Network Trust and Trust Behaviors among Executives in Supply Chain Interactions

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Forthcoming in *Management Science*

We integrate the results of a social network survey and a forecast information sharing experiment to examine the role of trust and trustworthiness in impacting high-ranking executives' decisions in supply chain interactions. The members of our executive sample have on average 17 years of work experience. A significant portion of them hold positions at the C-level in world-leading organizations that span a wide range of industries. By examining the roles of trust and trustworthiness in the decision making of high-ranking executives, we find strong external validation for as well as demonstrate how these nonpecuniary, behavioral factors impact the outcomes of business interactions. We employ a multi-method research design that allows us to investigate the extent to which the executives' trust *beliefs* toward a relevant network of exchange partners (which we define as their "network trust") impact their trust *behaviors* when engaging in business interactions with members of this network. We determine the conditions pertaining to the executives' professional experiences that strengthen or weaken the impact of network trust on the executives' trust behaviors in supply chain interactions. For example, executives with more diverse professional experiences rely more on network trust to shape their trust behaviors. Conversely, executives with prior positive trust experiences rely less on network trust in their trusting behaviors. We quantify that improved trust and trustworthiness can yield up to 41%, 6%, and 5% gain in the expected profit of the supplier, the retailer, and the supply chain. Our results offer tangible implications for how organizations can better leverage executives' knowledge about how much to rely on network trust in business interactions to achieve better outcomes.*

Keywords: trust, trustworthiness, belief, behavior, social network, network trust, executives, professional experiences, multi-method, behavioral operations, organizational behavior, experimental economics

History: This paper was first submitted in September 2016; revised in September 2018 and June 2019.

"I know who I can depend on, I know who to trust
I'm watching the roads, I'm studying the dust."

– Bob Dylan

1.   Introduction

Trust is an essential element in all aspects of life including economic transactions. A particularly relevant setting is that of a supply chain, in which interdependent companies with potentially conflicting

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incentives need to coordinate information and actions to satisfy customer demand. However, when and how much to trust are not easy decisions. A lack of trust or overoptimistic trust can both be detrimental. Consider as an example the well-known case of Barilla – an Italian pasta maker. Barilla's executives wanted to implement Vendor Managed Inventory (VMI) with its distributors to better meet demand while reducing inventory levels (Hammond 1994). VMI required the distributors to relinquish their inventory decisions (i.e., when and how much to replenish) to Barilla. The premise was that if Barilla had greater visibility to end consumer demand, then it could better plan production and manage inventory throughout its distribution network. These changes in turn would result in fewer stock outs and higher sales for both the distributors and Barilla. However, the distributors (such as Cortese) felt threatened to be cut out of the supply chain. In fact, Barilla's own salespeople negatively influenced procurement managers at the distributors not to trust Barilla for the proposed VMI process. Collectively, they created significant barriers to the VMI implementation.[1]

Consider, as another example, the interaction between IBM Global Storage Technologies (GST), now a unit within Western Digital, and Apple in early 2000s when Apple was about to launch the revolutionary iPod.[2] Apple intended to use IBM GST's microdrive (which also revolutionized the hard disk storage business) in its iPods. Focusing on a successful launch of the iPod, Apple's executives gave projected demand forecast that was five times the current capacity of IBM GST with no commitment to purchase. When IBM GST asked for some commitment, Apple instead offered to be a "strategic partner," again with no explicit commitment to buy. Given these ambitious forecasts, IBM GST had to decide whether or not to expand its microdrive capacity to fulfill the potential future demand of iPods, while bearing the risk of having excess capacity should the demand turn out to be low. IBM GST decided to expand its microdrive capacity by building a new factory in the Philippines and establishing agreements with suppliers in Asia. Shortly after IBM GST ramped up the mass production, Apple decided to drop the use of IBM's microdrive and instead announced that they would use Samsung's flash drives in the iPods. IBM GST never shipped a single unit of microdrive from the factory that was built to satisfy Apple's forecasts and lost over $50 million of investments. Although the IBM GST executives called the decision to build the factory a "leap of faith," they were not strangers to the Apple executives because executives from both firms were veterans and knew each other through the Silicon Valley high-technology industry network. In fact, the Apple executive in charge (i.e., executive vice president for world wide sales and operations at Apple) at that time was Tim Cook, who himself was an IBM executive prior to joining Apple.

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[1] The Barilla case is one of the most widely known management cases. It has been and is still being taught in almost all MBA programs since late 1990s.

[2] In 2003, IBM merged its Global Storage Technologies (GST) unit with Hitachi, and they founded Hitachi GST. The company was eventually sold to Western Digital in 2012. The example described here is based on personal communications with Apple and IBM executives who were then in charge of the partnership. Some of the issues were also leaked at the time to magazines such as The Mac Observer on May 16, 2004.

These and many other anecdotes demonstrate the challenges of trust in business settings. Motivated by these challenges, our main goals are (i) to examine whether and when executives' trust beliefs toward exchange partners impact the degree to which they trust each other in supply chain interactions, and (ii) to offer implications on how organizations can leverage trust for improved outcomes. To strengthen the external validity of our results, we study a sample of high-ranking executives. Our sample of executives have on average 17 years of work experience. They hold positions of general manager or higher, with nearly 40% of them at the C-level, including chief executive officers. The organizations they lead span a wide range of industries and are global leaders in the respective sectors. Among the private-sector organizations, 60 are Fortune 500 or S&P 500 companies or both, and they have an annual revenue of U.S.$984 million or higher (average U.S.$50.67 billion). At the time of this study, these executives had spent a year together and established relationships with each other during a 20-month executive MBA (EMBA) program at a university in the Northeastern United States.

Our specific research questions are, to what extent executives' trust *behaviors* in supply chain interactions depend on their trust *beliefs* toward the *network* of exchange partners, and further, how the executives' prior experiences may influence the strength of this dependency. We highlight that trust *belief* is distinct from trust *behavior*. Trust belief refers to an individual's psychological *perception* of how much he or she intends to trust others, whereas trust behavior refers to the extent of trust *actions* actually taken by an individual. While intuition may suggest that a positive correlation between trust belief and trust behavior should always exist, this intuition does not hold in general (see Glaeser et al. 2000, Ben-Ner and Halldorsson 2010, Yamagishi et al. 2015 for examples of mixed results). However, recent research has shown a link between trust belief and trust behavior *if* the two are measured with the same "target" and context (McEvily et al. 2012).

We particularly focus on an executive's *network* of exchange partners as an important target of trust. This network perspective on trust is instrumental to capture the reality that trust in business transcends organizational boundaries. In today's business world, individuals who represent firms are not static. It is common for managers in one firm to leave and join another firm in the same industry or context. In fact, many buyer firms hire former managers of supplier firms and vice versa. For example, Toyota often hires former employees of its suppliers to manage those same suppliers; similarly, firms hire former Internal Revenue Service agents to be their internal tax consultants.[3] Furthermore, industry conferences and trade associations purposely (and naturally) connect managers of different organizations. For example, chief procurement officers and senior supply chain managers from various companies get together in annual conferences such as that of the Institute for Supply Management; similarly, Salesforce.com organizes a constant stream of events that allow customer-facing managers and executives to share

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[3] We thank the department editor for pointing out these excellent examples.

experiences and learn from each other. As a result, a manager's professional network often permeates through organizational boundaries.
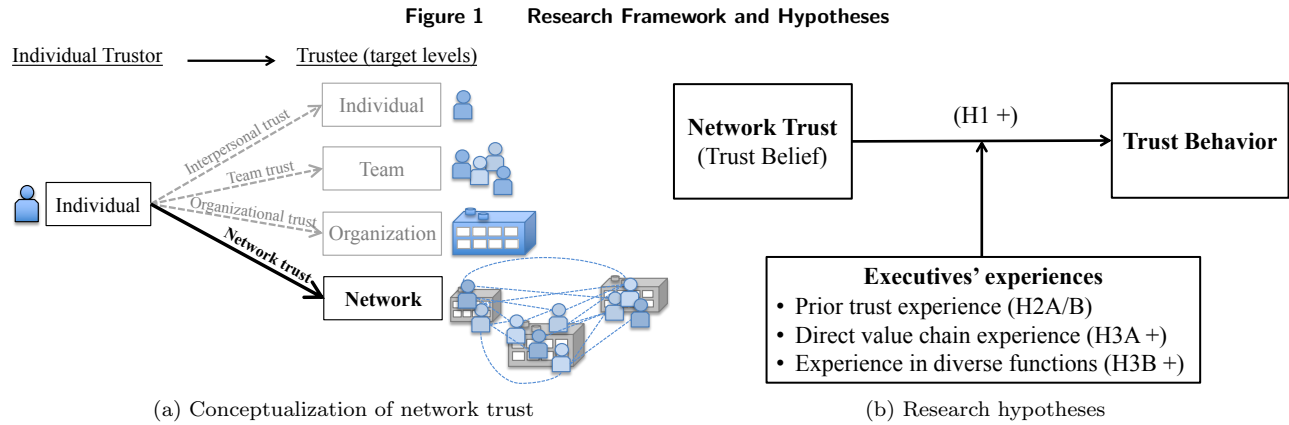
Due to such common personnel changes in organizations, the person who is the target of trust in a supply chain setting is often not fixed even for the same supplier–buyer relation. For example, an operations manager at Samsung may not always interact with the same procurement manager at BestBuy and vice versa. Therefore, one's perception of the "new" supply chain partner's trustworthiness must rely on other contextual information such as the organizational goals or social structures in which they are embedded (Zucker 1986, McKnight et al. 1998, Zaheer et al. 1998). Supply chain agents take actions as representatives of their respective organizations. Hence, they are guided by the prescribed responsibilities and incentives that come with their work roles. These responsibilities and incentives tend to stay constant even though the particular person occupying the role may change. As such, we contend that supply chain agents would likely develop trust beliefs toward the relevant group, or network, of business partners, based on information and interactions that are not confined to the current organizational boundaries. We define such individual-to-network level trust belief as "network trust." That is, network trust is an individual's psychological perception of how much he or she intends to trust members in a relevant network of exchange partners. These perceptions are often developed based on information or observed actions that signal the partners' trustworthiness. Hence, network trust entails important knowledge to inform the individual's trust behavior in related transactions with members of the network. According to the concept of "embeddedness" (Granovetter 1985), social relations generate trust that impacts economic behavior. Supply chain agents' network trust is thus shaped by the network of relationships to which they belong. Hence, we employ methods of social network survey and analysis in organizational studies to measure network trust with our executive sample.

To examine the executives' trust *behaviors* in a concrete business setting, we implement a supply chain decision experiment. The experiment focuses on one of the most fundamental and actively-studied research topics in supply chain management: demand forecast information sharing and inventory/capacity decisions under uncertainty. The aforementioned interaction between IBM GST and Apple is a good example. A key challenge in this context is incentive conflicts between the supply chain parties, e.g., while both IBM GST and Apple wanted to best satisfy future uncertain demand, IBM GST in addition bore the risk of excess capacity. Such incentive conflicts can lead to forecast manipulation by the informed party (e.g., a downstream retailer), and in turn, over-caution by the uninformed party (e.g., an upstream supplier) to disregard the information being communicated. Observations of such are prevalent across a range of industries, such as electronics, medical equipment, and commercial air-crafts, limiting the efficiency of the corresponding supply chains (e.g., Lee et al. 1997, Cohen et al. 2003, Özer and Wei 2006). To address such incentive conflicts, a group of researchers have shown in various settings how trust and trustworthiness between supply chain partners can mitigate these conflicts and

improve supply chain efficiency (e.g., Özer et al. 2011, 2014, 2018, Inderfurth et al. 2013, Spiliotopoulou et al. 2016, Beer et al. 2018, Scheele et al. 2018). In this paper, we advance this research by examining the extent to which executives rely on network trust to determine their trust behaviors when making information sharing and investment decisions as supply chain partners.

By employing a multi-method research design that integrates social network analysis in organizational studies and decision experiments in operations management, we make three key contributions. First, we conceptualize, define, and promote the notion of *network trust* – an individual's trust belief toward the relevant network of exchange partners – as an important perspective of trust in supply chain settings, and employ an egocentric network analysis approach to quantify network trust. In Figure 1a, we contrast network trust to the three levels of analyses examined in prior trust studies, i.e., trust at the individual-to-individual, individual-to-team, and individual-to-organization levels (see Fulmer and Gelfand 2012 for a comprehensive review). These three levels of analyses correspond to three different targets of trust – another individual, a team of individuals, or an organization. Our notion of network trust complements and extends this framework by examining an individual's trust belief toward a network of pertinent partners. First, this individual-to-network level trust belief is especially relevant in today's global businesses and given the technological developments that lead to a connected and mobile workforce. Personnel changes commonly occur in organizations and result in network of relations that span beyond organizational boundaries (as in the case of Apple executive Tim Cook who was a former employee of IBM). Second, we employ the egocentric network analysis approach that requires each focal person to evaluate his/her trust belief toward each and every member of the network. This approach is distinct from methods in prior research of team and organizational trust whereby trust belief toward a team or an organization is measured by considering the target (i.e., the team or organization) as a single entity. Measuring trust beliefs toward a collective as a single entity could introduce aggregation biases because the executives may "anchor" on only a subset of the network members in their evaluations. The egocentric network analysis approach we employ mitigates such biases and improves the precision of the resulting measurement of network trust (Blalock 1971, Stoker 2008).

Second, we determine to what extent the executives' professional experiences influence the impact of network trust on their trust behaviors in supply chain interactions. In doing so, we deepen our understanding of the link between trust beliefs and trust behaviors. Few scholars have explicitly examined this link (except for Glaeser et al. 2000, McEvily et al. 2012). Rather, organizational scholars mainly study trust as a "psychological state" (Rousseau et al. 1998) affecting other attitudes, intentions, or outcomes such as costs (Fulmer and Gelfand 2012), whereas economics and operations researchers study trust primarily as a decision or action (Camerer 2003, chapter 2 and Özer and Zheng 2017). It is thus important for both theory and practice to further investigate the link between trust beliefs and trust

Figure 1   Research Framework and Hypotheses

(a) Conceptualization of network trust   (b) Research hypotheses

behaviors, particularly at the network level – the target level that previous studies have not considered. Our results determine the conditions in which executives rely more or less on network trust to shape their trust behaviors. These conditions relate to the characteristics of the executives' professional experiences. In Figure 1b, we summarize the key dimensions of the executives' experiences we examine, namely, prior trust experience, direct value chain experience, and experience in diverse functions. As network trust captures an executive's knowledge about the partners' trustworthiness, those executives who rely more on network trust to guide trust behaviors are more judicious about when and how much they should trust. Therefore, identifying conditions that lead to a stronger or weaker reliance can offer valuable implications for organizations to leverage trust in a more cognizant manner. This way, organizations can both improve efficiency by utilizing trust (when they should) and avoid costly mistakes due to blind trust (when they should not trust).

Third, by examining the roles of trust and trustworthiness with our sample of executives who are managing some of the most influential organizations in their respective industries, we offer strong external validation that trust and trustworthiness indeed have a significant impact on costly business decisions. In doing so, we also shed some light on the role of trust in executives' decision-making process. Furthermore, since these executives had spent a year together and established relationships with each other, our study design also allows us to observe and quantify network trust among them and to determine the role of prior experiences in how an executive utilizes network trust in his or her business decisions.

2.   Research Hypotheses

Here we develop our hypotheses regarding whether and when executives' trust beliefs toward the relevant network of partners, i.e., their network trust, influence their trust behaviors in supply chain interactions. Before proceeding, it is important to first define and differentiate trust *belief* and trust *behavior*. Trust belief refers to an individual's psychological *perception* of how much he or she intends to trust others. This perception often stems from information or observed actions that signal the others' trustworthiness.

Based on a survey of a large body of research on trust across disciplines, Rousseau et al. (1998) define trust (belief) as "a psychological state comprising the *intention* to accept vulnerability based upon positive expectations of the intentions or behavior of another" (p. 395). Therefore, trust belief captures the degree to which an individual expects his or her partner to act in a caring and reliable way if they are to interact (McAllister 1995). Psychologists and sociologists primarily adopt surveys to study trust beliefs. By contrast, trust behavior refers to the extent of trust *actions* actually taken by an individual. Özer and Zheng (2018) define trust (behavior) as "to *behave* voluntarily in a way to accept vulnerability due to uncertain behavior of another, based upon the expectation of a positive outcome" (p. 494). Thus, trust behavior captures the degree to which an individual demonstrates trust for his or her partner by making costly decisions when they interact. Economists and operations researchers predominantly use decision experiments to study trust behaviors. We argue that it is important and necessary to explicitly define and differentiate trust along the belief and the behavior dimensions.

Trust belief and trust behavior are conceptually distinct. Yet, they may be linked only when the "target" of trust belief matches with the target of trust behavior (McEvily et al. 2012). This observation aligns with Ajzen and Fishbein (1977), who note that, "significant relations between attitudes and behavior are usually obtained when there is correspondence with respect to both the target and the action elements" (p. 892). Matching the targets of trust belief and trust behavior requires two parts. First, the two targets are the same. For example, "I *believe* my brother is trustworthy in keeping secrets, therefore I *tell* him my secrets." Alternatively, "I *believe* Company X is trustworthy in providing high-quality service, therefore I *do* business with its representatives." Second, the specific context in which we measure trust belief must be the same context in which we measure trust behavior. For example, "I rely and act on information from close family members, but in a business context, I tend to question information from salespeople." Experiences and perceptions vary in different contexts; e.g., trust beliefs toward family members often differ from trust beliefs toward business partners (World Values Survey 2015). Hence, trust beliefs elicited in a family context are unlikely to correlate with trust behaviors measured in a business context. Our goal is to investigate whether and when the executives' trust beliefs influence their trust behaviors in business exchanges. Therefore, we choose to focus on the executives' "network trust" – trust beliefs toward the relevant network of business partners (the target) – and business interactions (the context) in our analysis.

2.1. Relating Network Trust to Trust Behavior

A social network perspective on trust is especially important for supplier–retailer (or seller–buyer) transactions. As Granovetter (1985) stated, "continuing economic relations often become overlaid with social content that carries strong expectations of trust" (p. 490). This perspective examines patterns of relationships among people (or entities) and how these patterns influence individual perception and

action. These patterns of relationships are often called structures or "networks" (Granovetter 1985, Wasserman and Faust 1994).

Network trust – trust belief specifically toward the relevant network of exchange partners – provides a cue for how much to trust when interacting with people in that network. This logic is in line with previous research that shows an individual often uses his or her impression of entities related to a new target entity as cues to determine how much to trust the new target (McKnight et al. 1998, Stewart 2003). This cognitive process may be applied toward those targets whom the individual barely knows (McKnight et al. 1998). If an individual believes that she could trust her network because she perceives her network to have a certain level of trustworthiness, then she is likely to apply that perceived level of trustworthiness and the resulting trust belief to any one member of the network. This application of trust belief means that individuals rely on network trust *beliefs* to shape trust *behaviors* when interacting with any member of the network. That is, if network trust were high or low, one would behave more or less trustingly. Such reliance on network trust is likely due to the presence of uncertainty and conflicting incentives, which drive one's desire to be careful and judicious about the decision to trust. For instance, when encountering an unknown merchant on the Internet, potential buyers usually first check the merchant's reputation score or whether it is affiliated with a trusted source before deciding to purchase its products (Stewart 2003, Resnick et al. 2006).

In our context, we study the executives' trust beliefs toward their cohort members specifically. At the time of our study, the executives had already spent a year together in the EMBA program and had established relationships with one another. This history of interactions helps foster a social network within the cohort, and it provides the executives with valuable information about the (perceived) trustworthiness of their fellow cohort members to form trust beliefs (i.e., network trust). The cohort is a relevant social network because in our experiment, the executives interact with their cohort members as supplier and buyer of a supply chain. We propose that the executives, in an effort to be careful and judicious, will rely on network trust to determine how much to trust their exchange partners in their decisions (i.e., behaviors or actions). Hence, we hypothesize a positive relation between network trust and trust behaviors.

HYPOTHESIS 1. *The executives' network trust positively impacts their trust behaviors in supply chain interactions.*

The desire to be careful and judicious about how much to trust in situations with conflicting incentives is naturally influenced by a person's prior experiences. Trust scholars have proposed that trust relies on a trustor's knowledge of a trustee's intention or action to fulfill the expectations of trust. That knowledge depends on the specific context at hand and one's experience about the context (Hardin 2002, Özer and Zheng 2017). For example, how much we trust an unknown person depends on the situation in which

we encounter that person and/or whether we have had similar experiences with others. Therefore, how much the executives judiciously rely on network trust to shape their trust behaviors is likely influenced by their prior related experiences. We identify two categories of experiences relevant to our context – prior trust experiences with business partners, and professional experiences during the executives' career. We next develop hypotheses on how these experiences may influence the effect of network trust on the executives' trust behaviors.

2.2. The Role of Prior Trust Experiences

We first consider the executives' prior trust experiences with business professionals (outside of the EMBA cohort) with whom they have interacted in business exchanges. These experiences are relevant because they may precondition an executive's trust belief toward business partners in general. We define such trust belief as the executive's "preconditioned trust." Indeed, the experiential view of trust (Brehm and Rahn 1997, Hardin 2002) suggests that one's tendency to trust is formed through prior experiences. A person who has had positive relations with trustworthy partners in the past will have a greater tendency to trust in the future, even when dealing with new partners. That is, executives who have had more positive prior trust experiences with business partners are likely to develop higher preconditioned trust. Now the question is, how would the executives' preconditioned trust impact their reliance on network trust to shape their trust behaviors in current business exchanges?

We first note that preconditioned trust (belief) is a form of general trust (belief), which refers to "a belief in the benevolence of human nature in general" and "is not limited to particular objects [targets]" (Yamagishi and Yamagishi 1994, p. 139). Network trust, however, is specific to the interaction at hand and also has a specific target, i.e., individuals in a relevant network. Prior research on general trust suggests that having low general trust belief may positively or negatively influence one's trust belief toward a specific target. This literature studies trust *beliefs* and does not study or measure trust *behavior*. In contrast, we investigate how general and specific trust *beliefs* together interact to inform executives' trust *behaviors*. We postulate two possibilities regarding this interaction.

The first possibility is that the executives' preconditioned trust informs them to utilize network trust when general trust from prior experiences is lacking. Specifically, if the executives' prior trust experiences were negative, hence resulting in low preconditioned trust, then the executives would likely be cautious about trusting in the future. As a result, they would rely on their network trust – trust beliefs toward current exchange partners – to determine trust behaviors. Aligned with this reasoning, Zucker (1986) finds that as the U.S. society and economics transformed during the period of 1840–1920, trust toward society in general declined, while building local trust through setting standards (within business communities) became a solution. Likewise, Yamagishi and Yamagishi (1994) explain that due to low levels of general trust in Japan's institutions, Japanese individuals tend to rely on trust built within their close networks. Lazzarini et al. (2008) provide experimental evidence for the connection

between an individual's low general trust and high likelihood to maintain trust beliefs with established exchange partners. If individuals with low general trust places more value on specific trust beliefs, then it is likely that executives with low preconditioned trust would rely more on network trust to determine trust behaviors. We thus propose the following hypothesis.

HYPOTHESIS 2A. *The positive effect of network trust on the executives' trust behaviors in supply chain interactions is stronger when the executives' preconditioned trust is low.*

The second possibility is that the executives' preconditioned trust acts as a prerequisite for network trust to be useful. Executives with negative prior trust experiences (i.e., those with low preconditioned trust) could be biased toward these negative experiences. As a result, they generalize to all business exchanges that one cannot be too careful with his or her partners. Such executives would not trust in general, and network trust would not be relevant. The idea of general trust belief serving as a condition for specific trust beliefs to be relevant is discussed among political scientists who examine the relation between the decline of general trust (in the U.S.) and one's low trust in others in the community (Putnam 2000, Uslaner and Brown 2005). Conversely, we posit that executives with positive prior trust experiences (i.e., those with high preconditioned trust) would appreciate the value of trust in specific relationships. Consistent with this reasoning, Nee et al. (2018) find that, among a sample of Chinese entrepreneurs, those who maintain more personal and cooperative exchange relationships are also those who have high general trust. Similarly, Andersson (2012) uses the General Social Survey data to show that individuals who are generally trusting and optimistic have a stronger inclination to build social relationships with people around them. If individuals with high general trust places more value on specific trust, then it stands to reason that executives with high preconditioned trust are likely to rely more on network trust to determine trust *behaviors*. We thus propose the following competing hypothesis.

HYPOTHESIS 2B. *The positive effect of network trust on the executives' trust behaviors in supply chain interactions is stronger when the executives' preconditioned trust is high.*

2.3. The Role of Prior Work Experiences

The executives' prior work experiences can expose them to various levels of volatility, conflicting incentives, and complexity in business interactions. These experiences influence the executives' perception of uncertainty in how future business partners may behave (Milliken 1987). Due to conflicting incentives in the exchange relationship, trusting the partner would likely incur costs to the focal person, and being trustworthy would often not be in the best (economic) interest of the person possessing the information. These conflicts give rise to the perception of uncertainty about the partner potentially taking advantage of a focal person (Özer and Zheng 2018). Awareness of such conflicts and the associated complexity is more salient to those who have prior relevant (complex) experiences.

When aware of complexity and thus facing uncertainty, individuals tend to cognitively reduce complexity by relying on heuristics (Kahneman and Tversky 1972). We suggest network trust as a type of heuristic, in the sense that an individual applies his or her trust belief toward a network of potential partners to any one member in that network. Similarly, management scholars propose that when faced with uncertainty, even perceived uncertainty, individuals become motivated to reduce it (Mullin and Hogg 1999). An important way for individuals to reduce (perceived) uncertainty involves two parts: (i) to identify with a contextually relevant group and (ii) to behave in a manner that is in line with their perception of the group and the resulting belief toward the group (Hogg and Terry 2000, Hogg 2007). Mapping (i) to our context, a salient relevant group is the EMBA cohort to which the executives belong, because the executives interact with members of this group in the experiment. Part (ii) means that the executives' trust behaviors will be guided by their network trust, i.e., trust beliefs toward the cohort members. Given that the executives have substantial and different work experiences, they may vary in the degree to which they perceive uncertainty of their partners' behavior in business interactions. If an executive perceives a high level of uncertainty in the business partners' behavior, it is likely that he or she would rely on network trust as both a heuristic and an uncertainty-reducing tool to decide how much to trust in the interactions. The higher the perceived uncertainty, the more he or she would rely on network trust.

What aspects of prior work experiences give the executives substantially different exposure to volatility, conflicting incentives, and business complexity? We postulate that two aspects are important: experiences in direct value chain functions and experiences in diverse functions. Following standard business function categories (Porter 1985), we define direct value chain functions to be those involving activities that directly add value to customers. They include logistics, operations, marketing and sales, and customer service. Conversely, non-direct value chain functions include general administration, human resources management, finance and accounting, information technology, and facility management. Executives who have worked in direct value chain functions (versus those who have not) are more exposed to the volatility and complexity of meeting customer demands, as well as the conflicting incentives often observed across firms in a supply chain. These executives also better recognize the challenge that it is often not possible to align all incentives with formal contracts that stipulate actions for every possible contingency.[4] Hence, uncertainty about the partners' behavior inherently always exists. As such, executives are likely to rely on network trust as a heuristic to reduce uncertainty and determine trust behaviors. We thus construct the following hypothesis.

HYPOTHESIS 3A. *The positive effect of network trust on the executives' trust behaviors in supply chain interactions is stronger when the executives have direct value chain experiences.*

[4] The challenge that no contract can stipulate actions for every possible contingency is the motivation behind the extensive literature on incomplete contracts (Hart and Moore 1990, Tirole 1999).

By the same token, executives who have worked in a diverse set of functions (versus just one specific function) are also more aware of conflicting incentives and the inherent complexity of resolving them, since they have had the opportunity to experience the issues from different perspectives. Taking perspective from another's point of view is an important skill in negotiations and other strategic interactions because it helps the individual to find a balance between conflicting incentives (Galinsky et al. 2008). Discussed earlier, network trust as a heuristic entails taking the perspective of a contextually relevant set of other individuals (i.e., potential exchange partners). Therefore, relying on network trust can help to achieve the desired balance. Our experiment involves decisions of information sharing and procurement in a supplier–retailer exchange. These decisions are complex due to the presence of conflicting incentives between the exchange partners (Simchi-Levi et al. 2007, Zipkin 2012). Executives with experiences in diverse functions are likely more aware of this complexity and the resulting challenge for developing trust with their exchange partners. As such, these executives likely believe a balance can be found by relying more on network trust to shape trust behaviors. The above reasoning leads us to make the following hypothesis.

HYPOTHESIS 3B. *The positive effect of network trust on the executives' trust behaviors in supply chain interactions is stronger when the executives have more diverse professional experiences.*

3.   Research Methods

To examine our hypotheses, we discuss next how we measure the executives' trust beliefs, professional experiences, and trust behaviors. We first note a few important characteristics of our executive sample and its relevance to our research. Our sample of executives have on average 17 years of work experience. They hold positions of general manager or higher; nearly 40% have the title of president, chief executive officer, vice president, or director. The organizations they lead span government agencies, non-profits, and private-sector industries including automotive, banking, biotechnology, consulting, electronics, entertainment, food & beverage, healthcare, industrial products, insurance, oil & gas, software, telecommunications, and utilities. The majority of these organizations are global leaders in their respective sectors. For example, among the private-sector organizations, 60 are Fortune 500 or S&P 500 companies or both, and they have an annual revenue of U.S.\$984 million or higher (average U.S.\$50.67 billion). In their everyday work, these executives must consider financial objectives, such as profitability and increasing shareholder value, to exercise administrative and managerial control and execute decisions in their respective organizations. Since these executives are accustomed to operating with this mindset, they will likely be financially driven while participating in our study. By verifying the roles of trust and trustworthiness among a population so highly conscious of financial goals, we can provide strong external confirmation of the extent to which these nonpecuniary, behavioral factors influence business outcomes. In addition, since top executives are leaders of an organization and set

normative behavior for management, studying when and how they leverage trust in critical decision making is highly relevant. Finally, the executive sample is organized by the EMBA program office into four cohorts, with each cohort containing between 56 and 62 students. Each cohort naturally defines the boundary of a network on which we can focus our investigation.

In particular, to measure the executives' trust beliefs (both their network trust and preconditioned trust), we conduct a social network survey with the executives. To characterize the executives' professional experiences, we utilize biographical data from the EMBA program office and supplement it with the executives' LinkedIn profile data. To measure the executives' trust behaviors, we use the forecast information sharing game (Özer et al. 2011, 2014, Beil et al. 2018). We collected data from two EMBA classes, with two cohorts in each class. We followed the same procedure to conduct the survey and the experiment at around the same time for both classes; i.e., when the executives had spent a year together in the program. We verify with Wilcoxon rank sum tests that the key variables in our analysis do not differ significantly between the two classes. In what follows, we elaborate on the design and measurements in each part.

3.1. Trust Beliefs and the Social Network Survey

We examine two types of trust belief in this paper: *network trust* which captures the executives' trust beliefs toward the relevant network of exchange partners (i.e., their cohort), and *preconditioned trust* which captures the executives' trust beliefs toward business professionals formed through their prior trust experiences. To measure these trust beliefs, we use previously-validated survey questions. In particular, we adapt McAllister's (1995) Managerial Interpersonal Trust instrument to our context. Among the many trust survey instruments developed in various sociology and social psychology studies, McAllister's instrument is the most relevant to our study for two reasons. First, the survey was developed using a participant and context similar to ours; i.e., inviting executive-level managers to evaluate their trust beliefs toward similar-level managers in a business context. Second, in a comprehensive review of trust measurements, McEvily and Tortoriello (2011) find that McAllister's instrument is among the most reliably replicated approaches for eliciting trust beliefs.

McAllister's (1995) survey instrument measures trust beliefs in two dimensions: affect and cognition. Affect-based trust belief describes a person's tendency to trust based on emotional ties and interpersonal care and concern. The more a person believes that his or her partners genuinely care about himself or herself, the more likely the person would trust them (Clark and Mills 1979, Lewis and Weigert 1985, Clark et al. 1986, Organ 1988). Cognition-based trust belief describes a person's tendency to trust based on his or her belief in the reliability and competence of the partners to fulfill their responsibilities or roles (Lindskold 1978, Cook and Wall 1980, Granovetter 1985).

McAllister's survey contains eleven questions in total, with five and six questions measuring affect-based and cognition-based trust beliefs, respectively. We include in our survey two questions for each

dimension that consistently have the highest factor loadings in both McAllister's and subsequent replication studies (e.g., Chua et al. 2008, Dunn et al. 2012).[5] The chosen questions involve evaluating four statements with respect to the target of trust: (i) "I felt comfortable to freely share my most outlandish ideas and hopes with them." (ii) "If I shared my problems with them, I know they would respond constructively and caringly." (iii) "I believe that they approach their jobs with professionalism and dedication." (iv) "Given their track records, I see no reason to doubt their competence and preparation for our work." Statements (i) and (ii) measure affect-based trust belief, while statements (iii) and (iv) measure cognition-based trust belief.

To minimize possible spillover or priming effects, we administered the social network survey (using the Qualtrics software) two weeks prior to the forecast information sharing game. At the time the executives completed the survey, they had no knowledge of the game they would play in two weeks. We established a two-week gap between the survey and the game for two reasons. First, the survey should be administered at a time that is reasonably close to when the game is played, as network trust is built over time. Measuring the executives' network trust too early would not capture the trust belief that one had gradually developed toward his or her cohort members by the time of the game. Second, because the executives were working full-time throughout the EMBA program and only returned to campus for classes every two weeks, a two-week separation also accommodated this logistical constraint. To minimize social desirability biases, we assured the executives that their responses would be kept confidential and blinded to the authors and their fellow classmates. Confidentiality and blindedness were achieved by asking a graduate student not involved in the current research to replace each executive's name in the raw data with a randomly assigned numeric ID, before the data was analyzed by the authors.

We also provided the executives with strong intrinsic motivation (knowledge and learning) to complete the survey carefully. A few weeks before issuing the survey, we gave an educational presentation about social network research and the practical implications for organizations. We then introduced the opportunity for them to take the survey about their cohorts and promised we would present to them insights from the survey results (e.g., the structure of their social networks).[6] We design the survey to take about 20 to 25 minutes for an executive to complete. A total of 108 (out of 113) executives from the first class and 106 (out of 123) executives from the second class completed all questions in the survey (96% and 86% completion rates). These completion rates are well above the threshold for reliably calculating network measures (Wasserman and Faust 1994, Kossinets 2006), as discussed next.

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[5] Factor loadings are produced by factor analysis and measure the degree to which survey questions are associated with the underlying unobservable constructs. A higher factor loading represents a stronger association. Factor loadings are commonly used by sociologists and psychologists as key indicators of the quality of a survey instrument (Kim and Meuller 1978).

[6] There was strong evidence that our presentation had successfully motivated the executives to complete the survey and treat it seriously. For example, in the debriefing session after both the survey and the experiment were completed, the executives had shown a very high level of engagement in learning about the results. In fact, a number of the executives had asked if we could conduct a similar social network survey within their respective organizations.

3.1.1. Measuring network trust. We apply McAllister's instrument with an egocentric network analysis approach (Wasserman and Faust 1994) to measure the executives' network trust. In particular, we asked each executive to imagine that he or she were doing business with each member of his or her EMBA cohort. For each cohort member, the executive was asked to indicate how much he or she would agree with statements (i) and (iii) above if they were doing business together. Each executive stated his or her agreement scores for all cohort members in a roster in which the cohort members had been randomly ordered. The executives indicated their agreement with each statement for every cohort member on a seven-point Likert scale, with 1 meaning "strongly disagree," 4 meaning "neutral," and 7 meaning "strongly agree."[7] We use only statement (i) for the affect dimension and (iii) for the cognition dimension to measure network trust for two reasons. First, as each cohort in our sample had 56 – 62 executives, an executive had to respond to each statement 55 – 61 times. We use only one statement in each dimension to limit the length of the survey and the response burden on the executives, thus ensuring the quality of the responses. Using a single question to measure a variable of interest is common in social network research provided that the question has previously been validated (e.g., Marsden 1990, Borgatti and Cross 2003). Second, the two chosen questions consistently have the top factor loading in their respective dimension in both the original and subsequent replication studies.

We adopt the concept of structural centrality in social network analysis (Freeman 1979, Bonacich 1987) to quantify each executive's network trust. Structural centrality captures the degree to which an individual is "in the thick of things" or most active in a given network (Freeman 1979, p. 219). Relating to trust beliefs, the more structurally central an individual is, the more people in the network the individual believes to be trustworthy and thus intends to trust. Such an individual is more likely to generalize his or her trust belief toward all members of the network. To determine the structural centrality of each executive in the cohort network, we follow Bonacich's (1987) approach to account for both direct and indirect ties in the network. That is, an executive's structural centrality depends on both the degree to which the executive trusts his or her cohort members and the degree to which those trusted members trust others. The more an executive trusts his or her direct ties, and the more those directly-trusted people also trust their direct ties, the higher the executive's network trust.

Specifically, let s_{ij} be executive i's score toward executive j in a dimension (affect or cognition); i.e., s_{ij} is an integer between 1 and 7. We define the adjusted score $s'_{ij} = 0$ if $s_{ij} \leq 4$ and $s'_{ij} = s_{ij} - 4$ if $s_{ij} > 4$. We treat scores of 1 to 4 as 0 because, scores 1–3 mean the executives "strongly disagree to somewhat disagree" with the trust belief statements, and score 4 means the executive is neutral about the statements. Conversely, we subtract the neutral score 4 from 5–7 to eliminate the jump in score

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[7] Executives in the first class evaluated statement (i) and then statement (iii). For executives in the second class, the order of the two statements were randomized. We do not observe any statistical differences in the distributions of the network trust measures obtained between the two ordering scenarios.

from being neutral to having some trust belief, and to differentiate the strength of positive trust belief from one executive to another.[8] Given s'_{ij}, the executives' network trust is defined by the following system of equations (Bonacich 1987):

$$\mathrm{NT}_i = \sum_{j \neq i} (\alpha + \beta \mathrm{NT}_j) s'_{ij}, \quad \text{for all } i, j \in \{1, 2, \ldots, N\}, \tag{1}$$

where NT_i is executive i's network trust, N is the total number of executives in a cohort, α is a scaling factor that multiplies all NT_i's to prevent them from growing unboundedly large with the size of the network, and $\beta \in (0, 1)$ captures the effect of indirect ties on executive i's network trust.[9] In social network analysis, β is typically chosen by the researcher depending on the research context. In our setting, a β value of 0 means that an executive's network trust depends only on his or her direct ties. Conversely, a β value of 1 means that both direct and indirect ties influence an executive's network trust with equal strength. We choose β to be strictly between 0 and 1 because (i) prior research has shown that both direct and indirect ties influence a person's belief about others' trustworthiness (McEvily et al. 2003, Ferrin et al. 2006); and (ii) direct experience has a stronger influence on a person's trust belief than indirect evidence does (Paruchuri 2010). Some researchers have found that results based on different β values are highly consistent with each other (Shipilov et al. 2011).[10]

We utilize a commonly-used software for social network analysis, UCINET, to compute the executives' network trust. The values α and β are automatically determined for each cohort by UCINET's algorithm (Borgatti et al. 2002).[11] A higher value of NT_i implies that executive i has a higher trust belief toward his or her cohort members in the associated dimension. Analogously, we also measure how much a focal executive is perceived to be trustworthy by his or her cohort members in both the affect and cognition dimensions. We call this measure the executive's *network trustworthiness*. This measure is defined in a similar way as Equation (1), with s'_{ij} replaced by s'_{ji}. In other words, how much an executive is perceived to be trustworthy by the network depends on both the degree to which cohort members perceive the executive to be trustworthy and the degree to which others perceive those members to be trustworthy. We use NTW_i to denote executive i's network trustworthiness, with a higher value indicating that the executive is perceived to be more trustworthy by his or her cohort members in the associated dimension.

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[8] Since social network analysis has its foundation in graph theory, network measures are traditionally calculated based on binary variables that indicate the presence or absence of ties (or edges) between actors (or nodes) within the network (Wasserman and Faust 1994, Ferrin et al. 2006). More recently, researchers have begun to use social network methods to study sentiments and perceptions in those ties. Along this line, we use social network analysis to examine trust beliefs within the executives' cohort. To better capture the potentially continuous level of such beliefs, we adapt the binary approach to semi-dichotomize the executives' original scores. In §4.5, we conduct robustness analyses where we use the traditional binary approach or the original 7-point scores to calculate the executives' network trust measures and obtain the same results.

[9] In matrix form, the vector of the executives' network trust $\mathbf{NT}$ can be calculated as $\mathbf{NT} = \alpha(\mathbf{I} - \beta\mathbf{S})^{-1}\mathbf{S}\mathbf{1}$, where $\mathbf{I}$ is the identity matrix, $\mathbf{S}$ is the matrix of the adjusted scores s'_{ij}, and $\mathbf{1}$ is a column vector of ones.

[10] We repeat our analysis with $\beta = 0$ and obtain identical results as in §4.

[11] Specifically, β is set to be slightly smaller than the reciprocal of the largest eigenvalue of $\mathbf{S}$, the matrix of s'_{ij}; and α is selected such that $\sum_i \mathrm{NT}_i^2 = N^2$.

3.1.2. Measuring preconditioned trust. To measure the executives' preconditioned trust, we asked the following question: "Consider your typical experience of interacting with people outside your organization in the past 3 years of your work, how much do you agree or disagree with the following statements?" The executives were then asked to evaluate on a seven-point scale each of the four statements (i) – (iv) discussed earlier. To quantify each executive's preconditioned trust, we first confirm his or her responses to the two statements in each dimension are consistent with each other by measuring the associated Cronbach's α values. Provided that the responses are consistent, we then adjust the original seven-point scores in the same way as in the calculation of the network trust measure. That is, we treat scores of 1–4 as 0 and subtract the neutral score 4 from 5–7. Finally, we take the average of the adjusted scores for both statements in each dimension as the executive's affect-based and cognition-based preconditioned trust measure (e.g., Chua et al. 2008). A higher average score indicates a higher level of preconditioned trust in the corresponding dimension.[12]

3.2. Professional Experiences and Biographical Data

To characterize the executives' professional experiences, we utilize the executives' biographical data provided by the EMBA program office and their employment history obtained from their LinkedIn profiles. All but three executives have a complete LinkedIn profile; those three executives are removed from our analysis. A research assistant and one of the authors separately coded the biographical variables, and the results were cross-checked for consistency. For the few coding discrepancies, two of the authors discussed together to resolve them. We characterize two aspects of the executives' professional experiences as discussed in §2.3: experience in direct value chain functions and the diversity of their professional experiences. We measure an executive's direct value chain experience by the number of years during the executive's career in which he or she worked in a direct value chain function. In addition, we measure an executive's professional experience diversity by the average number of years (relative to the total length of career) that the executive spent in each functional role. Note that this measure is inversely related to diversity; i.e., the longer the executive spent in each function on average, the less diverse is his or her professional experience.

3.3. Trust Behaviors and the Forecast Information Sharing Game

The forecast information sharing game involves interactions between a supplier (he) and a retailer (she) in a two-tier supply chain. The supplier produces a product at a unit cost c and sells to the retailer at a unit wholesale price w. The retailer sells the product to the market at a unit retail price r. The market demand for the product is expressed as $D = X + Y$. The variable X represents the private forecast information observed by the retailer but not by the supplier. The supplier only knows that X is

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[12] We perform a robustness analysis in which we only use the executives' responses to statement (i) to quantify their preconditioned affect trust and their responses to statement (iii) to quantify their preconditioned cognition trust, as we do for network trust. We observe the same results as discussed in §4.2.2.

uniformly distributed on $[X_L, X_H]$. The variable Y represents the market uncertainty. Both the supplier and the retailer only know that Y is a zero-mean random variable uniformly distributed on $[Y_L, Y_H]$. The game proceeds as follows. First, the retailer observes her private forecast information X and submits a forecast report $\hat{X}$ to the supplier. Second, the supplier observes $\hat{X}$ (but not X), determines the production quantity Q, and makes a costly investment of cQ. Third, the market uncertainty Y, hence demand D, is realized, and the retailer sells $S = \min(D, Q)$ because the supplier can only deliver up to the available inventory Q. Finally, the supplier's and retailer's profits (resp., $wS - cQ$ and $(r - w)S$) are realized. Note that the retailer does not share any overage risk of excess inventory with the supplier; i.e., if demand D is lower than the produced quantity Q, then the cost of excess inventory, $c(Q - S)$, is fully borne by the supplier. However, the retailer is subject to the underage risk of missing demand; i.e., she would miss $(r - w)(D - Q)$ in profit if production quantity Q is less than demand D. Therefore, the retailer has an incentive to inflate her forecast in the report. Accordingly, the supplier may not consider the report to be truthful, but instead, discount the report when making the production decision. We refer the reader to Özer et al. (2011) for a formal description and analysis of this game.

Table 1 summarizes our experimental treatments and the number of executives who participated in each treatment from each class. The factor that we vary across treatments is the length of interactions between the supply chain partners (single versus repeated interactions). Varying this factor allows us to disentangle spontaneous trust and trustworthiness that form without any prospect for future interactions from the trust and trustworthiness that emerge in a long-term relationship. This distinction helps us understand how the impacts of trust and trustworthiness on decisions differ in new business relationships versus established ones. In all treatments, we take $r = 140$, $w = 100$, $c = 80$, X and Y uniformly distributed on $[100, 400]$ and $[-75, 75]$, respectively. These parameters correspond to a setting in which the supplier incurs a substantial production cost (hence a high cost of excess inventory), and the supply chain faces considerable demand uncertainty. The high production cost makes the supplier particularly vulnerable to potential manipulation in the retailer's report. The large demand uncertainty gives the retailer a strong incentive to inflate her report. Taken together, it is most striking to observe trust and trustworthiness to arise in such a setting (Snijders and Keren 1999, Malhotra 2004, Özer et al. 2011). Thus, it is also most insightful to examine the degree to which network trust plays a role in shaping executives' trust behaviors in this setting.[13]

All treatments were conducted during an action-learning lecture of operations management. The executives were randomly assigned to one of the treatments such that interactions were restricted to members of the same cohort (i.e., the executives never interacted with a partner outside of their own

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[13] We were also able to conduct a treatment with a low production cost ($c = 20$) and single interactions with 20 executives from Class A (13 rounds). Our results remain unchanged when including this treatment in our analysis. We have chosen to omit this treatment in our discussions due to its smaller sample size and per the request of the review team.

Table 1 **Experimental Design**

Treatment (length of interactions)	No. of participants	No. of rounds	Class[†]
Single interactions	24	13	A
Single interactions	20	10	B
Repeated interactions	26	10	A
Repeated interactions	28	8	B

Notes. In all treatments, $r = 140$, $w = 100$, $c = 80$, X and Y are uniformly distributed on $[100, 400]$ and $[-75, 75]$. The number of participants summarized here represents the sample size in our final analysis after filtering out those executives who did not participate in either the survey or the experiment and those who did not have a complete LinkedIn profile.
†: We use A and B to denote the two different EMBA classes to ensure confidentiality.

cohort). The executives were informed of this fact. Each executive participated in only one treatment (i.e., we used a between-subject design). Half of the executives in each treatment were randomly assigned the role of retailers while the other half were assigned the role of suppliers. The participants were separated into two classrooms according to their role. Each executive played the same role in all rounds of the experiment. For the single-interaction treatments, the executives were informed that they would be randomly and anonymously matched with a new partner within their cohort in each round. For the repeated-interaction treatment, they were informed that they would have the same anonymous partner from their cohort in all rounds. To ensure that the executives had a good understanding of the game, they were required to read the instructions, answer a series of practice questions, and turn in their answers before they played the game. We offered monetary incentives to the executives to motivate careful decision making during the experiment; the executives' final earnings were proportional to their experimental profits. On average they earned \$55, with individual earnings ranging from a minimum of $-\$61$ to a maximum of \$96.[14] The experiment lasted on average for 70 minutes.

Measuring trust and trustworthy behaviors. First, the retailer's trustworthy behavior is measured by her average forecast inflation, $\overline{(\hat{X} - X)}$. A fully trustworthy retailer shares her forecast truthfully, thus $\overline{(\hat{X} - X)} = 0$. Higher forecast inflation values imply less trustworthy behavior, because they indicate that the retailer is deviating more from the actual forecast in hope of inducing higher production from the supplier. Second, the supplier's trust behavior is measured by the difference between the supplier's production decision and the optimal production decision if the supplier believes that the retailer's report is equal to the actual forecast. That is, the supplier's trust behavior is measured by his average production deviation, $\overline{(Q - Q^*_{\text{Full Trust}})}$, where $Q^*_{\text{Full Trust}} = \hat{X} + ((w-c)/w)(Y_H - Y_L) + Y_L$.[15] Recall from our earlier discussion that the retailer has an incentive to inflate her forecast. Therefore, if the supplier is not fully trusting, he would discount the report before making his production decision.

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[14] In total, six executives earned a negative experimental profit and did not receive any payment. We verify that our results remain valid after excluding the data from these executives in our analysis. Since the executives participated in the experiment during their time at school, the opportunity cost of occupying their time is likely to be low. The payment in this study was scaled to be three times as high as that offered to the U.S. participants in Özer et al. (2014). Although this does not reflect the income ratio between executives and undergraduate/graduate students perfectly, there is no evidence that our executive participants were careless or overly generous in the experiment. For example, the postexperiment discussion was characterized by a high level of engagement, ambition, and careful reasoning. See Bolton et al. (2012) for a discussion addressing similar scaling between manager and student payments.

[15] $Q^*_{\text{Full Trust}}$ is the supplier's optimal production (newsvendor) decision when the only uncertainty is due to Y.

As a result, Q would be smaller than $Q^*_{\text{Full Trust}}$ on average. The less trusting the supplier, the more he would discount the report. Thus, a lower value of $(\overline{Q - Q^*_{\text{Full Trust}}})$ indicates less trusting behavior.

4. Survey and Experimental Results

In this section, we first present the summary statistics on the executives' trust beliefs, professional experiences, and trust behaviors. We then examine the research hypotheses outlined in §2 and quantify the economic impact of trust. Finally, we discuss a number of robustness analyses.

4.1. Summary Statistics: Executives' Trust Beliefs, Professional Experiences, and Trust Behaviors

We first examine the executives' *trust beliefs*. Table 2 presents the summary statistics of the executives' network trust, network trustworthiness, and preconditioned trust. Recall from §3.1.2 that we measure the executives' preconditioned trust by asking them to evaluate two statements in each dimension (affect and cognition). The Cronbach's α value of the executives' responses to the two statements in either dimension is 0.83, indicating high consistency (Kline 2000). Hence, we use the average responses to the two statements in each dimension to measure the executives' preconditioned trust.

Table 2   Summary Statistics: Executives' Network Trust, Network Trustworthiness, and Preconditioned Trust

							Correlation Matrix				
Item	Mean	Median	Std. Dev.	CV	Min	Max	NT-Cognition	NTW-Affect	NTW-Cognition	PT-Affect	PT-Cognition
NT-Affect	0.96	0.94	0.48	0.50	0.07	1.99	0.39***	0.01	−0.01	0.13	0.08
NT-Cognition	1.05	1.10	0.22	0.21	0.33	1.34		0.22**	0.14	0.03	0.16
NTW-Affect	0.99	1.00	0.17	0.17	0.57	1.46			0.57***	0.06	0.08
NTW-Cognition	1.00	1.01	0.08	0.08	0.61	1.21				0.03	0.27**
PT-Affect	1.07	1	0.94	0.88	0	3					0.48***
PT-Cognition	1.86	2	0.90	0.48	0	3					

Notes. "Std. Dev." stands for standard deviation. "CV" stands for coefficient of variation. "NT/NTW/PT" stands for the executives' network trust, network trustworthiness, and preconditioned trust in either the "Affect" or the "Cognition" dimension. ***: $p < 0.01$; **: $p < 0.05$; *: $p < 0.10$; p values are from significance tests on the correlation coefficients.

We highlight four observations. First, for either network trust or preconditioned trust, there exists a higher variation among the executives in the affect dimension than in the cognition dimension. The lower variations in the executives' cognition-based trust beliefs may reflect their recognition that their cohort members, as well as the business partners in their work experiences are professionally and intellectually homogeneous. Second, we examine the correlation between the affect and cognition dimensions for each of network trust, network trustworthiness, and preconditioned trust. We observe significantly positive correlations between the two dimensions. This result shows that affect and cognition are two interrelated dimensions of trust beliefs. Third, we observe very little correlation between network trust and preconditioned trust in either dimension. The limited correlations imply that network trust and preconditioned trust capture the executives' trust beliefs toward distinct targets (i.e., the EMBA cohort versus business professionals outside of the cohort). Finally, in either the affect or the cognition dimension, we do not observe significant correlation between network trust and network trustworthiness. This

result suggests that those executives who intend to trust the cohort members are not necessarily perceived by those members to be trustworthy or not. We demonstrate this result with two network graphs in Figure 2.

Figure 2a illustrates the executives' affect-based network trust in one of the cohorts. Each node in Figure 2a represents an executive. The 5-digit codes next to the nodes are the ID numbers assigned randomly to the executives to anonymize them in our data. A directed edge from node i to node j exists only when executive i has given executive j a score above 4. The size of a node indicates the magnitude of the associated executive's network trust, with a larger node representing higher network trust. The nodes are positioned such that executives with higher network trust are closer to the center of the graph; as one goes from the center toward the periphery, network trust of the executives decreases. Accompanying the network trust graph is the network trustworthiness graph for the same cohort, Figure 2b. In this second figure, all of the nodes are placed in the exact same positions as in Figure 2a; however, the node size represents the network trustworthiness of the corresponding executive. Reviewing both figures, we can see that there is a substantial amount of network trust and trustworthiness within the cohort, yet there also exist considerable variations in both measures across different executives. In addition, we observe that the sizes of the nodes between the two graphs do not necessarily align. Consider for example executive 81097 (highlighted by a red square). This executive is represented by a large node (i.e., high network trust) in Figure 2a but a small node (i.e., low network trustworthiness) in Figure 2b. Our results suggest that trust and trustworthiness are related but distinct constructs that do not always align with each other (e.g., Hardin 2002, Ashraf et al. 2006, Özer and Zheng 2017).

We next summarize the descriptive statistics of the executives' professional experiences and demographics in Table 3. Observe that our executives have on average worked in direct value chain functions for 6.5 years (35% of the time in their career), with a minimum of 0 and a maximum of 33 years. At the time of our study, 54% of them were working in a direct value chain function. Regarding professional experience diversity, they have on average worked in 3 different functions, with a range of 1–6 functions across the sample. Correspondingly, the average number of years they spent in each function are 9 years, with a range of 2–21 years. These variations in our executive sample allow us to examine how their professional experiences influence the effect of network trust on their trust behaviors.

Turning to the executives' *trust behaviors*, Table 4 presents the summary statistics regarding the executives' decisions in the forecast information sharing game and measures of their trust and trustworthy behaviors. As an example, Figure 3 presents the executives' decisions against their observed information for the single-interaction treatment. We highlight two observations. First, in all treatments, the correlations between the retailers' forecasts and their reports, and the correlations between the retailers' reports and the suppliers' production quantities are all significantly positive ($p < 0.01$). Hence, the retailers' reports are informative (Figure 3 left graph), and the suppliers rely on the reports

Figure 2　　Illustration of Affect-Based Network Trust and Trustworthiness in an EMBA Cohort
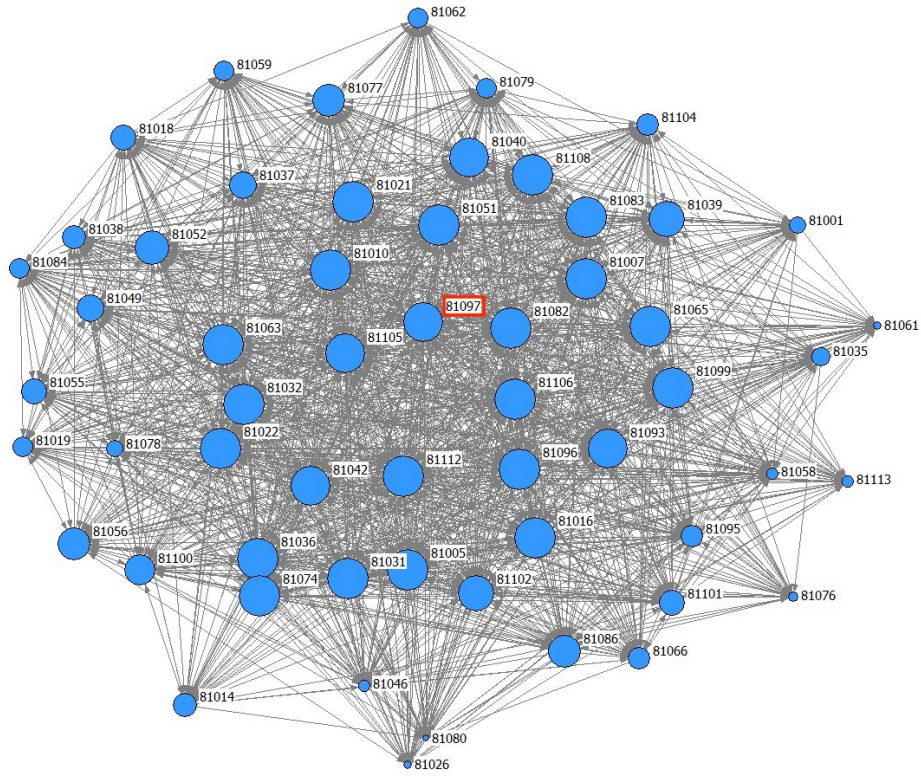
(a) Network trust (the maximum value in this cohort is $NT_{81036} = 1.81$; the minimum value is $NT_{81061} = 0.08$)
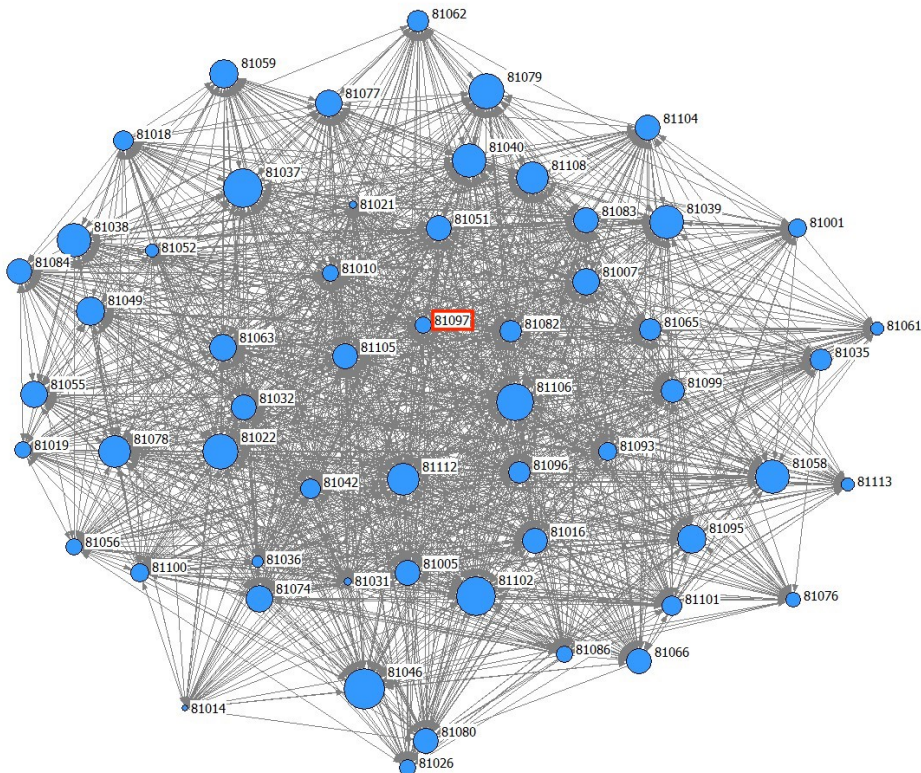
(b) Network trustworthiness (the maximum value in this cohort is $NTW_{81046} = 1.37$; the minimum value is $NTW_{81014} = 0.68$)

Table 3   Descriptive Statistics of the Executives' Demographic and Professional Characteristics

Continuous variables	Mean	Median	Std. Dev.	Min	Max	Binary variables (yes = 1, no = 0)	Proportion of executives
Age (years)	41	40	6.72	30	60	Female	31%
Work experience (years)	17	16	6.10	8	40	Having Int'l work experience	42%
Annual revenue of Org. (in million \$)†	13,623	336	32,444	0.12	196,633	C-level or higher†	37%
						Private Org.†	58%
# years in direct VC	6.52	4.25	7.21	0	32.77	Direct VC position†	54%
% career in direct VC	0.35	0.24	0.36	0	1	Consumer-facing Org.†	41%
Avg. tenure per Fxn.	8.82	9.08	4.58	1.79	21.38	Master's or higher degree	42%
# Fxn.'s worked	2.68	2.5	1.05	1	6	Eng. major	39%

Notes. "Std. Dev.," "Org.," "Fxn.," "Int'l," and "Eng.," stand for standard deviation, organization, function, international, and engineering. We consider a position with the title of chief officer, director, vice president, or president to be C-level or higher.
†: These variables are based on the executive's most recent position and organization at the time of the study.

to some extent when making their production decisions (Figure 3 right graph). Second, in all treatments, the average inflation, $\overline{(\hat{X} - X)}$, is significantly positive, and the average production deviation, $\overline{(Q - Q^*_{\text{Full Trust}})}$, is significantly negative (Wilcoxon rank sum test, $p < 0.01$). Thus, we observe partial trust and trustworthy behaviors as in prior studies (Özer et al. 2011, 2014, Scheele et al. 2018, Beil et al. 2018; again see Figure 3), even with high-ranking executives who have extensive business experiences. A further comparison of the executives' behaviors with those of college students in prior studies reveal that executives tend to be more cognizant about (i) how much to trust depending on the potential vulnerability of trusting, and (ii) how trustworthy to be (or how much to manipulate information) depending on the potential externalities of manipulation. See Appendix A for more details.

Table 4   Summary Statistics of Game Behavior: Mean [Median] (Standard Deviation)

| Treatment	Decisions and correlations				Trustworthy and trust behaviors	
	$\hat{X}$	$\text{Corr}(\hat{X}, X)$	Q	$\text{Corr}(Q, \hat{X})$	$\overline{(\hat{X} - X)}$	$\overline{(Q - Q^*_{\text{Full Trust}})}$
Single interactions	282 [295] (86)	0.70	225 [215] (85)	0.61	33 [21] (66)	-46 [-39] (76)
Repeated interactions	276 [280] (90)	0.78	237 [237] (88)	0.71	25 [6] (60)	-32 [-19] (67)

Notes. "Corr" stands for correlation. All correlations are significant with $p < 0.01$.

4.2.   When Does Network Trust Impact Trust Behaviors in Supply Chain Interactions?

We now focus on the executives' decisions as suppliers in the forecast information sharing game to examine our research hypotheses outlined in §2. In all of the regression models, we control for the executives' gender, years of work experience, whether or not he or she was working in a private organization, in a consumer-facing industry, had international work experience, majored in engineering, and had a master's or higher degree. The coefficients for these demographic and background variables are mostly not statistically significant. Hence, they are omitted in the regression results tables.

4.2.1.   H1: Does network trust impact trust behaviors?   We first examine whether the executives' network trust impact their trust behaviors in the forecast information sharing game (i.e., Hypothesis 1). To do so, we estimate two random-effects regression models as summarized in Table 5.[16] The

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[16] Because our participants make decisions over multiple rounds, we use random-effects models to accommodate repeated measures in our data (e.g., Montmarquette et al. 2004, Özer et al. 2011). In addition, we verify that the demographic and biographical
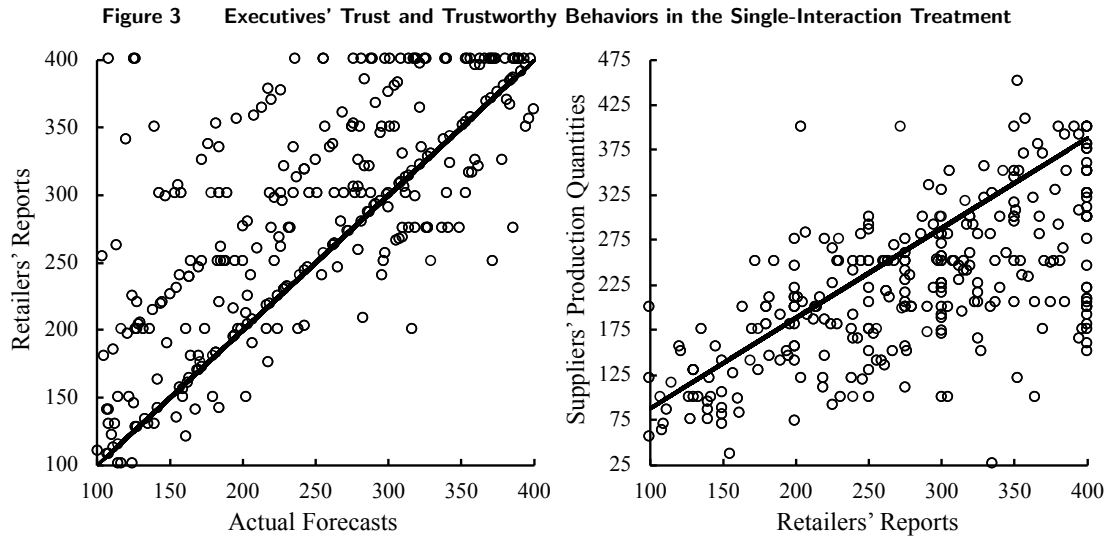
Figure 3   Executives' Trust and Trustworthy Behaviors in the Single-Interaction Treatment

Note. The left graph shows the retailers' reports given their privately-observed forecast information; the solid line in this graph is the 45 degree line. The right graph shows the suppliers' production decisions given the reports from their retailers; the solid line in this graph is $Q^*_{\text{Full Trust}}$ given the retailers' reports. Each circle is an observation from the experiment.

dependent variable for both models is the executives' trust behavior measured by $(Q - Q^*_{\text{Full Trust}})$. The independent variables are listed in the first column of Table 5. The 0–1 dummy variable I_R is equal to 1 for a repeated-interaction treatment. We estimate the regressions with the affect-based network trust (Model (N1)) or cognition-based network trust (Model (N2)) separately because these two dimensions are significantly correlated with each other (see Table 2). We observe from Table 5 that both dimensions of network trust have significantly positive coefficients. That is, executives with higher network trust (in either dimension) demonstrate more trusting behaviors in the game, supporting Hypothesis 1.

Table 5   Executives' Trust Behaviors $(Q - Q^*_{\text{Full Trust}})$: Effect of Network Trust

	Value (standard error)	
Variable	Model (N1)	Model (N2)
Intercept	45.84 (29.78)	-36.07 (41.27)
$\hat{X}$	-0.35 (0.03)***	-0.35 (0.03)***
t	-0.86 (0.73)	-0.83 (0.73)
I_R	19.92 (12.10)*	31.40 (12.55)***
NT-Affect	43.96 (14.92)***	–
NT-Cognition	–	101.66 (27.21)***
Log likelihood	-2797.69	-2795.48
AIC	5623.39	5618.95
BIC	5682.83	5678.40

Notes. "–" means the variable is not present in the regression.
***: $p < 0.01$; **: $p < 0.05$; *: $p < 0.1$; p values are derived from t tests.

4.2.2.   H2: The role of preconditioned trust. We next investigate how preconditioned trust may influence the effect of network trust on the executives' trust behaviors; i.e., Hypotheses 2A and 2B. To do so, we estimate four random-effects models as presented in Table 6. In each of these models,

characteristics of the executives across the different treatments are not significantly different (Wilcoxon rank sum tests on continuous variables and χ^2 tests on proportions for comparing all variables listed in Table 3 across treatments, $p > 0.1$). Thus, analyzing all data in a pooled regression is appropriate.

we include the executives' network trust measure (NT-Affect or NT-Cognition), their preconditioned trust measure (PT-Affect or PT-Cognition), and the interaction between the two. We observe that the coefficients of the network trust measures are significantly positive, while the interaction terms are negative though nonsignificant. The negative interaction suggests that the effect of network trust on trust behavior may diminish with higher preconditioned affect trust. To investigate this possibility, we use the delta method to estimate the statistical significance of the total coefficient for network trust (i.e., the sum of the coefficients for network trust and the interaction term) evaluated at different values of the executives' preconditioned trust. The detailed results are summarized in Appendix B, Table A.2. We observe that the total coefficient for network trust is statistically significant when the preconditioned trust measure is below 2 for all four models. Conversely, it is not statistically significant when the preconditioned trust measure is at 2.5 or above in three of the four models. Hence, we find supporting evidence for Hypothesis 2A instead of Hypothesis 2B. That is, within our data, when the executives' preconditioned trust is low, they require the presence of high network trust to justify more trusting behaviors in the forecast sharing game.

Table 6　　Executives' Trust Behaviors ($Q - Q^*_{\text{Full Trust}}$): Interaction between Network Trust and Preconditioned Trust

	Value (standard error)			
	PT-Affect		PT-Cognition	
Variable	Model (P1)	Model (P2)	Model (P3)	Model (P4)
Intercept	21.27 (35.52)	-59.96 (54.78)	3.38 (47.22)	-91.50 (75.23)
$\hat{X}$	-0.35 (0.03)***	-0.35 (0.03)***	-0.35 (0.03)***	-0.35 (0.03)***
t	-0.86 (0.73)	-0.83 (0.73)	-0.86 (0.73)	-0.83 (0.73)
I_R	21.64 (11.99)**	31.12 (12.75)***	18.87 (12.01)*	32.04 (12.73)***
NT-Affect	63.30 (22.18)***	–	72.85 (31.31)**	–
NT-Cognition	–	121.13 (42.55)***	–	152.83 (65.53)**
PT-Affect	18.15 (13.92)*	23.96 (36.02)	–	–
PT-Cognition	–	–	20.24 (16.23)	31.95 (35.23)
Interaction†	-15.00 (13.22)	-17.47 (33.65)	-15.83 (14.88)	-28.57 (32.53)
Log likelihood	-2796.84	-2794.94	-2796.88	-2795.05
AIC	5625.67	5621.88	5625.77	5622.11
BIC	5693.61	5689.82	5693.71	5690.04

Notes. "–" means the variable is not present in the regression.
†: This variable represents the interaction term between network trust and preconditioned trust in the model.
***: $p < 0.01$; **: $p < 0.05$; *: $p < 0.1$; p values are derived from t tests.

4.2.3. H3: The role of prior work experiences. Here we examine how the executives' prior work experiences influence the effect of network trust on their trust behaviors. In particular, we consider their experiences in direct value chain functions and the diversity of their experiences (i.e., Hypotheses 3A and 3B). Recall from §3.2 that we measure an executive's direct value chain experiences by $T_{\text{Direct VC}}$, the number of years during which he or she was in a direct value chain function. In addition, we measure the diversity of an executive's professional experiences by T_{Fxn}, the average number of years that the executive spent in each functional role. We examine how these variables may influence the effect of network trust on the executives' trust behaviors. Table 7 presents the random-effects regression results.

Table 7   Executives' Trust Behaviors ($Q - Q^*_{\text{Full Trust}}$): Interaction between Network Trust and Prior Work Experiences

	Value (standard error)	
Variable	Model (E1)	Model (E2)
Intercept	-79.94 (41.58)*	-184.47 (69.34)***
$\hat{X}$	-0.32 (0.03)***	-0.32 (0.03)***
t	-0.65 (0.73)	-0.57 (0.73)
I_R	22.23 (11.37)**	51.81 (13.71)***
NT-Affect	124.18 (29.86)***	–
NT-Cognition	–	232.33 (60.74)***
$T_{\text{Direct VC}}$	-5.96 (2.57)**	-2.89 (4.86)
T_{Fxn}	14.19 (3.81)***	15.87 (5.26)***
Interaction† (NT $\times T_{\text{Direct VC}}$)	5.21 (2.16)**	4.37 (4.40)
Interaction† (NT $\times T_{\text{Fxn}}$)	-12.51 (3.27)***	-15.55 (5.13)***
Log likelihood	-2590.86	-2590.64
AIC	5217.72	5217.29
BIC	5292.96	5292.53

Notes. "–" means the variable is not present in the regression.
†: This variable represents the interaction term between the experience variable and the network trust variable in the model.
***: $p < 0.01$; **: $p < 0.05$; *: $p < 0.1$; p values are derived from t tests.

First, we observe that the interaction term between network trust and $T_{\text{Direct VC}}$ is significantly positive for the affect dimension and positive though nonsignificant for the cognition dimension. That is, executives who have worked longer in direct value chain functions rely more on their network affect trust to decide when to behave trustingly. Hence, we find support for Hypothesis 3A with respect to network affect trust. Second, we observe that the interaction term between network trust and T_{Fxn} is significantly negative for both affect and cognition dimensions. A shorter average tenure per functional role indicates a more diverse experience. Therefore, our results support Hypothesis 3B. That is, the effect of network trust on trust behaviors is strengthened for executives who have a more diverse professional experience.

4.3.   The Executives' Trustworthy Behaviors

We now examine whether network trustworthiness impacts the executives' trustworthy behaviors as retailers in the forecast information sharing game. Table 8 summarizes the regression results. The dependent variable in both models is the retailers' trustworthy behaviors, inversely measured by forecast inflation ($\hat{X} - X$). A positive coefficient means larger inflation, i.e., less trustworthy behavior. We observe that the executives' network trustworthiness in either dimension has no significant effect on their trustworthy behaviors in the game. This lack of correlation suggests that a person's tendency to be truthful or to lie is largely influenced by contextual factors. Therefore, it is difficult for (perceived) trustworthiness from others' beliefs to transfer to trustworthy actions, especially when temptation of economic gains from deception is strong. Our results to some extent align with prior experimental results showing that deception behaviors can be easily varied by changing the magnitude of benefits and externalities from deception (Gneezy 2005, Erat and Gneezy 2012).

4.4.   The Economic Impacts of Trust and Trustworthiness

Here we quantify the impacts of trust and trustworthy behaviors on the suppliers', retailers', and supply chain's profits, as well as on supply chain efficiency within our experimental data. Since the actual

Table 8   Executives' Trustworthy Behaviors ($\hat{X} - X$): Effects of Network Trustworthiness

Variable	Value (standard error)	
	Model (R1)	Model (R2)
Intercept	64.96 (44.59)	131.23 (75.45)*
X	-0.25 (0.02)***	-0.25 (0.02)***
t	0.68 (0.62)	0.68 (0.62)
I_R	-9.85 (11.54)	-8.63 (11.32)
NTW-Affect	-6.65 (33.72)	–
NTW-Cognition	–	-71.29 (68.88)
Log likelihood	-2665.30	-2664.77
AIC	5358.59	5357.55
BIC	5417.79	5416.75

Notes. "–" means the variable is not present in the regression.***: $p < 0.01$; *: $p < 0.10$; p values are derived from t tests.

profits earned in each round depend on the realized value of the market uncertainty Y, we analyze the *expected* profits of the supplier, the retailer, and the supply chain given the supplier's actual production decision Q to achieve a fairer comparison. Specifically, the supplier's expected profit given Q is $\Pi^S(Q) = w\mathbb{E}_Y \min\{X+Y, Q\} - cQ$,[17] the retailer's expected profit given Q is $\Pi^R(Q) = (r-w)\mathbb{E}_Y \min\{X+Y, Q\}$, and the supply chain's expected profit given Q is the sum of these two terms. In addition, we compute supply chain efficiency as the ratio $E^{SC} = [r\mathbb{E}_Y \min\{X+Y, Q\} - cQ] / [r\mathbb{E}_Y \min\{X+Y, Q^c\} - cQ^c] \times 100\%$, where $Q^c = X + ((r-c)/r)(Y_H - Y_L) + Y_L$ is the centralized firm's optimal production decision.

We estimate a set of random-effects regression models as presented in Table 9. The key variables of interest are the suppliers' Trust behaviors (measured by $(Q - Q^*_{\text{Full Trust}})$), the retailers' Trustworthiness behaviors (measured by $(X - \hat{X})$), and their interaction, Trust $\times$ Trustworthiness. Note that both Trust and Trustworthiness are negative with partial trust and trustworthiness, and they are equal to zero at full trust and trustworthiness. We also interact these terms with the treatment dummy for the repeated-interaction treatment, I_R, to examine possible treatment differences in the economic impacts of trust and trustworthiness.

Table 9   The Impacts of Trust and Trustworthy Behaviors on Expected Profits

Variable	Value (standard error)			
	Supplier's Profit	Retailer's Profit	Supply Chain Profit	Supply Chain Efficiency
Intercept	-2132.79 (410.57)***	-2325.82 (161.31)***	-4425.90 (574.80)***	69.41 (7.36)***
X	17.26 (1.25)***	39.12 (0.49)***	56.16 (1.75)***	0.04 (0.02)*
t	47.48 (29.24)	20.68 (11.28)*	66.47 (40.93)	0.21 (0.53)
I_R	280.19 (258.45)	59.68 (99.44)	392.26 (361.83)	3.55 (4.53)
Trust	-18.46 (2.11)***	24.99 (0.79)***	6.16 (2.95)**	-0.11 (0.04)***
Trustworthiness	31.18 (2.21)***	-19.38 (0.89)***	11.65 (3.09)***	0.35 (0.04)***
Trust $\times$ Trustworthiness	0.07 (0.02)***	0.03 (0.01)***	0.10 (0.03)***	0.001 (0.0003)***
$I_R \times$ Trust	11.84 (3.10)***	4.87 (1.23)***	16.58 (4.35)***	0.20 (0.06)***
$I_R \times$ Trustworthiness	-1.04 (3.26)	-0.73 (1.28)	-1.45 (4.56)	-0.12 (0.06)**
$I_R \times$ Trust $\times$ Trustworthiness	0.13 (0.04)***	0.06 (0.01)***	0.19 (0.05)***	0.002 (0.0006)***
Log likelihood	-4672.01	-4332.20	-4845.63	-2600.32
AIC	9368.03	8688.39	9715.26	5224.64
BIC	9418.98	8739.74	9766.22	5275.60

Notes. Trust $= Q - Q^*_{\text{Full Trust}}$, Trustworthiness $= X - \hat{X}$. ***: $p < 0.01$; **: $p < 0.05$; *: $p < 0.1$; p values are derived from t tests.

We first consider the supplier's expected profit (column 2 of Table 9). The positive coefficient for Trustworthiness means that the supplier significantly benefits from the retailer's trustworthiness. In

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[17] The symbol $\mathbb{E}_Y$ denotes taking expectation over all possible values of Y.

addition, while being more trusting by itself hurts the supplier given the average level of forecast inflation in the game, two factors mitigate this negative impact. The first factor is when the partners engage in repeated interactions, as can be seen from the significantly positive coefficient for $I_R \times$ Trust. Second, the positive coefficient for Trust $\times$ Trustworthiness implies that, as the retailer becomes more trustworthy (i.e., Trustworthiness gets less negative and closer to zero), being more trusting is less costly for the supplier. This mitigating effect is again stronger under repeated interactions (see the significantly positive coefficient for $I_R \times$ Trust $\times$ Trustworthiness).

The results regarding the retailer's expected profit (column 3 of Table 9) are very much in line with those for the supplier's profit. First, the supplier's trust significantly benefits the retailer (i.e., the coefficient for Trust is significantly positive). While being more trustworthy per se given the average level of trust in the game is not beneficial, we again observe a significantly positive interaction between Trust and Trustworthiness (and an even stronger positive interaction under repeated interactions). That is, the negative impact of being more trustworthy is mitigated as the supplier becomes more trusting, and repeated interactions further strengthen this mitigation.

Finally, we turn to the supply chain's expected profit and efficiency (columns 4 and 5 of Table 9). Both trust and trustworthiness significantly improve the supply chain's expected profit, and repeated interactions further elevate the positive impact of trust on supply chain profit (see the significantly positive coefficients for Trust, Trustworthiness, and $I_R \times$ Trust). Regarding supply chain efficiency, having a more trustworthy retailer always leads to significantly higher efficiency. This is likely because the retailer's trustworthiness induces more effective information sharing. Conversely, the supplier being more trusting per se (given the average level of forecast inflation) under single interactions hurts efficiency. Interestingly, this result is reversed under repeated interactions. In this case, having a more trusting supplier indeed enhances supply chain efficiency (the sum of the coefficients for Trust and $I_R \times$ Trust is significantly positive; linear hypothesis test, $p < 0.05$).

The observed significant effects correspond to substantial economic values of trust and trustworthiness. Given the average values of Trust and Trustworthiness in each treatment, we quantify the profit gains in a supply chain with full trust and trustworthiness versus a supply chain with the average level of distrust and forecast inflation in our data. Specifically, we estimate that for the single- and repeated-interactions treatments respectively, the supplier's expected profit gain is 41% and 24%; the retailer's expected profit gain is 6% and 4%; and the expected profit gain for the supply chain is 4% and 5%.

Finally, we also examine how much expected profit gains may result from the observed level of trust and trustworthy behaviors in our data as compared to the fully noncooperative benchmark of no trust nor trustworthiness at all. To do so, we compute the percentage profit difference in the expected profits of the supplier, the retailer, and the supply chain between the observed quantity decisions and the optimal quantity decision under the standard model (Özer et al. 2011). Taking average over all observations, we

quantify the following expected profit differences in comparison with the no-trust, no-trustworthiness benchmark. First, the supplier's expected profit is hurt by 11% in the single-interaction treatment, however, it is increased by 54% in the repeated-interactions treatment. Second, the retailer's expected profit increases by 29% and 37% in the single- and repeated-interactions treatments respectively. Third, the supply chain overall benefits from an expected profit gain of 29% and 37% in the single- and repeated-interactions treatments. These results provide additional evidence for the significant economic values of trust and trustworthiness in the supply chain.

4.5. Robustness Analyses

We perform a number of additional analyses to demonstrate the robustness of our results. First, we examine whether the executives' "inherent" trust beyond a professional setting plays a role in impacting their trust behaviors. To measure inherent trust, we added four questions based on the most widely-used instrument for eliciting general trust (Yamagishi and Yamagishi 1994, Yamagishi et al. 2015, World Values Survey 2015, General Social Survey 2016) in the survey with the second EMBA class. Specifically, the executives were asked to state on a seven-point scale how much they agree or disagree with each of the following statements: "Generally speaking, most people can be trusted"; "Generally speaking, you cannot be too careful when dealing with people"; "Most people are basically good natured and kind"; "Most people are basically honest." The Cronbach's α value of the executives' responses to these statements is 0.77. Thus, we take the average score across all four statements (reverse-coded for the second statement) as an executive's general trust score. We then reestimate the regression models shown in Table 5 using only the data from the second class, with the addition of the executives' general trust as an independent variable. We observe the same results as discussed in §4.2.1 and the coefficient for the general trust measure is not statistically significant (Table A.3). Therefore, we do not find evidence in our data that the executives' inherent trust beyond a professional setting has any impact on their trust behaviors in the game.

Our second analysis considers an alternative approach to elicit network trust. Specifically, we added a new question in the survey with the second class that asked the executives to evaluate the same trust belief statements while considering their cohort as a single entity (in contrast to the egocentric approach of evaluating these statements for each cohort member one-by-one). The order between this new "aggregate-level" question and the original egocentric questions was randomized across different executives. We take the executives' responses to the new question as their aggregate-level measures of network affect and cognition trust. We then reestimate the models in Table 5 using only the data from the second class, either replacing our original network trust measures with the aggregate-level measures or including the aggregate-level measures as additional independent variables. We observe the same results as in Table 5, and the coefficients for the aggregate-level measures are not statistically significant (Table A.4). This analysis confirms the importance of using the egocentric network analysis approach

to correctly quantify network trust as discussed in §1. That is, the above aggregate-level approach hurts the precision of the measurement because it may lead the executives to anchor on or bias toward only a subset of cohort members in their evaluations.

Lastly, recall from §3.1.1 that we adjust the executives original scores to the trust belief statements by considering scores of 1–4 as 0 and scores of 5–7 as 1–3. One can consider two alternatives: (i) use the original scores to calculate the executives' network trust; (ii) use a dichotomizing approach where all scores below or equal to 4 are treated as 0, and all scores above 4 are treated as 1. This latter approach is commonly employed by organizational scholars (Cross and Cummings 2004, Ferrin et al. 2006). We reestimate the models in Table 5 with the executives' network trust being calculated based on these two alternative methods and obtain the same results (Table A.5).

5.   Discussion and Conclusions

In this paper, we employ a multi-method research design to study the roles of trust and trustworthiness in shaping high-ranking executives' business decisions. Our executives have on average 17 years of work experience, and a significant portion of them hold C-level positions at world-leading organizations. Conducting *both* a social network survey *and* a supply chain decision experiment among such a sample of individuals is unique and requires substantial efforts. By examining the roles of trust and trustworthiness with this sample, we offer strong external validation that these behavioral factors indeed have a significant impact on costly business decisions and the efficiency of supply chain interactions. Based on our experimental data, we quantify that improved trust and trustworthiness can yield significant economic impacts for the supply chain. Specifically, compared to the average level of distrust and forecast inflation in our data, a fully trusting and trustworthy supply chain can gain up to 5% in expected profit, with the supplier and the retailer gaining up to 41% and 6% in their respective expected profits. Equally importantly, we demonstrate that executives are cognizant of when and how much to rely on trust and trustworthiness in business decisions.

In particular, we examine the extent to which the executives' network trust *beliefs*, elicited through a social network survey, impact their trust *behaviors*, observed in a forecast information sharing game in which they interacted with members of their cohort. We define "network trust" as the executives' trust beliefs toward a contextually relevant social network, i.e., the network of pertinent partners in supply chain exchanges. The network of relationships (that exist in network trust) are not confined to a single pair of organizations, but rather, encompass executives representing the network of relationships beyond their organization affiliations. This network perspective on trust is instrumental to capture the reality that trust in business transcends organizational boundaries. Our study design is unique and opportune in that we measure the executives' trust beliefs toward their EMBA cohort members with whom the executives had a year to interact and establish relationships, thus operationalizing network trust.

We show that the executives' network trust significantly and positively impacts their trust behaviors in supply chain interactions. In addition, we identify conditions pertaining to the executives' professional experiences that strengthen or weaken this relationship. In doing so, we deepen our understanding of the link between trust beliefs and trust behaviors – particularly at the network level, the target level that previous studies have not considered. Specifically, executives with lower preconditioned trust (i.e., those with negative prior trust experiences), those with direct value chain experiences, and those with more diverse professional experiences are significantly more reliant on network trust to determine their trust behaviors in business transactions. We postulate that these experiences educate the executives to be more judicious about how much to trust in business interactions by utilizing relevant knowledge about their partners (i.e., the knowledge that inheres in network trust, for example, their partners' perceived trustworthiness). In addition to these experience variables, we observe two additional biographical factors that also influence the extent to which executives use network trust to shape their trust behaviors. In particular, female executives rely more on network trust to inform their trust behaviors, whereas executives who have worked and lived internationally rely less on network trust but in general show higher trust in their behaviors (Appendix D).

From a management standpoint, we show that executives are cognizant of how much to rely on network trust, and their professional experiences play an important role in shaping this capability. Several business cases have shown that organizations benefit from properly utilizing trust. However, many other cases have also shown that organizations suffer substantial profit losses due to imprudent trust beliefs and behaviors. Thus, when and how organizations should build and leverage trust with their partners remains a critical challenge. Our research addresses this challenge and informs organizations on how they could leverage executives' capability of making judicious trusting decisions for improved outcomes, and further, how they could help executives to develop this capability in their careers. For example, if an impending transaction involves executives and managers with low preconditioned trust, then organizations should be more proactive to enhance trust beliefs within the relevant network because the executives are likely to exert trusting actions (when profitable to do so) only if the local network trust is sufficiently high. This implication applies to highly competitive industries (e.g., consumer electronics) where preconditioned trust may be generally low. It also applies when companies in developed countries initiate business relationships with ones in less developed countries where institutions are less mature and not conducive for preconditioned trust to develop. Aligned with this insight, Toyota and other keiretsu organizations started the practice of placing former employees into its network of suppliers soon after the country's institutions crumbled after World War II. This approach helped the companies to sustain trusting and collaborative relationships with their suppliers through strong network trust, when generalized (preconditioned) trust were at an all-time low. Conversely, if preconditioned trust tends to be high in certain industries (e.g., highly regulated ones) or countries, then a focus on building network trust may not be necessary.

Let us now revisit the cases discussed in §1, starting with the Barilla case. The company might have encountered less resistance to implementing VMI had it consciously cultivated trust within the relevant network of relationships (e.g., the group of Barilla sales agents and sourcing managers at the distributors). Turning to the failed transaction between Apple and IBM GST, perhaps IBM executives in charge of the talks had relied too much on their interpersonal trust with Tim Cook, who was the Apple executive in charge but also a former IBM executive. Our research suggests that the IBM GST executive in charge of the final decision could have benefited from reflecting on his experiences with the network of supply chain and procurement executives within Apple as well as across the relevant high-tech suppliers and manufactures who worked with Apple, i.e., his network trust, to inform his trusting behavior/decisions. In addition, the IBM GST executive in charge at that time had a finance background and had given more decision weights to executives from finance and business development. Had he paid more attention to the inputs from executives with direct value chain experiences, such as the supply chain executives, or from those with more diverse professional experiences, perhaps IBM would have been more wary about taking the leap of faith and could have prevented a costly mistake. This is because executives with direct value chain and/or more diverse professional experiences tend to be more judicious about when and how much to trust in business transactions. We remark, however, that our discussion is not about proving or concluding that IBM GST made a mistake by taking a trusting action. Perhaps it was a sound and calculated decision to signal IBM GST's trustworthiness to Apple, who was competing with IBM PC at the time, and to establish a sourcing line for other Apple products (see Özer and Zheng 2018 for additional discussions on this case). Nevertheless, our research underscores how judicious use of network trust, and its interaction with prior experiences can impact important business decisions.

Finally, our research demonstrates another important reason that supports firms' practice of rotating managers across different functional roles. The most commonly-cited reason for this practice is to increase employees' knowledge and interest in the organization. We show that in addition, rotating managers across different functional roles, and particularly engaging them in direct value chain functions during their career can help to train them on leveraging relevant knowledge to judiciously decide when and how much to trust in business interactions. Therefore, before placing executives in critical decision-making positions, organizations should specifically consider whether prospective executives have had such experiences. Similarly, they should provide opportunities for mid-career managers – at least for those who are vetted to become top executives – to obtain these experiences.

From a research standpoint, we introduce a social network perspective into the study of trust in supply chain settings. This approach demonstrates the relevance and importance of an individual-to-network level of analysis and complements prior trust studies that have focused on interpersonal, team, or organizational trust (see Figure 1 in §1). Our multi-method research design also facilitates

the integration and further advancement of our knowledge of trust. In addition, by studying a sample of high-ranking executives making decisions in a concrete business context, we further strengthen the implications of our conclusions to managerial decision-making in practice. As discussed earlier, trust varies across targets and contexts. We thus encourage management scholars to embrace and leverage the richness of their research contexts to continue to generate new insights about the role of trust in business decisions. Furthermore, the cumulative data also allows us to compare and determine when experienced participants demonstrate similar or different behaviors versus nonexperienced participants such as college students. Within our context, we observe that similar to college students, executives also exhibit a continuum of trust and trustworthy behaviors in supply chain interactions. Nevertheless, we also identify differences; e.g., executives are more cautious about how much to trust when the vulnerability of trusting is high. Such comparisons can help researchers better understand the boundary of their research outcomes with respect to experiences in the relevant contexts. Given the similarities between manager/executive behaviors and student behaviors observed in our study and others, we support that students represent a useful population sample for behavioral research in the operations, supply chain, and management fields, especially given their accessibility and the lower costs involved.

To conclude, we hope that our work will stimulate further cross-disciplinary research to deepen our understanding of how organizations can benefit from cognizant development and use of trust and trustworthiness to establish mutually beneficial business relationships.

References

Ajzen I, Fishbein M (1977) Attitude-behavior relations: A theoretical analysis and review of empirical research. *Psychological Bulletin* 84(5):888–918.

Andersson M (2012) Dispositional optimism and the emergence of social network diversity. *Sociological Quarterly* 53(1):92–115.

Ashraf N, Bohnet I, Piankov N (2006) Decomposing trust and trustworthiness. *Experimental Economics* 9(3):193–208.

Beer R, Ahn H, Leider S (2018) Can trustworthiness in a supply chain be signaled? *Management Science* 64(9):3974–3994.

Beil D, Leider S, Li J (2018) Team decision making in operations management, working paper, University of Michigan, Ann Arbor, MI.

Ben-Ner A, Halldorsson F (2010) Trusting and trustworthiness: What are they, how to measure them, and what affects them. *Journal of Economic Psychology* 31(1):64–79.

Blalock H (1971) Aggregation and measurement error. *Social Forces* 50(2):151–165.

Bolton G, Ockenfels A, Thonemann U (2012) Managers and students as newsvendors. *Management Science* 58(12):2225–2233.

Bonacich P (1987) Power and centrality: A family of measures. *American Journal of Sociology* 92(5):1170–1182.

Borgatti S, Cross R (2003) A relational view of information seeking and learning in social networks. *Management Science* 49(4):432–445.

Borgatti S, Everett M, Freeman L (2002) UCINET VI User Manual, analytic Technologies, Columbia, SC.

Brehm J, Rahn W (1997) Individual-level evidence for the causes and consequences of social capital. *American Journal of Political Science* 41(3):999–1023.

Byrnes J, Miller D, Schafer W (1999) Gender differences in risk raking: A meta-analysis. *Psychological Bulletin* 125:367–383.

Camerer C (2003) *Behavioral Game Theory: Experiments in Strategic Interaction* (Princeton, NJ: Princeton University Press).

Chua R, Ingram P, Morris M (2008) From the head and the heart: Locating cognition- and affect-based trust in managers' professional networks. *Academy of Management Journal* 51(3):436–452.

Clark M, Mills J (1979) Interpersonal attraction in exchange and communal relationships. *Journal of Personality & Social Psychology* 37(1):12–24.

Clark M, Mills J, Powell M (1986) Keeping track of needs in communal and exchange relationships. *Journal of Personality & Social Psychology* 51(2):333–338.

Cohen M, Ho T, Ren Z, Terwiesch C (2003) Measuring imputed cost in the semiconductor equipment supply chain. *Management Science* 49(12):1653–1670.

Cook J, Wall T (1980) New work attitude measures of trust, organizational commitment and personal need nonfulfillment. *Journal of Occupational Psychology* 53(1):39–52.

Cross R, Cummings J (2004) Tie and network correlates of performance in knowledge intensive work. *Academy of Management Journal* 47(6):928–937.

Dunn J, Ruedy N, Schweitzer M (2012) It hurts both ways: How social comparisons harm affective and cognitive trust. *Organizational Behavior & Human Decision Processes* 117(1):2–14.

Erat S, Gneezy U (2012) White lies. *Management Science* 58(4):723–733.

Ferrin D, Dirks K, Shah P (2006) Direct and indirect effects of third-party relationships on interpersonal trust. *Journal of Applied Psychology* 91(4):870–883.

Freeman L (1979) Centrality in social networks: Conceptual clarification. *Social Networks* 1(3):215–239.

Fulmer C, Gelfand M (2012) At what level (and in whom) we trust: Trust across multiple organizational levels. *Journal of Management* 38(4):1167–1230.

Galinsky A, Maddux W, Gilin D, White J (2008) Why it pays to get inside the head of your opponent. *Psychological Science* 19(4):378–384.

General Social Survey (2016) GSS questionnaires – 2016 GSS Ballot 2, retrieved at `http://gss.norc.org/Get-Documentation/questionnaires`.

Glaeser E, Laibson D, Scheinkman J, Soutter C (2000) Measuring trust. *Quarterly Journal of Economics* 115(3):811–846.

Gneezy U (2005) Deception: The role of consequences. *American Economic Review* 95(1):384–394.

Granovetter M (1985) Economic action and social structure: The problem of embeddedness. *American Journal of Sociology* 91(3):481–510.

Hammond J (1994) Barilla SpA (A), harvard Business School Case 694-046 (revised March 2008).

Hardin R (2002) *Trust and trustworthiness* (New York, NY: Russell Sage Foundation).

Hart O, Moore J (1990) Property rights and the nature of the firm. *Journal of Political Economy* 98:1119–1158.

Hogg M (2007) Uncertainty–identity theory. *Advances in Experimental Social Psychology* 39(1):69–126.

Hogg M, Terry D (2000) Social identity and self-categorization processes in organizational contexts. *Academy of Management Review* 25(1):121–140.

Inderfurth K, Sadrieh A, Voigt G (2013) The impact of information sharing on supply chain performance under asymmetric information. *Production & Operations Management* 22(2):410–425.

Kahneman D, Tversky A (1972) Subjective probability: A judgment of representativeness. *Cognitive Psychology* 3(3):430–454.

Kim J, Meuller C (1978) *Introduction to Factor Analysis: What It Is and How to Do it* (Newbury Park, CA: Sage University Paper Series on Quantitative Applications in the Social Sciences, 07-013. Sage Publications, Inc).

Kline P (2000) *The Handbook of Psychological Testing* (London, United Kingdom: Routledge), 2nd edition.

Kossinets G (2006) Effects of missing data in social networks. *Social Networks* 28:247–268.

Lazzarini S, Miller G, Zenger T (2008) Dealing with the paradox of embeddedness: The role of contracts and trust in facilitating movement out of committed relationships. *Organization Science* 19(5):709–728.

Lee H, Padmanabhan V, Whang S (1997) Information distortion in a supply chain: The bullwhip effect. *Management Science* 43(4):546–558.

Lewis J, Weigert A (1985) Trust as a social reality. *Social Forces* 63(4):967–985.

Lindskold S (1978) Trust development, the GRIT proposal, and the effects of conciliatory acts on conflict and cooperation. *Psychological Bulletin* 85(4):772–793.

Malhotra D (2004) Trust and reciprocity decisions: The differing perspectives of trustors and trusted parties. *Organizational Behavior & Human Decision Processes* 94(2):61–73.

Marsden P (1990) Network data and measurement. *Annual Review of Sociology* 16:435–463.

McAllister D (1995) Affect- and cognition-based trust as foundations for interpersonal cooperation in organizations. *Academy of Management Journal* 38(1):24–59, ISSN 00014273, URL http://www.jstor.org/stable/256727.

McEvily B, Perrone V, Zaheer A (2003) Trust as an organizing principle. *Organization Science* 14(1):91–103.

McEvily B, Radzevick J, Weber R (2012) Whom do you distrust and how much does it cost? An experiment on the measurement of trust. *Games & Economic Behavior* 74(1):285–298.

McEvily B, Tortoriello M (2011) Measuring trust in organisational research: Review and recommendations. *Journal of Trust Research* 1(1):23–63.

McKnight D, Cummings L, Chervany N (1998) Initial trust formation in new organizational relationships. *Academy of Management Review* 23(3):473–490.

Milliken F (1987) Three types of perceived uncertainty about the environment: State, effect, and response uncertainty. *Academy of Management Review* 12(1):133–143.

Montmarquette C, Rullière JL, Villeval MC, Zeiliger R (2004) Redesigning teams and incentives in a merger: An experiment with managers and students. *Management Science* 50(10):1379–1389.

Mullin B, Hogg M (1999) Motivations for group membership: The role of subjective importance and uncertainty reduction. *Basic & Applied Social Psychology* 2(2):91–102.

Nee V, Holm HJ, Opper S (2018) Learning to trust: From relational exchange to generalized trust in China. *Organization Science* 29(5):969–986.

Organ D (1988) *Organizational Citizenship Behavior: The Good Soldier Syndrome* (Lexington, MA: Lexington Books).

Özer Ö, Subramanian U, Wang Y (2018) Information sharing, advice provision or delegation: What leads to higher trust and trustworthiness? *Management Science* 64(1):474–493.

Özer Ö, Wei W (2006) Strategic commitments for an optimal capacity decision under asymmetric forecast information. *Management Science* 52(8):1239–1258.

Özer Ö, Zheng Y (2017) Establishing trust and trustworthiness in supply chain information sharing. Ha AY, Tang CS, eds., *Handbook of Information Exchange in Supply Chain Management*, chapter 14, 287–312 (Basel, Switzerland: Springer International Publishing Switzerland).

Özer Ö, Zheng Y (2018) Trust and trustworthiness. Donohue K, Katok E, Leider S, eds., *The Handbook of Behavioral Operations*, chapter 14, 489–523 (Hoboken, NJ: John Wiley & Sons, Inc.).

Özer Ö, Zheng Y, Chen KY (2011) Trust in forecast information sharing. *Management Science* 57(6):1111–1137.

Özer Ö, Zheng Y, Ren Y (2014) Trust, trustworthiness, and information sharing in supply chains bridging China and the United States. *Management Science* 60(10):2435–2460.

Paruchuri S (2010) Intraorganizational networks, interorganizational networks, and the impact of central inventors: A longitudinal study of pharmaceutical firms. *Organization Science* 21(1):63–80.

Porter M (1985) *Competitive Advantage: Creating and Sustaining Superior Performance* (New York, NY: Free Press).

Putnam R (2000) *Bowling Alone: The Collapse and Revival of American Community* (New York, NY: Simon & Schuster).

Resnick P, Zeckhauser R, Swanson J (2006) The value of reputation on eBay: A controlled experiment. *Experimental Economics* 9(2):79–101.

Rousseau D, Sitkin S, Burt R, Camerer C (1998) Not so different after all: A cross-discipline view of trust. *Academy of Management Review* 23(3):393–404.

Scheele L, Thonemann U, Slikker M (2018) Designing incentive systems for truthful forecast information sharing within a firm. *Management Science* 64(8):3690–3713.

Shipilov A, Li S, Greve H (2011) The prince and the pauper: Search and brokerage in the initiation of status-heterophilous ties. *Organization Science* 22(6):1418–1434.

Simchi-Levi D, Kaminsky P, Simchi-Levi E (2007) *Designing & Managing the Supply Chain* (New York, NY: McGraw-Hill Education), 3rd edition.

Snijders C, Keren G (1999) Determinants of trust. Budescu D, Erev I, Zwick R, eds., *Games & Human Behavior: Essays in Honor of Amnon Rapoport*, 355–386 (Mahwah, NJ: Lawrence Erlbaum Associates, Inc.).

Spiliotopoulou E, Donohue K, Gürbüz M (2016) Information reliability in supply chains: The case of multiple retailers. *Production & Operations Management* 25(3):548–567.

Stewart K (2003) Trust transfer on the World Wide Web. *Organization Science* 14(1):5–17.

Stoker T (2008) Aggregation: Econometrics. Blume L, Durlauf S, eds., *The New Palgrave Dictionary of Economics* (London, England: Macmillan).

Tirole J (1999) Incomplete contracts: Where do we stand? *Econometrica* 67(4):741–781.

Triandis H, Bontempo R, Villareal M (1988) Individualism and collectivism: Cross-cultural perspectives on self-ingroup relationships. *Journal of Personality and Social Psychology* 54(2):323–338.

Uslaner E, Brown M (2005) Inequality, trust, and civic engagement. *American Politics Research* 33:868–894.

Wasserman S, Faust K (1994) *Social Network Analysis: Methods and Applications* (Cambridge, United Kingdom: Cambridge University Press).

World Values Survey (2015) 1981-2014 longitudinal aggregate v.20150418, aggregate data file produced by JDSystems, Madrid, Spain, retrieved at `http://www.worldvaluessurvey.org`.

Yamagishi T, Akutsu S, Cho K, Inoue Y, Li Y, Matsumoto Y (2015) Two-component model of general trust: Predicting behavioral trust from attitudinal trust. *Social Cognition* 33(5):436–458.

Yamagishi T, Jin N, Miller A (1998) In-group bias and culture of collectivism. *Asian Journal of Social Psychology* 1(3):315–328.

Yamagishi T, Yamagishi M (1994) Trust and commitment in the United States and Japan. *Motivation & emotion* 18(2):129–166.

Zaheer A, McEvily B, Perrone V (1998) Does trust matter? Exploring the effects of interorganizational and interpersonal trust on performance. *Organization Science* 9(2):141–159.

Zipkin P (2012) A reply to Williamson's "Outsourcing ...". *Production & Operations Management* 21(3):465–469.

Zucker L (1986) Production of trust: Institutional sources of economic structure, 1840–1920. Staw B, Cummings L, eds., *Research in Organizational Behavior*, volume 8, 53–111 (Greenwich, CT: JAI Press).

Appendix A: Comparing Executives' and College Students' Behaviors in the Forecast Sharing Game

Here we compare the executives' behaviors with those of college students using our data and the data collected by Özer et al. (2014) under the same treatment conditions. Figure A.1 presents the data from both samples. We estimate the regression models summarized in Table A.1. The variable I_{Exec} is a dummy variable indicating whether the current data point corresponds to the decision of an executive. The coefficients of interest are the ones for terms that involve I_{Exec}. We first discuss the comparison of the suppliers' behaviors. The significantly positive coefficient for I_{Exec} and the significantly negative coefficient for $I_{\text{Exec}} \times \hat{X}$ imply that (i) if $\hat{X}$ were equal to zero, then the executives would behave more trustingly than the college students; (ii) as $\hat{X}$ increases, however, the executives decrease their trust faster than the college students do. Note that in our setup, X, and hence, $\hat{X}$, takes values between 100 and 400. Therefore, we use the delta method to examine at what values of $\hat{X}$ do we observe a significant difference in the trust behaviors of executives versus college students. This analysis shows that for $\hat{X} \in [100, 300)$, the level of trust is not significantly different between the two subject pools, whereas for $\hat{X} \geq 300$, the executives demonstrate significantly lower trust than the college students.
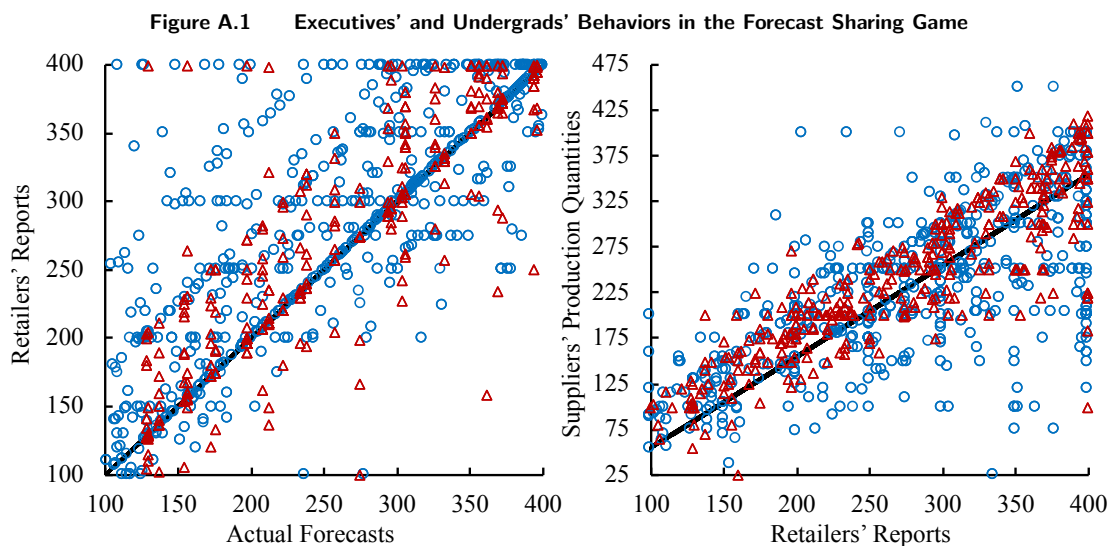
Figure A.1   Executives' and Undergrads' Behaviors in the Forecast Sharing Game

Note. The left graph shows the retailers' reports given their privately-observed forecast information; the solid line in this graph is the 45 degree line. The right graph shows the suppliers' production decisions given the reports from their retailers; the solid line in this graph is $Q^*_{\text{Full Trust}}$ given the retailers' reports. Each circle (triangle) is an observation from the experiment with the executive (undergraduate) sample.

We next turn to the retailers' behaviors. The significantly positive coefficient for I_{Exec} and the significantly negative coefficient for $I_{\text{Exec}} \times X$ imply that (i) if X were equal to zero, then the executives would inflate more (i.e., behave in a less trustworthy manner) than the college students; (ii) as X increases, however, the executives increase their trustworthiness faster than the college students do. A similar analysis as above shows that for $X \in [100, 240]$, the executives inflate significantly more than the college students do, whereas for $X \geq 240$, there is not a significant difference in the level of trustworthiness between the two subject pools.

To summarize, the comparison yields three insights: (i) Executives are more cautious about trusting when the potential vulnerability is high (i.e., when receiving a high report); (ii) they are more likely to manipulate

Table A.1   Comparison of Executives' and Undergrads' Behaviors in the Forecast Sharing Game

Variable	Value (standard error)	
	Supplier's Trust Behavior $(Q - Q^*_{\text{Full Trust}})$	Retailer's (Un)trustworthy Behavior $(\hat{X} - X)$
Intercept	53.37 (12.64)***	47.30 (11.51)***
$\hat{X}$	-0.13 (0.03)***	–
X	–	-0.13 (0.03)***
I_R	4.94 (9.23)	-8.76 (8.44)
t	-1.15 (0.44)	0.63 (0.41)
I_{Exec}	45.59 (14.61)***	47.13 (13.08)***
$I_{\text{Exec}} \times \hat{X}$	-0.22 (0.04)***	–
$I_{\text{Exec}} \times X$	–	-0.13 (0.04)***
Log likelihood	-4499.08	-4542.31
AIC	9014.15	9100.63
BIC	9052.08	9138.71

Notes. "–" means the variable is not present in the regression. ***: $p < 0.01$; p values are derived from t tests.

the forecast when the potential externalities of doing so is relatively low (i.e., when the private forecast is low); and (iii) other than these two scenarios, their trust and trustworthy behaviors are rather similar to those of nonexperienced individuals.

Appendix B: Detailed Results for the Interaction between Network Trust and Preconditioned Trust

We use the delta method to examine Hypothesis 2 – how the executives' preconditioned trust influence the effect of network trust on their trust behaviors. Table A.2 summarizes the total coefficients for network trust evaluated at different values of preconditioned trust based on the delta method. The values of preconditioned trust vary in the range of $[0, 3]$ with an increment of 0.5 (column 1).

Table A.2   Total Coefficients for Network Trust When Interacting with Preconditioned Trust

PT values	Value (standard error)			
	PT-Affect		PT-Cognition	
	Model (P1)	Model (P2)	Model (P3)	Model (P4)
0.0	63.30 (21.88)***	121.13 (41.97)***	72.85 (30.88)**	152.83 (64.64)**
0.5	55.80 (17.54)***	112.39 (31.02)***	64.93 (24.65)***	138.55 (50.51)***
1.0	48.30 (14.89)***	103.66 (26.73)***	57.02 (19.21)***	124.27 (37.95)***
1.5	40.80 (14.85)***	94.92 (31.89)***	49.10 (15.44)***	109.98 (29.04)***
2.0	33.30 (17.45)	86.19 (43.25)**	41.19 (14.68)***	95.70 (27.60)***
2.5	25.80 (21.76)	77.45 (57.22)	33.27 (17.33)	81.42 (34.56)**
3.0	18.30 (26.97)	68.72 (72.31)	25.36 (22.19)	67.14 (46.29)

Notes. The four models correspond to the ones in Table 6.
***: $p < 0.01$; **: $p < 0.05$; p values are derived from two-sided z tests.

Appendix C: Regression Results for Robustness Analyses

Tables A.3–A.5 present the detailed regression results for the robustness analyses discussed in §4.5.

Appendix D: Additional Results Regarding Demographic and Biographical Factors

In addition to the factors considered in our hypotheses in §2, we observe two additional biographical factors that also influence the extent to which executives use network trust to shape their trust behaviors. The corresponding regression results are summarized in Table A.6. First, as observed from models (B1) and (B2), the positive effect of network trust on trust behaviors is significantly stronger for female executives. This result is consistent with the general findings that females are more risk averse (Byrnes et al. 1999), and hence, they naturally require

Table A.3   Executives' Trust Behaviors ($Q - Q^*_{\text{Full Trust}}$): Controlling for General Trust

	Value (standard error)	
Intercept	50.65 (41.10)	26.14 (60.45)
$\hat{X}$	-0.24 (0.04)***	-0.24 (0.04)***
t	-3.59 (1.30)***	-3.60 (1.30)***
I_R	4.30 (13.65)	6.03 (17.26)
General Trust	-5.57 (8.02)	0.21 (9.56)
NT-Affect	68.17 (17.12)***	–
NT-Cognition	–	61.12 (35.65)**
Log likelihood	-1183.57	-1188.35
AIC	2383.14	2392.70
BIC	2410.28	2419.85

Notes. "–" means the variable is not present in the regression.
***: $p < 0.01$; **: $p < 0.05$; *: $p < 0.1$; p values are derived from t tests.

Table A.4   Executives' Trust Behaviors ($Q - Q^*_{\text{Full Trust}}$): Trust Beliefs toward Cohort (as A Single Entity)

	Value (standard error)			
Intercept	96.41 (24.92)***	99.67 (39.80)**	32.23 (26.90)	40.17 (47.90)
$\hat{X}$	-0.24 (0.04)***	-0.24 (0.04)***	-0.24 (0.04)***	-0.24 (0.04)***
t	-3.59 (1.29)***	-3.59 (1.29)***	-3.59 (1.30)***	-3.59 (1.30)***
I_R	-3.15 (17.26)	-3.10 (17.35)	5.48 (13.68)	7.34 (16.93)
Affect Trust to Cohort	2.36 (8.54)	–	-3.19 (6.84)	–
Cognition Trust to Cohort	–	0.47 (13.73)	–	-13.78 (14.60)
NT-Affect	–	–	66.92 (17.09)***	–
NT-Cognition	–	–	–	79.46 (39.68)**
Log likelihood	-1189.77	-1189.81	-1183.70	-1187.90
AIC	2393.54	2393.62	2383.40	2391.80
BIC	2417.30	2417.37	2410.55	2418.95

Notes. "–" means the variable is not present in the regression.
***: $p < 0.01$; **: $p < 0.05$; *: $p < 0.1$; p values are derived from t tests.

Table A.5   Executives' Trust Behaviors ($Q - Q^*_{\text{Full Trust}}$): Network Trust based on Original or Dichotomized Scores

	Value (standard error)			
	Original scores		Dichotomized (0/1) scores	
Intercept	-291.55 (97.96)***	-229.65 (84.54)***	25.27 (32.41)	-92.85 (52.07)*
$\hat{X}$	-0.35 (0.03)***	-0.36 (0.03)***	-0.35 (0.03)***	-0.36 (0.03)***
t	-0.70 (0.73)	-0.71 (0.73)	-0.84 (0.73)	-0.76 (0.73)
I_R	12.12 (10.94)	12.93 (11.01)	19.50 (11.87)	25.60 (11.71)**
NT-Affect	46.97 (11.82)***	–	8.70 (2.75)***	–
NT-Cognition	–	39.92 (10.24)***	–	21.65 (5.55)***
Log likelihood	-2794.78	-2795.00	-2797.12	-2795.00
AIC	5617.56	5618.00	5622.24	5618.00
BIC	5677.00	5677.45	5681.69	5677.44

Notes. "–" means the variable is not present in the regression.
***: $p < 0.01$; **: $p < 0.05$; *: $p < 0.1$; p values are derived from t tests.

more assurance to be willing to take the risk of trusting others. In our context, having higher trust beliefs toward network members encourage female executives to be more trusting when interacting with these members in the forecast sharing game. Second, based on models (B3) and (B4), we observe that executives with international work experiences are significantly more trusting in the game and rely less on network trust to shape their trust behaviors. This result may be because the international experiences have broadened the executives' perspectives and exposed them to different cultures. As a result, they are more open-minded and less subject to in-group biases where trust is restricted to closely-related, familiar partners to minimize uncertainty and incentive conflicts (Triandis et al. 1988, Yamagishi et al. 1998). Therefore, these executives do not condition their trust behaviors

as much on their trust beliefs specifically toward an in-group (i.e., the executives' cohort in our setting) when interacting with members of that group.

Table A.6   **Executives' Trust Behaviors ($Q - Q^*_{\text{Full Trust}}$): Interactions between Network Trust and Other Biographical Factors**

Variable	Model (B1)	Model (B2)	Model (B3)	Model (B4)
	Value (standard error)			
Intercept	70.81 (27.67)**	38.25 (44.65)	30.01 (29.56)	-97.55 (41.38)**
$\hat{X}$	-0.35 (0.03)***	-0.35 (0.03)***	-0.35 (0.03)***	-0.35 (0.03)***
t	-0.90 (0.73)	-0.82 (0.73)	-0.85 (0.73)	-0.82 (0.73)
I_R	27.75 (11.02)**	38.71 (11.73)***	24.04 (11.76)**	32.10 (11.31)***
NT-Affect	8.50 (16.52)	–	65.29 (17.38)***	–
NT-Cognition	–	43.16 (31.12)*	–	167.58 (31.11)***
I_{Female}	-66.27 (25.55)**	-133.06 (50.50)**	–	–
$I_{\text{Int'l}}$	–	–	71.14 (32.94)**	180.91 (47.06)***
Interaction	85.90 (23.81)***	145.67 (46.33)***	-61.87 (28.57)**	-151.29 (43.89)***
Log likelihood	-2791.74	-2790.84	-2795.38	-2790.01
AIC	5613.49	5611.69	5620.77	5610.02
BIC	5677.18	5675.38	5684.46	5673.71

Notes. The variables I_{Female} and $I_{\text{Int'l}}$ are dummy variables indicating whether the executive is female and had international work experiences. "–" means the variable is not present in the regression.

†: This variable represents the interaction term between network trust and the biographical factor in the model.

***: $p < 0.01$; **: $p < 0.05$; *: $p < 0.1$; p values are derived from t tests.