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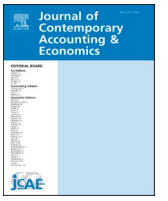

Managerial ability and supply chain power☆

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ABSTRACT

This paper investigates how major customer firms, managed by highly capable managers, can gain bargaining power over their suppliers. Our results document a positive association between managerial ability and the supply chain power a major customer firm holds over its suppliers. The results are robust to endogeneity concerns, tested through two-stage least squares (2SLS) regressions and difference-in-differences estimates surrounding forced CEO turnovers. We find the positive association to be stronger for durable goods manufacturers and higher ability managers engaged in socially responsible activities and corporate innovation. We provide evidence that higher-ability managers use their enhanced bargaining power to secure greater supplier trade credit.

1. Introduction

Managing an efficient supply chain is becoming an increasingly crucial concern for firms to remain market competitive. Firms are constantly looking for ways to restructure their supply chains to gain a competitive advantage, particularly following significant political and economic events such as Brexit and the tariff war between the US and China (Economist, 2019). Typically, firms have relatively little choice in their customer base but have more bargaining opportunities in managing their suppliers. To remain competitive by ensuring low product prices, high quality and lowest total sourcing and production costs, firms seek to optimize their supply chain by having multiple competing financially dependent suppliers (Flynn and Flynn, 2005; Lee and Oakes, 1996; Lian, 2017).

During volatile economic times, having a competitive supplier market enables firms to manage their market competitiveness efficiently (Rahaman et al., 2020). Supply chain power (SCP) can be defined as one partner's ability to influence the actions of a counterpart, i.e., a customer firm holds bargaining power and influences the actions of a supplier (Emerson, 1962; French et al., 1959). Studies have shown that customers try to gain significant bargaining power over their supplier base to receive superior resource allocation and favourable contract terms (Elking et al., 2017; Handley and Benton Jr, 2012). However, the exact role played by managers in gaining this SCP is not clear. According to the resource-based view of the firm, businesses try to exert control over their resource bundle to achieve a sustainable competitive advantage (Barney, 1991; Rungtusanatham et al., 2003). From this perspective, managers' ability to bundle resources is heterogenous, therefore firms managed by more able managers can bundle and deploy resources in a much superior manner (Hansen et al., 2004; Lippman and Rumelt, 2003). Managers who can create good linkages with

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their suppliers and have control over their supplier base, should facilitate an efficient sourcing flow from their suppliers that benefits the customer firm's operational performance (Rungtusanatham et al., 2003). Though value creation can be a function of resource heterogeneity, significant variation can still exist because of varying managerial ability in extracting value from a firm's resources. In this context, we examine how the heterogeneous ability of a major customer firm's manager influences the bargaining power the firm holds over its supplier network.

Managerial ability is difficult to define since it derives from previous experience and is tacit. Managers with superior knowledge of factor markets can select valuable resources and negotiate their use on more favourable terms than their rivals (Makadok, 2001). More able managers are also more knowledgeable in forecasting industry trends and product demand and thoroughly understand the firm's operating environment (Demerjian et al., 2012; Demerjian et al., 2013b). They use this understanding to bundle and deploy resources more efficiently than their competitors with less able managers, by gaining more control over their firm's supply chain (Hansen et al., 2004; Lippman and Rumelt, 2003). Having greater SCP enables managers to procure valuable resources more conveniently because suppliers are highly likely to prioritize their requests and allocate materials and capacity to meet a major customer firm's demands (Pulles et al., 2014). In the event of an operational disruption, more able managers with greater SCP will be better prepared to continue uninterrupted business operations with the help of dependent suppliers making the necessary adjustments to the changing economic environment. One example of this argument is how Amazon continued to post record profits during the Covid-19 pandemic while most other businesses were making losses. When the economy faced the Covid-19 shock, Amazon, managed by founder and CEO, Jeff Bezos, was able to reorganize how it operated because of its wide network of dependent suppliers. Though Amazon struggled at the start of the pandemic, it quickly made the necessary adjustments, focusing primarily on shipping essential goods, in-house order fulfilment and changing inventory policy to meet the rising consumer demand for online shopping (Mercer, 2021; Palmer, 2020). Jeff Bezos, and his Amazon management team's superior managerial ability, read the shifting industry trends faster and reacted promptly by using the high bargaining power they held over their suppliers, resulting in positive operational outcomes in the form of record profits.

However, identifying a proper measure of managerial ability has been widely debated. Most previous research looked at proxies by considering firm characteristics that are typically outside the direct control of management such as media mentions, abnormal stock returns and CEO tenure and pay (Fee and Hadlock, 2003; Milbourn, 2003; Rajgopal et al., 2006; Tervio, 2008). These measures contain noise and are difficult to attribute solely to efforts by management. Some studies use Data Envelopment Analysis (DEA) to measure managerial talent for firms in a single industry such as consumer goods, banking and insurance, and mutual funds (Leverty and Grace, 2012; Murthi et al., 1996; Murthi et al., 1997). In contrast, Demerjian's (2012) managerial ability measure extends across industries, is less noisy and has an economically significant association with manager fixed effects. Studies using this measure of managerial ability find a positive association with the readability of 10-K reports (Hasan, 2020), tax savings (Koester et al., 2017), better earnings quality (Demerjian et al., 2013), income smoothing (Baik et al., 2020), innovation success (Chen et al., 2015), higher credit rating (Bonsall IV et al., 2017) and better post-merger operating performance and announcement period returns while avoiding the adverse effects of information asymmetry through higher earnings smoothing (Doukas and Zhang, 2020). We use Demerjian's (2012) measure as our proxy for managerial ability.

We follow Rahaman et al.'s (2020) approach to measure a customer firm's SCP. SFAS No. 14 (before 1997) and SFAS No. 131 (after 1997) require suppliers (regardless of the number of segments operated) to disclose the presence of and sales to all major customers representing exceeding 10 % of their revenue. The Compustat Customer Segment dataset contains major customer–supplier sales data based on historical customer data from Compustat segment files and CRSP company data using a fuzzy name-matching algorithm (Cen et al., 2017; Cohen and Frazzini, 2008). Using this dataset, we construct three different firm-level SCP measures that identify the density (NUMSAPP), dispersion of sourcing (SDISPERSION), and customer's market power over its suppliers (MKTPOWER) in the supply chain. By extracting the first component from a Principal Component Analysis (PCA) (Rahaman et al., 2020), these three measures are combined to develop a composite SCP index. For robustness, we also consider an alternative proxy for SCP - Customer Firm Reliance - measured through the total purchases from all Compustat-listed manufacturing sector suppliers that record the current firm as (one of) their major customer(s), as a proportion of Cost of Goods Sold of the customer firm (Banerjee et al., 2008). Higher values of this measure signify the dependence of the major customer firm on fewer suppliers, potentially exposing the major customer to unforeseen disruptions in the supply chain and decreasing its power over the suppliers.

In our regression models, we use the SCP index as our dependent variable and the Demerjian (2012) managerial ability measure as the independent variable, with some firm-specific control variables (i.e., Tobin's Q, book leverage, asset tangibility, firm size and current ratio). Our baseline results show that a major customer firm's managerial ability has a positive, statistically significant association with SCP. Except for the MKTPOWER proxy (where the coefficient is positive but not statistically significant), managerial ability has a positive, statistically significant coefficient across the other two proxies and the composite SCP index, with the inclusion of firm, industry and year fixed effects. These results indicate that better managers maintain greater diversity (NUMSAPP) and hold relatively higher bargaining power (SDISPERSION) over their suppliers. Managerial ability continues to have a positive association with SCP when we use the alternative proxy, Customer Firm Reliance. To rule out concern that our findings could be a function of firm size and little to do with managerial ability itself, we conduct a subsample analysis by splitting the sample based on observations with higher or lower than the median firm size. We find that the positive association between managerial ability and SCP continues to hold. These results show that more able managers rely on a diversified network of suppliers, therefore keeping a diversified pool of suppliers to limit their exposure to potential supply chain disruptions that could affect regular business operations.

Latent firm characteristics or omitted correlated variables could drive our findings, causing endogeneity concerns affecting the causality behind the positive relationship found between managerial ability and SCP. We use two-stage least squares (2SLS) regression analysis using instrumental variables - the market for local talent (proxied by average Metropolitan Statistical Area (MSA) managerial ability and Outside CEO talent pool), and the proportion of a state's population holding a college degree. We also use a difference-in-

differences analysis using forced CEO turnover on the full and a propensity-score matched sample to provide further robustness to our findings. These tests further validate the positive association between managerial ability and SCP.

We perform two cross-sectional analyses to identify mechanisms that may drive the positive association between managerial ability and SCP. First, we find that this positive association is more pronounced when the major customer firm managed by a more able manager is engaged highly in socially responsible activities. Suppliers consider the value of its customer firms engaging in Corporate Social Responsibility (CSR) activities with increasing importance, with a stronger relationship between customer–supplier exchange and a customer's CSR performance (Kim and Choi, 2018; Klassen and Vachon, 2003; Liu et al., 2021). Not only does the customer firm's CSR engagement influence suppliers' adoption of certain CSR practices (such as complying with customer's CSR codes of conduct or meeting CSR-specific performance specifications), it also leads to improved perception of sourcing quality among downstream customers (Gielens et al., 2018; Li et al., 2017). Suppliers value socially responsible customers more, since such engagement signals higher levels of trustworthiness in meeting financial obligations, higher growth prospects and provides insurance-like protection in meeting payments against prospective adverse shocks (Godfrey et al., 2009; Lev et al., 2010; Zhang et al., 2020). In addition, more able managers typically conduct more socially responsible and fewer socially irresponsible activities (Yuan et al., 2019). Our results confirm these expectations; firms with managers in the top quartile of the managerial ability measure engage in more than the median level of CSR activities and gain significantly greater SCP than managers with less ability. This positive association is statistically significant for firms engaged in higher than the median level of CSR, compared with those with lower a level of CSR engagement whose coefficients are insignificant.

Secondly, we argue that the positive association between managerial ability and SCP is stronger for major customers with high corporate innovation performance. Studies show cross-sectional evidence of positive innovation outputs of customer firms increases supplier profitability. Knowledge spill-over from customer firms with greater technological invention and production efficiency can benefit suppliers, not only those who are linked geographically but also economically, particularly when a customer's demands account for a larger fraction of a supplier's total sales (Chu et al., 2019; Li, 2018). Prior studies find managerial ability has a positive association with corporate innovation success (Chen et al., 2015). Therefore, suppliers forming ties with higher ability manager-led major customers can expect to receive access to the customer's unique technological inventions and manufacturing efficiencies that, in the long run, may benefit in greater sales and financial performance for the suppliers. Thus, it is reasonable to expect that suppliers are motivated to form close links with major customers managed by more able managers to receive innovation externality benefits while improving their own future performance, leading to higher SCP. Our results support this expectation. Top tier managers (managerial ability in the top quartile) gain significantly higher SCP when their innovation performance is higher than the median, as proxied by their innovation citations and number of patents filed. Though the relationship is statistically significant and positive across the full sample, the effect is not significant for major customers with lower than median innovation performance. This indicates that the positive association between managerial ability and SCP is stronger when major customers are engaged more in socially responsible activities and have a higher innovation performance.

To add further robustness to our study, we examine subsamples of customer firms from the durable and nondurable goods manufacturing sectors. Firms that manufacture durable goods are usually more dependent on their suppliers because of their greater need to source unique products. In contrast, nondurable goods manufacturers typically procure standardized products. As a result, it is economically beneficial for major customers in the durable goods sector to maintain a closer relationship with their suppliers since durable and sophisticated goods often require after-sales service and/or spare parts and more frequent transactions (Banerjee et al., 2008; Kale and Shahrur, 2007; Lian, 2017; Saccani et al., 2007). Therefore, because of the need for durable goods sector customers to buy unique products, it is logical for these firms to gain greater SCP and dictate sourcing terms and priority of product delivery than nondurable goods sector customers. We conduct a subsample analysis on the two groups of major customers and find that managerial ability is positively associated with SCP for both subsamples. However, the coefficient of managerial ability for durable goods sector customers is higher. A Chow-test for their p-values indicates that the effect is more pronounced for durable goods customers than for their non-durable goods counterparts.

We explore whether this increased SCP for customers run by more able managers translates into extracting greater resources and benefits. One resource would be the trade credit extended by suppliers to major customers. Research on a firm-level database of Chinese firms' documents shows that suppliers with weak bargaining power are more likely to provide trade credit (Fabbri and Klapper, 2016). However, the role played by more able managers in this context is yet to be explored. We conduct tests with Accounts Payables to Total Assets (AP/TA) for major customers as a proxy for trade credit received from suppliers. We find evidence that top-tier managers (top quartile managerial ability value) receive significantly higher trade credit in a customer–supplier network when the major customer has higher than median SCP. Though the result also holds for the full sample, the effect loses statistical significance when the customer firm has lower than median SCP. This indicates the value of SCP in extracting credit from suppliers since trade credit is considered one of the most crucial sources of inter-firm financing with almost 80 % of US-based firms selling their products on credit (Tirole, 2010).

Our study adds to contemporary literature in accounting, finance and supply chain in three ways. First, we add to the literature on the resource-based view of the firm. We demonstrate the heterogeneity of managerial actions in value creation and resource extraction for a firm. Firms managed by superior managers can bundle and deploy resources more efficiently; our study establishes how such strategies achieve that. More able managers can devise strategies by using greater bargaining power over their supplier network, which facilitates an array of benefits such as receiving higher trade credit from suppliers. Secondly, we add to the literature on the role managerial ability plays in finance and accounting issues. Previous studies examined how managerial ability influences the informativeness of earnings and income smoothing of firms (Baik et al., 2020), the earnings smoothing of acquiring firms (Doukas and Zhang, 2020), better credit rating (Bonsall IV et al., 2017) and higher quality of earnings reporting (Demerjian et al., 2013). In this

context, we explore a literature gap by illustrating how managerial ability in a major customer firm facilitates the development of stronger economic ties with its suppliers. Thirdly, supply chain interactions have had much recent attention, but accounting and financial research in this context has mostly looked at issues related to financing policies and operational outcomes (Banerjee et al., 2008; Costello, 2020; Hu et al., 2022; Lian, 2017; Rahaman et al., 2020; Wang, 2012). We address an issue that has not been explored much from a financial standpoint: 'How do firms gain control and power over their suppliers?' We provide a comprehensive analysis that not only explores the significance of managerial ability in gaining SCP, but also identifies two specific factors through which suppliers are motivated to form close economic ties with major customers. Our results demonstrate that suppliers value their major customers engaging in CSR activities managed by top-tier managers, adding to the literature on the value-enhancing view of CSR (Bae et al., 2021; Deng et al., 2013; Lins et al., 2017) and the customer–supplier relationship nexus (Gielens et al., 2018; Godfrey et al., 2009; Li et al., 2017; Zhang et al., 2020). We demonstrate that the positive association between managerial ability and SCP is stronger for customer firms with better corporate innovation performance, adding to the literature that explores how corporate innovation affects customer–supplier ties (Chu et al., 2019; Clark, 1989; Li, 2018; Petersen et al., 2005).

The rest of the paper is organized as follows. Section 2 explains the data, main variables and regression design. Section 3 presents the baseline results with a primary and alternative proxy for SCP along with the subsample analysis for robustness, followed in section 4 by tests to mitigate endogeneity concerns. Section 5 presents the channel analysis. Section 6 explores the role of managerial ability with higher SCP in extracting trade credit and section 7 concludes the paper.

2. Data and variables

2.1. Data

We collect unbalanced firm-level panel data from 1992 to 2018 to examine the relationship between managerial ability and SCP. Supply chain data are from the Compustat customer segment dataset from WRDS. We use a publicly available dataset provided by Demerjian (2012) to collect data on managerial ability.[1] Accounting data for our control variables are from Compustat. After merging these datasets and excluding the utility sector (SIC codes: 4900–4990) and finance industry (SIC codes: 6000–6990) for the regulated and different nature of their industries, our final sample comprises 11,031 firm-year observations. These observations include only the identifiable major customers from the Compustat customer segment dataset; firms without identifiable suppliers are excluded as in previous studies (Rahaman et al., 2020). All variables are winsorized at the 1st and 99th percentile.

2.2. Dependent variable

Our dependent variable of interest is SCP. To construct this proxy, we use data from Compustat customer segment files from WRDS. This dataset provides comprehensive data on major customers and sales from their suppliers based on historical customer data from Compustat segment files and CRSP company data, using a fuzzy name-matching algorithm (Cen et al., 2017; Cohen and Frazzini, 2008). This information is publicly available because SFAS No. 14 (before 1997) and SFAS No. 131 (after 1997) require firms (regardless of the number of segments operated) to disclose the existence of and sales to principal customers representing over 10 % of total firm revenue. However, some suppliers may report customers who are significant to their business operations but contribute less than 10 % of their total sales (Dhaliwal et al., 2016). We exclude such suppliers and consider only those with at least 10 % of total sales to maintain consistency. Our dataset contains data from 1992-2018. Lanier et al. (2019) used the natural logarithm of one plus the number of suppliers disclosing the firm as a major customer as the key proxy for SCP (NUMSAPP), with the assumption that a higher density of suppliers implies greater power for the firm with regard to its suppliers. In addition, we use the extent of dispersion in dollar amounts of inputs sourced from different suppliers (SDISPERSION) to measure the degree to which a firm relies on heterogeneous input sources for its productive operations. To measure the ability of a firm to extract more surplus from its supply chain, thereby giving it a greater incentive to rely on the chain, we use a modified version of Lerner's index (MKTPOWER). All these measures are combined into a single SCP index through the extraction of the first component from a Principal Component Analysis (PCA),[2] a methodology previously used by Rahaman et al. (2020).

2.3. Independent variables

Our primary independent variable is managerial ability. For our purposes, we use the managerial ability (MA score) proxy developed by Demerjian et al. (2012). This measure is estimated first by estimating firm efficiency in industries, by comparing the firm sales conditional on the following inputs used by the firm: Cost of Goods Sold; Selling and Administrative Expenses; Net Operating Leases; Net R&D; Net PP&E; Purchased Goodwill; and Other Intangible Assets. This DEA-estimated efficiency measure can be attributed to both the firm and the manager; therefore, it contains similar noise to other managerial ability measures such as a more able manager predicting trends (regardless of firm size) and bigger firms negotiating better terms with suppliers regardless of manager quality. As a result, this DEA-generated efficiency measure is modified by purging it of key firm-specific characteristics that could aid

[1] The managerial ability (MA-score) data are available at: https://peterdemerjian.weebly.com/managerialability.html.

[2] Of the three components generated by PCA, only the first component (PC1) has an eigenvalue greater than one and explains approximately 62% of the common variation among the three supply chain power dimensions, and is therefore considered the most appropriate SCP index.

or hinder management's efforts, such as firm size and age, market share, positive free cash flow and complex international and multi-segment operations. These firm-level variables are included as independent variables in a Tobit-regression with the DEA-generated efficiency scores; the residual from the estimation is considered a measure of managerial ability. This residual is attributed to the management team and is validated by a number of tests in Demerjian et al. (2012). This measure has been widely used in accounting (Baik et al., 2011; Baik et al., 2020; Demerjian et al., 2012; Demerjian et al., 2013; Koester et al., 2017) and finance literature (Albuquerque et al., 2013; Bui et al., 2018; De Franco et al., 2017; Doukas and Zhang, 2021).

We control for a host of firm-specific determinants of SCP, as reported in the literature, to reduce the probability that managerial ability captures the effect of these characteristics on SCP (Lanier Jr et al., 2019; Rahaman et al., 2020). These controls include firm size, Tobin's Q, Book Value of Leverage, Asset Tangibility and Current Ratio. All control variables are defined in Appendix 1 and are winsorized at the 1st and 99th percentile.

2.4. Research model

To test our hypothesized relationship between managerial ability and SCP, we estimate the following model:

$$SCP_{i,t} = \beta_0 + \beta_1 ManagerialAbility_{i,t} + Controls_{i,t} + YEARFE + FIRM(INDUSTRY)FE + \varepsilon_{i,t}$$

where: subscripts i and t relate to firm and year, respectively. We use the composite SCP index based on PCA as the dependent variable and the managerial ability proxy measured by Demerjian (2012) as the key independent variable. For robustness purposes, we consider three individual measures of SCP as dependent variables in our baseline analysis. We include both year and industry fixed effects to control for time-invariant industry factors and time-varying unobservable factors. In addition, we include firm fixed effects to capture the average impact of unobservable time-invariant firm characteristics, consistent with previous research on managerial ability (Koester et al., 2017). If our hypothesized relationship holds, then we expect the coefficient β_1 to be positive.

2.5. Summary statistics

Table 1 presents the summary statistics. The mean and median values of the SCP index are 0.12 and 1.43, respectively, with the quantile distribution demonstrating significant variation across firms. The mean value of managerial ability is 0.06, with a standard deviation of 0.06, like those reported in previous studies (Demerjian et al., 2012; Koester et al., 2017). Mean and median values of the control variables reveal that, on average, major customer firms have significant book leverage and asset tangibility (0.26 and 0.30, respectively) and over double current assets compared with current liabilities, indicating no significant liquidity concerns.

3. Results

3.1. Baseline regression

We report the baseline OLS regression estimates in Table 2. For robustness, we report the estimates with the three SCP components (NUMSAPP, SDISPERSION and MKTPOWER) in models 1–3 with year and industry fixed effects and in models 5–7 with year and firm fixed effects. Models 4 and 8 report the estimates with SCP as the dependent variable with industry and firm fixed effects, respectively, along with year fixed effects in both models. Standard errors are adjusted for heteroscedasticity and clustered by year and firm level across models 1–8 to draw statistical inference.

Except for models 3 and 7, the coefficients of managerial ability remain positive and statistically significant. When MKTPOWER is the dependent variable, the effect is positive but not statistically significant. The effect is positively significant at the 1 % level for the

Table 1
Summary Statistics. This table reports the descriptive statistics for our dependent, independent and control variables. All variables are winsorized at the 1st and 99th percentile.

Variable	Obs	Mean	S.D.	Quantile Min	0.25	Median	0.75	Max
SCP	10,667	0.1230	1.4302	−1.2805	−1.0301	0.6112	1.0545	4.2651
MARKET POWER	11,023	0.3618	0.2724	−0.9304	0.2048	0.3415	0.5225	1.0000
SDISPERSION	11,023	0.2201	0.2905	0.0000	0.0020	0.1012	0.4825	0.9545
NUMSAPP	11,153	0.5540	0.3348	0.3008	0.3024	0.4825	0.7005	1.5612
Managerial Ability	11,031	0.0615	0.0628	−0.1625	−0.0641	0.0280	0.1415	0.4224
Firm Size	11,031	8.0002	1.9502	2.6336	6.6635	8.1321	9.4540	12.8412
Tobin's Q	10,485	2.0812	1.5132	0.5300	1.2321	1.6143	2.3544	23.0823
Book Leverage	10,991	0.2621	0.2005	0.0000	0.1104	0.2408	0.3731	1.3652
Asset Tangibility	11,029	0.3001	0.2233	0.0002	0.1313	0.2441	0.4528	0.9346
Current Ratio	10,656	2.0125	1.4958	0.1105	1.1632	1.6105	2.3621	15.3642
Customer Firm Reliance	11,153	0.0704	0.1250	0.0000	0.0005	0.0224	0.0740	0.6974
Net CSR	11,023	−0.0345	1.7805	−3.0000	−1.0000	0.0000	1.0000	4.0000
Patent	11,054	14.4621	26.8612	0.0000	1.0000	3.0000	12.0000	106.0000
Citation	11,054	160.4328	294.2438	1.0000	11.0000	44.0000	136.0000	1197.0000

Table 2
Baseline Regressions. This table reports the baseline regression results with regard to managerial ability on supply chain power (SCP) measures. The dependent variables in models 1–3 and 5–7 are the individual components of SCP, NUMSAPP, SDISPERSION and MKTPOWER, respectively. The dependent variable in models 4 and 8 is the composite SCP index. The key independent variable for models 1–8 is Managerial ability, proxied by the MA-score developed by Demirijian et al. (2012). Models 1–4 include year and industry fixed effects and models 5–8 include year and firm fixed effects. Standard errors are adjusted for heteroscedasticity and clustered at the firm and year level. P-values are in parentheses. Significance at the 10%, 5% and 1% level is indicated by *, **, and ***, respectively.

Dependent Variable	(1) NUMSUPP	(2) SDISPERSION	(3) MKTPOWER	(4) SCP	(5) NUMSUPP	(6) SDISPERSION	(7) MKTPOWER	(8) SCP
Managerial Ability	0.3447***	0.2179***	0.0215	1.4157***	0.1078***	0.0485**	0.0022	0.4199***
	(0.000)	(0.000)	(0.257)	(0.000)	(0.000)	(0.010)	(0.916)	(0.000)
Tobin's Q	0.0009	0.0026	0.0046**	0.0107	0.0032**	0.0036*	−0.0052**	0.0190**
	(0.573)	(0.119)	(0.015)	(0.164)	(0.046)	(0.074)	(0.019)	(0.023)
Book Leverage	−0.0926***	−0.0695***	−0.0277*	−0.3858***	−0.0071	−0.0112	−0.0303	−0.0657
	(0.000)	(0.000)	(0.064)	(0.000)	(0.636)	(0.546)	(0.135)	(0.388)
Asset Tangibility	0.0088	0.0299*	0.0054	0.0907	0.0936***	0.1076***	−0.0501	0.4870***
	(0.590)	(0.074)	(0.000)	(0.232)	(0.000)	(0.001)	(0.146)	(0.000)
Current Ratio	−0.0081***	−0.0079***	−0.0089***	−0.0380***	−0.0097***	−0.0091***	−0.0036	−0.0442***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.204)	(0.000)
Firm Size	0.1057***	0.0823***	−0.0049***	0.4521***	0.1241***	0.0978***	−0.0074	0.5328***
	(0.000)	(0.000)	(0.005)	(0.000)	(0.000)	(0.000)	(0.141)	(0.000)
Constant	−0.2718***	−0.4288***	0.4286***	−3.4458***	−0.4572***	−0.5824***	−0.4463***	−4.2554***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	10,093	10,093	10,093	9,743	9,596	9,596	9,596	9,258
Adjusted R-squared	0.5571	0.4074	0.1489	0.5153	0.8108	0.6396	0.4923	0.7647
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	NO	NO	NO	NO
Firm FE	NO	NO	NO	NO	YES	YES	YES	YES

composite SCP index. However, these coefficients may reflect cross-sectional variation between firms (managers) with the exclusion of firm fixed effects. With the inclusion of firm fixed effects to eliminate cross-firm variations in each variable and to identify the association between the variables arising from variation in the firm characteristics over time, we find that one standard deviation increase in managerial ability increases the composite SCP index value of an average major customer by 21.0 % (0.4199 X 0.06 X 100)/0.12). Adjusted R^2 values for the models with SCP index as the dependent variable increase from 51.53 % to 76.47 % after including firm fixed effects, highlighting that stationary characteristics varying across firms explain a significant portion of SCP variation. The mean variance inflation factors (VIF) do not exceed 2.0 across the models, confirming the absence of multicollinearity in our results.

In examining the individual SCP dimensions, we find our results are consistent with the hypothesized prediction. Firms that have a higher number of suppliers (NUMSAPP) have greater density in their supply chain, indicating the firm has more power over its suppliers. It would be beneficial for more able managers to seek reasonable power over their suppliers to acquire resources efficiently. Results from Table 2, model 5, suggest that a 1 % increase in managerial ability increases NUMSAPP by approximately 10.78 % in models with year and firm fixed effects. Similarly, better managers are less likely to be dominated by their suppliers in sourcing, therefore higher SDISPERSION implies relatively greater power of a firm over its suppliers. The results in Table 2, model 6, also show the same: a 1 % increase in managerial ability boosts SDISPERSION by 4.85 % in models with year and firm fixed effects. Further, though the coefficient for managerial ability is not statistically significant when the dependent variable is MKTPOWER, the positive coefficient is consistent with our hypothesized relationship. These findings reasonably indicate that managers with higher efficiency in resource management gain significant control over their supply chain, leading to gaining a valuable competitive advantage.

In terms of the control variables, Tobin's Q, asset tangibility and firm size mostly retain a positive relationship with our dependent variables. Except in models 3 and 7, size, cash ratio, ROA, leverage and the CAPEX ratio retain a consistent relationship with our dependent variables with MKTPOWER as the dependent variable. Firms that are larger, carry a lower current ratio and leverage, higher asset tangibility and have greater growth potential (higher Tobin's Q), continue to have a positive relationship with SCP and its NUMSAPP and SDISPERSION proxies. These associations agree with the literature, because major customers with greater SCP may have lower liquidity because of efficient supply chain linkages and greater demand data sharing, leading customers to have shorter inventory turnover periods and lag time, therefore they carry lean levels of current assets, which reduces supply chain related costs (Cachon and Fisher, 2000; Lee et al., 2007).

3.2. Alternative proxy for supply chain power

To provide further robustness to our baseline findings, we consider an alternative measure of SCP. This measure considers the importance of purchases from firms' dependent suppliers. We measure Customer Firm Reliance as the total purchases from all Compustat-listed manufacturing sector suppliers that record the customer firm as (one of) their principal customer(s), as a proportion of Cost of Goods Sold of the customer firm (Banerjee et al., 2008). It quantifies a major customer's COGS sourcing from suppliers with regard to its total COGS sourcing from all suppliers. Higher values imply a customer firm's dependence on fewer suppliers, thereby exposing the major customer to potential supply chain disruptions, which decreases the power it has over its supply chain. Therefore,

we hypothesize that managerial ability would have a negative coefficient with this alternate measure of SCP.

Table 3 reports the OLS estimate of the effect of managerial ability on the alternative measure of SCP. Models 1 and 2 report the estimates with industry and firm fixed effects. Our results imply that more able managers are better able to diversify their sourcing channels, leading to dependence on fewer concentrated suppliers for its COGS sourcing. This result agrees with the resource-based theory since superior managers are better able to bundle and deploy resources by decreasing reliance on fewer customers and, instead, having better diversification of their supplier network that ensures that the major customer is less susceptible to disruptions in its supply chain and does not have to shift suppliers if one faces interruptions (Whitney et al., 2014). This reiterates our primary findings that more able managers retain significant bargaining power over their supply chain partners.

3.3. Subsample analysis (durable versus non-durable goods manufacturers)

Manufacturing firms in the durable goods sector generally produce more unique products. Most of these firms source their unique inputs from durable goods sector suppliers and deal with mostly nondurable goods sector suppliers for standardized product sourcing. However, manufacturers in the nondurable sector produce fewer unique goods and mostly procure general purpose products from suppliers in both the durable and nondurable goods sectors. Because of these distinct sourcing patterns, customer firms that purchase higher quantities of inputs from their dependent suppliers maintain lower leverage, which acts as a way to encourage their suppliers to commit to higher relationship-specific investment (Banerjee et al., 2008; Titman and Wessels, 1988). These customers are also motivated to maintain a close relationship with their suppliers because durable, sophisticated goods often require after-sales service and/or spare parts and might require frequent interactions and transactions, along with the sharing of proprietary information (Banerjee et al., 2008; Kale and Shahrur, 2007; Lian, 2017; Löffler, 2021; Saccani et al., 2007). To maximize efficiency in resource procurement, it makes more sense for superior managers in durable goods sector customer firms to gain greater SCP so that they can have a diversified network of dependent suppliers who can satisfy their unique demands.

We group our sample customer firms based on their primary SIC codes into the durable or nondurable goods manufacturing sectors. Firms with primary SIC codes from 3,400 to 3,990 are classified as durable goods manufacturing major customers and those with primary SIC codes between 2,000 and 3,400 as nondurable goods manufacturing major customers. Based on these classifications, we have 2,816 firm-year observations for major durable goods manufacturing sector customers and 2,648 firm-year observations in the non-durable goods manufacturing sector. The remaining firms are in the service sector, which we do not consider in this subsample analysis.

Table 4 reports the regression estimates based on industry classifications. Consistent with our baseline results, managerial ability continues to have a positive relationship with SCP. However, the effect is much stronger in the durable goods sector than the nondurable goods sector. An increase in managerial ability from the 25th percentile to 75th percentile leads to almost a 19.30 % (0.9651 X (0.14 – (-0.06)) increase in SCP for a durable goods manufacturing major customer, compared with 11.61 % (0.5806 X (0.14 – (-0.06)) increase for the non-durable goods manufacturing customer in models with year and industry fixed effects. Moreover, the coefficient of managerial ability remains statistically significant for durable goods manufacturers after including firm fixed effects, but it loses statistical significance for nondurable goods manufacturers. We conduct a Chow test to identify whether these coefficients are statistically distinct. Our Chow test p-value is 0.0185, which means we reject the null hypothesis that the coefficients are statistically indifferent at the 5 % significance level. These results provide a robust outlook for our primary hypothesis, demonstrating that, though more able managers, in general, seek greater SCP, the relationship is stronger for durable goods manufacturers, because they have a greater need to better synchronize their production inputs for their unique sourcing needs.

4. Mitigating endogeneity bias

Our baseline results and the additional robustness tests consistently indicate a positive relationship between managerial ability and SCP. However, these results could be driven by latent firm characteristics or omitted correlated variables and might not indicate a causal effect of managerial ability on SCP. To address this potential endogeneity concern, we conduct 2SLS regression analysis using two instrumental variables and a difference-in-differences analysis using forced CEO turnovers.

4.1. Instrumental variable – Market for local talent

In this section, we analyse the causality of our identified relationship between managerial ability and SCP using the instrumental variables approach. For a variable to be considered an instrument, it needs to be related to managerial ability but unrelated to SCP. The first set of instruments considered is the availability of high-ability managers in the customer firm's local labour market. It is expected that greater availability of more able managers in the local labour market would increase the likelihood of a firm's directors considering more highly able managers in their hiring network, *ceteris paribus*. Cremers and Grinstein (2014) define outside CEO talent pools based on the number of local peer firms, defined as publicly traded firms in the same industry whose headquarters are within 100 miles of the subject firm's headquarters (based on the geographical measure from Coval and Moskowitz (1999, 2001)). The presence of more local peer firms would indicate that the subject firm would have greater availability of outside CEO talent to hire. There is no

Table 3
Baseline Results – Alternate Proxy for Supply Chain Power. This table reports the baseline regression results with regard to managerial ability and an alternative measure of supply chain power (SCP). The dependent variable in models 1–2 is Customer Firm Reliance, measured by the total purchases from all Compustat-listed manufacturing sector suppliers that record the current firm as (one of) their principal customer(s), as a proportion of Cost of Goods Sold of the customer firm. The key independent variable across models 1–2 is Managerial Ability, proxied by the MA-score developed by Demirijian et al. (2012). Standard errors are adjusted for heteroscedasticity and clustered at the firm and year level. P-values are in parentheses. Significance at the 10%, 5% and 1% level is indicated by *, **, and ***, respectively.

Dependent Variable	(1) Customer Firm Reliance	(2) Customer Firm Reliance
Managerial Ability	−0.0956***	−0.0325***
	(0.000)	(0.000)
Tobin's Q	0.0012	0.0016*
	(0.157)	(0.053)
Book Leverage	0.0142**	−0.0038
	(0.035)	(0.617)
Asset Tangibility	0.0132	0.0102
	(0.120)	(0.431)
Current Ratio	0.0051***	0.0002
	(0.000)	(0.820)
Firm Size	0.0134***	0.0027
	(0.000)	(0.163)
Constant	0.1478***	0.0426**
	(0.000)	(0.011)
Observations	10,093	9,596
Adjusted R-squared	0.0994	0.6026
Year FE	YES	YES
Industry FE	YES	NO
Firm FE	NO	YES

Table 4
Subsample Analysis (Durable versus Non-Durable Goods Manufacturer). This table reports the regression results of the subsample analysis of Durable and Non-Durable goods manufacturing major customer firms. The dependent variable in models 1–4 is the composite Supply Chain Power (SCP) index. Models 1 and 2 consider a sample of firms from the durable goods manufacturing sector (primary SIC from 3,400 to 3,990). Models 3 and 4 consider a sample of firms from the non-durable goods manufacturing sector (primary SIC from 2000 to 3,390). The key independent variable across models 1–4 is Managerial Ability, proxied by the MA-score developed by Demirijian et al. (2012). Standard errors are adjusted for heteroscedasticity and clustered at the firm and year level. P-values are in parentheses. Significance at the 10%, 5% and 1% level is indicated by *, **, and ***, respectively.

Dependent Variable: SCP Index	Durable Goods Sector		Non-durable Goods Sector	
	(1)	(2)	(3)	(4)
Managerial Ability	0.9651***	0.1644*	0.5806***	0.2652
	(0.000)	(0.092)	(0.000)	(0.126)
Tobin's Q	0.06441***	0.0306*	−0.0106	−0.0013
	(0.000)	(0.075)	(0.442)	(0.915)
Book Leverage	−0.1292	0.0771	0.1985	0.2720*
	(0.225)	(0.617)	(0.101)	(0.052)
Asset Tangibility	−0.0355	0.2121	−0.4971***	0.2344
	(0.773)	(0.379)	(0.002)	(0.372)
Current Ratio	−0.0203	−0.0262	0.0203	−0.0160
	(0.182)	(0.238)	(0.194)	(0.339)
Firm Size	0.3592***	0.4238***	0.5284***	0.7511***
	(0.000)	(0.000)	(0.000)	(0.000)
Constant	−3.1379***	−3.7033***	−4.0207***	−5.7910***
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	2,816	2,688	2,648	2,525
Adjusted R-squared	0.4522	0.6829	0.4967	0.7827
Year FE	YES	YES	YES	YES
Industry FE	YES	NO	YES	NO
Firm FE	NO	YES	NO	YES
Chow Test p-value	0.0185			

particular theory that links the availability of high-ability managers in the local labour market with a firm's supply chain network, satisfying the exclusion criterion for it to be considered a valid instrumental variable.[3] Based on this conjecture, we develop two instrumental variables that measure the market for local talent, the average managerial ability of executives in each Metropolitan State Area (MSA) and the outside CEO talent pool. We match the customer firm headquarters' zip codes in each MSA to find the average managerial ability for its geographical location. Following Cremers and Grinstein (2014), we use the Fama-French 48 industry group classifications and firm headquarters county address to develop the external CEO talent pool that is proxied by the number of local peer firms.

Table 5, models 1 and 2, report the results of the 2SLS regression analysis using average MSA Managerial Ability as the instrumental variable and models 3 and 4 report the 2SLS estimates using CEO talent pool as the instrumental variable. Columns 1 and 3 report the first stage regression outputs where the average MSA Managerial Ability and CEO talent pool is regressed against the dependent variable, managerial ability, with all control variables and the inclusion of year and industry fixed effects. Columns 2 and 4 report the second stage regression outputs with the fitted managerial ability as the key independent variable and SCP as the dependent variable. In these regressions, our instruments demonstrate a significant, positive coefficient. We conduct two diagnostic tests, i.e., the under-identification and weak instrument tests. Both, based on the critical values of Stock and Yogo (2005) and Cragg-Donald Wald F statistics, reject the null that the instruments are irrelevant and weak. The second stage regression results demonstrate a statistically significant, positive relationship between the instrumented managerial ability measure and SCP.

4.2. Instrumental variable - proportion of state population holding a college degree

Empirical evidence demonstrates a positive association between a CEO's education background and managerial ability (Berry et al., 2006; Chevalier and Ellison, 1999; Palia, 2000). A domestic matching bias persists in the CEO labour market, despite the prospect of hiring potential CEOs from overseas (Yonker, 2017). Consequently, we contend that a state-level demographic variable, College Degree, measured as the percentage of the state population where a firm is headquartered holding a college degree can serve as a reasonable proxy for the quality of the local CEO labour pool. It is highly unlikely to directly affect the SCP of a customer firm because it is a state-level demographic variable.[4] Nevertheless, to ease concerns that a college degree might capture the effect of other state-level variables that could affect SCP, we add the additional state-level control variables of per capita personal income, unemployment rate, house price and crime rate. We collect the state college degree data from the US Census Bureau, crime rate data from FBI Uniform Crime Reports website and the other state-level variables from St. Louis FED website. Because of a lack of available data before 2010 from these sources, our sample period for this test is 2010–2018, significantly reducing the number of firm-year observations to 2,614.

Table 6 reports the results of the instrumental variable 2SLS regressions. In model 1, we regress College Degree as the key independent variable along with all the control variables from the baseline analysis and the four state-level controls introduced in this section. The coefficients for College Degree are positive and statistically significant at the 5 % level and our diagnostic tests reject the null that the instrument is irrelevant and weak. In model 2, we regress the fitted values of managerial ability on SCP. The results show that coefficients of the fitted managerial ability remain positive and statistically significant at the 1 % level for both proxies. These results further add robustness to our prediction that more able managers gain significant SCP.

4.3. Difference-in-differences test – CEO forced turnover

We use a difference-in-differences test and exploit forced CEO turnover to address further endogeneity concerns affecting our baseline findings. If managerial ability truly captures the manager effect, then we expect to observe a change in SCP after a new CEO with a different managerial ability joins the firm. To examine changes in SCP arising from changes in managerial ability because of CEO turnover, we examine the following difference-in-differences regression estimate:

$$\Delta SCP3_{it} = \beta_0 + \beta_1 \Delta Managerial\_Ability3_{it} + \beta_2 Turnover_{it} + \beta_3 \Delta Managerial\_Ability3_{it} XTurnover_{it} + \Delta Controls_{it} + YEARFE + FIRM(INDUSTRY)FE + \varepsilon_{it}$$

where: subscripts i and t relate to firm and year, respectively. The dependent variable, ΔSCP3, is the difference between a major customer firm i's SCP in $t+1$ through $t+3$ and $t-3$ through t-1. ΔManagerial_ability3 is the difference between firm i's managerial ability score summed over $t+1$ through $t+3$ (representing the new CEO's ability) and $t-3$ through $t-1$ (reflecting the prior CEO's ability). Turnover is an indicator variable that equals one if a CEO had a forced turnover from firm i in year t and zero otherwise. Though we use the same control variables as in our baseline regression, in difference-in-differences we measure the difference in their values summed from $t+1$ through $t+3$ and $t-3$ through $t-1$. Using these differentiated controls helps us further isolate the manager-specific effect attributed to CEO turnover. In this difference-in-differences test, our identification strategy relies on the assumption that changes in managerial ability for firms with a forced CEO turnover are more likely to arise because of the change in the management team. For that purpose, the coefficient of the interaction term between ΔManagerial_ability3 and turnover captures the manager-specific effect on SCP following a forced turnover.

[3] We also ran regressions with SCP as the dependent variable and the instrumental variables as the independent variables. Untabulated results demonstrate no statistically significant relationships.

[4] We also find no significant relationship existing between SCP and the instrumental variable in separate untabulated regression estimates.

Table 5
Instrumental Variable – Market for Local Managerial Talent. This table presents the results of two-stage least-squares regression analysis using Average Metropolitan Statistical Area (MSA) Managerial Ability and Outside CEO Talent Pool as the instrumental variables. Model 1 and 3 presents the results from the first stage OLS regression analysis where managerial ability is the dependent variable. In model 2 and 4, the fitted managerial ability values from model 1 and 3 is used as an independent variable, respectively, with Supply Chain Power (SCP) as the dependent variable. Standard errors are adjusted for heteroscedasticity and clustered at the firm and year level. P-values are in parentheses. Significance at the 10%, 5% and 1% level is indicated by *, **, and ***, respectively.

Dependent Variable	(1) Managerial Ability	(2) SCP	(3) Managerial Ability	(4) SCP
Fitted Managerial Ability		5.4846***		3.8845***
		(0.000)		(0.000)
MSA Average Managerial Ability	0.5366***			
	(0.000)			
Outside CEO Talent Pool			0.0006***	
			(0.000)	
Constant	−0.2737***	−2.3006***	−0.1820***	−2.4096***
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	9,663	9,663	8,035	8,035
Adjusted R-squared	0.3197	0.3010	0.2962	0.2733
Controls	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES
	Statistics	p value	Statistics	p value
Cragg-Donald F-statistic	332.001	<0.10	80.790	<0.10
Hansen J Statistic	323.922	<0.10	80.822	<0.10

Table 6
Instrumental Variable – the Proportion of State Population Holding a College Degree. This table presents the results of two-stage lease-squares regression analysis using Proportion of State Population holding a college degree (College) as the instrumental variable. Model 1 presents the results from the first stage OLS regression analysis where managerial ability is the dependent variable. In model 2, the fitted managerial ability value from model 1 is used as an independent variable along with the control variables, with Supply Chain Power (SCP) as the dependent variable. Standard errors are adjusted for heteroscedasticity and clustered at the firm and year level. P-values are in parentheses. Significance at the 10%, 5% and 1% level is indicated by *, **, and ***, respectively.

Variables	(1) Managerial Ability	(2) SCP
Fitted Managerial Ability		5.6907***
		(0.000)
College Degree	0.0049**	
	(0.027)	
Tobin's Q	0.0291***	0.1249***
	(0.000)	(0.004)
Book Leverage	−0.0669**	−0.3615
	(0.010)	(0.151)
Asset Tangibility	−0.0180	−0.0071
	(0.687)	(0.978)
Current Ratio	0.0008	−0.0976**
	(0.872)	(0.018)
Firm Size	0.0309***	0.4093***
	(0.000)	(0.000)
Crime	−0.0279	−0.1489
	(0.276)	(0.520)
Unemployment	−0.0389	0.5043***
	(0.276)	(0.006)
Per Capital Income	1.5705	−5.0882
	(0.145)	(0.432)
Mean Housing Price	0.0017	0.2669
	(0.963)	(0.311)
Constant	−3.7239	−2.3006***
	(0.123)	(0.000)
Observations	2,614	2,614
Adjusted R-squared	0.2998	0.2513
Year FE	YES	YES
Industry FE	YES	YES
	Statistics	p value
Cragg-Donald F-statistic	13.341	<0.10
Hansen J Statistic	13.642	<0.10

Though the difference-in-differences method allows treated and control firms to be different (Roberts and Whited, 2013), to rule out effects generated from potentially correlated omitted variables, we select control firms using propensity score matching (PSM). We model the probability of a forced CEO turnover based on a logistic regression as a function of the control variables and managerial ability. We use a publicly available dataset for CEO departures in the S&P 1500 firms from 2000 to 2018 to identify forced CEO turnovers in our sample firms[5] (Gentry et al., 2021). We validate those forced CEO turnovers by crosschecking with press releases and news coverage.

Table 7, Panel A, presents the results from estimating the difference-in-differences regression using the full and PSM samples. The interaction term between ΔManagerial_ability3 and turnover remains positive and statistically significant for models 1–4 for the full and PSM samples, with year, industry and firm fixed effects. This implies that a new, more able CEO can gain more SCP than a less able predecessor. The coefficient of ΔManagerial_ability3 is also positive, signifying that incumbent CEOs with higher ability are positively associated with greater SCP.[6]

As a further robustness test, we conduct placebo tests. We assign a treatment dummy to the propensity score matched sample for one and two periods before and after the actual forced turnover event (Fake Turnover). Panel B presents the results where we interact the ΔManagerial_ability3 with fake turnover dummy one and two years before and after the actual turnovers for the full and the propensity score matched samples. The coefficients of these new interaction dummies remain insignificant in all the models of Panel B. The placebo test provides additional robustness to the importance of the exact timing of turnovers, further supporting our findings that more able managers improve a customer firm's SCP.

5. Cross-sectional analysis

5.1. CSR engagement

Socially responsible activities entice both suppliers and customers to form close linkages in a supply chain (Kim and Choi, 2018; Klassen and Vachon, 2003; Liu et al., 2021). The exchange of CSR engagement in a customer–supplier network impacts both parties. In many cases, customer firms influence suppliers to adopt certain CSR practices (i.e., comply with a customer's CSR codes of conduct or meet CSR-specific performance benchmarks), and protects their interests against potential supply chain scandals such as the Rana Plaza incident[7] in 2013 (Dai et al., 2021; De Bettignies and Robinson, 2018; Sinkovics et al., 2016). Studies show that a customer firm's CSR engagement is viewed positively by its suppliers because they consider such customers to be more trustworthy and capable of meeting financial obligations. In addition, suppliers view socially responsible customers positively for having higher growth prospects and providing an insurance-like protection in meeting payments against prospective negative shocks (Godfrey et al., 2009; Lev et al., 2010). Based on these arguments, we expect major customers managed by more able managers who undertake higher CSR activities gain higher SCP. To test this hypothesis, we estimate an OLS regression for the following model:

$$SCP_{i,t} = \beta_0 + \beta_1 High\_ManagerialAbility_{i,t} + \beta_2 NetCSR_{i,t} + \beta_3 High\_Managerial\_AbilityXNet\_CSR_{i,t} + Controls_{i,t} + YEARFE + FIRM(INDUSTRY)FE + \varepsilon_{i,t}$$

We use the MSCI ESG Kinder, Lydenberg and Domini (KLD) database to construct a customer firm's social performance by measuring its Net CSR engagement (Di Giuli and Kostovetsky, 2014; Flammer, 2015; Jiao, 2010; Zhang et al., 2020). The KLD database provides a score for a firm's social performance by evaluating its actions in seven dimensions: community, corporate governance, diversity, environmental protection, employee relations, product quality and human rights. We capture a firm's Net CSR score (i.e., strengths minus concerns) in five dimensions excluding the corporate governance and human rights (Jiao, 2010). Because of the varying number of indicators in each dimension across years, we first calculate the CSR strengths and concerns scores across the five dimensions as the ratio of strengths (concerns) values to the total number of strengths (concerns) indicators. The Net CSR score is calculated as the difference between the CSR strengths and CSR concerns scores. We construct the High Managerial Ability proxy as a dummy variable equal to 1 if a firm's managerial ability score in a particular year is in the top quartile across all firms. Because of the unavailability of data in the KLD database, merging these two datasets leave us with 6,518 firm-year observations.

Table 8, models 1–3, report the estimates of the channel effect based on the specified regression model with year and industry fixed effects; models 4–6 include year and firm fixed effects. We break down the full sample into two groups, one where the customer firm has a higher than or equal to the median CSR score and the other with lower than the median CSR score. Models 3 and 6 report the estimates for the full sample. Our variable of interest in this table is the interaction term between high managerial ability and net CSR score. The interaction term remains positive and statistically significant for the high CSR group and the full sample. However, the interaction is not significant for the low CSR group, with the coefficient even being negative in the model with year and firm fixed effects. These results indicate that when a major customer is involved in higher levels of socially responsible activities, top-tier

[5] CEO turnover data are available from - https://doi.org/10.5281/zenodo.4543893.

[6] We further investigate whether this relationship with the interaction effect holds without the change effect. Untabulated results demonstrate that the interaction between CEO forced turnover and managerial ability is positive and statistically significant in the models without considering the change effect, for both the full and the propensity score matched samples.

[7] The Rana Plaza collapse of 2013 led to the death of 1,138 workers, who were working for a readymade garment supplier of renowned fashion brands, i.e., Mango, Walmart and Primark. Non-compliance with building safety regulations was the primary reason for the incident, which led to the formation of several international compliance standards, i.e., the Accord and increased global focus on the social responsibility of supply chains.

Table 7
Difference-in-Differences Test – CEO Forced Turnover using a Propensity Score Matched (PSM) Sample. This table presents the results of CEO forced turnover analyses using a difference-in-differences design. The dependent variable is ΔSupply Chain Power (ΔSCP). Panel A presents the results from a difference-in-differences analysis estimating OLS regressions for both the propensity score matched sample and the full sample. Panel B presents the results of the placebo test for both the full and the matched sample. Standard errors are adjusted for heteroscedasticity and clustered at the firm and year level. P-values are in parentheses. Significance at the 10%, 5% and 1% level is indicated by *, **, and ***, respectively.

Panel A: Regression with full and PSM samples

Dependent Variable:	(1)	(2)	(3)	(4)
ΔSCP	Full Sample	PSM Matched Sample	Full Sample	PSM Matched Sample
ΔMASCORE3 X Turnover	0.9330***	0.5505**	0.5747***	0.6487*
	(0.000)	(0.049)	(0.000)	(0.095)
ΔMASCORE3	0.6899***	1.0242***	0.9838***	0.7992***
	(0.000)	(0.000)	(0.000)	(0.009)
Forced Turnover	−0.4781*	−0.4823*	−0.2575***	−0.4718***
	(0.090)	(0.085)	(0.000)	(0.001)
ΔTobin's Q	−0.0117	−0.0464***	−0.0353***	−0.0282
	(0.148)	(0.008)	(0.000)	(0.318)
ΔBook Leverage	−0.3317***	−0.5386***	−0.4605***	−0.2670
	(0.000)	(0.000)	(0.000)	(0.145)
ΔAsset Tangibility	−0.1485**	−0.3090**	−0.3127***	−0.2479
	(0.022)	(0.033)	(0.000)	(0.258)
ΔCurrent Ratio	−0.0999***	−0.2119***	−0.1447***	−0.2338***
	(0.000)	(0.000)	(0.000)	(0.000)
ΔFirm Size	0.0102**	0.0709***	0.0488***	0.0609***
	(0.013)	(0.000)	(0.000)	(0.000)
Constant	0.1316***	−3.1219	0.1084***	0.0178
	(0.000)	(0.206)	(0.000)	(0.867)
Observations	10,093	2,352	10,005	1,752
Adjusted R-squared	0.0863	0.1484	0.1115	0.3952
Year FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES
Firm FE	NO	NO	NO	NO

Panel B: Placebo Test – Full and PSM Sample

Dependent Variable: ΔSCP	Full Sample				PSM Sample			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ΔMASCORE3 X (Fake Turnover + 1 period)	0.2456				−0.5405			
	(0.440)				(0.315)			
ΔMASCORE3 X (Fake Turnover + 2 periods)		−0.2361				−1.0909		
		(0.430)				(0.187)		
ΔMASCORE3 X (Fake Turnover − 1 period)			0.4275				0.8797	
			(0.401)				(0.233)	
ΔMASCORE3 X (Fake Turnover − 2 periods)				1.1364				−1.1057
				(0.199)				(0.105)
Fake Forced Turnover + 1 period	0.0926				0.3155*			
	(0.303)				(0.081)			
Fake Forced Turnover + 2 periods		0.1179				−0.1951		
		(0.186)				(0.347)		
Fake Forced Turnover − 1 period			−0.2020				−0.1653	
			(0.123)				(0.283)	
Fake Forced Turnover − 2 periods				−0.0129				0.0244
				(0.884)				(0.852)
ΔMASCORE3	0.7691***	0.8398***	0.7627***	0.6803**	1.4385***	1.4316***	1.2621***	1.4379***
	(0.007)	(0.004)	(0.006)	(0.010)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	0.0696***	0.0636***	0.1051***	0.0838***	−0.1349**	−0.0188	−0.0692	−0.0941
	(0.000)	(0.000)	(0.000)	(0.000)	(0.021)	(0.811)	(0.228)	(0.134)
Observations	10,093	10,093	10,093	10,093	2,350	2,350	2,350	2,350
Adjusted R-squared	0.0795	0.0797	0.0804	0.0821	0.1399	0.0983	0.1386	0.1387
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Year and Industry FE	YES	YES	YES	YES	YES	YES	YES	YES

Table 8
Cross-sectional Analysis – CSR Engagement. This table reports the regression results with regards to firm's CSR engagement as the cross-sectional effect of managerial ability on supply chain power. The dependent variable in models 1–6 is the composite Supply Chain Power (SCP) index. High Managerial Ability is a dummy variable equal to 1 if the firm's MA-score in a particular year is in the top quartile across all firms, and 0 otherwise. The key independent variable in this table is the interaction between High Managerial Ability and Net CSR. Models 1 and 2 present the results for sample where the CSR value is above the median (High CSR) and below the median (Low CSR) value of CSR; model 3 presents the result for the full sample. Models 1–3 includes year and industry fixed effects. Models 4–6 repeats with the inclusion of year and firm fixed effects. Standard errors are adjusted for heteroscedasticity and clustered at the firm and year level. P-values are in parentheses. Significance at the 10%, 5% and 1% level is indicated by *, **, and ***, respectively.

Dependent Variable: SCP	(1) High CSR	(2) Low CSR	(3) Full Sample	(4) High CSR	(5) Low CSR	(6) Full Sample
High Managerial Ability X Net CSR	0.0709***	0.0493	0.0295**	0.0227**	−0.0279	0.0050*
	(0.002)	(0.187)	(0.024)	(0.048)	(0.244)	(0.095)
Net CSR	0.0405**	0.0333	0.0216*	0.0018	0.0196	0.0043
	(0.035)	(0.163)	(0.060)	(0.881)	(0.330)	(0.607)
High Managerial Ability	0.1246	0.4534***	0.4373***	0.0208	0.0861	0.1121**
	(0.419)	(0.000)	(0.000)	(0.818)	(0.106)	(0.019)
Constant	−4.5400***	−3.4089***	−3.7772***	−6.1675***	−5.1806***	−5.1801***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	2,454	4,064	6,518	2,185	4,061	6,246
Adjusted R-squared	0.4940	0.4862	0.5323	0.8199	0.7738	0.7899
Controls	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	NO	NO	NO
Firm FE	NO	NO	NO	YES	YES	YES

managers can gain significantly higher SCP over their supplier network.[8]

5.2. Corporate innovation

A number of studies have explored the effect of innovation externalities in the customer–supplier nexus. With regard to developing a new product, close collaboration between customer and supplier assists in building higher levels of trust, commitment and communication (Koufteros et al., 2005), leading to a shorter product development period, lower development costs and better product quality (Clark, 1989; Petersen et al., 2005). Economic links between customers and suppliers also play a crucial role. Research shows that positive innovation outputs of customer firms enhance their suppliers' profitability, mostly driven by knowledge diffusion from customer to supplier. Moreover, managerial ability has a positive association with corporate innovation success (Chen et al., 2015). It is thus reasonable to expect that suppliers will be motivated to form close links with major customers managed by more able managers to receive innovation externality benefits to improve their own future performance. Therefore, we expect major customers managed by more able managers to have higher corporate innovation performance to gain higher SCP. To test this hypothesis, we estimate the OLS regression for the following model:

$$SCP_{i,t} = \beta_0 + \beta_1 High\_ManagerialAbility_{i,t} + \beta_2 Corporate\_Innovation_{i,t} + \beta_3 High\_Managerial\_AbilityXCorporate\_Innovation_{i,t} + Controls_{i,t} + YEARFE + FIRMFE + \varepsilon_{i,t}$$

We use the total number of patents filed by a firm in a given year (Patent) and the total number of citations ultimately received from the patents filed during the given year (Citation) as two proxies to capture corporate innovation performance (Bernstein, 2015; Faleye et al., 2014; Hasan et al., 2020; Hirshleifer et al., 2012; Kogan et al., 2017). We collect firm-level patent and citation data from the KPSS database and set the patent and citation data to zero if the KPSS database does not report any patents or citations for a firm in a given year. We construct the High Managerial Ability proxy as a dummy variable equal to 1 if a firm's managerial ability score in a particular year is in the top quartile across all firms, and zero otherwise.

Table 9, models 1–3, report the estimates with the citation proxy of innovation and models 4–6 for the patent proxy. Models 1–6 include year and firm fixed effects. Models 3 and 6 consider the full sample, so we divide the sample into two groups, one where the customer firm has a higher than or equal median innovation (citations and patents) value and the other with lower than median innovation value. Our variable of interest in this table is the interaction term between high managerial ability and corporate innovation. We find the interaction variable remains positive and statistically significant for the high innovation (citations and patents) and the full sample. However, the interaction is not statistically significant for the low innovation sample and the coefficient is negative. These results indicate that, when a major customer has strong innovation performance with more citations and patents, top-tier managers can gain significantly higher SCP over the supplier network.[9]

[8] We also demonstrate that the effect of this cross-sectional test remains valid with the original continuous managerial ability measure, in untabulated regression estimates.

[9] We also demonstrate that the effect of this cross-sectional test remains valid with the original continuous managerial ability measure, in untabulated regression estimates.

Table 9
Cross-sectional Analysis – Corporate Innovation. This table reports the regression results with regard to a firm's innovation performance as the cross-sectional effect of managerial ability on supply chain power (SCP). The dependent variable in models 1–6 is the composite SCP index. Innovation is measured through two proxies: log (1 + Citations) and log (1 + Patents). High Managerial Ability is a dummy variable equal to 1 if the firm's MA-score in a particular year is in the top quartile across all firms, and 0 otherwise. The key independent variable in this table is the interaction between High Managerial Ability and Innovation proxies. Models 1–3 consider the innovation citation proxy and models 4–6 consider the innovation patent proxy. Models 1–2 and 4–5 present the results for the sample where the innovation citations and patents proxy value is above and below the median values; model 3 and 6 presents the result for the full sample. Standard errors are adjusted for heteroscedasticity and clustered at the firm and year level. P-values are in parentheses. Significance at the 10 %, 5 % and 1 % level is indicated by *, **, and ***, respectively.

	Innovation - Citation			Innovation - Patent		
Dependent Variable: SCP	(1)	(2)	(3)	(4)	(5)	(6)
	High Citation	Low Citation	Full Sample	High Patent	Low Patent	Full Sample
High Managerial Ability X Log (1 + Innovation)	0.1539***	0.0329	0.0560***	0.2310***	−0.0304	0.0926***
	(0.000)	(0.233)	(0.001)	(0.000)	(0.352)	(0.000)
Log (1 + Citations)	0.0071	0.0310*	0.0229**			
	(0.617)	(0.051)	(0.021)			
Log (1 + Patents)				0.0772***	−0.0133	0.0421***
				(0.000)	(0.503)	(0.000)
High Managerial Ability	0.2044***	0.4831***	0.4294***	0.2647***	0.4837***	0.3438***
	(0.003)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Constant	−3.5690***	−3.2810***	−3.4334***	−3.5624***	−2.9085***	−3.2581***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	3,516	6,233	9,749	4,052	5,697	9,749
Adjusted R-squared	0.5677	0.4924	0.5177	0.5926	0.4870	0.5227
Controls	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES

5.3. The impact of managerial ability and supply chain power in extracting trade credit

We acknowledge that, within complex supply chain networks, firms simultaneously operate both as suppliers and customers of trade credit. Studies show that more upstream firms borrow more from suppliers and lend more to customers (Gofman and Wu, 2022). In this context, more able managers in customer firms with greater SCP should be able to extract more trade credit from their suppliers. To test this proposition, we estimate the OLS regression for the following model:

$$Trade\_Credit_{i,t} = \beta_0 + \beta_1 High\_ManagerialAbility_{i,t} + \beta_2 SCP_{i,t} + \beta_3 High\_Managerial\_AbilityXSCP_{i,t} + Controls_{i,t} + YEARFE + FIRM(INDUSTRY)FE + \varepsilon_{i,t}$$

We consider Accounts Payables to Total Assets (AP/TA) as the proxy for trade credit received by a major customer. Firm-level trade credit data are from Compustat. We construct the High Managerial Ability proxy as a dummy variable equal to 1 if a firm's managerial ability score in a particular year is in the top quartile across all firms and zero otherwise.

Table 10 reports the estimates of our regression models. Models 1–3 report the estimates with year and industry fixed effects and models 4–6 include year and firm fixed effects. We split the sample into two groups based on the median SCP values. Models 3 and 6 consider the full sample. Our variable of interest in this table is the interaction between high managerial ability and SCP. Except for models 2 and 5 with the low SCP sample, the interaction term is positive and statistically significant. This indicates that more able managers in the top quartile of managerial ability who have more SCP, can secure greater trade credit from their suppliers.[10]

6. Conclusion

This paper examines the role of managerial ability in major customer firms in securing greater bargaining power over their supplier network. Our study adds to the literature on the resource-based view of the firm. According to that theory, firms seek control over their bundle of resources to achieve a sustainable competitive advantage (Barney, 1991; Rungtusanatham et al., 2003). The ability of the managers to use firm resources are heterogenous, therefore more able managers should be able to bundle and deploy resources in a much superior manner (Hansen et al., 2004; Lippman and Rumelt, 2003). Our results provide empirical proof that managers with significant control over their suppliers can facilitate an efficient sourcing flow from the suppliers (Rungtusanatham et al., 2003). We provide consistent evidence that more able managers are associated with greater SCP. The effect is stronger for customer firms in the durable goods manufacturing sector because of their unique source needs and closer links with their supplier network. Our results are robust to endogeneity concerns potentially arising from omitted variables, mitigated through 2SLS regressions using instrumental variables. In addition, our results hold for the full and propensity score matched samples in difference-in-differences tests using forced

[10] We also demonstrate that the effect of this consequential analysis remains valid with the original continuous managerial ability measure, in untabulated results.

Table 10
Impact of Managerial Ability and Supply Chain Power in Extracting Trade Credit from Suppliers. This table reports the regression results with regard to a firm's supply chain power (SCP) and managerial ability in extracting trade credit from its suppliers in the form of accounts payable. The dependent variable in models 1–6 is Accounts Payable scaled by Total Assets (AP/TA), as the proxy for trade credit received from a firm's suppliers. High Managerial Ability is a dummy variable equal to 1 if the firm's MA-score in a particular year is in the top quartile across all firms and 0 otherwise. The key independent variable in this table is the interaction between High Managerial Ability and SCP. Models 1–2 and 4–5 present the results for the sample where the SCP value is above the median (High SCP) and below the median (Low SCP) value respectively, and model 3 and 6 presents the result for the full sample. Models 1–3 include year and industry fixed effects and models 4–6 include year and firm fixed effects. Standard errors are adjusted for heteroscedasticity and clustered at the firm and year level. P-values are in parentheses. Significance at the 10%, 5% and 1% level is indicated by *, **, and ***, respectively.

Dependent Variable: AP/TA	(1) High SCP	(2) Low SCP	(3) Full Sample	(4) High SCP	(5) Low SCP	(6) Full Sample
High Managerial Ability X SCP	0.0056***	0.0031	0.0070***	0.0020**	0.0007	0.0013*
	(0.002)	(0.235)	(0.000)	(0.071)	(0.640)	(0.078)
SCP	0.0098***	0.0199**	0.0080***	0.0042***	0.0053	0.0034***
	(0.000)	(0.032)	(0.000)	(0.000)	(0.447)	(0.000)
High Managerial Ability	0.0262***	0.0395	0.0201***	0.0093***	0.0162	0.0251***
	(0.000)	(0.129)	(0.000)	(0.000)	(0.282)	(0.000)
Constant	0.4132***	0.2880***	0.3250***	0.3049***	0.2600***	0.3365***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	4,918	4,823	9,741	4,748	4,254	9,002
Adjusted R-squared	0.5755	0.3845	0.4796	0.9018	0.8270	0.8728
Controls	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	NO	NO	NO
Firm FE	NO	NO	NO	YES	YES	YES

CEO turnover. Further tests reveal that the relationship is stronger for major customers engaged in socially responsible activities and with higher corporate innovation performance. We demonstrate that more able managers in major customer firms possessing higher than median SCP can extract comparatively more trade credit from their suppliers than lower SCP customers. These findings provide an outlook on how managers looking to efficiently extract and manage resources, can do so by putting importance in securing a well-diversified network of dependent suppliers.

Conflict of interest statement

No potential conflict of interest is reported by the authors.

CRediT authorship contribution statement

G M Wali Ullah: Conceptualization, Data curation, Writing – original draft, Formal analysis, Methodology. **Juan Luo:** Writing – review & editing, Investigation, Supervision. **Alfred Yawson:** Conceptualization, Writing – review & editing, Validation, Supervision.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: G M Wali Ullah reports financial support was provided by The University of Adelaide.

Data availability

The authors do not have permission to share data.

Appendix 1

Table A1
Variable Definitions.

Variable	Formula/derivation	Data Source
Firm-level Variables		
NUMSAPP	Logarithm of one plus the number of suppliers who identify the customer as a major customer (capturing 10 %, or more, of supplier's total sales).	Compustat customer-segment file

(*continued on next page*)

Table A1 (*continued*)

Variable	Formula/derivation	Data Source
SDISPERSION	$SDISPERSION_{it} = 1 - \sum_{s=1}^{N}\left(\frac{SUPP_{st}}{TOTALSUPP_{it}}\right)^2$ Where, $SUPP_{st}$ is the dollar value of inputs sourced by firm i from supplier s in period t and $TOTALSUPP_{it}$ is the total dollar value of inputs sourced by firm i in period t.	Compustat customer-segment file
MKTPOWER	We first calculate the Lerner index as operating profits (before depreciation, interest, special items and taxes) over sales. Then we define $SPOWER_{it}$ as: $SPOWER_{it} = 1 - \sum_{s=1}^{N}\left(\frac{SUPP_{st}}{TOTALSUPP_{it}} \times LINDEX_{st}\right)$ Then, we define MKTPOWER as $\log(1 + SPOWER_{it})$. Here, $\frac{SUPP_{st}}{TOTALSUPP_{it}}$ is the fraction of input sourced from supplier s by firm i in period t.	Compustat customer-segment file
Supply Chain Power (SCP)	SCP is constructed as the first principal component based on a principal component analysis (PCA) using NUMSAPP, SDISPERSION and MKTPOWER.	Constructed by the authors
Customer Firm Reliance	Total purchases from all Compustat-listed manufacturing sector suppliers that record the current firm as (one of) their principal customer(s), as a proportion of Cost of Goods Sold of the customer firm.	Compustat
Managerial Ability	MA-score developed by Demirjian et al. (2012) through a DEA-based methodology. Data are made available at the author's personal website - https://peterdemerjian.weebly.com/managerialability.html	Author personal website
Size	Natural logarithm of total assets	Compustat
Cash Ratio	Total cash to total book value of assets	Compustat
R&D to Sales	Research and development expenses to total sales	Compustat
Return on Assets (ROA)	Operating income before depreciation to the total book value of assets	Compustat
Leverage	Long-term (total) debt plus current (total) liabilities to the total book value of assets	Compustat
Asset Tangibility	Net property, plant and equipment/total assets	Compustat
CAPEX Ratio	Capital expenditure to the total book value of assets	Compustat
CEO Tenure	Natural logarithm of the number of years as CEO of the firm	Execucomp
Net CSR	CSR strengths and concerns scores across five dimensions in the KLD database (community, diversity, environmental protection, employee relations and product quality) are calculated as the ratio of strengths (concerns) values to the total number of strengths (concerns) indicators. Afterwards, Net CSR is calculated as the difference between CSR strengths score and the CSR concerns score.	MSCI KLD
Corporate Innovation (Patent)	Natural logarithm of one plus the total number of patents a firm filed in a filing year	KPSS
Corporate Innovation (Citation)	Natural logarithm of one plus the total number of citations a firm received from the patents it filed in a filing year	KPSS
R&D Input	R&D scaled by book assets.	Compustat
Trade Payable (AP/TA)	Accounts payable to total assets	Compustat
State-level Variables		
College	The percentage of the population holding a college degree in the US state where a sample firm is headquartered	US Census Bureau
Per Capita Personal Income	The natural log of annual per capita personal income in a given US state	St. Louis FED
Unemployment Rate	Average unemployment rate (in percentage) over the 12 months in a given year for a given US state	St. Louis FED
House Price Index	Average all-transactions house price index over the four quarters in a given year for a given US state. The index equals 100 in the first quarter of 1980.	St. Louis FED
Crime Rate	The natural log of total number of reported crimes per 100,000 people in a given year for a given US state.	FBI Uniform Crime Reports
Country-level Variables		
Unemployment Rate	Unemployment rate refers to the share of the labour force that is without work but available for and seeking employment.	World Bank
Inflation Rate	Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used.	World Bank
GDP Growth	Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2015 prices, expressed in U.S. dollars.	World Bank

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