Outsourcing Flexibility under Financial Constraints

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ABSTRACT

We develop the notion of outsourcing as providing flexibility overcoming financial constraints and provide empirical evidence concerning the role of flexibility on the likelihood and value of outsourcing. The results show that the likelihood of outsourcing is higher, the greater the firm's financial constraints before outsourcing (or the less its financial flexibility). The effect of financial flexibility on the probability of outsourcing is greater, the lower the ex-ante operational flexibility, implying substitutability between financial and operational flexibility. We also find that the market valuation of outsourcing announcements is positive due to net flexibility gains and that such ex post valuation is positively related to ex ante financial constraints. Our findings are consistent with the notion that outsourcing is a vehicle for flexibility acquisition and that financial constraints play a prominent role in such acquisition.

JEL classification: G14; G34; F23
Keywords: Outsourcing, real options, financial constraints, operational flexibility, boundaries of the firm

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1. Introduction

A key implication of real options theory (e.g., see Myers, 1977; McDonald and Siegel, 1986; Pindyck, 1988; Dixit, 1989; Trigeorgis, 1996) is the importance of flexibility in corporate investment strategy.[1] The theory suggests that a firm's ability to adapt is critical in changing market conditions. Such flexibility is partly driven from the irreversibility of large physical investments and the firm's desire to remain flexible under market uncertainty conditions. ROT has been applied to various organizational issues such as joint ventures (Reuer and Tong, 2005), multinational network flexibility (Kogut and Kulatilaka, 1994; Ioulianou et al., 2017), ownership strategy (Li and Li, 2010), and other strategic considerations (see the critical survey by Trigeorgis and Reuer 2017). Triantis and Hodder (1990) and Trigeorgis (1993) have examined conditions when flexibility is value-enhancing in situations involving a complex set of strategic and operating options. Predominantly, the notion of flexibility employed in existing work involving ROT has been operational in focus or involved strategic growth flexibility, and focused less on financial flexibility and financial constraints.

The importance of financial flexibility has been well-recognized in the corporate finance literature. For instance, Denis and McKeon (2012) find that financial flexibility, meaning the lack of financial constraints, plays an important role in the capital structure choice. Gamba and Triantis (2008) develop a dynamic model where the value of financial flexibility depends on the costs of external financing, the firm's growth potential, and the reversibility of capital. A global survey of Chief Financial Officers by Campello, Graham and Harvey (2010) finds that financial constraints significantly influence CFO ability to invest in

[1] For additional early work on real options, see Triantis and Hodder (1990), Trigeorgis (1993), and Bernardo and Chowdhry (2002).

attractive investment opportunities during the financial crisis of 2008, underscoring the importance of financial flexibility under constraints.

In this paper, we analyze the role of financial flexibility or financial constraints in the context of outsourcing decisions by U.S. firms while controlling for operational flexibility. We use a set of outsourcing deals by publicly-traded U.S. firms during the 22-year period from January 1, 1995 to December 31, 2016. We explicitly examine whether there is an underlying substitute relationship between financial flexibility and operational flexibility in the context of outsourcing. This is related and extends the work of Choi et al. (2018) who focus on the role of operational flexibility in the context of offshore outsourcing. Past studies, primarily based on transaction cost economics (Williamson, 1975, 1979) and resource-based theory (Barney, 1991; Teece, Pisano and Shuen, 1997), treat outsourcing as part of broader organizational strategies affecting the boundaries of the firm (e.g., Coase, 1937; Williamson, 1975). As such, common motives for outsourcing include the desire to reduce transaction or operational costs (Williamson, 2008) and to acquire competences (Kotabe and Murray, 1990). Given that ROT emphasizes the role of uncertainty and the value of flexibility, its application to the outsourcing context is well-justified (Leiblein, 2003; Nembhard, Shi, and Aktan, 2003).

Outsourcing is widely adopted by firms as a competitive strategic vehicle in unpredictable market environments. Hewlett-Packard, for instance, makes some products that require key technologies in-house, but outsources many of its other products and services such as printers and servers (Businessweek, 2005). Dell focuses on component integration, distribution, and marketing with virtually no production in-house (Quinn, 2000). At Procter & Gamble, more than 35% of all new product lines come from outside the firm (Huston and Sakkab, 2006). It is not only low-tech commodity products and simple services that are

outsourced but also facilities involving complicated technologies and cutting-edge innovations. An executive at Unisys Corps underscored that outsourcing "can offer companies the flexibility to quickly change technology as their needs change" (*Wall Street Journal*, 2007).

We develop the notion of an outsourcing decision being viewed as a switching real option and present empirical evidence concerning the likelihood and value of outsourcing flexibility under financial constraints. Without such financial constraints, outsourcing can essentially be viewed as a choice between in-house production and contracting with a partner firm. Outsourcing flexibility allows for the contract to be altered, terminated or renewed at expiration, or to switch suppliers. In effect, outsourcing is a real option that enables the firm to switch to alternative time-dependent investment paths and contingent decisions depending on how future market uncertainty evolves. Under constraints, financial flexibility matters also through its interaction with operating flexibility, thereby impacting the likelihood and value of outsourcing.

We posit that outsourcing is more likely to take place when a firm is facing financial or operational difficulties. Outsourcing can be one of a few restructuring strategies during times of financial difficulty and can allow managers to engage in the strategic use of debt to improve its bargaining position with labor (e.g., Matsa, 2010). Our focus is on whether and how *ex ante* financial flexibility (the reverse of pre-outsourcing financial constraints) relates to the likelihood and value of outsourcing. We also consider whether and how operational flexibility might influence or interact with the impact of financial flexibility.

Our study makes several contributions to the literature. Our study is the first that examines a real options view of outsourcing under financial constraints. As such, pre-outsourcing financial constraints *quo ante* is an antecedent of the likelihood of outsourcing as well as its consequences on market valuation. Second, we show that financial and operational flexibility are partial substitutes; that is, the effect of

financial flexibility (or constraints) on the likelihood and value of outsourcing is moderated by operational flexibility. As such, the effect of financial flexibility on value gains is greater when pre-outsourcing operational flexibility *quo ante* is lower. Third, we document the market valuation effect of outsourcing given financial constraints. Finally, we help advance the real options notion that outsourcing can serve as a vehicle for flexibility acquisition and that this extends to the case when financial constraints are present.

The rest of the paper proceeds as follows. The next section develops our testable hypotheses. Then we describe the sample and data characteristics and our empirical methodology. Subsequently, we present our empirical results, while the last section concludes.

2. Background and Development of Hypotheses

2.1 Outsourcing as a real option

Flexibility and real options is a way of coping with market uncertainty, rather than investing in costly, irreversible, and often rigid real assets that limit future investment decisions (Bowman and Hurry, 1993; Trigeorgis, 1996). Ioulianou et al. (2017) provide evidence that managerial awareness of the firm's real options can enhance firm value in multinational operations. For a recent review of the role of flexibility and real options in strategic management decisions, see Trigeorgis and Reuer (2017).[2]

From a real options perspective, flexibility can provide significant benefits to outsourcing. Beyond obvious cost savings from outsourcing to lower-cost suppliers, outsourcing can free up financial resources that can be invested in more value-creating activities within the firm (Bryce and Useems, 1998). In an

[2] Without relying on ROT, other scholars have pointed to the importance of flexibility and operating leverage, respectively, in coping with external shocks (Kotabe and Mol, 2009) or in generating excess return (Novy-Marx (2011).

uncertain business environment, outsourcing may also allow firms to be more agile and access new technologies and knowhow compared to in-house production (Jiang, Belohlav, and Young, 2007). As Gilley, Greer, and Rasheed (2004) explicate, outsourcing should not be viewed narrowly in terms of procurements; rather it can provide a multitude of strategic and operating options that can be exercised contingent on the resolution of future uncertainty.

ROT generally posits that firms benefit from flexibility to dynamically adjust their future investment decisions according to changing market conditions (e.g., Dixit and Pindyck, 1994; Kogut, 1991; Trigeorgis, 1996). Outsourcing creates value partly because it provides the flexibility to stage, cancel, and scale up or down the firm's internal versus external operations depending on changing market conditions. Flexibility is maintained until the contractual option is acted upon or the contract expires (if not extended). Sanchez (1993: 254-255; 1995: 138) argues that "in dynamic environments a firm can achieve competitive advantage by creating strategic flexibility in the form of alternative courses of action – or strategic options – available to the firm for competing in product markets".

A firm typically faces different types of uncertainty, such as a decline in demand due to competition or technological change, an upsurge or stickiness in input prices, asset specificity, adjustment costs and delays, imperfect information, and so forth. In such situations, it may be preferable to avoid making commitment to large fixed capacities upfront. An outsourcing agreement may allow the firm to avoid the trap of getting stuck with high fixed costs. Given high demand uncertainty, replacing inflexible in-house activities with flexible outsourcing contracts may allow the firm to make quicker and more flexible adjustments. In effect, outsourcing decisions can change such fixed cost investments into flexible production arrangements by attaining an adjustable contractual relationship with compatible outsourcing

partners (Jiang et al., 2007).[3] In case future market demand falls, for example, an outsourcing contract can be let expire without being renewed. Costs can be contained to the costs of getting into the outsourcing arrangement, such as partner search, contract negotiation, setting up initial facilities, training external crews, etc. In an up market, the contract can be renewed and even be scaled up. External suppliers can provide needed supplies possibly at a lower cost. More flexible production decisions in an outsourcing arrangement can be a potent source of value creation (Bowman and Hurry, 1993). Outsourcing also "allows firms to transfer the risk of changes in production as well as responsibility for future capital outlays to intermediate markets" (Holcomb and Hitt, 2007: 470). By contrast, in-house committed production is more difficult to downsize given the high fixed costs of letting go permanent employees and abandoning internal operations. These costs include severance pay, the cost of dealing with labor unions, and the loss due to the illiquidity of certain firm-specific assets.

Outsourcing can thus be viewed as a decision to enter an interim external contract with subsequent investments subject to renewal, modification or cancellation, and the benefit of gathered experience from the supplier relationship. The outsourcing decision involves a choice between outright in-house production commitment and contractually-adjusted future investment plans at a fixed contract price. Since the firm has a right to extend, scale up or down or cancel the outsourcing contract under specified conditions, it acquires valuable flexibility. The outsourcing firm can condition its strategic investments on the successful outcome of earlier interim decisions as well as external fluctuating demand or supply conditions. With flexible

[3] The firm may be better off to make a small initial investment at a limited cost to help assess the nature of risk and future contingent prospects by forming a more informed view of evolving investment attractiveness. The firm in effect can enter into a fixed-price term contract opening up strategic options at a specific premium.

contractual outsourcing provisions, the firm can mitigate downside risk while retaining potential upside gains via staged, scale-adjusted decisions. In this sense, outsourcing increases firm value as it gives the firm an option to grow in favorable market conditions but scale down or avoid additional investment in unfavorable conditions. The outsourcing decision payoff is asymmetric with full potential gains in an up market and limited loss in a down market. Accordingly, we expect the market will positively recognize the value of flexibility due to outsourcing. In a way, outsourcing is like a call option owned by the focal firm on the purchase of outsourced activities at a fixed contract price that expires at the maturity of the underlying contract (with an extension option). A binary option payoff schedule for outsourcing is shown in Appendix 1 for illustration.

The above discussion justifies the incentive of potential flexibility value acquisition via outsourcing. We posit that the flexibility value of outsourcing is recognized in the market's reactions to outsourcing announcements. This is a preliminary, base hypothesis intended to confirm that our sample behaves as expected, prior to our main analysis on the effect of financial constraints on the likelihood and value of outsourcing.

H1: (market value) The market value of outsourcing will be positive, as manifested in cumulative abnormal returns surrounding outsourcing announcements.

2.2 Financial constraints

There is wide agreement in the literature that the financial conditions of a firm or its financial flexibility is an important determinant of its investment behavior. Denis (2011) argues that decisions on financial policies should preserve flexibility to respond to adversity at times of insufficient resources. Denis and Sibilkov (2010) find evidence that, for financially constrained firms, liquidity in the form of cash

holdings can be a value-enhancing alternative to costly external financing. Gamba and Triantis (2008) develop a dynamic model where financial flexibility mitigates the underinvestment problem due to lack of financing, partly due to the irreversibility of capital. Luo (2011) finds that financially constrained firms outperform relative to unconstrained firms after controlling for governance; this suggests that financial constraints may substitute for good governance in disciplining firm managers at times of cash shortage.

Trigeorgis (1993) argues that a firm or a project often involves multiple real options which may interact, typically involving substitutability or functional redundancies, which often results in their combined option value being less than the sum of individual option values. It is similarly plausible that operational flexibility may also interact with financial flexibility in a substitutable capacity. Gamba and Triantis (2008) find that high cash levels increase firm value when there are growth options and high external financing costs. Aabo, Pantzalis, and Park (2016) find that financial constraints diminish the impact of multinationality on growth options, and that the operational flexibility associated with multinationality accrues fully only if a firm is not financially constrained. Ioulianou et al. (2017) provide evidence that multinational flexibility can create value for less financially constrained firms.

We here argue that financial flexibility can be acquired by outsourcing agreements and that outsourcing flexibility creates more value for financially constrained firms. Bryce and Useems (1998) suggest that use of outsourcing by a firm may help alleviate the tightness of financial resources so that it can invest more effectively in value-creating activities within the firm. Thus, financial constraints or difficulties *quo ante* can induce more outsourcing. However, outsourcing is subject to resistance by labor. Thus, firms may engage in the strategic use of debt to improve their bargaining position vis-à-vis labor

(Bronars and Deere, 1991: Matsa, 2010; Agrawal and Matsu, 2013). In the context of real switching options, variables related to labor strength can be viewed as a form of switching cost. Thus we hypothesize that there is a connection between the likelihood of outsourcing and the financial constraints facing the firm *ex ante* before outsourcing.

H2: (outsourcing likelihood) The likelihood of outsourcing is higher, the greater the degree of ex ante financial constraints (or the lower the ex-ante financial flexibility) before outsourcing.

Given the presence of multiple interacting real options within the firm, the firm's operational flexibility due to real options will likely also interact with the degree of its financial flexibility or financial constraints. In this case, the value creation from outsourcing is related to the breadth or spectrum of acquired flexibility including operational and financial flexibility. *Ex-ante*, financial constraints can induce more outsourcing. *Ex post*, outsourcing creates financial (as well as operational) flexibility that may impact value positively. Moreover, the incremental value of financial flexibility depends on (or is moderated by) the degree of operational flexibility.

Lambrecht (2017) reviews real options in the firm's strategic growth decisions (such as market entry modes) and in its corporate finance choices (such as cash levels and liquidity). Gamba and Triantis (2008) show that financial flexibility is valuable since it mitigates underinvestment problems caused by lack of financing opportunities. Goto et al. (2017) consider the strategic market entry of a leader and a follower operating in an economy that switches back and forth between booms and busts, where the two firms' real operational options interact with their financial conditions. Aabo et al. (2016) and Ioulianou et al. (2017) find that financial constraints lower the value of operational flexibility afforded by multinationality: the effect of operational flexibility is realized if there are little or no financial constraints.

We hypothesize a similar interactive effect among financial constraints and operational flexibility in terms of the likelihood and value of outsourcing.

H3: (interaction of financial and operational flexibility) The effect of ex ante financial constraints on the likelihood of outsourcing is greater, the lower the level of ex ante operational flexibility.

Flexible outsourcing decisions are positively affected by external uncertainty. When the future is rather predictable, firms would benefit by having full control via internalizing transactions and efficiency as flexibility is of little value. When external uncertainty is high, flexibility can generally add more value. According to Bowman and Hurry (1993: 767), "[t]he more volatile the opportunity, the more an organization stands to gain (or the less it risks losing) by holding the option." Under uncertainty, leaving options open and being flexible is key. Financial flexibility is enhanced by outsourcing decisions since outsourcing allows freeing fixed investments for a more flexible contractual relationship (Gilly and Rasheed, 2000). According to Lee Ayling, a partner in KPMG's outsourcing division, financial flexibility is a key driver of outsourcing (Financial Times, 2012). Further, sale of assets that formerly supported a currently outsourced function can improve a company's cash flow. For the above reasons, we expect that *ex ante* financial constraints will have a positive impact on the market value of outsourcing.

H4: (financial flexibility acquisition) The market value of outsourcing depends positively on the degree of ex ante financial constraints facing the firm, ceteris paribus.

3. Sample and Variable Construction

3.1 Sample

Information on outsourcing events was obtained from *Wall Street Journal (WSJ)* articles in the Factiva database. Keyword search in the headline used the following search terms: "outsourcing," "outsource," or "contract." The time period of study is the 22-year period from January 1, 1995 to December 31, 2016.[4] We obtained 402 initial event observations on outsourcing announcements by publicly-traded U.S. headquartered firms and foreign firms traded in US stock exchanges. Of these, 74 observations were eliminated due to unavailability of essential firm or event information, such as the first date of outsourcing announcement, firms' daily stock price data in CRSP and key financial statement data in COMPUSTAT. We screen out 8 cases which also involved other important corporate announcements (e.g., lawsuits, strikes, layoffs, M&As, earnings, dividends) that could contaminate the market reaction to outsourcing announcements. For this, we searched the *WSJ* for confounding news items for time window (-10, +10). The actual event day is typically one day prior to the date the event is reported in the *WSJ*. We limited the analysis to U.S. outsourcing firms with complete data, removing 47 announcements by foreign firms. Our final data consists of 273 U.S. outsourcing events (mostly unique firms, although some firms have multiple outsourcing announcements). We further identified their counterpart firms, which were the outsourcing contract receivers associated with the 273 outsourcing cases. 198 counterpart firms were obtained. Many counterpart firms have received more than one outsourcing contracts from different outsourcing firms in our sample.

[4] According to NBER, this represents a period of full business cycle from growth, peak, recession, trough and recovery (http://www.nber.org/cycles.html).

Table 1 shows the distribution of outsourcing events by industry over the period 1995-2016. Five industries have more than 20 outsourcing events: construction; manufacturing; transportation and communication; business services; and finance, insurance and real estate. Concentration of outsourcing in the manufacturing industry (70 out of 273) and in transportation and telecommunications (66) suggests industry clustering (e.g., Zhu, Hsu and Lillie, 2001). Perusal of outsourcing event stories indicates that the types of outsourcing range from computer components manufacturing and IT services, to accounting and transportation, as well as R&D and procurements. Some counterpart firms received more than one outsourcing contracts from different outsourcing firms.

[Insert Table 1 here]

In our logistic estimation for the likelihood of outsourcing, the event sample is augmented by the matching control sample. The matching sample is constructed using COMPUSTAT firms from the same four-digit industry that do not have outsourcing activities during the same fiscal year, with the closest firm size to the outsourcing firms.

3.2 Variable construction

3.2.1 Financial flexibility

Our main variable of interest is financial flexibility. Rather than measuring financial flexibility directly, we use two standard measures of financial constraints as being the reverse of financial flexibility. Kaplan and Zingales (KZ, 1997) show that estimated cash flow sensitivities are greatest among firms that are least financially constrained. The KZ index is based on classification of a firm's financial characteristics based on five readily available accounting-based measures (cash flow, market value, debt, dividends, and cash holdings, each scaled by total assets). Lamont, Polk, and Saa-Requejo (2001) estimate an ordered logit

model relating the degree of financial constraints to components. The KZ index loads positively on market-to-book and leverage ratios, and negatively on cash flow, dividends and cash holdings. A higher KZ index value implies a firm is more financially constrained. Hadlock and Pierce (HP, 2010) augment the classification of Kaplan and Zingales (1997) with qualitative information to create their own index of financial constraints. The HP index loads negatively on size and age (hence sometimes called the SA index), and positively on size-squared, where size is the natural log of inflation-adjusted book assets, and age is the number of years a firm is listed with a non-missing stock price on COMPUSTAT. In sum, both high KZ index and high HP index are measures of financial constraints, therefore their high values indicate lower financial flexibility.[5]

3.2.2 Operational flexibility

While flexibility is a key tenet of real option theory, it can take several forms (that may be substitutes) and its measurement is rather difficult.[6] In this paper, we focus on financial flexibility and its interactions with operational flexibility.

For proxies of operational flexibility, we consider an organization's infrastructure (non-labor cost) to support growth and to provide the general resources needed for exercising growth options, as well as the labor cost. Following Chen, Kacperczyk, and Ortiz-Molina (2011), we use a measure of operating leverage, proxied by the sum of a firm's labor-related cost and non-labor or infrastructural cost measured by Sales,

[5] We further used the ranked KZ index from 0-9 for firms in each industry for the same fiscal year as an alternative measure of financial flexibility, with no appreciable difference in results.

[6] Some researchers, for example, such as Kulatilaka and Marks (1988) and Kogut and Kulatilaka (1994), discuss strategic or operational flexibility. Trigeorgis (1996) expounds that both strategic growth flexibility and operational flexibility embrace various forms of flexibility available to the firm.

General and Administrative Expenses, (COGS+SGA), divided by sales. Second, we use the labor component of the above measure, namely staff expenses (XLR) divided by sales. Finally, we also use the number of business segments as an alternative proxy for operational flexibility since a greater number of business segments allows greater operational freedom to switch or move across business segments within the firm.

3.2.3 Controls

As noted, a key control variable driving the value of real options and hence outsourcing flexibility is the degree of external uncertainty facing the firm. As our measure of firm-specific uncertainty, we use the standard deviation of stock return residuals from the single-factor CAPM in the time window (-365, -10) surrounding the date of outsourcing announcements as reported in *Wall Street Journal* (t=0) to proxy for idiosyncratic risk. To measure switching costs, we use two variables. First, we use asset specificity measured by the ratio of intangible assets to total assets. Second, we use a "distress" dummy, taking the value one if a firm reported layoffs, strikes or bankruptcy in the *WSJ* during the one-year window prior to outsourcing or if the firm reported negative net incomes in COMPUSTAT in the year prior to outsourcing, and zero otherwise.[7]

We include several additional variables as controls in the context of the outsourcing decision. We include leverage measured by total book debt scaled by book value of total assets. Low pre-outsourcing book leverage allows for more financial flexibility. Additionally, to capture industry structure effects, we use the concentration ratio measured by the Herfindahl-Hirschman Index (HHI) of sales or the market share of the

[7] We also used the ratio of unionized firm workers to total workers in the industry as proxy for switching cost, with little difference.

firm in the given two-digit SIC industry to control for revenue concentration across business segments. Finally, we control for corporate governance via the percentages of independent directors in the board. Definitions of all variables are summarized in Appendix II.

Table 2 shows Pearson correlations among the key variables. As anticipated, the two alternative measures of financial constraints (KZ, HP) are highly correlated at 0.56 (they are used as alternatives, one at a time). Also, as anticipated, the correlation between two of the three measures of operational flexibility (XLR/Sales, and (COGS+SGA)/Sales) is high (0.66), although the correlations with the third measure, number of business segments, are low (ranging from -0.03 to 0.24). We include one of these correlated variables at a time (individually) in our regression equations. Overall, the scores of the variance inflation factors (VIF) are low (less than 10), indicating that multicollinearity is not an issue.

[Insert Table 2 here]

4. Empirical Results

4.1 Cumulative abnormal returns

We first test our benchmark proposition on whether the flexibility value of outsourcing is recognized in the market upon the announcements. We follow standard event-study methodology to calculate abnormal return (*AR*) and cumulative abnormal return (*CAR*). The value impact of the announcement for outsourcing firms is measured by the *CAR* for outsourcing firms. AR_{jt} is the residual between actual returns and expected returns of firm *j* at time *t*, estimated by the single-factor market model over the 150-day period beginning at t = -250 trading days and ending at t = -101 days prior to the

announcement event (day 0). CAR_j is computed as the cumulative sum of AR_{jt} for each firm j over the different time windows.

Table 3 shows the CAR for outsourcing firms and their counterpart firms for three time windows: (-1, 1), (-5, 5), and (-10, 10). The results in Panel A show that the outsourcers' mean CARs are positive and statistically significant at 1% for (-1, 1) and (-5, 5). Stock returns of outsourcers rise on average by 0.40% over the three days surrounding the outsourcing announcement (from t = -1 to t =+1) and by 0.91% over eleven days (from t = -5 to t = +5). This confirms H1 regarding the positive market valuation of outsourcing announcements. The mean CARs for the counterpart firms in Panel B are also positive but less significant. These results suggest that outsourcing is on average valued positively by the market, and this appears to hold true for both outsourcing firms and their counterpart firms, indicating potential synergies.[8]

[Insert Table 3 here]

Notably, the overall mean CARs may potentially reflect the net impact of offsetting differential benefits and costs from outsourcing; this concern is applicable to both outsourcing firms and their counterpart firms. To examine this further, we divide the sample into two subsamples: one that has positive CARs and another with only negative CARs. Results confirm the conjecture of a mixed effect. For both outsourcing firms and their counterpart firms, the separate positive CAR subsample and the separate negative CAR subsample, respectively, show highly significant value impacts for all three time windows, with high absolute magnitudes throughout. When the effect of outsourcing is disaggregated by positive or

[8] For the entire time window of (-10, 10), the number of positive and negative ARs, for both outsourcing firms and their counterpart firms, is approximately equal, consistent with an earlier study by D'Aveni and Ravenscraft (1994) who found mixed results.

negative CAR sign, the coefficients and t-stats are fairly large in absolute values for both positive and negative cases. This suggests that the estimated coefficients of outsourcing in the aggregate have a downside bias and hence mask the potentially larger real impacts of outsourcing.

4.2 The effect of financial flexibility on the likelihood of outsourcing

Since outsourcing is the outcome of a firm's strategic choices, we conduct a logistic regression to examine the likelihood of outsourcing decisions based on a set of outsourcing and non-outsourcing firms. The dependent variable is a binary variable which equals one if a firm outsourced, and zero if not. A key issue is how to select the control sample of non-outsourcing firms that is otherwise comparable. Our matching firm sample is constructed based on three criteria using COMPUSTAT, namely firms that do not have outsourcing activities during the same fiscal year, that are from the same four-digit industry, using the firm with the closest size (total assets) to the outsourcing firm. We examine the possibility of event sample errors later.

In order to explain the likelihood of a firm's decision to outsource, we consider as our main variable the degree of financial flexibility measured by the KZ index or HP index, as well as operational flexibility proxies such as (COGS+SGA)/Sales, XLR/Sales, and business segments. Controls include the standard deviation of stock return residuals (idiosyncratic volatility), asset specificity, a "distress" dummy, leverage, and market concentration ratio. All independent variables are lagged one year prior to the outsourcing announcement to reduce endogeneity problems. The results of our logistic regression of the likelihood of outsourcing are shown in Table 4. Financial flexibility measured by the KZ index is shown in models 1 to 5, and using the HP index in models 6-9, respectively. Models 1-3 and 6-8 show robustness using the three different proxies of operational flexibility separately. Models 4, 5, and 9 additionally consider interaction

terms between proxies of financial flexibility and operating flexibility to examine how operating flexibility moderates the impact of financial flexibility on the likelihood of outsourcing.

[Insert Table 4 here]

In KZ-based models 1-5, the coefficients on the KZ index are positive in all models and statistically significant in four of the five models, indicating that firms with lower *ex ante* financial flexibility (or facing greater financial constraints) before outsourcing are more likely to undertake outsourcing. These results are consistent with H2. When we use the HP index as a measure of financial flexibility in models 6-9, the coefficients are positive in all four models and statistically significant in two models, which is slightly weaker than the KZ results but still supportive of H2. Among the three measures of operating flexibility, XLR/Sales and business segments are statistically significant, with positive signs for all three measures as expected. These results suggest that financial flexibility (reverse of financial constraints) has an equally important effect on the likelihood of outsourcing as does operational flexibility.

Including an interaction term of financial flexibility with operating flexibility, the coefficient of the interaction is negative in all three models but significant only in model 5 for KZ index * Business segments. These results seem to suggest that when the degree of operating flexibility is lower, the effect of financial flexibility on the likelihood of outsourcing is greater, providing weak support for H3.

4.3 The effect of financial flexibility on the market value of outsourcing (outsourcer CAR)

We posited previously that firms facing more financial constraints before outsourcing (having less financial flexibility) will benefit more from outsourcing. To examine whether this conjecture is borne out in short-term market valuation, as measured by the cumulative abnormal return (CAR), we next examine the relationship between financial flexibility proxies and short-term market valuation surrounding the

outsourcing announcements. CAR is here shown for outsourcing firms over the base window (-5, 5) around the *WSJ* report date (day 0) for the outsourcing sample.

The results of our multivariable regressions with one-digit industry fixed effects are shown in Table 5. Models 1 through 4 use the KZ index as our financial flexibility measure, whereas models 5 through 8 give results for the HP index. As in Table 4, the same three different operating flexibility proxies are employed to test whether the effect of financial flexibility on short-term market valuation is impacted by the degree of operating flexibility. Models 4 and 8 include interaction terms of financial flexibility with operating flexibility.

[Insert Table 5 here]

The results in Table 5 show that the coefficients on the financial constraints measures are positive in all 8 models and statistically significant in half of the models. Economically, there is a 0.106 increase in CAR (-5, 5) for a one standard deviation increase in the degree of *ex ante* financial constraints (measured by the KZ index) in model 2.[9] Thus when firms are more financially constrained *ex ante*, their market valuation is higher partly due to the acquisition of financial flexibility via outsourcing. This is supportive of H4. Regarding operational flexibility, all three measures show positive coefficients in all models, and have some support statistically: (COGS+SGA)/Sales in models 2 and 4, and XLR/Sales in models 5 and 8. The coefficient of the interaction term is statistically insignificant. All results in Table 5 are robust with and without industry fixed effects and after controlling for high-tech industry effects.

[9] The standard deviation of the KZ index for the outsourcing sample is 1.337 (not shown). The coefficient on KZ index is 0.079 in model 1, Table 5. Therefore, with one standard deviation change in KZ index, the change in CAR (-5, +5) is 1.337 x 0.079 = 0.106.

4.4 Heckman sample selection

The event study method used in sections 4.1 and 4.3 above examines market responses to outsourcing for a set of firms that had such outsourcing announcements. This creates two potential methodological issues. One is sample selection bias arising from relying on outsourcing event data only rather than the population which also includes non-outsourcing firm data.[10] Another concerns potential endogeneity of the outsourcing decisions because outsourcing is an outcome of a firm's strategic choice. To address resulting potential biases, we use the two-stage Heckman (1979) sample selection procedure. For this purpose, we also include firms that did not have any outsourcing events during the time period, as well as those that did. Specifically, we create a matching non-outsourcing firm sample from firms in COMPUSTAT based on a three-way matching (firm size, industry, and year). That is, we identify firms that did not have outsourcing activities during the same fiscal year, that come from the same four-digit industry, and select the ones with the closest firm size to the outsourcing firms. In the first stage, a probit model is estimated for the outsourcing indicator, shown in model 1 of Table 6. In the second stage, the inverse Mills ratio generated in the first stage is included as an independent variable for sample bias correction along with the financial and operational flexibility measures and controls to estimate the conditional coefficients shown in models 2 and 3; the dependent variable for the second stage is CAR (-5, +5) for the outsourcing firms, analogous to Table 5. Results are shown for the KZ index.

[Insert Table 6 here]

[10] For logistic estimation in 4.2 on the likelihood of outsourcing, we did use both outsourcing and matching non-outsourcing data.

Model 1 in Table 6 shows that the coefficient of the financial constraints measure, the KZ index, is positive and statistically significant. This reiterates the earlier findings in Table 5 that outsourcing firms facing more financial constraints before outsourcing are more likely to engage in outsourcing, supporting H2.

The negative signs of the inverse Mills ratio indicate that, without sample correction, the coefficients of the second stage models would be downward-biased. The bias-corrected coefficients on the impact of financial constraints (reverse of financial flexibility) shown in models 2-3 are positive and significant, indicating that financially constrained firms have more to benefit from outsourcing. Regarding the operational flexibility measures, (COGS+SGA)/Sales is significantly positive in model 2 and business segments in model 3. The interaction of KZ index and business segments is negative and significant in model 3, indicating that the lower the operating flexibility, the lower the effect of financial constraints on outsourcer's market valuation. This is consistent with H4. Qualitative results on all independent variables in the second-stage models are similar to the results in Table 5.

4.5 Quasi-natural experiment

In the above, we addressed aspects of the endogeneity issue by using lagged explanatory variables and by estimating the Heckman correction model. In this section, we conduct a quasi-natural experiment to identify causality. For this purpose, we employ two exogenous disaster shocks: the BP Oil Spill in 2010, and the Hurricane Katrina disaster in 2005. Our rationale is that firms facing high financial constraints (having low financial flexibility) may suffer more from a natural disaster than firms with low financial constraints. This exogenous shock might cause financially constrained firms to consider

outsourcing even more in the post-disaster period than comparable unconstrained firms. We therefore estimate the following specification for the probability of outsourcing by logistic regression.

$$Outsourcing\ probability$$

$$= \alpha + \beta_1 \times PostDisaster + \beta_2 \times KZ\ index + \beta_3 \times (KZ\ index \times PostDisaster)$$

$$+ \beta_4 \times \frac{XLR}{sales} + \beta_5 \times \left(KZ\ index \times \frac{XLR}{sales}\right) + \beta_6 \times \left(KZ\ index \times \frac{XLR}{sales} \times PostDisaster\right)$$

$$+ controls + \varepsilon$$

Results in Table 7 show that the coefficient of the KZ index is positive and significant at 10% in the case of the BP Oil Spill, weakly confirming H2. Interestingly, the coefficient of the interaction term, KZ Index* PostDisaster, is also positive and significant (at 10%), strengthening the case of financial constraints as a likely causal factor driving the likelihood of outsourcing. This suggests that a natural disaster can aggravate a firm's financial difficulties, which might then induce more outsourcing. Since this effect is greater for financially constrained than unconstrained firms, the effect on the likelihood of outsourcing is greater for financially constrained firms than unconstrained firms.

[Insert Table 7 here]

When the 2005 Hurricane Katrina is used as a shock, we find that XLR/Sales, a labor-based operational flexibility proxy, is positive and significant, while the KZ proxy for financial flexibility is positive but statistically insignificant. A reason might be that Katrina was a rather localized event compared to the BP oil spill, which led to a wider effect on oil prices and earnings. The coefficient of the interaction term, KZ Index* XLR/Sales, is negative and significant, lending support to H3 that the effect of *ex-ante* financial constraints is greater, the lower the *ex-ante* operational flexibility before outsourcing. We

acknowledge that the results of this experiment provide only weak support since the coefficients of financial and operational flexibility measures and their interactions are significant only at 10%.

5. Discussion, Limitations and Future Paths

A potential limitation of this study is its restrictive focus on viewing the outsourcing decision on its own. It does not consider, for example, how outsourcing decisions might be combined or interact with in-house production or viewed as part of broader strategic collaborations such as alliances, joint ventures or partnerships. Despite its narrow focus, our study's findings have value as they provide conceptual support and empirical evidence on the value of outsourcing flexibility stemming from contingent contracting choices. How, and under what conditions, outsourcing can be integrated with broader organizational strategies is an important issue for future work.

Another issue deserving future attention is an examination of outsourcing activities of smaller, private or non-US firms. Future work might extend to other countries to analyze contextual conditions when multinational flexibility is value-enhancing. A more detailed, disaggregated examination of the types of outsourcing would also be a fruitful subject for future research. Finally, an examination of non-market strategies that firms might employ in dealing with political pressures in offshore outsourcing merits special attention.

A key managerial implication of this work is the importance of embedding the concept of financial flexibility in conjunction with operational flexibility in important strategic firm decisions, such as outsourcing or multinational network activities. A key idea underlying strategic options is to condition major strategic initiatives on learning outcomes from limited-cost interim decisions that can be

discontinued, extended or scale-adapted to future market conditions. Financial flexibility or the lack of it should also be considered as it may significantly influence the likelihood and value of outsourcing outcomes, both directly and via its interaction with operational flexibility. In outsourcing decisions, just as in other important areas of business and strategy under uncertainty, flexibility in both financial conditions and operations matter.

6. Conclusions

Flexibility is generally valuable as it allows making adaptive decisions, such as via outsourcing contracts, depending on future market developments. Outsourcing often involves major corporate restructuring decisions partially motivated by flexibility. It provides a flexible alternative to continued in-house production that is generally more rigid. Yet most previous work on outsourcing has emphasized transaction-based costs and benefits and has paid inadequate attention to the value of flexibility constraints embedded in outsourcing contracts and their interaction with operational flexibility.

In this paper, we take a real options view of outsourcing under financial constraints and provide empirical evidence as to the value of flexibility on the likelihood and value of outsourcing. Without financial constraints, outsourcing involves a real option allowing switching between in-house production and external contracting at a specified cost. It thus offers a choice between a preset in-house production commitment versus a series of staged and scalable investment outlays. Given the sequential nature of such investment decisions as well as switching choices coupled with market uncertainty, outsourcing firms can create value via operational and financial flexibility.

When financial constraints are present, the probability of outsourcing is greater the greater the

firm's financial constraints before outsourcing. The interaction between financial and operational flexibility is also important. We have shown that the effect of financial flexibility on the likelihood of outsourcing is greater, the lower the *ex-ante* operational flexibility, confirming a degree of substitutability between financial and operational flexibility. *Ex-post* market valuation is confirmed to be positively related to *ex ante* financial constraints, consistent with the notion that outsourcing is a vehicle of flexibility acquisition. Financial constraints play a prominent role in that equation.

Appendix I: A Binary Model of Real Option Payoff for Outsourcing

Appendix 1 provides an illustration of how the value of outsourcing can be viewed as a real option, first when the costs of outsourcing are the same as those of in-house production (case 1) and then when they are lower than in-house production costs (case 2). The following numerical examples demonstrate the value of a real switching option in an outsourcing contract. For simplicity, we consider a binomial model with three periods: year 0, 1, and 2. Assume the risk free rate (r) is 5%. Production can be accomplished in-house or through outsourcing. The project revenue prospects are uncertain. Suppose the revenue, currently (R_0) at \$100, moves stochastically following a multiplicative random walk, with an expected up (u) revenue of R^u = \$180 (a multiplicative factor of 1.8) or a down (d) revenue of R^d = \$60 (a multiplicative factor of 0.6) in one year. Expected up-up (uu) revenue is R^{uu} = \$324, up-down (ud) revenue is R^{ud} = \$108, and down-down (dd) revenue is R^{du} = \$36 in year 2. The risk-neutral probability of up or down movements is p = (1 + r – d)/(u – d) = (1 + 0.05 – 0.6)/(1.8 – 0.6) = 0.375 and 1 – p = 0.625, respectively.

Case 1: The in-house production costs are the same as those of producing by an outsourcer.

Suppose the cost of in-house production (I_{ti}), is the same as that of out-of-house production (I_{to}). The cost is assumed to increase at the risk free rate of 5% each year. The cost is \$104 in year 0 and will rise to \$109.2 in year 1 and \$114.66 in year 2 ($I_{1o} = I_{1i}$ =\$104, $I_{2o} = I_{2i}$ = \$109.2, $I_{3o} = I_{3i}$ =\$114.66). The NPV of making the product in-house with a one- or two-year project life equals 100 – 104 = – \$4.

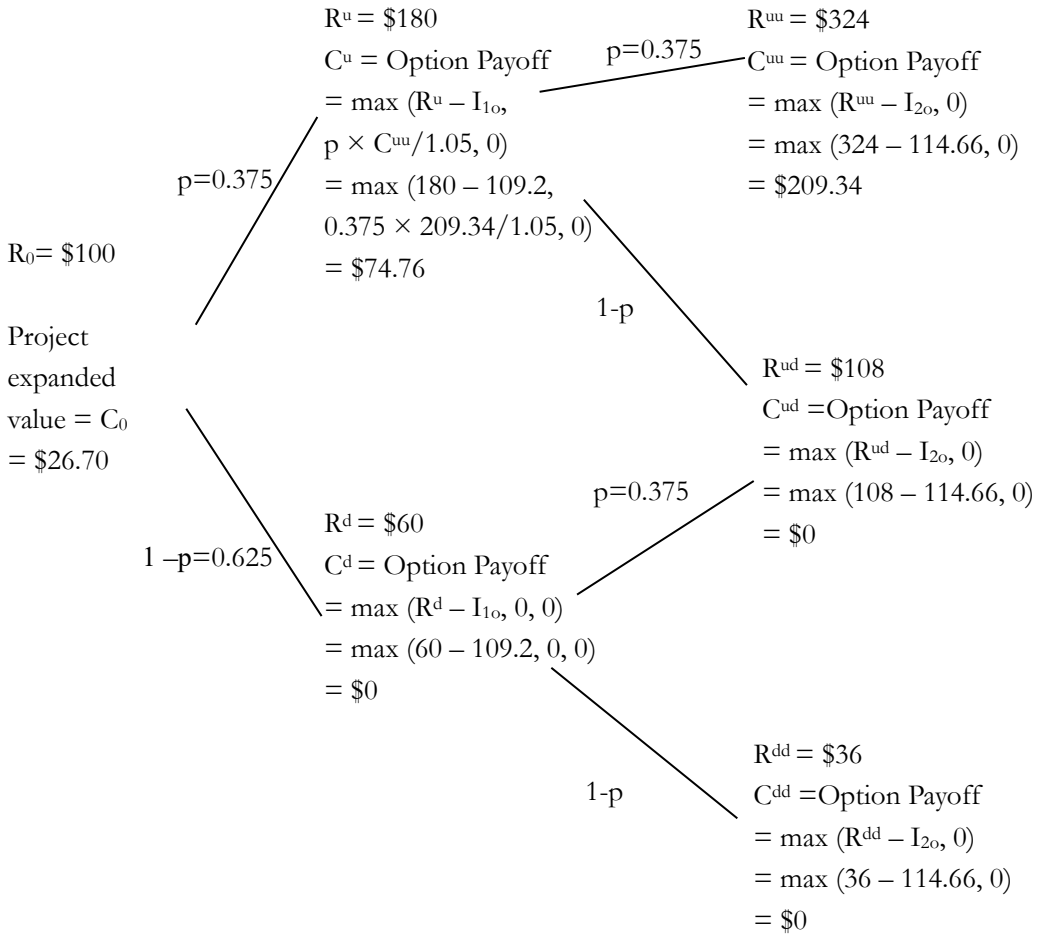
Outsourcing is better than in-house production due to the benefits of flexibility stemming from real options. Suppose the project life is two years while the duration of the outsourcing contract is one year. The firm can decide to renew the outsourcing contract in year 1 with the same cost of out-of-house production as that in year 0. The outsourcing contract gives the firm an option of switching from in-house production to outsourcing with an external entity under contract. The option payoff is notated as C. C^{uu} is the option payoff in the up-up-node in year 2 and equals max ($R^{uu} – I_{2o}$, 0) = max (324 – 114.66, 0) = \$209.34. Similarly, $C^{ud} = 0$ and $C^{dd} = 0$. C^u is the option payoff in the up-node in year 1 and equals max ($R^u – I_{1o}$, p × C^{uu}/1.05, 0) = max (180 – 109.2, 0.375 × 209.34/1.05, 0) = \$74.76. Similarly, $C^d = 0$. The expanded value of the project in year 0 including flexibility (C_0) is (209.34 × 0.375 × 0.375 + 0 + 0)/1.05^2 = \$26.70. The incremental value of the outsourcing option is \$30.70 (= expanded value of the project – in-house NPV = 26.70 – (–4) = \$30.70).

Case 2: The production costs of outsourcing are lower than those of in-house production.

Suppose production can still be accomplished in-house with a cost (I_{0i}) of \$104 but that outsourcing involves a lower cost (I_{0o}) of \$100 per unit of output in year 0. Suppose cost again increases at 5% each year. The in-house costs remain \$109.2 in year 1 (I_{1i}) and \$114.66 in year 2 (I_{2i}). The outsourcing costs will be \$105 in year 1 (I_{1o}) and \$110.25 in year 2 (I_{2o}). Suppose the firm can renew the outsourcing contract in year 1 with the same cost of out-of-house production as that in year 0. The expanded value of the project in year 0 (C_0) now is \$27.26. The incremental value of the outsourcing option is \$31.26. In this case, outsourcing is preferred to in-house production for two reasons: the benefits of flexibility and cost saving.

Appendix 1 (Continued):

Case 1: The production cost of making in house is the same as that of making by an outsourcer. The outsourcing firm has a project with a two-year life and can renew the outsourcing contract in year 1 with the same cost of out-of-house production as that in year 0.



$I_{0i} = I_{0o}$ = $104 --r=5%--> $I_{1i} = I_{1o}$ = $109.2 --r=5%--> $I_{2i} = I_{2o}$ = $114.66

Year 0 Year 1 Year 2

Appendix II: Definition of Variables

Financial Flexibility	
KZ Index	The KZ index, due to Kaplan and Zingales (1997) and Lamont, Polk, and Saa-Requejo (2001), is a measure of a firm's reliance on external capital. It is estimated by a five-factor model: cash flows to K, Tobin's q, debt to total capital, dividends to K, and cash to K, where K is lagged property, plant and equipment. It is calculated as –1.001909[(ib + dp)/lagged ppent] + 0.2826389[(at + prcc_f×csho - ceq - txdb)/at] + 3.139193[(dltt + dlc)/(dltt + dlc + seq)] – 39.3678[(dvc + dvp)/lagged ppent] – 1.314759[che/lagged ppent], where all variables in italics are COMPUSTAT data items. Firms with high KZ scores are more financially constrained.
HP Index	The HP index (Hadlock and Pierce, 2010) is a combination of asset size and firm age and is calculated as ($-0.737 * Size + 0.043 * Size^2 - 0.040 * Age$), where *Size* is the natural log of inflation-adjusted book assets, and *Age* is the number of years a firm is listed with a non-missing stock price on COMPUSTAT. Firms with high SA index are more financially constrained.
Operational Flexibility	
(COGS+SGA)/Sales	The sum of cost of goods sold (from COMPUSTAT) and selling, general and administrative expense (from COMPUSTAT) divided by sales (from COMPUSTAT).
XLR/Sales	Staff expense (from COMPUSTAT) divided by sales.
Business segments	The number of business segments of the firm in the COMPUSTAT segment database.
Controls	
SD of stock returns	The standard deviation of stock return residuals based on the CAPM estimated for the period from t = 365 calendar days to t = 10 calendar days prior to the outsourcing event.
Asset specificity	Asset specificity is defined as the ratio of intangible assets (COMPUSTAT item 33) to book value of total assets.
Distress dummy	Distress dummy is set to one if a firm reported layoffs, strikes or bankruptcy in the *Wall Street Journal* during the one-year window prior to outsourcing or if the firm reported negative net incomes in COMPUSTAT in the year prior to outsourcing; zero otherwise.
Leverage	Total liabilities scaled by total assets.
Concentration ratio	Herfindahl-Hirschman Index (HHI) of sales or the market share of the firm in the given two-digit SIC industry. HHI is calculated as the sum of squared segment sales divided by the squared firm sales.
Independent board	Independent directors as a fraction of the total board.

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Table 1: Distribution of Outsourcing Events by Industry

Our initial sample consisted of 402 outsourcing events by all publicly traded firms in the U.S. during the 22-year period 1995-2016 as reported in the *Wall Street Journal* included in the Factiva database. Eliminating events due to missing data, multiple-event contaminations and foreign firms, resulted in a final usual sample of 273 events. Multiple-event cases are excluded due to the presence of announcements of other major corporate events (e.g., lawsuits, layoffs, strikes, mergers and acquisitions, earnings, dividends) during the outsourcing event window (-10, 10).

SIC Code	Industry	Outsourcing firms	Counterpart firms
1000-1999	Mining	6	0
2000-2999	Construction	29	26
3000-3999	Manufacturing	70	61
4000-4999	Transportation and Communications	66	40
5000-5999	Trade	16	5
6000-6999	Finance, Insurance and Real Estate	29	8
7000-7999	Business Services	41	50
8000-8999	Legal, Educational and Social Services	16	8
Total		273	198

Table 2: Pearson Correlations

This table reports the correlations of the main variables used in the empirical work.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) KZ index	1										
(2) HP index	0.5620	1									
(3) (COGS+SGA)/Sales	0.0892	0.0866	1								
(4) XLR/Sales	0.0766	0.0868	0.6619	1							
(5) Business segments	0.0082	0.2353	-0.0569	-0.0307	1						
(6) SD of stock returns	-0.0007	0.0235	0.5349	0.4364	-0.0835	1					
(7) Asset specificity	0.2835	0.1482	-0.0800	-0.0655	-0.0575	-0.0577	1				
(8) Distress dummy	-0.0591	0.5024	-0.0487	-0.0991	0.1171	0.0606	0.1224	1			
(9) Leverage	0.1113	-0.0138	0.3404	0.3272	0.0184	0.1314	-0.0430	0.0371	1		
(10) Concentration ratio	0.1414	-0.0399	-0.0683	-0.0427	0.0662	0.0160	0.0122	-0.0049	0.0483	1	
(11) Independent board	0.0908	0.0771	0.0229	0.0483	0.1690	0.0383	0.1606	0.0490	0.1052	0.0981	1

Table 3: Cumulative Abnormal Returns (CAR) of Outsourcing Firms and their Counterparts

The event date (day 0) is the announcement date as reported in *The Wall Street Journal*. The estimation period is (-250,101). Abnormal return (AR) and cumulative abnormal return (CAR) are expressed as a percentage. AR_{jt} is calculated using the single-factor market model. $CAR_j = \sum_{t \epsilon window} AR_{jt}$, where R_{jt} is the compounded rate of return for firm j on day t; R_{mt} is the market rate of return from CRSP value-weighted market index on day t. Portfolio time-series (CDA) t-statistics are reported in parentheses. *, ** and *** denote significance at the 0.10, 0.05, and 0.01 (two-tailed) levels, respectively.

Panel A: Outsourcing firms

	Outsourcing firms			
Event window	Mean CAR	Mean pos. CAR	Mean neg. CAR	Positive to Negative
(-1, 1)	0.40***	4.40***	-3.64***	141:132
	(5.13)	(10.71)	(-10.12)	
(-5, 5)	0.91**	5.75***	-4.38***	138:135
	(2.30)	(10.86)	(-9.33)	
(-10, 10)	1.30	10.32***	-7.95***	130:143
	(1.23)	(10.19)	(-8.44)	

Panel B: Counterpart firms

	Counterpart firms			
Event window	Mean CAR	Mean pos. CAR	Mean neg. CAR	Positive to Negative
(-1, 1)	0.42	3.98***	-3.70***	110:88
	(1.39)	(5.80)	(-5.62)	
(-5, 5)	1.41*	4.92***	-2.53**	102:96
	(1.65)	(5.91)	(-2.50)	
(-10, 10)	1.68	8.37***	-7.52***	100:98
	(1.43)	(5.57)	(-4.09)	

Table 4: The Effect of Financial Flexibility on the Likelihood of Outsourcing

This table reports a logistic regression to determine the likelihood of outsourcing decisions based on a set of both outsourcing and non-event firms. The dependent variable in the logistic regression is a binary variable which equals one if a firm outsourced, and zero if not. All explanatory variables are defined in Appendix II and are lagged one year. t-statistics of coefficients are reported in parentheses. *, ** and *** denote significance at the 0.10, 0.05, and 0.01 (two-tailed) levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Financial flexibility (reverse of KZ and HP)									
KZ Index	0.369*	0.338*	0.232*	0.274*	0.259				
	(1.776)	(1.800)	(1.795)	(1.775)	(1.594)				
HP Index						0.247*	0.249	0.278*	0.225
						(1.953)	(1.550)	(1.705)	(1.391)
Operational flexibility									
XLR/Sales	0.009**			0.010**		0.008**			0.013*
	(2.189)			(2.023)		(2.058)			(1.777)
(COGS+SGA)/Sales		0.318					0.003		
		(1.905)					(1.187)		
Business segments			0.020*		0.021*			0.510*	
			(1.866)		(1.672)			(1.820)	
Interactions									
KZ Index*XLR/Sales				-0.144					
				(-0.266)					
KZ Index* Business segments					-0.049**				
					(-2.336)				
HP Index*XLR/Sales									-0.191
									(-1.257)
Controls									
SD of stock returns	0.580	0.644	0.876	-0.021	0.976	-0.467	-0.217	-0.352	1.124
	(0.358)	(0.440)	(0.712)	(-0.018)	(0.802)	(-0.126)	(-0.052)	(-0.123)	(0.249)
Asset specificity	-0.241	-0.241	-0.222	-0.235	-0.210	-0.086	-0.081	-0.091	-0.081
	(-1.049)	(-1.052)	(-0.970)	(-1.022)	(-0.923)	(-0.688)	(-0.633)	(-0.686)	(-0.610)
Distress dummy	-0.033	-0.034	-0.042	-0.021	-0.040	1.187	1.194	0.987	1.762
	(-0.754)	(-0.753)	(-0.945)	(-0.503)	(-0.912)	(1.162)	(1.228)	(1.161)	(1.139)
Leverage	-0.180	-0.177	-0.177	-0.136	-0.162	-0.081	-0.065	-0.088*	-0.092
	(-1.321)	(-1.338)	(-1.491)	(-1.230)	(-1.356)	(-1.633)	(-1.498)	(-1.683)	(-1.591)
Concentration ratio	-0.570	-0.575	-0.631	-0.309	-0.631	-0.085*	-0.079	-0.086	-0.084
	(-0.697)	(-0.701)	(-0.756)	(-0.388)	(-0.748)	(-1.662)	(-1.603)	(-1.608)	(-1.633)
Industry fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.08	0.08	0.09	0.10	0.10	0.08	0.08	0.09	0.07
Number of obs.	546	546	546	546	546	546	546	546	546

Table 5: The Effect of Financial Flexibility on the Marker Value of Outsourcing (Outsourcer CAR)

This table reports results of multivariate regression analysis of outsourcer cumulative abnormal return (CAR) on financial flexibility and other determinants. The dependent variable is CAR (-5, 5). All explanatory variables are defined in Appendix II and are lagged one year. t-statistics of coefficients are reported in parentheses. *, ** and *** denote significance at the 0.10, 0.05, and 0.01 (two-tailed) levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Financial flexibility (reverse of KZ and HP)								
KZ Index	0.047	0.079**	0.046	0.090*				
	(1.549)	(2.219)	(1.363)	(1.850)				
HP Index					0.067*	0.073**	0.052	0.062
					(1.904)	(2.026)	(1.518)	(1.135)
Operational flexibility								
XLR/Sales	0.301				0.108*			0.036*
	(1.630)				(1.907)			(1.922)
(COGS+SGA)/Sales		0.016**		0.012*		0.012		
		(2.156)		(1.965)		(1.597)		
Business segments			0.002				0.002	
			(1.127)				(1.203)	
Interactions								
KZ Index*(COGS+SGA)/Sales				-0.227				
				(-1.451)				
HP Index*XLR/Sales								-0.058
								(-1.482)
Controls								
SD of stock returns	1.253	0.814	2.808**	1.115	0.103	0.614	0.961	0.983
	(1.645)	(1.003)	(2.334)	(1.302)	(1.568)	(0.842)	(1.230)	(1.209)
Asset specificity	0.057	0.063	0.052	0.068	0.052	0.059	0.058	0.064
	(1.416)	(1.579)	(1.120)	(1.610)	(1.165)	(1.334)	(1.059)	(1.452)
Distress dummy	-0.009	-0.012	-0.022	-0.010	0.022	0.020	0.117	-0.123
	(-0.680)	(-0.915)	(-1.420)	(-1.380)	(0.644)	(0.520)	(1.617)	(-0.780)
Leverage	0.021	0.019	0.106	0.012	-0.023	-0.027	-0.032*	-0.026
	(0.583)	(0.469)	(1.591)	(0.369)	(-1.438)	(-1.602)	(-1.857)	(-1.570)
Concentration ratio	-0.009	0.014	0.002	-0.030	0.026	0.033	0.025	0.033
	(-0.246)	(0.374)	(0.068)	(-0.698)	(1.252)	(1.496)	(0.979)	(1.268)
Independent board	-0.004	-0.005	-0.017	-0.036	-0.262**	-0.249**	-0.303	-0.269
	(-0.111)	(-0.125)	(-0.525)	(-1.082)	(-2.319)	(-2.228)	(-1.528)	(-1.109)
Industry fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.20	0.22	0.23	0.22	0.16	0.17	0.18	0.18
Number of obs.	273	273	273	273	273	273	273	273

Table 6: Heckman Sample Selection

In the first stage, we first estimate a probit model for an outsourcing indicator in model 1. The resulting inverse of the Mills ratio is then used as an independent variable in the second stage along with financial flexibility, operating flexibility and other variables, to get unbiased estimates in models 2 and 3. All explanatory variables are lagged one year. t statistics of coefficients are reported in parentheses. *, ** and *** denote significance at the 0.10, 0.05, and 0.01 levels (two-tailed test).

	First stage	Second stage: Outsourcers' CAR (-5, +5)	
	(1)	(2)	(3)
Financial flexibility (reverse of KZ)			
KZ Index	0.161**	0.088**	0.075*
	(2.039)	(2.290)	(1.048)
Operational flexibility			
(COGS+SGA)/Sales		0.013*	
		(1.768)	
Business segments	0.010		0.001*
	(1.172)		(1.662)
Interaction			
KZ Index* Business segments			-0.011*
			(-1.859)
Controls			
SD of stock returns	0.046	0.015	0.029
	(0.490)	(0.318)	(0.650)
Asset specificity	-0.031	0.001	-0.008
	(-0.913)	(0.006)	(-0.247)
Distress dummy	0.025*	0.033*	0.025
	(1.678)	(1.860)	(1.432)
Leverage	-0.055	-0.127	-0.034
	(-0.242)	(-0.703)	(-0.381)
Concentration ratio	-0.091	-0.078	-0.061
	(-1.226)	(-1.618)	(-1.393)
Independent board		-0.059	-0.182
		(-0.985)	(-1.208)
Inverse Mills ratio		-0.072**	-0.040
		(-2.137)	(-0.720)
Industry fixed effect	Yes	Yes	Yes
Adj. R^2	0.11	0.20	0.21
Number of obs.	546	273	273

Table 7. Quasi-natural Experiment based on Exogenous Disaster Shocks

This table reports the impact of natural disasters (the BP oil spill and the Hurricane Katrina) on the relationship between financial flexibility and the likelihood of outsourcing. Estimation is done by logistic regression. PostDisaster is a dummy variable, equivalent to one for the period on and after the disasters. The dependent variable is the outsourcing dummy. t-statistics of coefficients are reported in parentheses. *, ** and *** denote significance at the 0.10, 0.05, and 0.01 (two-tailed) levels, respectively.

	BP oil spill	Hurricane Katrina
PostDisaster	0.048	0.004
	(0.681)	(0.052)
KZ Index	0.137*	0.111
	(1.735)	(1.407)
KZ Index* PostDisaster	0.173*	-0.050
	(1.729)	(-0.593)
XLR/Sales	0.120	0.200*
	(0.958)	(1.675)
KZ Index* XLR/Sales	-0.006	-0.010*
	(-1.135)	(-1.850)
KZ Index* XLR/Sales*PostDisaster	0.003	0.001
	(0.821)	(0.279)
SD of stock returns	-1.512	-1.115
	(-1.022)	(-0.684)
Asset specificity	-0.153	-0.111
	(-0.801)	(-0.554)
Distress dummy	0.045	0.054
	(1.017)	(1.244)
Leverage	0.105	0.089
	(0.836)	(0.736)
Concentration ratio	-0.277	-0.225
	(-1.580)	(-1.298)
Industry fixed effect	Yes	Yes
Adj. R^2	0.26	0.19
Number of obs.	1,092	1,092