

# Risk hedging through forward supply contract and equity ownership in a spin-off decision

Naoya Takezawa<sup>a,\*</sup>, Jay Rajasekera<sup>b</sup>, Kut C. So<sup>c</sup>

<sup>a</sup>Graduate School of Business Administration, Nanzan University, Nagoya, Japan

<sup>b</sup>Graduate School of International Management, International University of Japan, Niigata, Japan

<sup>c</sup>The Paul Merage School of Business, University of California, Irvine, California, USA

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## Abstract

We consider the situation where a publicly traded firm is spinning off a subsidiary in order to maximize the shareholder value of the firm. To balance the underlying operational risks of the spin-off, the firm also uses a forward supply contract to hedge against the price and demand fluctuations in the future transactions of the goods produced by the subsidiary. Using an option pricing framework, we formulate a value-maximization optimization problem for selecting the best ownership structure and forward supply contract in the spin-off decision. Using our model, we present a set of numerical results to illustrate the value of a forward supply contract as an additional lever to corporate ownership structure in mitigating the operational risks induced by the underlying market uncertainty in order to maximize shareholder value. Our results provide some interesting insights for selecting the appropriate ownership structure and forward supply contract under different operating environments in a spin-off decision.

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## 1. Introduction

It is common for a publicly traded firm to spin off some of its subsidiaries through an initial public offering (IPO) as an effective means to manage the financial assets of the firm. The spin-off can help the firm to hedge against the financial obligations required to operate the subsidiaries. More importantly, IPO is an important channel for the firm to unlock the potential value of the subsidiaries, especially in a rising equity market. Through an

IPO of a subsidiary, the firm can increase the shareholder value of the firm. Many studies in the corporate finance research literature have examined various factors in deciding whether to take on an IPO and what ownership to retain in order to balance the underlying financial factors in such decisions.

Our paper addresses some underlying operational issues in choosing such an IPO decision. We consider the following specific situation. A parent company is spinning off one of its subsidiaries through an IPO offering, where the parent will retain some equity share of the subsidiary and the rest of the equity share is distributed to the existing shareholders of the parent company. The spun-off subsidiary operates a manufacturing facility and is

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\*Corresponding author. Tel.: +81 5 2832 3110x751;  
fax: +81 5 2832 2104.

E-mail address: [ntakezaw@nanzan-u.ac.jp](mailto:ntakezaw@nanzan-u.ac.jp) (N. Takezawa).

the sole supplier of some key component for a major product of the parent company. The manufacturing facility requires a high level of investment to build and operate, where the underlying component market is volatile and subject to a high degree of fluctuations in terms of both price and demand. Such operating environment is common in high technology manufacturing firms such as a wafer fabrication facility for producing advanced semiconductor chips for computer and electronic products.

With a value-maximizing objective in its IPO decision, the parent company also needs to carefully balance the underlying operational risks. First, the parent company must secure a reliable and cost-efficient supplier of the key component produced by the spun-off subsidiary to meet the demand for its major product. Second, the parent must effectively manage the operational risks due to the future price and demand fluctuations of the required components. Also, the parent company has shifted the market and investment risks to its newly spun-off subsidiary, and the subsidiary is now fully responsible for managing the financial risk in operating its manufacturing facility in a highly volatile market. If the subsidiary is not capable of handling such risk exposure and cannot survive in a volatile market, this can adversely affect the IPO value of the subsidiary and thus the overall shareholder value of the parent company. Furthermore, the parent company would lose a reliable supplier of the key component, should the subsidiary go bankrupt.

The parent company needs to select an appropriate corporate ownership structure of the subsidiary during the spin-off to hedge against the above operational risks. For example, the parent can decide to retain a substantial portion of the equity share of the subsidiary so as to exert more control of the operations of the subsidiary. Through a higher equity ownership of the subsidiary operations, the parent can better manage the operational risks due to the future price and demand fluctuations of the component market. At the same time, a higher equity ownership by the parent can potentially help the subsidiary to leverage the financial resources of the parent company against the financial risk of the subsidiary to operate the manufacturing facility in a volatile market.

In this paper, we analyze an additional mechanism to deal with the above operational risks through the use of a forward supply contract, whereby the parent company agrees to buy certain quantities of

the key component from the subsidiary at some pre-specified price in the future. For the parent company, the forward supply contract helps to reduce the future price fluctuations for the required components and to secure the required production capacity from the subsidiary as its main component supplier. For the subsidiary as an independent firm, the supply contract guarantees a steady revenue stream from the parent company and helps to reduce the financial risk of operating the manufacturing facility in a volatile component market. Therefore, the forward supply contract provides an important risk sharing mechanism for both companies. The contract protects the parent company during a market upturn against unexpected component price increases, and at the same time, reduces the financial risk of the subsidiary by generating a steady stream of revenue for the subsidiary where the component price could decline significantly during a market downturn.

As an example, during the internet bubble in early part of year 2000, Conexant Systems, a worldwide leading provider of key semiconductor products for broadband communications, enterprise networks and the digital home, decided to spin off several of its divisions so as to allow each division to exploit its technology to better compete in a high potential market and to maximize the total shareholder value of the company. In particular, it decided to spin off its semiconductor manufacturing unit as an independent privately held pure-play semiconductor wafer foundry (named the Jazz Semiconductor) that serves customers targeting wireless, optical networking, power management, storage, aerospace/defense and other high-performance applications. The parent company, Conexant Systems, maintained a 40% equity ownership of this new independent company. Also, the parent company signed an initial 3-year supply contract for buying a fixed volume of the production capacity of the new company at some fixed price level each year. This arrangement allows the parent company to hedge against the high fixed cost of running the capital-intensive fabrication operations in a volatile semiconductor market, while the supply contract provides the financial security for the new independent company during its transition phase in search of new customers for its manufacturing technologies in a highly competitive foundry market.

In this paper, we investigate how the use of a forward supply contract, in addition to selecting an optimal corporate ownership structure during the

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