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產品市場價格競爭與多產品資本結構關聯性之研究

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Financial Leverage and Price Dispersion for Multi-product Retailing Firms*

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Abstract

This paper studies the relationships among a multi-product incumbent firm's business style, its bundling and pricing strategy, and the impacts of these decisions on the design of the financial contract and the targeting strategy of a new entrant. We show that, unlike in Adams and Yellen (1976), a monopolist may optimally adopt a pure bundling strategy when it is faced with demand uncertainty and costs of disposal for unsold products. We show that in such a monopoly market, depending on consumers' valuation distribution, pure components and mixed bundling strategies may respectively be optimal for a *marketing-oriented* firm, but a *production-oriented* firm tends to prefer a pure bundling strategy. When the incumbent is faced with a potential entrant that is financially unconstrained and uninformed of the state of demand, pure bundling may appear as the incumbent's optimal strategy because it raises the chance that the entrant may target at the wrong segment, and when the loss of mistargeting is significant, pure bundling may result in entry deterrence. Moreover, when the potential entrant is financially constrained, the incumbent's pure bundling strategy can maximize the state verification cost incurred to the entrant and its financier, and may help deter entry. We also document a relationship between equilibrium product prices and the entrant's face value of debt.

*First draft. Comments are invited.

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1 Introduction

The purpose of this paper is two-fold. First, it intends to develop a theory that demonstrates a relationship between *business style* and the bundling and pricing strategies adopted by a monopolistic firm. Second, it attempts to conduct an exploratory study about the informational role of bundling strategies in a context where a multi-product incumbent informed of the state of demand is faced with the threat of entry.

The main body of literature on commodity bundling has focused on a monopoly market, where the main subject is the role of bundling strategies in discriminating heterogeneous consumers; see for example Stigler (1968), Adams and Yellen (1976), Schmalensee (1982,1984), and McAfee, McMillan and Whinston (1989). In contrast, this paper will mainly consider homogeneous consumers with unknown preferences. We initially consider a monopoly market, and then introduce the threat of entry. In the monopoly case, the firm has a limited amount of human capital (a labor force) which can be dedicated to either marketing research or cost reduction. This choice determines the firm's *business style*. A *marketing-oriented* firm will learn the state of demand, but it tends to have a high production cost. A *production-oriented* firm tends to have a low production cost, but is faced with demand uncertainty. We focus on a situation where over-production can lead to significant costs of disposal.[1] The firm must make bundling and pricing decisions after committing to a business style. The choice of business style reflects the firm's appraisal regarding the relative benefits and costs of taking one bundling strategy relative to another once the firm's business style is determined. We show that in such a monopoly market, depending on consumers' valuation distribution, pure components and mixed bundling strategies may respectively be optimal for a *marketing-oriented* firm, but a *production-oriented* firm tends to prefer a pure bundling strategy. This result is in sharp contrast with Adams and Yellen (1976), where a pure bundling strategy is always suboptimal.

Then we examine the role of bundling strategies in revealing demand information and deterring entry in a context of potential entry, where the potential entrant facing a large start-up cost may or may not be financially constrained. When the incumbent is better informed than the entrant regarding the state of demand, and when over-production is costly, the entrant will try to extract demand information from the incumbent's choice of bundling strategies. The incumbent, on the other hand, realizing that over-production

[1] If the model is extended to include dynamics, then the latter can also represent an overly high inventory cost.

is costly to the entrant, will select a bundling strategy to manipulate the entrant's beliefs, as an attempt to maximize the chance that the latter may target at a wrong market segment. In a rational equilibrium, the optimal bundling strategy that best conceals the incumbent's superior information and hence maximizes the entrant's *mis-targeting* problem is pure bundling, and under some conditions, pure bundling succeeds in entry deterrence even when the entrant is not financially constrained.

Then we consider the case where the entrant must seek external financing if entry is desired. We show that there exists a situation where entry always happens and the incumbent does not adopt a bundle strategy if the entrant is financially unconstrained, but if instead the entrant is financially constrained, then the incumbent adopts a pure bundling strategy in equilibrium, which deters entry successfully. The situation under consideration is one where the entrant firm's profit is the insider's private information, but its financier can also spend a cost of verification to learn the true profit. Following the literature of optimal financial contracts we can assume without loss of generality that the entrant offers a debt contract when seeking external financing; see for example Townsend (1979) and Gale and Hellwig (1985). The incumbent, realizing the entrant's problem, would like to manipulate the distribution of the entrant's profits, so that the entrant and its financier must incur a large cost of state verification. One way to do so is for the incumbent to conceal demand information from the entrant, knowing that the asset substitution effect (see e.g. Jensen and Meckling 1976) will encourage the insider to take an inefficient risky pricing strategy in the presence of debt, which will in turn raise the cost of state verification for the entrant. When the cost of state verification is significant enough, the incumbent's optimal bundling strategy is pure bundling, which maximizes the agency cost incurred to the financially constrained entrant, and in certain cases, entry is deterred.

Finally, we derive a relationship between the firms' equilibrium product prices and the entrant's financial leverage. We focus on a set of parameters that is rich enough to allow the entrant to be either levered or unlevered in equilibrium. We show that the equilibrium product prices increase with the entrant's leverage, and compare the result to the related literature; for the latter see for example Phillips (1994), Showalter (1995), Chevalier and Scharfstein (1996), and Dasgupta and Titman (1998).

The remainder of this paper is organized as follows. In section 2 we discuss the monopoly case, and establish a relationship between a monopolistic firm's business style and its subsequent bundling strategy. One main result is that pure bundling can become an optimal strategy when the monopolist is faced with demand uncertainty and significant cost of disposal for unsold items. In section 3 we consider a financially unconstrained entrant. It is

shown that pure bundling is useful in concealing demand information and it raises the chance that the entrant may *mistarget*. Conditions are identified that pure bundling is the incumbent's equilibrium strategy, which deters entry. In section 4 we consider a financially constrained entrant, where we show that pure bundling, by concealing demand information from the entrant, encourages the entrant to take a risky pricing strategy, leading to a high agency cost for the entrant and its financier. Under some conditions, pure bundling results in entry deterrence. Then we examine the relationship between the firms' equilibrium product prices and the entrant's financial leverage. Concluding remarks are provided in section 5.

2 The Monopoly Case

Consider an economy consists of a competitive financial market and an industry with an incumbent firm faced with possible entry. All people to appear are risk neutral without time preferences.

At date 0, there is an all-equity firm endowed with abundant cash (a long purse) and is owned by entrepreneur E endowed with one unit of human capital (a management team). We shall also refer to the firm as *firm E* or the *incumbent firm*, and identify entrepreneur E with firm E from now on. Firm E can produce two products X and Y and sell to consumers with unit demand. There are two segments of consumers, H and L, with populations $a \in (0,1)$ and $1-a$. L-consumers' valuations for E's two products (X,Y) are $(1,1)$. H-consumers' valuations, however, are unknown to E initially. There are two equally likely states: in state X, H-consumers' valuations for (X,Y) are $(h,0)$, and in state Y, H-consumers' valuations for (X,Y) are $(0,h)$.

E must make two decisions sequentially. First, E must decide whether to commit his human capital to do *marketing research* (action M) or to improve *cost efficiency* (action C). If action M is taken, then E will learn the true demand state; and if action C is taken, then the (common) unit cost of producing X and Y drops from k to $k_0 \geq 0$, where $k > k_0$. Firm E is said to be *marketing-oriented* if action M is taken over C, and *production-oriented* if action C is taken over M.[2] E's choice between actions M and C will be referred to as a choice of *business style*.

After E chooses between actions M and C, E must choose a bundling strategy. E has 8 feasible bundling strategies; i.e. $\emptyset$, $\{X\}$, $\{Y\}$, $\{X,Y\}$, $\{X,B\}$, $\{Y,B\}$, $\{B\}$, $\{X,Y,B\}$, where B is a package containing one unit of X and

[2]This terminology is consistent with the literature in marketing management; see for example Kotler (1988).

one unit of Y, and $\emptyset$ represents that nothing is produced and offered to consumers. Note that $\{X, Y\}$, $\{B\}$, and $\{X, Y, B\}$ are respectively the pure components strategy, the pure bundling strategy, and the mixed bundling strategy studied in Adams and Yellen (1976). We emphasize that E may prefer to offer only one component in pure components and mixed bundling strategies under the following assumptions:

Assumption 1 *Production takes time in the sense that products must be produced and presented in a marketplace before consumers arrive.*[3]

Assumption 2 *Entrepreneur E derives no satisfaction from consuming* (X, Y). *Each unsold unit incurs a cost of disposal* $d > 0$.

Because of demand uncertainty and the cost of disposal, over-production can be costly. In this context, pure bundling has the virtue of being conservative, and may become an optimal choice for the monopolist. To simplify matters, we shall restrict attention to the set of parameters satisfying the following conditions:

Assumption 3

$$2 > h > 1 > k > k_0 \geq 0, \quad h > d > 0. \tag{1}$$

Some remarks are in order. The inequalities $2 > h > 1$ indicate that segment H is the low-valuation segment in the bundle transaction, but segment L becomes the low-valuation segment in the transaction of the pure component to which H attaches value h. Note that selling both X and Y to L-consumers is first best efficient because $1 > k$. Note that E is faced with a trade-off when choosing its *business style*: choosing M over C allows E to resolve demand uncertainty and avoid the disposition cost, but it also results in a high unit cost, and choosing C over M will have the opposite effect. We shall demonstrate that the choice of *business style* depends on the relative profitability of one bundling strategy relative to another, and E should become *marketing-oriented* if mixed bundling is optimal, and *production-oriented* if either pure components or pure bundling is optimal.

We use backward induction to prove our main result in this section. For simplicity, throughout this section, we shall assume that $k_0 = 0$.

[3]For example, (X, Y) may be innovative products that consumes do not know whether they exist, and even if consumers have heard about the products, they do not know the details and hence cannot place orders without actually seeing the products. On the other hand, arranging production layout to produce only a small sample can be prohibitively costly from the perspective of the firm.

Lemma 1 *If E has taken action M, then the optimal bundling strategy is $\{X, B\}$ in state X and $\{Y, B\}$ in state Y, with $P_B = 2$, and P_X or P_Y equal to h. The corresponding profit is $a(h-k) + (1-a)(2-2k)$.*

Proof. By symmetry, we consider only state X. The following table summarizes the profits corresponding to each undominated product-pricing strategy in state X.[4]

strategies	profits
X	$a(h-k)$ or $(1-k)$
X,B	$a(h-k)+(1-a)(2-2k)$
B	$(h-2k)$ or $(1-a)(2-2k)$

It can be verified easily that $\{X, B\}$ yields the highest profit in this case. ‖

The following table summarizes the profits corresponding to each undominated product-pricing strategy after C is taken:

strategies	profits
X	$\frac{a}{2}(h-d)$ or $(1-a)+\frac{a}{2}(1-d)$
X,Y	$a(h-d)$ or $2(1-a)+a(1-d)$
X,B	$2(1-a)+\frac{a}{2}(h-d)$
B	h or $2(1-a)$
X,Y,B	$2(1-a)+a(h-d)$

Now we can record a lemma.

Lemma 2 *The following statements are true.*

- *The pure bundling strategy $\{B\}$ is the unique choice that generates a profit independent of d.*
- *Given that $h > d$, $\{X, Y\}$ dominates both $\{X\}$ and $\{Y\}$, and $\{X, Y, B\}$ dominates $\{X, B\}$ and $\{Y, B\}$. In other words, only the three bundling strategies studied in Adams and Yellen (1976) are undominated.*
- *For $\{X, Y\}$, the optimal prices are $P_X = P_Y = h$ (respectively, $P_X = P_Y = 1$) if and only if*

$$h > \text{(respectively, } \leq) 1 + \frac{2(1-a)}{a}.$$

Thus $P_X = P_Y = h$ only if $a \geq \frac{2}{3}$.

[4]There may be two undominated pricing strategies corresponding to one bundling strategy, and in that case we record both profits in the table. For example, given the bundling strategy {X}, the pricing strategy $P_X = h$ generates profit $a(h-k)$ and the pricing strategy $P_X = 1$ generates profit $(1-k)$.

- *For* $\{B\}$*, the optimal price is* $P_B = h$ *if* $h \geq 2(1-a)$ *and* $P_B = 2$ *if* $h < 2(1-a)$*.*
- *When* $h \geq 2(1-a)$*, then* $\{B\}$ *dominates* $\{X, Y, B\}$ *if and only if* $ad \geq (2-h)(1-a)$*.*

Lemma 3 *Suppose that*

$$a \geq \frac{2}{3},\ 2 > h > 1 + \frac{2(1-a)}{a}.$$

Then after E takes action C, the optimal bundling strategy is $\{B\}$ *with bundling price h if* $ad \geq (2-h)(1-a)$*, and the optimal bundling strategy is* $\{X, Y, B\}$ *with* $P_B = 2$ *and* $P_X = P_Y = h$ *if* $ad < (2-h)(1-a)$*.*

Proof. By the preceding lemma, when $a \geq \frac{2}{3}$, the optimal pure components strategy is $\{X, Y\}$ with $P_X = P_Y = h$, yielding a profit $a(h-d)$, which is dominated by $\{B\}$ with bundling price h. Moreover, given $a \geq \frac{2}{3}$, $h > \frac{2}{3} \geq 2(1-a)$, and by the preceding lemma, $\{B\}$ dominates $\{X, Y, B\}$ if and only if $ad \geq (2-h)(1-a)$. ‖

Proposition 1 *Suppose that*

$$a > \frac{2}{3},\ 2 > h > 1 + \frac{2(1-a)}{a},$$

and

$$ad > (2-h)(1-a).$$

Then, in equilibrium E chooses action C and then $\{B\}$ *if* $(2-h)(1-a) < (2-a)k$*, and E chooses action M and then* $\{X, B\}$ *in state X and* $\{Y, B\}$ *in state Y if* $(2-h)(1-a) \geq (2-a)k$*.*

Proof. The proposition follows directly from Lemmas 1 and 3. ‖

Proposition 1 depicts a situation where the firm is faced with demand uncertainty and a sufficiently high cost of disposal for unsold products. In this case, if the firm has chosen to be *marketing-oriented*, then it has a clear idea about the configuration of demanders, and hence mixed bundling with correct *targeting* (i.e., $\{X, B\}$ in state X and $\{Y, B\}$ in state Y) appears as the best discrimination scheme; and if the firm has chosen to be *production-oriented*, then since the cost of disposal d is rather high, unlike in Adams and Yellen (1976), pure bundling strategy becomes the optimal choice, and since

h is also very high, serving L-consumers alone is not a good idea, so that the optimal bundling price is h. In choosing the optimal *business style* in the first stage, the firm correctly expects the optimal bundling strategies that it will adopt subsequently. Hence, it recognizes that choosing M will allow the firm to better price discriminate segment L, which will raise the revenue by $(1-a)(2-h)$, but it will also result in a higher unit cost of production, k, so that the total increase in production cost will be $ak + (1-a)(2k)$. The optimal *business style* is chosen after comparing the changes in the revenue and the production cost, and hence the decision depends on whether or not $(2-h)(1-a) \geq (2-a)k$.

Proposition 1 indicates an important virtue of pure bundling that has not been emphasized in the literature: unlike pure components and mixed bundling strategies, a pure bundling strategy can protect the firm from exposing to the risk of offering something (a pure component) that is likely to be undemanded, thereby avoiding costly disposal. When this benefit is significant, a pure bundling strategy can dominate other bundling choices, and the firm is encouraged to become *production-oriented*.

3 The Case of Financially Unconstrained Entrant

Now we introduce the threat of entry into the model, and demonstrate that an incumbent that would be *marketing-oriented* and would choose a pure components strategy in the absence of the threat of entry may become *production-oriented* and opt for a pure bundling strategy when faced with the threat of entry. This happens because a pure bundling strategy can prevent the uninformed entrant from free-riding on the *marketing-oriented* incumbent's superior information about the state of demand, thereby maximizing the chance that the uninformed entrant may make a wrong *targeting* decision, which in turn encourages the entrant to stay out. Since a *marketing-oriented* incumbent would not be able to utilize the demand information as flexibly as it would in the monopoly case, the presence of the threat of entry induces a preference toward *production-orientation* for the incumbent.

The game proceeds as follows. Assume that after E chooses his business style and makes the bundling and pricing decisions, an entrepreneur F can decide whether to spend $I > 0$ and produce either product X or product Y (but not both) at a unit cost c, where $k > c > 0$. We again identify firm F with entrepreneur F, and assume that like E, F is faced with the same demand uncertainty, production-in-advance constraint and cost of disposal

d. Learning the true demand state by engaging in marketing research is assumed to be prohibitively costly for F. However, F can observe all the decisions E made before making his own. Consumers arrive after F makes his entry, product, and pricing decisions.

Throughout this section, we shall confine attention to the set of parameters satisfying:

Assumption 4

$$a = 1, \quad 2 > h > k > k_0 > c > 0, \quad h > 2k_0.$$

Assumption 4 says that only H-consumers are present, and even if E chooses action C, F is still more cost efficient than E.

Lemma 4 *In the absence of F, E chooses* $\{X\}$ *in state X and* $\{Y\}$ *in state Y if action M is taken, yielding profit* $h - k$*; and E chooses* $\{B\}$ *if action C is taken, yielding* $h - 2k_0$*. Hence E chooses action M over C if and only if* $k \leq 2k_0$*, and action C over M if* $k > 2k_0$*.*

Proof. If E has taken action M, then there is only one undominated bundling strategy for E, which is to offer $\{X\}$ with $P_X = h$ in state X and $\{Y\}$ with $P_Y = h$ in state Y. The following table summarizes the profits corresponding to each undominated product-pricing strategy if E has taken C:

strategies	profits
X	$\frac{1}{2}(h - 2k_0 - d)$
X,Y	$h - 2k_0 - d$
B	$h - 2k_0$

Hence $\{B\}$ is the optimal choice after E has taken C. ‖

Lemma 5 *Suppose that* $2I + 2c + d > h$ *and* $2k + d > h$*. If E takes M, then there is a robust PBE*[5] *where E chooses* $\{B\}$ *in both states X and Y, and following E's decisions, F stays out. The supporting beliefs are such that the true state is X (respectively, Y) if E's bundling strategy contains a pure component X (respectively, Y).*

[5]It stands for *perfect Bayesian equilibrium*; see for example Fudenberg and Tirole (1991) for a formal definition.

Proof. Suppose that E has taken action M, and has learned that the state is X. Offering a pure component Y will cost $k + d$ for sure, and the benefit that this move can generate is limited by the difference between the first-best profit $h - k$ and the optimal payoff without the pure component Y (which must be non-negative, since $\emptyset$ is a feasible bundling strategy). Hence if $k + d > (h - k) - 0$, or $2k + d > h$, then no such pure component will be offered by E in state X in equilibrium. Thus if there is a PBE, then in state X E must offer either $\{X\}$, $\{X, B\}$, or $\{B\}$. If in equilibrium E offers either $\{X\}$ or $\{X, B\}$ in state X, and by symmetry, either $\{Y\}$ or $\{Y, B\}$ in state Y, then F will be fully informed in such a PBE, and given that E moves first and F has a cost advantage, in equilibrium E will end up with a net loss in both states, which is a contradiction. Hence in any PBE, E must offer $\{B\}$ regardless of the true state. But then, observing $\{B\}$, F still believes that both states are equally likely, and given $2I + 2c + d > h$, entry will result in an expected loss. Thus upon seeing $\{B\}$, F will stay out. ‖

Proposition 2 *Suppose that* $2k+d > h$ *and* $2I+2c+d > h$. *In the presence of F, in equilibrium E chooses C over M and then* $\{B\}$, *and upon seeing E's decisions, F stays out.*

Proof. In light of Lemma 5, we know that E will choose $\{B\}$ whether or not E has become informed of the state of demand. It follows that E should choose action C over M, so that the production cost can be reduced. Following action C, E should then choose $\{B\}$ by Lemma 4, and with the condition $2c + 2I + d > h$, F will stay out. ‖

Proposition 2 shows that the threat of entry discourages an incumbent firm from choosing a *marketing-oriented* business style. The intuition is as follows. By dedicating its human capital to marketing research, the incumbent is unable to fully internalize the benefits: either a new entrant can free ride on its information or the incumbent is forced to act as if it did not obtain the demand information. In this case, the incumbent firm is biased toward *production style*. The bias in the chosen business style and the corresponding bundling strategy succeed in entry deterrence, at a cost that these choices are actually not optimal from the incumbent's perspective, given that the entrant will decide to stay out. Of special interest is the PBE following E's action M, where pure bundling strategy is the only robust equilibrium choice for E under the condition $2c + d > h$. This equilibrium bundling strategy minimizes information revelation from E to the new entrant F, and ensures that F will stay out given imperfect information. Thus the above analy-

sis indicates another virtue of a pure bundling strategy which has not been stressed in the literature, that unlike pure components and mixed strategies, it does not reveal the incumbent's superior information regarding demand configuration to the rival firms.

4 The Case of Financially Constrained Entrant

In section 3, we have considered the incumbent's equilibrium choice of *business style* and bundling strategy when both the incumbent and the potential entrant have long purses. In this section, we shall consider the case where the incumbent has a long purse, but the potential entrant is endowed with a shallow pocket.[6] We shall focus on the case where the possible loss caused by *mis-targeting* cannot discourage F from entering the industry. In fact, we shall consider the case where regardless of E's strategy F will always enter if it is all-equity financed, and where the incumbent does not want to offer a bundle. In this case, if F is financially constrained instead, the incumbent will offer a pure bundling strategy, because pure bundling maximizes the problem of ex-post information asymmetry between F and his financier, and with sufficiently high costs of state verification, F cannot get financing in the first place, and hence must stay out after E offers the pure bundling strategy. Thus pure bundling deters entry because it maximizes the potential entrant's agency cost resulting from external financing.

We adopt a new model in this section, where production is costless. Again there are two products X and Y that can be produced by E, and there are two segments H and L of consumers, with populations $1-a$ and a. There are two equally likely states of demand, called X and Y. In state X, H's and L's reservation values for the two products are respectively $(H,0)$ and (L,l); and in state Y, H's and L's reservation values for the two products are respectively $(0,H)$ and (l,L), where $H > L > l > 0$. E is endowed with perfect information about the state of demand. We shall assume $H = 1$ as a normalization.

After E commits to a bundling and pricing strategy, a potential entrant F shows up. F has two possible types: with probability $q \in [0,1]$ F is penniless, and he needs I to start the business; and with probability $1-q$ F is endowed with initial wealth $w \geq 0$, so that he only needs to raise $\max(0, I-w)$ if

[6] See Bolton and Scharfstein (1990) for a model where the long-purse incumbent initiates a predation because the incumbent knows that the entrant has a shallow pocket, and the latter's chance of obtaining re-financing increases with its current profit.

entry is desired. When F shows up, his type becomes common knowledge. Whenever F needs external financing, he must design and offer a contract Z to the financial market (which consists of competitive risk neutral investors without time preferences); the details about the financial contract Z will be discussed later. Exactly one investor will be chosen to contract with F, and given Z, the investor must decide to accept or reject the contract Z and deliver the I needed by F.[7] In case financing is granted, then F must choose to produce either product X' or product Y' (but not both) and set a price. Assume that from L's perspective X and X' are perfect substitutes, and Y and Y' are perfect substitutes. An H-consumer, on the other hand, have reservation values $(H-v,0)$ for (X',Y') in state X and $(0,H-v)$ for (X',Y') in state Y, where $H > H-v \geq 0$.

After F's product and pricing decisions, E and F must present their products in a common marketplace, and following that consumers arrive. Consumers seek to maximize consumer surplus. After transactions are made, only F can costlessly observe how much profit he has made, but the investor who signed the contract with F must spend a cost $A > 0$ if he wants to know the true profit. Behind this assumption is that F's product and pricing strategies are non-verifiable; otherwise, F's profit would become observable to the financial market and any contract enforcer.

Now we can be more precise about the contract Z that F offers to the investor. As in Townsend (1979) and Gale and Hellwig (1985), the optimal contract Z that F can offer to the investor can be without loss of generality assumed to be a standard debt contract. In the debt contract Z, a face value D is specified, and after F makes (unobservable) transactions with consumers F must tell the investor whether the profit exceeds or falls short of D. In the former case, the contract specifies that F repays D; and in the latter case, the contract specifies that the investor should spend A to produce a verifiable report about the true profit, and in this case all the profit belongs to the investor. Note that the investor may turn down contract Z in the first place, if he does not expect that he can break even by accepting the contract.

Proposition 3 *Suppose that*

$$q = 0, \quad w > I,$$

and that[8]

$$L < 2l, \ aL > I, \ v + aL > 1 > v + l > \frac{1}{2}.$$

[7] We shall assume that F has limited liability, and hence it is a dominant strategy for F to always propose a contract to the financial market.

[8] It follows that $a \geq \frac{1}{2}$.

Then there is a PBE where in equilibrium, E chooses $\{X\}$ in state X and $\{Y\}$ in state Y, with price equal to 1, and F always enters, with his product strategy being offering X' if E offers X, and Y' if E offers Y, at the price L. The supporting beliefs for F are such that the state is X if the pure component X is offered but Y is not or they are both offered but Y is priced lower, and the state is Y if the pure component Y is offered but X is not or they are both offered but X is priced lower, and in the rest case F's belief is the same as his prior.[9]

Proof. Note that E must price first, and hence he cannot compete for L-consumers with F: at this time I is already sunk, and it is F's ex-post optimal strategy to always undercut his price below E's.

We first show that E cannot gain from any deviation. Since production is costless, it is feasible for E to deviate and choose different bundling (and pricing) strategies, or to deviate with the same bundling strategy but a different pricing strategy.

Consider the former. Note that a profitable deviation for E never aims at winning L-consumers from F. Given this important fact, a deviation can only be used to affect F's beliefs and hence F's pricing behavior. The optimal deviation in the class of deviations that involve E changing his bundling strategy and F holding the same posterior as in equilibrium will generate a profit equal to E's equilibrium profit, and hence there are no profitable deviations of this kind.[10] On the other hand, if E's deviation in state X leads F to believe that the state is Y for sure, then E's profit would be zero, and hence such a profitable deviation cannot exist either. Finally, if E's deviation leads F to hold a posterior the same as his prior (e.g. to produce both X and Y with $P_X = P_Y$), then we assume that after F enters, F chooses products X' and Y' with equal probabilities. For the uninformed F, pricing at l is his best response since $L < 2l$, and rationally expecting this, the optimal price for both X and Y is $P_X = P_Y = v + l$ rather than 1 from E's perspective, since $v + l > \frac{1}{2}$.[11] Since $1 > v + l$, this kind of deviations cannot be profitable for E either. Thus there are no profitable deviations for E that involve changing E's bundling strategy. Are there profitable deviations for E that involve changing the pure component price only? Note that given that F will be

[9]The specified supporting beliefs require that either F believe that a state is sure to occur or his posterior be the same as his prior. Such beliefs are consistent with a divine equilibrium; see Fudenberg and Tirole (1991).

[10]One feasible deviation that fits in this description is that E deviates and produced $\{X, B\}$ in state X with $P_X = P_B = H$.

[11]To see this, note that given F's price l, E's pricing at 1 can retain H-consumers only if F bets on the wrong product, which happens with probability $\frac{1}{2}$, while pricing at $v + l$ ensures that H will always purchase from E.

fully informed of the demand state in equilibrium, F will always price at L. Rationally expecting F's pricing behavior, it is indeed optimal for E to price at 1, since $v + L > 1$. To sum up, we conclude that given F's beliefs and strategies, E has no incentive to deviate from his equilibrium bundling and pricing strategies: it is impossible to win L-consumers, and the equilibrium revenue from serving H-consumers cannot be raised any further.

Next, consider F's incentives to deviate. Given E's bundling and pricing strategies, pricing at L is indeed optimal. To see this, note that F is fully informed in equilibrium, and pricing at L has already maximized his revenue from serving L-consumers (since he can offer just one product). How about reducing the price to below $1 - v$? That is not a profitable deviation for F, since $aL > 1 - v$. Thus when making the entry decision, F correctly expects that his equilibrium profit will be aL, which is greater than I by assumption, and hence F enters in equilibrium. ‖

Note that E chooses to share his superior information with F in the equilibrium recorded in Proposition 3. This happens because facing uncertainty F would rather take a conservative pricing strategy, but since prices are strategic complements, this forces E to select a low price in serving the loyals (H-consumers), resulting in a loss. If E shares his demand information with F, then F will become informed, and there is no need to price conservatively, which also promotes E's equilibrium price, and makes E better off.

Proposition 4 *Suppose that*

$$q = 1,\ 2I + A > aL > \max(I, 2al - I),\ v + aL > 1 > v + l > \frac{1}{2},$$

and that

$$2al > aL > 1 - a,\ L > (1 + a)l.$$

Then there is a PBE where E offers $\{B\}$ with $P_B = L$ in both demand states, and seeing $\{B\}$ the financial market rejects F's financial contract Z. The supporting beliefs are the same as in Proposition 3.

Proof. Given E's bundling strategy, F's posterior is the same as his prior. Thus we assume that after F enters, F chooses products X' and Y' with equal probabilities. We shall show that no feasible Z can satisfy the lending investor's IR condition. Given face value D of debt, F prefers pricing at l rather than $L - \epsilon$ (where $\epsilon > 0$ is very small) if and only if

$$\frac{1}{2}\max(aL - D, 0) \leq al - D \Leftrightarrow D \leq 2al - aL.$$

Since $aL + I > 2al$, no feasible D will induce F to price at l. Thus suppose that there exists Z that induces F to price at L. Since F may end up with zero profit if he chooses the price L, Z must specify that the lending investor should spend A at least with probability $\frac{1}{2}$. If accepting Z is the lending investor's equilibrium strategy, then the lending investor must be able to break even, which requires

$$aL \geq D \geq 2I + A,$$

a contradiction! We conclude that the financial market will turn down F's request of financing upon seeing E's bundling strategy $\{B\}$.

It remains to show that E has no incentive to deviate from his equilibrium bundling and pricing strategies. To this end, note that E's equilibrium profit is L, which is the highest profit that any symmetric bundling (and pricing) strategies can generate. In state X, a deviation that involves a bundling strategy that does not include B and X is apparently dominated, and a deviation that involves a bundling strategy that includes the pure component X but not Y will remove the uncertainty facing F and his financier, and will result in a profit recorded in Proposition 3, and hence such a deviation cannot be profitable. The argument applies to state Y as well, and hence E cannot profitably deviate by changing his bundling strategy. Can E profitably change the price without changing the bundling strategy? Since $aL > 1 - a$, we have $L > 1 - a$, and hence pricing at L is better than pricing at 1. How about pricing at l? This is again suboptimal, since $L > (1 + a)l$.‖

Propositions 3 and 4 together depict a situation where a bundling strategy that includes a pure bundle is suboptimal for an incumbent facing an all-equity entrant, but the pure bundling strategy can become optimal in case the entrant is financially constrained. The intuition is as follows. When the entrant is not financially constrained, pure component strategies that reveal the incumbent's demand information to the entrant may be optimal because without uncertainty the entrant is encouraged to price higher, which allows the incumbent to price higher also, resulting in a higher profit. When the entrant is financially constrained and must offer a debt contract, the well-known asset substitution effect is at work, and the entrant may prefer to price higher when facing demand uncertainty, this raises the agency cost that the entrant has to bear, and may even make financing and entry infeasible when the demand uncertainty is high. Recognizing this, the incumbent's equilibrium bundling strategy reveals no information, so that the demand uncertainty and the resulting agency problem facing the entrant can be maximized, which, under the specified conditions, leads to entry deter-

rence. Since the parameters satisfying the conditions specified in Proposition 4 also satisfy the conditions specified in Proposition 3, where pure bundling is a dominated strategy, pure bundling has been shown to be useful exactly because the potential entrant is financially constrained. In fact, the role of the pure bundling strategy stressed in this section is new relative to its roles documented in sections 2 and 3.

Proposition 5 *Suppose that*

$$0 < q < 1,\ 2I + A > aL > \max(I, 2al - I),\ v + aL > 1 > v + l > \frac{1}{2},$$

that[12]

$$\frac{aL - A}{2} + w > I > 2al - aL + w,\ I > w,$$

and that

$$2al > aL > 1 - a,\ L > (1 + a)l.$$

Then there is a $q^* \in (0, 1)$ *such that if* $1 > q \geq q^*$*, then there is a PBE where E offers* $\{B\}$ *with* $P_B = L$ *in both demand states, and seeing* $\{B\}$ *F enters if and only if he is endowed with* w*, and in that case the financial contract* Z *specifies a face vale of debt equal to*

$$D = 2(I - w) + A.$$

After F enters, F chooses products X' *and* Y' *with equal probabilities, and prices at* L*. The supporting beliefs are the same as in Proposition 3.*

Proof. By Proposition 4, E's strategy is strictly optimal if $q = 1$, and hence by continuity for q close one, that strategy remains optimal. Thus it remains to verify that the specified equilibrium behavior for F is indeed his best response in the event that F is endowed with initial wealth w. From Gale and Hellwig (1985), we know that maximum equity participation is optimal, and hence the amount that F will raise is $I - w$ if entry is desired. The assumed condition $I > 2al - aL + w$ ensures that F will price at L under every feasible debt contract, so that the costly profit verification problem cannot be avoided. The condition $\frac{aL-A}{2} + w > I$ ensures that an optimal contract exists, which specifies that the investor should verify the profit only when F offers X' in state Y or F offers Y' in state X. Hence the face value of debt solves

$$\frac{1}{2}D + \frac{1}{2}[-A] = I + w,$$

[12]It follows that $w > 0$.

which is the investor's zero-profit condition. This gives $D = 2(I - w) + A$. The rest assertions are obvious given Propositions 3 and 4. ‖

To derive a relationship between equilibrium product prices and financial leverage, let us modify the model slightly, and assume two possible interim events.

Proposition 6 *Suppose that after E makes his bundling and pricing strategies and before F shows up, two events may occur: either (event G_0) $q = 0$ with probability $\delta \in [0, 1]$ or (event G^*) $q \in (q^*, 1)$ with probability $1 - \delta$, where q^* is defined in Proposition 5. In event G_0, F is endowed with an initial wealth $w_0 > I$, and in event G^*, F may be penniless (with probability $q \in (q^*, 1)$) or endowed with an initial wealth w, which, together with other parameters, satisfies:*

$$2I + A > aL > \max(I, 2al - I),\ v + aL > 1 > v + l > \frac{1}{2},$$

$$\frac{aL - A}{2} + w > I > 2al - aL + w,\ I > w,$$

and

$$2al > aL > 1 - a,\ L > (1 + a)l.$$

Moreover, when G_0 or G^* occurs, it becomes common knowledge. Under the above assumptions, there exists a $\delta^* \in (0, 1)$ such that for all $\delta \in (0, \delta^*)$, a PBE exists where E offers $\{B\}$ with $P_B = L$ in both demand states, and seeing $\{B\}$ F always enters. After F enters, F chooses products X' and Y' with equal probabilities, and prices the chosen product at L in event G^* and at l in event G_0. The supporting beliefs are as described in Proposition 3.

Proof. That E's equilibrium strategy is optimal follows from Proposition 5 and the fact that E's payoff is continuous in δ and q. Thus it remains to verify that the specified equilibrium behavior for F is indeed F's best response. This, however, follows from Propositions 3 and 5 directly. ‖

Proposition 6 exhibits an equilibrium relationship between firms' product and pricing behavior and financial leverage. In event G_0, where firms are all-equity financed, F's price is l, which is lower than the optimal price L that F chooses in event G^*. This happens because of the asset substitution effect, which encourages F to bet on the high-risk-high-return pricing-high strategy when F is financially leveraged. In both events G_0 and G^*, E's price P_B remains the same. This is due to the assumed timing of events. For

example, if we assume instead that E must first choose his bundling strategy and then choose the supply quantities and prices,[13] and that G_0 or G^* occurs after E commits to his bundling strategy but before E makes his pricing strategy. With this new formulation, with sufficiently small δ, choosing $\{B\}$ remains to be E's optimal bundling strategy, but now E's product price can adjust with the information revealed by the event G_0 or G^*. In particular, Proposition 3 shows that in event G_0, E will price his bundle at $v + l < 1$, implying that both firms' prices tend to increase in the entrant's financial leverage. We record this observation as a corollary:

Corollary 1 *If parameters satisfy the conditions specified in Proposition 6, then the equilibrium product prices tend to increase with the entrant's financial leverage.*

5 Conclusion

In this paper, we have conducted an exploratory study about the roles of bundling strategies in transmitting information among rival firms, reducing risk exposure, and entry deterrence. We have shown that, unlike in Adams and Yellen (1976), a monopolist may optimally adopt a pure bundling strategy when it is faced with demand uncertainty and costs of disposal for unsold products. Furthermore, we have established a connection between *business style* and the optimal bundling strategy. It has been shown that in a monopoly market, depending on consumers' valuation distribution, pure components and mixed bundling strategies may respectively be optimal for a *marketing-oriented* firm, but a *production-oriented* firm tends to prefer a pure bundling strategy. In studying the roles of bundling strategies in revealing information and deterring entry, we have shown that when an incumbent is faced with a potential entrant that is financially unconstrained and uninformed of the state of demand, pure bundling may appear as the incumbent's optimal strategy because it raises the chance that the entrant may target at the wrong segment, and when the loss of mistargeting is significant, pure bundling may result in entry deterrence. Moreover, when the potential entrant is financially constrained, the incumbent's pure bundling strategy can maximize the state verification cost incurred to the entrant and its financier,

[13]Suppose for example that packaging each bundle or component requires a set-up of production layout. Setting up a production layout takes time, and once a layout is set up, it cannot be changed by the time consumers arrive. Only after the production layout is set up, can E start to produce the components and the bundle that are included in the chosen bundling strategy.

and may help deter entry. We have also documented a relationship between equilibrium product prices and the entrant's face value of debt.

For our purpose, we have chosen to focus on certain market environments where our analyses would produce the most eminent results. Hence we have not offered a complete characterization of the equilibrium bundling strategies that may arise from the models that we have studied. This constitutes a central part of the agenda of our future research on commodity bundling.

References

1. Adams, W., and J. Yellen, 1976, Commodity bundling and the burden of monopoly, Quarterly Journal of Economics, 90, 475-498.

2. Alba, J., C. Mela, T. Shimp, and J. Urbany, 1999, The Effect of Discount Frequency and Depth on Consumer Price Judgments, Journal of Consumer Research.

3. Blattberg, R., G. Eppen, and J. Lieberman, 1981, A theoretical and empirical evaluation of price deals for consumer nondurables, Journal of Marketing, 45, 116-129.

4. Blattberg, R., and S. Sen, 1974, Market segmentation using models of multidimensional purchasing behavior, Journal of Marketing, 38, 17-28.

5. Blattberg, R., and S. Sen, 1976, Market segments and stochastic brand choice models, Journal of Marketing Research, 13, 17-28.

6. Bolton, P., and D. Scharfstein, 1990, A theory of predation based on agency problems in financial contracting, American Economic Review, 80, 93-106.

7. Brander, J., and T. Lewis, 1986, Oligopoly and financial structure: the limited liability effect, American Economic Review, 76, 956-970.

8. Burdett, K., and K. Judd, 1983, Equilibrium price dispersion, Econometrica, 51, 955-969.

9. Butters, G., 1977, Equilibrium distribution of sales and advertising prices, Review of Economic Studies, 44, 465-491.

10. Carlson, J., and R.P. McAfee, 1983, Discrete equilibrium price dispersion, Journal of Political Economy, 91, 480-493.

11. Chen, Chia-Hui, and Shan-Yu Chou, 2003, A theory of price deals with financially leveraged retailers, working paper, College of Management, National Taiwan University.

12. Chevalier, J., 1995, Do LBO supermarkets charge more? An empirical analysis of the effects of LBOs on supermarket pricing, Journal of Finance, 50, 1095-1112.

13. Chevalier, J., and D. Scharfstein, 1996, Capital market imperfections and countercyclical markups: theory and evidence, American Economic Review.

14. Dasgupta, S., and S. Titman, 1998, Pricing strategies and financial policy, Review of Financial Studies, 11, 705-737.

15. Fudenberg, D., and J. Tirole, 1986, A "signal-jamming" theory of predation, Rand Journal of Economics, 17, 366-376.

16. Fudenberg, D., and J. Tirole, 1991, Game Theory, Boston: MIT Press.

17. Gale, D., and M. Hellwig, 1985, Incentive compatible debt contracts: the one-period problem, Review of Economic Studies, 647-664.

18. Gal-Or, E., 1982, Hotelling's spatial competition as a model of sales, Economic Letters, 9, 1-6.

19. Green, E., and R. Porter, 1984, Noncooperative collusion under imperfect price information, Econometrica, 52, 87-100.

20. Hong, P., R. Preston, McAfee, and A. Nayyar, 2002, Equilibrium price dispersion with consumer inventories, Journal of Economic Theory, 105, 503-517.

21. Jensen, M., and W. Meckling, 1976, Theory of the firm: managerial behavior, agency cost and ownership structure, Journal of Financial Economics, 3, 305-360.

22. Jeuland, A., and C. Narasimhan, 1985, Dealing–temporary price cuts–by seller as a buyer discrimination mechanism, Journal of Business, 58, 295-308.

23. Klemperer, P., 1987, Markets with consumer switching costs, Quarterly Journal of Economics, 102, 375-394.

24. Kotler, Philip, 1988, Marketing Management : Analysis, Planning, Implementation, and Control, Prentice Hall.

25. McAfee, R.P., 1994, Endogenous availability, cartels and merger in an equilibrium price dispersion, Journal of Economic Theory, 62, 24-47.

26. McAfee, R.P., 1995, Multi-product equilibrium price dispersion, Journal of Economic Theory, 67, 83-105.

27. McAfee, R.P., J. McMillan, and M. Whinston, 1989, Multi-product monopoly, commodity bundling and correlation of values, Quarterly Journal of Economics, 104, 371-383.

28. Narasimhan, C., 1988, Competitive promotional strategies, Journal of Business, 61, 427-450.

29. Opler, T., and S. Titman, 1994, Financial distress and corporate performance, Journal of Finance, 49, 1015-1040.

30. Pauwels, K., D. Hanssens, and S. Siddarth, 2002, The long-term effects of price promotions on category incidence, brand choice, and purchase quantity, Journal of Marketing Research, 39, 421-439.

31. Phillips, G., 1994, Increased debt and product market competition: an empirical analysis, Journal of Financial Economics, 37, 189-238.

32. Schmalensee, R., 1982, Commodity bundling by a single-product monopolist, Journal of Law and Economics, XXV, 67-71.

33. Schmalensee, R., 1984, Gaussian demand and commodity bundling, Journal of Business, LVII, S211-30.

34. Seward, J., 1990, Corporate financial policy and the theory of financial intermediation, Journal of Finance, 45, 351-377.

35. Showalter, D., 1995, Oligopoly and financial structure: comment, American Economic Review, 85, 647-653.

36. Spence, M., 1980, Multiproduct quality-dependent prices and profitability constraints, Review of Economic Stuides, XLVII, 821-842.

37. Stigler, G., 1964, A theory of oligopoly, Journal of Political Economy, 72, 44-61.

38. Stigler, G., 1968, A note on block booking, in G. J. Stigler (ed.), The Organization of Industry, Homewood, Illinoise: Richard D. Irwin.

39. Townsend, R., 1979, Optimal contracts with costly state verification, JET, 20, 265-293.

40. Varian, H., 1980, A model of sales, American Economic Review, 70, 651-659.

中文摘要

本研究主要探討的是生產多產品之既存廠商的經營模式、組合產品策略及訂價策略，以及上述策略對於新進廠商融資契約與選擇目標市場等決策的影響。有別於 Adams 及 Yellen（1976）的論點：在面臨需求不確定和處置滯銷產品需要成本的問題時，獨占廠商的最適策略是採取純組合產品訂價策略（pure bundling strategy），本研究認為，當獨占廠商處於此情境中，行銷導向(marketing-oriented)廠商的最適策略是根據消費者評價的分佈來決定採取純個別產品訂價策略（pure components strategy）或是混合型組合訂價策略（mixed bundling strategy）；而產品導向（production-oriented)的廠商則較偏好採取純組合產品訂價策略。當潛在的新進廠商沒有融資限制但對市場需求狀況訊息不清楚時，既存廠商的最適策略是採取純組合產品訂價策略，因為此舉將可增加新進廠商選擇錯誤市場區隔的可能性，而當該錯誤決策造成可觀損失時，純組合產品訂價策略就可形成此市場的進入障礙。此外，若潛在的新進廠商具有融資限制時，既存廠商的純組合產品訂價策略將可極大化新進廠商及其融資者評估和確認市場需求狀況所需支付的成本，進而有助於既存廠商嚇阻潛在進入廠商進入該市場。此外，本研究也進一步導證並探討產品均衡價格和新進廠商負債面額兩者間的關係。

關鍵字：價格促銷、財務槓桿、標準債務契約、多產品定價策略

Abstract

This paper studies the relationships among a multi-product incumbent firm's business style, its bundling and pricing strategy, and the impacts of these decisions on the design of the financial contract and the targeting strategy of a new entrant. We show that, unlike in Adams and Yellen (1976), a monopolist may optimally adopt a pure bundling strategy when it is faced with demand uncertainty and costs of disposal for unsold products. We show that in such a monopoly market, depending on consumers' valuation distribution, pure components and mixed bundling strategies may respectively be optimal for a *marketing-oriented* firm, but a *production-oriented* firm tends to prefer a pure bundling strategy. When the incumbent is faced with a potential entrant that is financially unconstrained and uninformed of the state of demand, pure bundling may appear as the incumbent's optimal strategy because it raises the chance that the entrant may target at the wrong segment, and when the loss of mistargeting is significant, pure bundling may result in entry deterrence. Moreover, when the potential entrant is financially constrained, the incumbent's pure bundling strategy can maximize the state verification cost incurred to the entrant and its financier, and may help deter entry. We also document a relationship between equilibrium product prices and the entrant's face value of debt.

Keywords：Price Dispersion, Financial Leverage, Standard Debt Contract, Multi-product Pricing Strategy

一、計畫緣由與目的：

近年來，組合產品策略（bundling strategy）的研究較著重於獨占市場中的組合產品策略，在辨別及區分異質消費者時所扮演的角色，(Stiger, 1968; Adams and Yellen, 1976;Schmalensee, 1982,1984;　McAfee, McMillan and Whinston, 1989）。然而，本研究則欲針對偏好未知的同質性消費者作進一步地探討分析。

本研究的主要目標有二：首先，本研究將先在獨占市場中作討論，希望提出一個具應用性之理論來解釋獨占廠商的經營模式與組合產品及定價策略間的關聯性。此外，本研究也將納入新競爭者的威脅作為延伸探討，探究一個已掌握市場需求資訊的多產品既存廠商，在面對潛在新進廠商的威脅下，其組合產品決策所扮演的資訊角色。

在獨占市場的討論中，由於廠商受制於人力資本（或勞動力），而必須決定要將資源投注於行銷研究或是成本縮減，進而確定廠商的經營模式（business style）。一個行銷導向(marketing-oriented)的廠商會選擇投注資源在行銷研究以獲悉市場需求狀況，但相對地必須承擔高生產成本；而一個產品導向(production-oriented)的廠商會選擇致力於成本縮減，卻必須面對需求的不確定。且在本研究探討的情境中，生產過多將產生處置滯銷品的高額成本。因此，廠商必須在決定其經營模式後，作出其組合產品策略及訂價策略。

本研究隨後引進新進廠商進行延伸討論，分別探討當既存廠商面臨具融資限制或不具融資限制之潛在新進入者的威脅時，其組合產品策略之選擇在揭露市場需求資訊中所扮演的角色。在本研究的模型中，零售商先決定資本結構才進行價格競爭，因此早先階段的財務契約會內生影響均衡的訂價策略。另一方面，零售商向財務市場中大眾投資人進行集資時，後者在決定負債面額時，也會理性的預期到負債面額對於後續均衡訂價的影響，而均衡的訂價行為，又會內生決定零售商的企業風險與負債的違約風險。從而後續的均衡訂價，也會回過頭來影響均衡時的負債面額，本研究亦將導證並推論產品均衡價格和新進廠商財務槓桿間的關係。

二、結果與討論

透過模型建構與推導，本研究獲致以下結論：

結論一：在需求不確定和處置滯銷產品需高額成本的獨占市場結構下，選擇行銷導向的廠商將可清楚該市場的需求型態，因而可針對正確的市場區隔做出最適的混合型組合產品策略（mixed bundling strategy）。而若該獨占廠商選擇的是產品導向將較偏好採取純組合產品策略（pure bundling strategy）。

過去學者Adams 及Yellen（1976）認為：在面臨需求不確定和處置滯銷產品需要成本的問題時，獨占廠商的最適策略是採取純組合產品訂價策略。但本研究發現，若獨占廠商選擇行銷導向的經營模式，投入資源在行銷研究，將可對市場需求狀況有較清楚的了解，則可正確的針對目標市場區隔提出分別適配的混合型產品策略。相對地，若廠商選擇產品導向的經營模式，致力於成本縮減，卻必須面對較高的需求不確定及高額的滯銷產品處置成本時，由於高端消費者評價（valuation）高，當高端消費者比例夠大時，只服務低端顧客將不是最佳策略，因此廠

商可選擇純組合產品策略，將組合產品價格訂到等於高端消費者評價之處，可減少提供錯誤商品組合的風險，避免高額的處置成本。

結論二：不具融資限制之新進廠商的威脅將使既存廠商較不願選擇行銷導向的經營模式。

市場出現新進廠商威脅時，由於既存廠商相較於新進廠商對於市場需求擁有較多訊息，且生產過剩必須承擔大筆成本，因此新進廠商會企圖從既存廠商的組合產品策略的選擇中發掘有關市場需求的資訊。另一方面，既存廠商也明瞭新進廠商會有如此的策略考量，因而將選擇純組合產品策略，以避免即使是不具融資限制的新進入者可由既存廠商的策略中獲得任何市場需求訊息，且可增加此新進廠商選擇錯誤市場區隔的可能性，且當該錯誤決策造成可觀損失時，純組合產品訂價策略就可形成此市場的進入障礙。因此，既存廠商將必須採取狀似不明市場需求而選擇朝向產品導向的經營模式。

結論三：若潛在的新進廠商具有融資限制時，既存廠商的純組合產品訂價策略將可極大化新進廠商及其融資者評估和確認市場需求狀況所需支付的成本，進而有助於既存廠商嚇阻潛在進入廠商進入該市場。

當新進廠商具融資限制且從事集資行為必須提出財務契約時，由於資產替代效果的作用，新進廠商面對需求不確定時將傾向於提高定價，卻可能造成必須承擔較高的代理成本（agency cost），增加融資與進入市場的困難度。再者，當既存廠商採取純均衡組合產品策略，使得新進廠商無法由此獲知任何額外市場相關訊息時，將可極大化新進廠商的代理成本。特別是當新進廠商進入市場必須面對高額創始成本時，將產生融資困難的問題，因此，既存廠商的純組合產品訂價策略可以達到嚇阻潛在進入廠商進入該市場的效果。

結論四：產品均衡價格將隨新進廠商的財務槓桿程度而提高。

本研究發現，資產替代效果促使財務槓桿程度高的新進廠商傾向於訂定高風險高報酬性質的高價策略，且由於既存廠商在新進廠商財務槓桿決策後才決定其定價，因而由彼此策略互補關係可提高其產品的均衡定價。因此市場之產品均衡價格隨著新進廠商的財務槓桿程度而提高。

三、計畫成果自評

本研究完成專案計畫書中之主要目標：提出理論解釋獨占廠商的經營模式與組合產品及定價策略間之關聯性，並探究一個已獲市場需求資訊的多產品既存廠商在面對新進廠商威脅下，其組合產品策略之選擇。在後續研究中，可繼續延伸此模型，對均衡的組合產品策略作一全面的特性描述與研究，這亦是本研究未來可能的延伸方向重點。

四、參考文獻

[1] Adams, W., and J. Yellen, 1976, Commodity bundling and the burden of monopoly, Quarterly

Journal of Economics, 90, 475-498.

[2] Alba, J., C. Mela, T. Shimp, and J. Urbany, 1999, The Effect of Discount Frequency and Depth on Consumer Price Judgments, Journal of Consumer Research.

[3] Blattberg, R., G. Eppen, and J. Lieberman, 1981, A theoretical and empirical evaluation of price deals for consumer nondurables, Journal of Marketing, 45, 116-129.

[4] Blattberg, R., and S. Sen, 1974, Market segmentation using models of multidimensional purchasing behavior, Journal of Marketing, 38, 17-28.

[5] Blattberg, R., and S. Sen, 1976, Market segments and stochastic brand choice models, Journal of Marketing Research, 13, 17-28.

[6] Bolton, P., and D. Scharfstein, 1990, A theory of predation based on agency problems in financial contracting, American Economic Review, 80, 93-106.

[7] Brander, J., and T. Lewis, 1986, Oligopoly and financial structure: the limited liability effect, American Economic Review, 76, 956-970.

[8] Burdett, K., and K. Judd, 1983, Equilibrium price dispersion, Econometrica, 51, 955-969.

[9] Butters, G., 1977, Equilibrium distribution of sales and advertising prices, Review of Economic Studies, 44, 465-491.

[10] Carlson, J., and R.P. McAfee, 1983, Discrete equilibrium price dispersion, Journal of Political Economy, 91, 480-493.

[11] Chen, Chia-Hui, and Shan-Yu Chou, 2003, A theory of price deals with financially leveraged retailers, working paper, College of Management, National Taiwan University.

[12] Chevalier, J., 1995, Do LBO supermarkets charge more? An empirical analysis of the effects of LBOs on supermarket pricing, Journal of Finance, 50, 1095-1112.

[13] Chevalier, J., and D. Scharfstein, 1996, Capital market imperfections and countercyclical markups: theory and evidence, American Economic Review.

[14] Dasgupta, S., and S. Titman, 1998, Pricing strategies and financial policy, Review of Financial Studies, 11, 705-737.

[15] Fudenberg, D., and J. Tirole, 1986, A ``signal-jamming'' theory of predation, Rand Journal of Economics, 17, 366-376.

[16] Fudenberg, D., and J. Tirole, 1991, Game Theory, Boston: MIT Press.

[17] Gale, D., and M. Hellwig, 1985, Incentive compatible debt contracts: the one-period problem, Review of Economic Studies, 647-664.

[18] Gal-Or, E., 1982, Hotelling's spatial competition as a model of sales, Economic Letters, 9, 1-6.

[19] Green, E., and R. Porter, 1984, Noncooperative collusion under imperfect price information, Econometrica, 52, 87-100.

[20] Hong, P., R. Preston, McAfee, and A. Nayyar, 2002, Equilibrium price dispersion with consumer inventories, Journal of Economic Theory, 105, 503-517.

[21] Jensen, M., and W. Meckling, 1976, Theory of the firm: managerial behavior, agency cost and

ownership structure, Journal of Financial Economics, 3, 305-360.

[22] Jeuland, A., and C. Narasimhan, 1985, Dealing--temporary price cuts--by seller as a buyer discrimination mechanism, Journal of Business, 58, 295-308.

[23] Klemperer, P., 1987, Markets with consumer switching costs, Quarterly Journal of Economics, 102, 375-394.

[24] Kotler, Philip, 1988, Marketing Management : Analysis, Planning, Implementation, and Control, Prentice Hall.

[25] McAfee, R.P., 1994, Endogenous availability, cartels and merger in an equilibrium price dispersion, Journal of Economic Theory, 62, 24-47.

[26] McAfee, R.P., 1995, Multi-product equilibrium price dispersion, Journal of Economic Theory, 67, 83-105.

[27] McAfee, R.P., J. McMillan, and M. Whinston, 1989, Multi-product monopoly, commodity bundling and correlation of values, Quarterly Journal of Economics, 104, 371-383.

[28] Narasimhan, C., 1988, Competitive promotional strategies, Journal of Business, 61, 427-450.

[29] Opler, T., and S. Titman, 1994, Financial distress and corporate performance, Journal of Finance, 49, 1015-1040.

[30] Pauwels, K., D. Hanssens, and S. Siddarth, 2002, The long-term effects of price promotions on category incidence, brand choice, and purchase quantity, Journal of Marketing Research, 39, 421-439.

[31] Phillips, G., 1994, Increased debt and product market competition: an empirical analysis, Journal of Financial Economics, 37, 189-238.

[32] Schmalensee, R., 1982, Commodity bundling by a single-product monopolist, Journal of Law and Economics, XXV, 67-71.

[33] Schmalensee, R., 1984, Gaussian demand and commodity bundling, Journal of Business, LVII, S211-30.

[34] Seward, J., 1990, Corporate financial policy and the theory of financial intermediation, Journal of Finance, 45, 351-377.

[35] Showalter, D., 1995, Oligopoly and financial structure: comment, American Economic Review, 85, 647-653.

[36] Spence, M., 1980, Multiproduct quality-dependent prices and profitability constraints, Review of Economic Stuides, XLVII, 821-842.

[37] Stigler, G., 1964, A theory of oligopoly, Journal of Political Economy, 72, 44-61.

[38] Stigler, G., 1968, A note on block booking, in G. J. Stigler (ed.), The Organization of Industry, Homewood, Illinoise: Richard D. Irwin.

[39] Townsend, R., 1979, Optimal contracts with costly state verification, JET, 20, 265-293.

[40] Varian, H., 1980, A model of sales, American Economic Review, 70, 651-659.