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# Shareholder Wealth Enhancement through Outsourcing Strategies that Increase the Total Cost but Leave Revenues Unchanged

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## Abstract

This article focuses on outsourcing contracts which, while shifting internal processes and activities to an external party, substitute a fixed cost by a variable cost. Given this, the standard Capital Asset Pricing Model of finance theory is used to show that some of these outsourcing contracts may enhance a firm's value despite increasing the total cost, while leaving revenues unchanged. This is because the substitution of fixed by variable cost reduces risk, as captured by the CAPM beta, and hence lowers the cost of capital used in the valuation of the firm. The article first derives value elasticity (the percentage change in firm value to the percentage change in fixed cost) for an outsourcing contract that displaces fixed cost by variable cost on a one-on-one basis, and shows that such a total cost preserving substitution of fixed by variable cost will always increase the value of the firm. Subsequently, the article shows that for a given reduction in fixed cost, the variable cost can be increased by an iso-value factor $\alpha$ greater that unity (this implies that the total cost will increase) such that the firm value is unchanged. Any contractual arrangement by which the variable cost increase lies between unity and $\alpha$ will therefore, despite an increase in the total cost, always result in an increase in firm value. This has important implications for firms that outsource, and for vendors, while designing and negotiating an outsourcing contract.



**Keywords:** CAPM, Valuation, Outsourcing

## 1 Introduction

The title of this article may sound like an oxymoron, but it is not. I use the standard Capital Asset Pricing Model (CAPM—Sharpe 1964, and Lintner 1965) to show that there exist outsourcing strategies that are "costly" (in that they increase the total cost of a firm), that leave revenues unchanged, but however enhance the value of the firm. While several definitions of outsourcing can be found, the central feature is captured by the Ellram and Billington (2001) definition, "as the transfer of activities and processes previously conducted internally to an external party". However, in this article I will use a narrower focus, analyzing outsourcing contracts that substitute a fixed cost (when activities and processes are conducted internally) by a variable cost (when activities and processes are conducted by an external party).

Value enhancement can occur with outsourcing contracts (defined as above) because the substitution of fixed by variable cost reduces risk, as captured by the CAPM beta, and hence lowers the cost of capital. The firm value may increase if in an MM (Modigliani and Miller 1958, 1963) discounted cash flow valuation framework the reduction in the numerator—the free cash flows (because of the increase in total cost) is more than offset by the reduction in the denominator—the cost of capital.

While clearly the outsourcing contract used here may not capture the complexities of commercial outsourcing contracts, it does capture a common explanation for outsourcing-that costs are affected by outsourcing (Alexander and Young 1996). However this common explanation implicitly or explicitly assumes "cost-savings". Hätönen and Erikkson (2009) in a review of outsourcing research identify "cut costs" as a prime motive for some theories of outsourcing. Varadarajan (2009) exhorts firms to think beyond cost saving and incorporate quality considerations. His framework contemplates outsourcing at a higher cost, if a potential outsourcing partner can, for instance, undertake superior quality R&D. My primary focus in this article is however on "total cost increase", assuming that non-cost considerations such as quality remain unchanged in an outsourcing arrangement.

Dominant theories for outsourcing such as transaction-cost economics or resource-based views provide a "rich" explanation (see Hätönen and Eriksson 2009 for a review of the outsourcing literature). However, the narrow view used in this article allows the use of standard valuation models of finance theory, with the potential to provide important insights into a sub-set of outsourcing contracts.

The rest of this paper is organized as follows. Section 2 shows that cost-preserving outsourcing (i.e. contracts that substitute a fixed cost by variable cost on a one-on-one basis) always enhances firm value. This result implies that an outsourcing contract in which additional variable cost arising from outsourcing is larger than the fixed cost displaced, could still add value. This is formally examined in section 3 in which I show that, within a certain limit, such a total cost increase is consistent with the value of the firm increasing. As a concession to readers who yearn for a total cost saving outsourcing, section 4 briefly values such contracts, and shows that the benefit from cost saving is significantly enhanced by cost of capital reduction. These sections use simplifying assumptions. Section 5 shows that the results obtained in the earlier sections hold even when restrictive assumptions are lifted. Section 6 concludes the paper.

## 2 Cost-preserving outsourcing

I will first value a firm at time '0'under a set of base case assumptions. I assume that this firm enters immediately into an outsourcing contract at time '0' that reduces the fixed cost and increases the variable cost, and estimate the revised value of the firm incorporating this contract. A comparison of these two values (base case and post-outsourcing contract) constitutes the core methodology of this article. Sections 2 to 4 use the same set of base case assumptions, section 5 relaxes some assumptions that were primarily introduced to facilitate formulation.

### 2.1 Base case

I will assume that the standard CAPM and MM propositions (Modigliani-Miller 1958, 1963) hold[1] and that the expected return of the market portfolio is $r_M$, and the risk-free rate is $r_F$. The following assumptions about the firm are used in the base case. These are clarified and justified below.

i) The firm has level, perpetual operating cash flows.
ii) The firm is all equity financed.
iii) There are no fixed assets.
iv) The firm has a single product output, with a non-random (and needless to say, non-negative) contribution margin.

[1] Copeland, Weston and Shastri 2005 provide a set of CAPM assumptions (chapter 6) and a synthesis of MM and CAPM (Chapter 15).

The level perpetual cash flows are consistent with MM. To operationalize this assumption, the forecast annual income statements (from year 1 onwards) comprise annual revenues normalized to unity, annual variable cost $VC_0$, and annual cash (with zero fixed assets there is no depreciation) fixed cost $FC_0$. The income tax rate is T. Following from these, the firm has an annual contribution $C_0$=1-$VC_0$, and an annual earnings before interest and taxes $EBIT_0 = C_0 - FC_0$. A measure of operating risk is the degree of operating leverage (DOL) given by $C_0/EBIT_0$ (Mandleker and Rhee 1984), and this will change as an outsourcing contract reduces fixed cost and increases the variable cost.

The all-equity assumption allows me to focus on how the CAPM unlevered beta of the firm changes with outsourcing. In section 5 I will show that the introduction of debt does not alter the conclusions of sections 2 and 3.

With assumption (iii) an evaluation of an outsourcing arrangement needs to consider changes only in the variable and fixed costs (and not in the fixed assets). In section 5 I will show that the introduction of fixed assets does not alter the results of sections 2 and 3, conceptually. However, closed-form solutions are messy and valuation is best done numerically.

Valuation of the firm, given these assumptions, requires the unlevered cost of equity, and a number of decompositions of systematic risk are available (Rubinsten 1973, Lev 1974, Gahlon and Gentry 1982, Mandleker and Rhee 1984, Conine 1982 and 1983). I will use a synthesis of this literature (Brealey et al. 2011, chapter 9) that assigns a revenue beta[2] $\beta_{REV}$ to the revenue stream, appropriate to the single product, and assigns a zero beta to the fixed cost. Since the contribution margin is assumed non-random, the variable cost stream has the same beta as the revenue stream. The base case value $V_0$ of this firm with level perpetual cash flows is given by equation (1).

$$V_0 = \frac{C_o(1-T)}{r_{REV}} - \frac{FC_o\,(1-T)}{r_F} \qquad (1)$$

[2] $\beta_{REV} = Covariance(Firm\ Revenue, Market) \Big/ Variance(Market)$

The firm is valued in equation (1) as holding a "long position" in the present value of after-tax contribution, and a "short position" in the present value of after-tax fixed cost. The discount rate for the contribution is $r_{REV}$ obtained from $\beta_{REV}$ using the CAPM[3].

The systematic risk of the unlevered firm $\beta_U$ is given by equation (2) below (given the assumption that $\beta_{Fixed\ cost}=0$), this explicitly facilitates understanding of how outsourcing affects the firm's cost of capital.

$$\beta_U = \frac{PV(After\ tax\ contribution)}{Firm\ value}\beta_{REV} - \frac{PV(After\ tax\ fixed\ cost)\beta_{Fixed\ cost}}{Firm\ value}$$

$$\beta_U = \frac{\frac{C_o(1-T)}{r_{REV}}}{\frac{C_o(1-T)}{r_{REV}} - \frac{FC_o\,(1-T)}{r_F}}\beta_{REV} \qquad (2)$$

Capitalizing the after-tax earnings, $EBIT_0(1\text{-}T)$, at the cost of unlevered equity $r_u$ appropriate to this $\beta_U$ will obviously provide $V_0$.

### 2.2 Cost-preserving outsourcing contract

Given this base case scenario, suppose that an outsourcing contract changes the fixed cost by ΔFC and the variable cost by ΔVC, such that the change in the total cost ΔTC is zero. This results in the annual contribution changing to $C_0+\Delta FC$, while the annual earnings before interest and tax is unchanged. The value $V'_0$ of the firm following this outsourcing contract is given by equation (4).

$$V'_0 = \frac{(C_o + \Delta FC)(1-T)}{r_{REV}} - \frac{(FC_o + \Delta FC)(1-T)}{r_F} \qquad (3)$$

Comparing (1) and (3) it is clear that an outsourcing contract that reduces the fixed cost (i.e. ΔFC is negative) and increases the variable cost, while preserving total cost, always increases the value of the firm by an amount ΔV given by equation (4). This is because $r_{REV}$ is always greater than $r_F$ for positive $\beta_{REV}$. This conclusion also follows given that the value post-outsourcing comprises the capitalizing of

[3] The expected return of the $i^{th}$ security is related to its beta $\beta_i$, by $r_i = r_F + (r_M - r_F)\beta_i$

the same after-tax earnings as in the base case by a lower cost of equity (since the beta of the unlevered firm using the formulation in (2) adjusted for outsourcing will reduce post-contract).

$$\Delta V = (1 - T)\Delta FC \left(\frac{1}{r_{REV}} - \frac{1}{r_F}\right) \quad (4)$$

Using equations (1) and (4), the value elasticity $\eta_V$ defined as $(\Delta V/V_0)/(\Delta FC/FC_0)$ can be derived, and is in equation (5) below. This value elasticity measures the sensitivity of the firm value to changes in the fixed cost. Given the assumption that $r_{REV}$ is not less than $r_F$ and that the contribution is non-negative, $\eta_V$ will always be negative, i.e. a fixed cost reducing cost-preserving outsourcing will always increase the firm value.

$$\eta_V = \frac{\left(\frac{1}{r_{REV}} - \frac{1}{r_F}\right)}{\left(\frac{\left(C_0/FC_0\right)}{r_{REV}} - \frac{1}{r_F}\right)} \quad (5)$$

From equation (5) expressing the contribution in terms of the variable and fixed cost, it can be shown that:

$\frac{\partial|\eta_V|}{\partial\beta_0} > 0$, $\frac{\partial|\eta_V|}{\partial VC_0} > 0$, and $\frac{\partial|\eta_V|}{\partial FC_0} > 0$

Essentially a firm with higher revenue beta will find cost-preserving outsourcing of greater value than one with a lower revenue beta. The same is true for firms with a higher degree of operating leverage (i.e. a firm with either higher variable cost or higher fixed cost).

### 2.3 Illustration

An illustration of cost-preserving outsourcing using hypothetical data is provided in table 1. The base case assumes firm parameters and market parameters[4]. The firm parameters assumed are normalized revenue of 1, variable cost $VC_0$ =0.60, fixed cost $FC_0$ =0.20, tax rate T=30%, and the revenue beta

[4] The tax rate and market parameters correspond to the Indian context. The revenue beta assumption is discussed in section 5.1, where debt is analyzed.

$\beta_{REV}$=0.20. The market parameters assumed are the expected return on market $r_M$=14%, and the risk-free rate $r_F$=7%.

Using these inputs the value elasticity $\eta_v$= -0.250. With this elasticity, the value addition is sufficiently large as to interest a firm. An outsourcing contract that reduces the fixed cost by 10% and adds an equal amount of variable cost, will add 2.50% to the base case value of the firm. If the firm had a higher $\beta_{REV}$ =0.40, the value addition is 6.67%. The value addition is 15.00% with a higher $\beta_{REV}$ of 0.60.

Ceteris paribus, a higher variable or fixed cost (i.e. a higher degree of operating leverage) will also increase the value elasticity.

Thus a firm that outsources using a contract that is "cost-neutral" will always benefit from the arrangement because of the lowered cost of capital (that in turn reflects the risk reduction effects of shifting fixed cost to variable).

**Table 1: Value-elasticity**

| | | |
|---|---|---|
| **Base case** | | -0.250 |
| ***Sensitivity*** | | |
| $\boldsymbol{\beta_{REV}}$ | 0.40 | -0.667 |
| $\boldsymbol{\beta_{REV}}$ | 0.60 | -1.500 |
| $\boldsymbol{VC_0}$ | 0.63 | -0.308 |
| $\boldsymbol{FC_0}$ | 0.21 | -0.284 |

## 3 Total cost increasing outsourcing and the iso-value factor

Equation (3) implies that an outsourcing contract with the additional variable cost higher than the fixed cost displaced, could still add value. Starting from the base case scenario in section 2.1, suppose that an outsourcing contract changes the fixed cost by $\Delta FC$. I introduce the iso-value factor $\alpha$ (where $\alpha > 1$) that has the following property. For a given decrease in the fixed cost, the variable cost can increase by an amount $-\alpha\Delta FC$ while just preserving the base value of the firm[5]. This factor can be formulated as follows.

[5] This implies that the total cost increases by $-(\alpha-1)\Delta FC$.

The base case valuation is given, as earlier, by equation (1). The contractual arrangement will reduce the contribution to C+ αΔFC. The post-contract value is in equation (6).

$$V"_0 = \frac{(C_o + \alpha\Delta FC)(1-T)}{r_{REV}} - \frac{(FC_o + \Delta FC)(1-T)}{r_F} \quad (6)$$

Equating $V_0$ and $V"_0$, the iso-value factor α satisfies equation (7).

$$\alpha = \frac{r_{REV}}{r_F} = 1 + \left(r_M / r_F - 1\right)\beta_{REV} \quad (7)$$

As earlier, the value of the firm can be derived by capitalizing the reduced earnings before interest and tax $EBIT_0+(\alpha-1)\Delta FC$, by the cost of capital based on the revised unlevered beta, $\beta"_U$.

For the base case values used in the illustration in section 2.3 (where the revenue beta $\beta_{REV}=0.20$), the value of α using equation (7) is 1.20. Thus an outsourcing contract that results in the variable cost increasing by 120% (or equivalently the total cost increasing by 20%) of the fixed cost reduction does not alter the value of the firm. Any contract that results in a lower total cost increase is beneficial to the firm. This brings me back to the central thesis of this paper that costly (in the sense that the total cost increases while a fixed cost is substituted by a variable cost) outsourcing may still be able to enhance shareholder value. Table 2 contains sensitivity analysis. For instance, if the revenue beta is 0.40, the value of α is 1.40. In this case firm will benefit as long as the total cost increase is below 40% of the fixed cost reduction.

**Table 2: Iso-value α**

| Revenue Beta | Value of α |
|---|---|
| **$\beta_0$=0.20** | 1.20 |
| **$\beta_0$=0.40** | 1.40 |
| **$\beta_0$=0.80** | 1.80 |

Thus this section formally shows that total cost increasing outsourcing can, within certain limits, add value to a firm. It is critical to recognize the value that de-risking can add to a firm.

## 4 Cost-reducing outsourcing

Now suppose starting from the base case scenario in section 2, a new contractual arrangement changes the fixed cost by $\Delta FC$. For a given decrease in the fixed cost, the variable cost increases by $-\gamma\Delta FC$ (where $\gamma < 1$). This implies that the total cost reduces by $-(\gamma-1)\Delta FC$. As before, valuation is done incorporating cost-savings and the reduced discount rate. A numerical illustration is provided.

Consider a firm with the base case firm and market parameters assumed in section 2.3, using an outsourcing contract that reduces the fixed cost by 10% and with a $\gamma$ of 0.80. This results in a value-addition of 5.00% to the base case value. Of this 2.67% is the value accruing from cost-savings discounted at the base case cost of capital, and the remaining 2.33% is the benefit of a lowered cost of capital. The latter is fairly significant. In the make-or-buy literature (closely related to the outsourcing literature) cost savings are typically discounted at the base case cost of capital. If a make-or-buy decision reduces fixed cost and increases variable cost, such a computation will underestimate benefits[6].

## 5 Relaxing assumptions

The no-debt and no-fixed assets assumption used in sections 2 and 3 are lifted in this section.

### 5.1 Debt

If to the base model in section 2.1, debt that is level and perpetual is introduced, the levered firm can be valued using the MM (Modigliani-Miller 1958, 1963) Proposition I ($V_L=V_U+TB$ where $V_L$ and $V_U$ are the values of the levered and unlevered firm, respectively, T is the income tax rate as before, and B is the market value of debt). While this proposition holds for risky debt, I will first assume risk-free debt Given such debt with a value B=0.61 (in addition to the base case assumptions in section 2.3), the value-elasticity $\eta_V$ reduces from -0.25 in section 2.3 to -0.22. This level of debt corresponds to a leverage ratio

[6] A commonly used protocol for make-or-buy uses "Annual Equivalent Costs" (Brealey et al. 2011, chapter 6).This protocol also assumes that the same cost of capital is used for discounting both the "make" and the "buy" alternatives. This paper would suggest that "make" and "buy" alternatives that differ in variable and fixed cost structures, need to be discounted at different costs of capital.

(Debt/Firm Value) of 40%[7]. Note that to both the base case and the scenario following the outsourcing contract a constant tax shield TB is added. Thus the difference in value (post-outsourcing contract and base case) is the same with and without debt. However since the base case firm with debt has a higher value (than in the all-equity case), $\eta_V$ is reduced. With total cost increasing outsourcing, the value of $\alpha$ in section 3 remains unchanged. Thus the introduction of risk-free debt does not affect the earlier conclusions.

With risky debt, the market value of debt in general will not be the same in the base case, and in the post contract scenarios. Additional assumptions (for instance, about the volatility of the revenue stream) are required so as to use an option pricing model for valuing risky debt. The central thesis of this article will not change.

The three values of intrinsic business risk used here (0.20, 0.40, and 0.90) correspond roughly to low moderate and high estimated equity betas. Hamada 1972 shows that with risk-free debt the appropriate levered beta of equity $\beta_L=\{1+(1-T)B/S\}\beta_{U,}$ where S is the market value of equity. With plausible[8] ranges of values of the debt to equity ratio and the cost structure, the revenue beta $\beta_{REV}=0.20$ is likely to generate a levered beta somewhat below 1 (the beta of the market portfolio is 1). A revenue beta of 0.40 will generate a levered beta of roughly around 1, and a revenue beta of 0.60[9] will generate a levered beta somewhat above 1.

### 5.2 Depreciable fixed assets

Assume that in the base case in section 2.3, the firm at the outset had depreciable fixed assets $FA_0$. The annual straight line depreciation rate is d, and the annual investment from Year 1 onwards is equal to the depreciation $dFA_0$—thus the firm generates level perpetual cash flows. As in section 2 let the fixed costs change by $\Delta FC$.

[7] The base case leverage is 40.2% and with an outsourcing contract leverage reduces to 40.01% because the outsourcing increases the firm value.

[8] The key word is "plausible", counter-examples can be set by assuming a very high degree of operating leverage or debt.

[9] Estimates of the Mandleker and Rhee, 1984 intrinsic business risk by Xu et al. 2004, provide values as high as 0.90. This intrinsic business risk is not the same as the revenue beta used here, but can be shown to be comparable with restrictive assumptions (Callahan and Mohr 1989).

The computation of change in value (post-outsourcing over base case) also needs as an input the reduction in fixed assets at time ‘0’ as a consequence of outsourcing. The valuation is best done numerically. However, the broad conclusions of the previous sections will hold.

## 6 Conclusion

The results of this paper have implications for firms that intend to outsource and for vendors.

For firms that outsource, it is important to incorporate risk in the assessment of outsourcing arrangements. For vendors, it is important to avoid a “here is how much you will save if you outsource the work to us” mindset. Equally important a vendor who does not do his valuation homework may damage the vendor firm value, if risk is not incorporated when pricing an outsourcing contract.

Clearly these implications are meaningful only in a context where outsourcing results in some substitution of fixed by variable cost.

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