

## **DO SHAREHOLDERS CARE ABOUT CORPORATE INVESTMENT RETURNS?\***

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*This paper considers the apparent contradiction between the results of Artto (1997), who claims that shareholders in the paper industry have gained reasonable returns, and Pohjola (1996), who argues that a large shareholder value has been lost (the Artto–Pohjola Paradox). We show under fairly general conditions that the shareholders may enjoy reasonable return while the managers are simultaneously destroying value of the firm by allocating funds to bad investments. In this case the firm's shareholders suffer an opportunity loss equal to the value that could have been created if the firm had paid the funds out to them and they had invested the funds in equivalently risky projects. The paradox occurs if the growth rate of a firm's market value of equity is high enough to guarantee a non-negative return for the shareholders but too low in the sense that the shareholders would have earned more had the funds invested at the return (at least) equal to the opportunity cost of capital. Our results support Jensen's (1986) argument of the incentives of corporate managers to invest inefficiently, since here the shareholders do not necessarily challenge the management due to the fact that they may be perfectly happy and satisfied in financial terms. (JEL: D24, G31, L73)*

### **1. Introduction**

Do shareholders care about corporate investment returns? Is it possible that the shareholders

are enjoying a reasonable return while the firm's managers are simultaneously destroying the value of the firm by making bad investments? It will be shown in the paper that this situation, although apparently contradictory, is indeed possible. In this case the firm's shareholders suffer an opportunity loss equal to the value that could have been created if the firm had paid the funds available for investment within the firm out to the shareholders and they

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had invested the funds in equivalently risky projects.

This situation occurs especially if the shareholders judge the performance of the firm's managers only based on the shareholders' return whilst the losses due to the opportunity cost of capital are not transparent or observable to the shareholders. The result implies that the shareholders should not judge the performance of the managers only based on the shareholders' return but also based on the productivity of capital, which is directly controllable by the managers. In other words, the shareholders should ensure that the managers invest at the return at least equal to the opportunity cost of capital.

It is well known that the long-term economic growth depends crucially on the productivity of tangible and intangible capital. A typical feature for a development path of any economy has been a gradual move from the strategy of extensive growth, relying on expanding use of natural and other resources, towards the strategy of intensive growth, based on continuous improvement of efficiency in the use of existing production factors. Yet, as indicated by the recent study of McKinsey Global Institute (1996), there are huge differences in capital productivity even among the most developed nations across various industries.

In addition, capital productivity may vary drastically even between the firms in the same industry. Jensen (1993) argues that low productivity during the last two decades may have been caused by a failure of corporate internal control systems. Corporate control has been ineffective in dealing with a slow down in the markets, excess capacity and exit. It should be mentioned that our results further underline Jensen's original concern of the importance of the internal corporate control systems. While Jensen's (1986) proposition is based on the incentives of managers to invest inefficiently, our findings further support this argument. It will be shown in the paper that the shareholders do not necessarily challenge the management since they may be perfectly happy and satisfied in financial terms.<sup>1</sup>

The productivity and performance of the Finnish industry has recently been examined by Pohjola (1996). Applying the method estab-

lished by Jensen (1993), Pohjola finds that in many industrial sectors, especially in the paper industry, the productivity of investments in 1986–1994 has been far too low from the point of view of the shareholder value generated. Based on Pohjola's findings one could conclude that the shareholders would have lost up to FIM 45 bn (some EUR 7.5 bn) over the period in terms of opportunity cost. In an apparent contradiction with Pohjola's findings, Artto (1997) shows that the shareholders in the paper industry should have enjoyed reasonable returns (around 15% IRR) over the period 1982–1996. Consequently, we have two views, one of which claims that a large shareholder value has been lost whereas the other concludes that shareholders have gained reasonable returns. This apparent contradiction will be called the *Artto–Pohjola paradox*.<sup>2</sup>

The remainder of this paper is organised as follows. In section 2 the opportunity costs of capital are modelled in terms of continuous time based on the so-called Jensen's method. Section 2 also derives the shareholders' return and relates that to the capital productivity measures. In section 3 we derive the sufficient condition for the Artto–Pohjola Paradox. Section 4 presents further analysis on the necessary conditions for the paradox. Section 5 concludes the paper.

## *2. The opportunity cost of capital and the shareholders' return*

As argued by Jensen (1986), shareholders and corporate managers may have conflicting interests. In particular, the managers may have incentives to cause their firm to grow beyond the optimal size by realising investments, which do not yield positive net present values when

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<sup>1</sup> See also the recent interesting contribution by Kanninen (2000) who considers corporate managers' inefficient investment behaviour under separation of ownership and control.

<sup>2</sup> Given the importance of the paper industry in the Finnish economy (the paper industry still accounts for about 25% of total exports), these controversial results have not only caused an academic debate but also been a source of public concern. See, for example, the Helsingin Sanomat 19 March 1998.

discounted at the relevant cost of capital. In other words, the shareholders would be better off if the managers would disgorge the cash to shareholders rather than invest it inefficiently. Thus a conflict may arise between the dividends to be paid out versus the funds to be invested within the firm. Following this line of thought, we employ Jensen's (1993) capital productivity measures and relate them to the explicit financial returns enjoyed by shareholders.

A firm can be considered as a value creating process for its shareholders and for the banking sector (financing the corporate debt), i.e. as a process creating value on the firm's capital structure. In general, a company generates shareholder value through two ways: (1) by a stream of dividends; and (2) by increasing the market value of the firm. In addition, a firm creates value for the banking industry in terms of paying the debt. Therefore, the total value  $V_T$  created by the firm up to date  $n$  can be expressed as follows:<sup>3</sup>

$$(1) V_T = V_n + \int_0^n \delta_t e^{\rho(n-t)} dt + \int_0^n \beta_t e^{r(n-t)} dt,$$

where

$V_n$  = value of the firm at the future horizon date  $n$  ( $> 0$ );

$\delta_t$  = payments to shareholders in the form dividends and net share repurchases ( $> 0$ );

$\beta_t$  = debt repayments including the principal and interest ( $> 0$ );

$\rho$  = the cost of equity;

$r$  = the riskless interest rate (riskless debt assumed).

The value of the firm at any moment of time equals the sum of the market values of equity and debt, i.e.  $V_j = S_j + B_j$ ,  $j = 0, \dots, n$ . What is not paid out as a dividend or a repayment of debt from the corporate cash flow, is *invested within the firm*. To simplify our analysis we assume no taxes.<sup>4</sup> The ultimate aim of an invest-

ment ( $\kappa_t$ ) can be taken as increasing the value of the firm, and thus contributing towards a higher shareholder value.

Consider next the firm that follows an *alternative investment strategy* of putting the funds  $\kappa_t$  available for investment (net of depreciation) to marketable securities (instead of investing in conventional R&D and machinery and equipment), yielding a return equal to their cost of capital,  $i$ , at the same risk level. Thus,  $i$  stands for opportunity return at the same risk level. Denote the value created by this alternative strategy as:

$$(2) V'_T = V'_n + \int_0^n \delta_t e^{\rho(n-t)} dt + \int_0^n \beta_t e^{r(n-t)} dt + \int_0^n \kappa_t e^{i(n-t)} dt.$$

Based on assumed development of the equity value of the firm under the alternative investment strategy, a measure for capital productivity can be presented as follows.<sup>5</sup>

*Measure J2.* Under the alternative strategy, assume that the investment equal to depreciation suffices to maintain the intermediate cash flows ( $C_t = \delta_t + \beta_t + \kappa_t$ ) but at the end of the period the firm has equity value of zero. Hence,  $V'_n = 0 + B_n$ .

$$(3) J2 = V_T - V'_T = S_n - \int_0^n \kappa_t e^{i(n-t)} dt.$$

In above,  $J2$  represents the difference between the equity value at the end of the period  $n$  (contributed to by investments made within the firm) and the future value of an alternative investment (e.g. marketable securities). Were  $J2$  negative, the firm's investment strategy would

*ply an incentive to change the firm's capital structure towards higher debt. The analysis to be presented in the following is based on comparison of two alternative investment strategies in a purely descriptive context. The effects of taxation would be the same for both investment scenarios and thus taxation should not influence the comparison outcome. A different but related question not addressed here is whether a tax regime per se changes the allocation of investment funds.*

<sup>3</sup> See Jensen (1993), which is based on discrete time. To simplify our analysis, we use a continuous time model.

<sup>4</sup> It is well known that with a tax regime which allows debt capital interest to be set off against tax liability, a company would be able to increase its expected annual net after-tax cash flow by gearing up. Thus, taxation would im-

<sup>5</sup> Jensen (1993) presented four measures. Here only one measure will be reviewed but the analysis for the remaining measures should be straightforward following the argument to be presented in the following.

not have been optimal in terms of creating value. A larger value could have been created if the firm had invested in alternative investment opportunities, e.g. marketable securities with the opportunity return  $i$  (at the same risk level).<sup>6</sup>

When looking at Jensen's capital productivity measures, it should be noted that the return on corporate investments is usually not observable to the shareholders, i.e. we have the case of *asymmetric information*. The shareholders evaluate the *explicit financial returns*, i.e. the share purchase costs vis-à-vis received dividends and capital gains in terms of increased share value. The total value for the shareholders measured at date  $n$  can be written as follows<sup>7</sup>:

$$(4) R = S_n - S_0 e^{\rho n} + \int_0^n \delta_t e^{\rho(n-t)} dt,$$

where  $\rho$  is the cost of equity.

Does the shareholder's interest automatically guarantee that the firm's investment strategy yields a return on the investment equal to, or higher than, the opportunity cost of capital? In other words, does such a mechanism exist that corporate manager's bad investment decisions are necessarily reflected in the shareholder returns, leading possibly further to the management reorganisation by the owners? The answer to this question seems to be negative. The following discussion will elaborate that a shareholder may be perfectly satisfied even if the corporate investment strategy incurs a significant loss in opportunity cost terms.

<sup>6</sup> For example, another measure presented in Jensen (1993), closely related to  $J2$  measure examined in the present paper, is defined as follows: Assume the investment equal to depreciation is sufficient to maintain the initial equity value of the firm, but due to the allocation of (net) investment in the marketable securities the equity value does not increase. Hence,  $V'_n = S_0 + B_n$ ,  $J1 = V_T - V'_T = S_n - S_0 - \int_0^n \kappa_t e^{i(n-t)} dt$ . Thus,  $J1$  effectively compares the change of the equity value of the firm to the future value of investment in marketable securities.

<sup>7</sup> Artto (1997) used present value terms; here we apply future values. If  $R = 0$ , then  $\rho$  is the internal rate of return (IRR) on share purchases. If  $R > 0$ , then the shareholder enjoys higher return than IRR, i.e.  $IRR > \rho$  (the case of positive excess returns).

### 3. The Artto–Pohjola paradox

In the following, we will demonstrate that the shareholders may enjoy a return equal to, or even higher than, their cost of equity ( $\rho$ ) while they simultaneously suffer a loss in opportunity cost terms due to inefficient investments by corporate managers. In other words, the Artto–Pohjola paradox appears when the shareholders' return could have been increased had the investments within a firm yielded a return equal to the one available in alternative investment opportunities. For the sake of simplicity and without loss of generality in the rest of the paper, we assume constant dividends,  $\delta_t = \delta$  and investments,  $\kappa_t = \kappa$ .

Consider now the relationship between the shareholders' return as defined in equation (4) and Jensen's capital productivity measure, equation (3). The value of end-period equity  $S_n$  is critical for the ultimate appearance of the Artto–Pohjola paradox. To show this, we assume that  $S_n = S_0 e^{\gamma n}$ , i.e. that the initial equity value grows to the end-period value at the constant

rate  $\gamma$ . Recall that  $J2 = S_0 e^{\gamma n} - \int_0^n \kappa e^{i(n-t)} dt$ . After

integrating, we get  $J2 = S_0 e^{\gamma n} - (\kappa/i)(e^{in} - 1)$ . The first term is the end-period value of equity, and the second term is the value of investments in marketable securities. The shareholder's total

return is  $R = S_0 e^{\gamma n} - S_0 e^{\rho n} + \int_0^n \delta e^{\rho(n-t)} dt$ , and af-

ter integrating we get  $R = S_0(e^{\gamma n} - e^{\rho n}) + (\delta/\rho)(e^{\rho n} - 1)$ . The first term is the capital gain, and the second term is the received dividends.

Now we can find  $\gamma^J$  and  $\gamma^R$  such that  $J2 = 0$  and  $R = 0$ , respectively. The *sufficient condition* for the Artto–Pohjola paradox is  $R \geq 0$  and  $J2 < 0$ , which is valid when  $\gamma^R \leq \gamma < \gamma^J$ . After some calculation we get  $\gamma^R = \ln[(\delta/\rho S_0)(1 - e^{\rho n}) + e^{\rho n}]/n$  and  $\gamma^J = \ln[(\kappa/i S_0)(e^{in} - 1)]/n$ . Now we can write the sufficient condition as follows:

*Result 1:* The Artto–Pohjola paradox appears if the growth rate  $\gamma$  of a firm's market value of equity is such that:  $\rho + \ln[(\delta - \delta e^{\rho n})/(\rho S_0 e^{\rho n}) + 1]/n \leq \gamma < i + \ln[(\kappa e^{in} - \kappa)/(i S_0 e^{in})]/n$ .

	$R \geq 0$	$R < 0$
$J2 \geq 0$	Investor Heaven	Black Hole
$J2 < 0$	Artto–Pohjola Paradox	Management Disaster

Figure 1: Jensen’s Productivity Measure and Shareholders’ Return.

Thus the Artto–Pohjola paradox appears when  $\gamma$  is high enough to guarantee a non-negative return ( $R \geq 0$ ) for the shareholders but is too low in a sense that a larger shareholder value could have been created had the funds been paid out to the shareholders and invested further in equivalently risky projects. While Result 1 sets forth the general sufficient condition for the Artto–Pohjola paradox, an immediate and interesting further question is, in which kind of industries the paradox is likely. Answering the question properly would require empirical analysis of characteristics of various industries, which is beyond the scope of this paper.

Some further economic intuition can, however, be gained simply by inspecting the conditions that must hold to satisfy Result 1. Notice that the left-hand side of the inequality is smaller or equal to  $\rho$  when the term inside square brackets is strictly greater than zero but smaller than one. In order to demonstrate the relationship between the received dividends and the capital gain assume for a moment that  $\delta = 0$ . The non-negative shareholder return is possible even with zero dividends, but then the required  $\gamma$  has to be higher, in fact in this case it equals to  $\rho$ . Consider now the right-hand side of the inequality, and assume  $\rho = i$ . The strict inequality thus holds only when  $(\kappa e^{in} - \kappa) > iS_0 e^{in}$ , since only then  $i \leq \gamma < i + \ln[(\kappa e^{in} - \kappa)/(iS_0 e^{in})]/n$ . Assume now that dividends are positive, then we know that the required capital gain and thus  $\gamma$ , which guarantee the non-negative shareholder return, decrease. Therefore, lower returns on marketable securities ( $i$ ) and/or smaller invest-

ments in marketable securities ( $\kappa$ ) are needed for the appearance of the Artto–Pohjola paradox. In general, we can conclude that for a given growth rate of a firm’s market value of equity the appearance of the Artto–Pohjola paradox is more likely for firms, which are intensive in investment compared to the dividends paid out.

The relationship between Jensen’s productivity measure and the shareholders’ financial return are further illustrated in Figure 1. For the sake of illustration, suppose that the shareholder IRR can be smaller than the cost of equity  $\rho$ , i.e. it is possible that  $R < 0$  (negative excess returns). The Artto–Pohjola paradox appears in the low-left quadrant of the table, where the shareholders’ return  $R$  is sufficient (positive or equal to zero) but Jensen’s productivity measure is negative. Were the sufficient shareholder value  $R$  associated with high positive productivity figures, we would have the situation of “investor heaven” (the top-left quadrant). Third, low returns to the shareholder ( $R < 0$ ), are likely to trigger a company restructuring (“management disaster”). Finally, the same scenario is likely for the top-right quadrant (“black hole”), where the firm absorbs equity while it does not invest.

#### 4. Analysis of the necessary conditions

In order to gain further understanding on the necessary conditions for the paradox, we

present some additional results. In particular, a consideration of the difference of R-J2 appears to generate some useful further results from an empirical viewpoint. Notice that positive R-J2 is a *necessary but not a sufficient condition* for the Artto–Pohjola paradox ( $R \geq 0$ ): the positive difference R-J2 indicates that the financial return to the shareholder exceeds the capital productivity measure (furthermore with  $J2 < 0$ , the shareholder suffers an opportunity loss while being satisfied in financial terms). The analysis below indicates that the sufficient conditions for the Artto–Pohjola paradox are rather general. Note also that the magnitude of the difference R-J2 *per se* is not the main subject of our interest but the focus is instead on the sign of the difference. So, consider the difference:

$$(5) \quad R-J2 = S_n - S_0 e^{\rho n} + \int_0^n \delta e^{\rho(n-t)} dt - S_n + \int_0^n \kappa e^{i(n-t)} dt = \int_0^n \delta e^{\rho(n-t)} dt + \int_0^n \kappa e^{i(n-t)} dt - S_0 e^{\rho n}.$$

From above we get the following result:

*Result 2:* (R-J2) is independent on the end-period equity value  $S_n$  ( $n > 0$ ).

In order to simplify our analysis we analyse the case where  $\rho = i$ , and then the difference becomes:

$$(6) \quad R-J2 = \int_0^n \delta e^{i(n-t)} dt + \int_0^n \kappa e^{i(n-t)} dt - S_0 e^{in}.$$

Two simple calculations are needed to derive the basic description for R-J2. First, the function is upward sloping with respect to time if its first derivative is positive. It appears that:

*Result 3:*  $\partial(R-J2)/\partial n > 0$ , if  $\delta + \kappa > iS_0$  i.e. if the sum of annual dividends and investment is greater than the interest on the initial equity value.

The validity of this condition, of course, is an empirical matter. However, it should be noted that the condition is normally true if the company yields return on equity larger than the interest rate. It therefore is quite likely that the

shareholder’s return grows faster than does the productivity of capital J2. Second, we shall examine whether the difference R-J2 will become positive over time:

*Result 4:*  $(R-J2) > 0$  if  $\delta + \kappa > iS_0$  and  $n$  is greater than  $n^* = [\ln(\delta + \kappa) - \ln(\delta + \kappa - iS_0)]/i$ . Hence, (R-J2) will become positive with a sufficiently long time frame ( $n$ ).

With regard to the above results, Figure 2 illustrates a possible outcome for the difference R-J2.<sup>8</sup> In brief, the shape of the curve R-J2 is determined by the fact that while the shareholders’ opportunity cost increases over time only at the rate of cost of equity ( $\rho$ ), the firm’s opportunity cost of capital grows faster, at the rate of interest ( $i$ ) plus the annual capital investment ( $\kappa$ ).

Since the difference R-J2 is independent of the development of the equity value  $S_n$  – but the actual values of R and J2 are not – each value for  $S_n$  will generate different curves for R and J2. Therefore, with varying  $S_n$ , an infinite number of R and J2 curves can be generated, which all, however, will deliver the only one and the same difference curve R-J2.

Figure 3 below depicts one possible pair of R and J2, which generates the same difference curve R-J2 as in figure 2. In the figure, R is an increasing function of  $n$  whereas J2 is a decreasing function. The fact that R is increasing indicates that the cost of equity ( $\rho$ ) is smaller than the shareholder IRR – indeed, the IRR here is 13%. The decreasing J2 curve indicates that the growth rate of the equity value ( $\gamma$ ) is not large enough to compensate the opportunity cost of capital expenditure, determined by the available return when investing in alternative opportunities, e.g. marketable securities (an interest rate ( $i$ ) as well as the cost of equity ( $\rho$ ) of 10% was assumed in the calculations).

<sup>8</sup> The figures are generated based on illustrative data assuming  $\kappa = 0.25$  and  $\delta = 0.025$  for periods 0–10 to be paid at the end of each period. Equity value  $S_0$  of 1.4 is assumed throughout the period 0 and it is assumed thereafter to grow at 11% per year amounting to 4 at the end of the period 10. Investor IRR is 13% over periods 0–10. The cost of equity,  $\rho$ , and an interest rate,  $i$ , are both 10%.

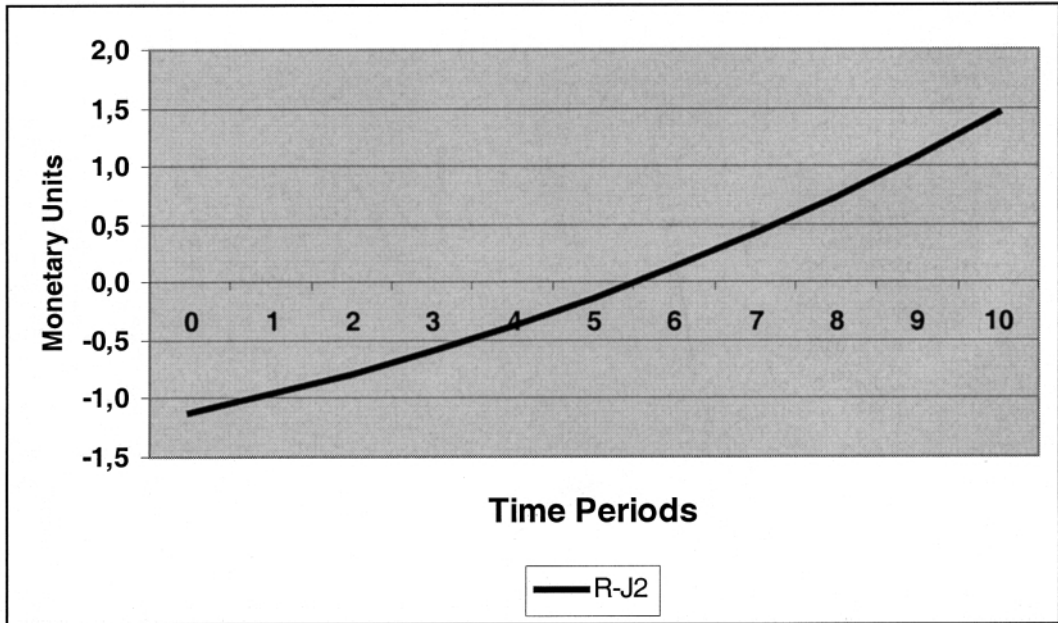


Figure 2: The Difference between Shareholder Return (R) and Capital Productivity (J2).

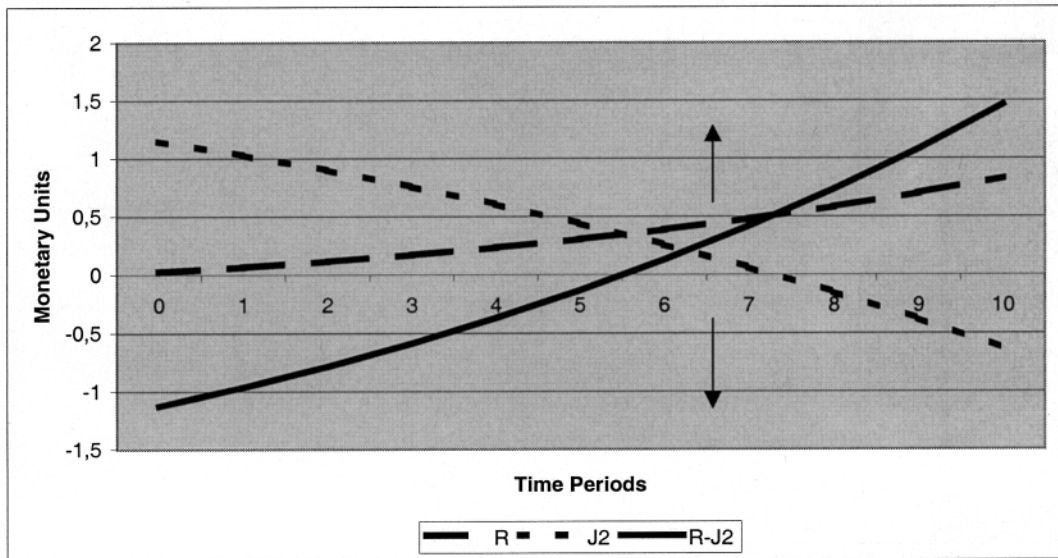


Figure 3: Shareholders' Return (R), Capital Productivity (J2) and the Difference (R-J2).

In figure 3, J2 reaches zero at the seventh period and thereafter J2 is negative whereas R remains positive and growing. Therefore, with n greater than seven, we have the Artto-Pohjo-

la paradox with moderate shareholder return but too low equity value to compensate the lost return of investing in alternative opportunities than the firm itself. In general, a decrease in the

end period equity value  $S_n$  would shift R and J2 downwards and an increase in the equity value would result in a shift upwards. However, the curve R-J2 is not affected by  $S_n$ , as was shown above.

## 5. Concluding remarks

It has been shown that, under quite general conditions, the shareholders' financial return R grows faster than Jensen's capital productivity (J2) with the lengthening of the time frame. In addition, with sufficiently long time frames R always becomes larger than J2. The Arto–Pohjola paradox appears if the firm's equity value increases at a relatively low rate. Here the opportunity cost of accumulating investment becomes large, resulting in negative capital productivity, measured in terms of J2. Simultaneously, the shareholders' financial return R may still remain positive indicating reasonably profitable investment in IRR terms (or in future value terms).

It is therefore possible that a firm goes on investing in low yielding assets while the shareholder still enjoys moderate returns without realising the opportunity losses arising from the investments. It can be concluded that the Arto–Pohjola paradox is not a real paradox. It should be emphasised that our results further underline Jensen's original concern of the importance of the internal corporate control systems. As argued by Jensen (1986), shareholders and corporate managers may have conflicting interests. In particular, the managers may have incentives to cause their firm to grow beyond the optimal size by realising investments, which do not yield positive net present values when discounted at the relevant cost of capital. While Jensen's proposition is based on the incentives of managers, our findings further support this argument. The shareholders do not necessarily challenge the management since they are perfectly happy and satisfied in financial terms.

It should also be noted that Jensen's productivity measures may indicate the same level of productivity for a highly investment-intensive company enjoying rapid increase in its market

value of equity and, on the other hand, for a company with a rather stagnant equity value development and a low scale of investment activity. Even if the productivity measures are not directly observable *per se* for an investor, she typically gets worried if the share price of a capital-intensive firm performs poorly to some exchange index (i.e. average performance).

In general there are two possible reasons for the Arto–Pohjola paradox and for a low capital productivity rank *à la* Jensen. First, the investors may lack sufficient information in order to make a correct judgement on the expected returns of a firm's investment activity. In fact, companies do often have an incentive to conceal information on their investments, especially on R&D.<sup>9</sup> Therefore, the solution for improvement is in this case trivial: inform if you can.

The second possible explanation for a low capital productivity is that the firm's investment does not, indeed, yield sufficient returns (from a shareholder's viewpoint). The most straightforward solution for improvement is here to invest less and to pay more dividends. The scaled-down investment activity would immediately result in increased productivity (J2) whereas the increased dividend stream would simultaneously lift up the shareholder return (R). Also, if the firm's commitment to holding back its investments is considered convincing in the long term, the increased dividend stream may become capitalised in the market value of equity, lifting the productivity measures and the shareholder return further upwards. Alternatively, the firm might invest in buying back its own shares, hoping that it would result in a price increase. The increased capital gains would further improve the productivity performance as well as the shareholder return. Furthermore, the shareholder return could in this case still be improved by the fact that the dividend pool available per share held by the investors would grow. The result would thus be higher J2 and R, and

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<sup>9</sup> For example, *Raision Yhtymä Ltd* did not perform successfully in Pohjola's (1996) study since the research period did not capture the launching of a new product *Beneol*, after which the company's share price soared.



a shift towards the “investor heaven” as indicated in figure 1.

The main message stemming from our analysis is that the simultaneous appearance of shareholders’ reasonable return, on the one hand, and low capital productivity, on the other hand, is not necessarily paradoxical. This situation, although apparently contradictory, is possible when the growth rate of equity is within certain boundaries. In the long run, only firms, which are able to invest with returns higher than the opportunity cost of capital, are successful.

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