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### **Moral hazard, old and new**

In the widely-held listed corporation, asymmetric information between shareholder principals and manager agents causes moral hazard (MH) in well-known directions:

1. *lack of effort and economy* (Adam Smith's 'negligence and profusion') (MH1);
2. *risk aversion* due to asymmetric outcomes (MH2).

While the ultimate cause is asymmetric information, remuneration is also involved. The default assumption on this is that top managers are paid a fixed salary – thus the lack of effort and economy – and will remain in post, *unless* the firm's performance goes below a certain threshold level – thus the risk aversion.

In fact if the only problems are MH1 and 2, modified methods of remuneration may solve them: profit-based bonuses give incentive for effort and economy and reduce risk aversion at least to some extent. Stock options also reward effort and economy, but they work particularly against risk aversion: while the salaried manager has nothing to gain from a high-risk strategy, with stock options it may make him or her very rich indeed.

The problem with such remuneration 'fixes' is in measuring outcomes, specifically profit. That is why in widely-held firms, the role of financial reporting and audited accounts is key. Does profit thus measured, give an accurate and reliable view of performance? In differentiated oligopoly product markets (that is to say, most markets for large firms) a small rise in price may lead only gradually to an erosion of market share, while it gives an immediate substantial increase in profit. Much the same is true of capital-widening investment: if this is cut, then whenever demand peaks the firm will be unable to supply and will lose market share; but meanwhile profit has been raised. In that case the bonus-remunerated manager will indeed raise price and cut investment; as apparently recently in the UK (Smithers 2014).

The use of stock options in conjunction with profit bonuses may alleviate this problem, because the value of options is a function of the share price, and that depends on the stock market's view of the firm's future performance. And are not markets efficient?! Unfortunately the only half-plausible form of market efficiency is the weak form, which involves optimal use of the information *available to the market*; with the widely held firm, this may be little more than past profit, as measured in its accounts. So the effect of stock options may be merely to exacerbate the 'gaming' of profit, particularly in the period just before the options are exercised.

This critical discussion of profit-based bonuses and stock options has been based on one crucial implicit assumption, about *time horizons*: that managers will leave or retire before the

consequences of their actions or inactions ‘catch up with them’. To make the point, let us imagine that this assumption does not hold. If (for example) a manager expected in year  $t$  to be in post in year  $t+20$ , it is hard to imagine any moral hazard affecting his or her current actions. Over-pricing or under-investment would surely lead long before  $t+20$  to a fall in bonuses and the share price. Unfortunately along with the spread of ‘high-powered incentives’ has gone an increase in the mobility of top management, so that it is now more typical in the UK and US for a CEO to stay in post for around five years, and to be recruited from outside. This gives ample opportunity for moral hazard, particularly in the later stages of the period in post.

We can thus formulate a third moral hazard (MH3): *Short-termism* due to difference in time horizon (managers will leave or retire) and shareholder ignorance of distant outcomes of present actions. (Short termism can be defined as valuing near profit more highly than distant profit, beyond what could be justified by any plausible discount rate.)

Unfortunately profit-based bonuses, which reduce MH 1 and 2, increase MH3, as in the Smithers case. So do stock options, since the most certain way to increase share price at the exercise date is to raise profit and divert cash to buy back shares. Likewise the market for corporate control – and the consequent risk of hostile take-over bids<sup>1</sup> - makes short-term shareholder discontent more risky for managers.

### **Moral hazard and innovation**

It has been agreed for some time that the agency problem has particularly adverse consequences for innovation. However most of the literature works with only MH1 and 2, and it has fastened on MH2 – risk aversion – as the main problem. Innovation is risky – specifically, it involves substantial spending on R&D, whose outputs are decidedly uncertain. So managers who are risk averse will underspend on R&D and thus under-produce on innovation. (More nuanced analyses distinguish among different types of R&D and argue that risk-averse managers will underspend on those which might lead to *radical* innovation, where the prospects are particularly uncertain.) It is shareholders who by contrast may not be risk averse. To be precise, it is the shareholders in widely-held firms who given adequate diversification will not be risk-averse. In family-controlled firms, whose main owners may have most of their eggs in the one basket, the principals may be as risk-averse as the agents. This gives advantage in innovation, allegedly, to widely-held firms - if their principals can find a way to ‘align the incentives’ of managers with their own.

The proponents of this view have however overlooked the issue of aggregation, and time. A specific innovation project may indeed be highly risky. A large firm may however carry out a number of such projects, which in aggregate – perhaps by covering several alternative ‘bets’ on the future trajectory of its industry – may be much less risky than each individually. What is, at all events, certain in modern industry is that over time there will be innovation

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<sup>1</sup> The most familiar effect of the market for corporate control is fear of a hostile take-over bid. But equally powerful must be the attraction of higher profit (leading to higher share price) to those managers contemplating expansion through acquisition (whether hostile or consensual).

and that any firm which does not spend appropriately on R&D to initiate it or at least keep up with it, will be left behind and ultimately wiped out. The higher-technology the sector, the sooner nemesis is likely to arrive. If we can define an industry norm for each sector, in R&D intensity, then with a (let us say) ten-year time horizon, the risk attached to a strategy involving below-norm R&D intensity is higher than that for a strategy with intensity around the norm. A strategy with R&D intensity of zero would be rather certain in its outcome: it would lead to the loss of most of whatever was invested in other spending categories (e.g. physical capital).

It is thus once again MH3 – short termism – which is key. Without short-termism, the rational risk-averse manager will spend heavily on R&D - at least as much as the industry norm. With short-termism, he or she will presumably not, because R&D as usually treated, represents an immediate reduction in profit. But this effect is a rather certain one. So reducing R&D intensity below the industry norm is a rational strategy for short-termist managers *tout court* – risk averse or not. Indeed it will be a more rational strategy for those managers whose risk aversion is reduced or eliminated by bonuses and options – because they will be more inclined to short-termism.

### **Information and innovation**

The argument so far has treated the agency relationship as if it were purely informed by reported profit. This is too crude. Reported profit is very important; but even in the UK stock market (notoriously poorly-informed by comparison with that in the US) there are (for example) stockbrokers who regularly generate reports for clients which go well below this sort of surface data. And – as to reported data – it is perfectly possible, and reasonable, for investors to reach the same conclusion as we did above: that R&D intensity below the industry norm will lead in time to profitability below the norm – and to mark down the value of the under-spending firm accordingly. So the availability of data on R&D spend may alleviate the asymmetry of information.

How far it does so, however, depends on two factors:

1. How good an indicator is the R&D (and other) data which is available, of the *total inputs to innovation*?

An example of R&D data as a good indicator would be a firm (and an industry) where innovation in product and processes emerged fully-formed, so to speak, from central R&D laboratories without any important contribution from the manufacturing or marketing functions. The cost of the labs would then be the cost of innovation, more or less. The pharmaceutical industry is perhaps as near as real life approaches to this stereotype (Tylecote and Visintin 2008 chapter 2). More normal is a situation where staff in other functions besides R&D have important parts to play in innovation. With process innovation, manufacturing is an obvious contributor; with product innovation, marketing. In both process and product innovation, manufacturing equipment and facilities may be used. Before an innovation is introduced, money and time may have to be invested in staff training.

It is unlikely that these contributions will be costed and entered into the accounts as such – partly because they may be entirely informal, and/or they may be difficult to assign. (The high expenditure on training of a typical German engineering firm, for example, will be useful for ongoing production as well as for innovation.) The inputs to innovation, or a large part of them, may then have *low visibility*. This will clearly exacerbate the asymmetry of information problem. Only the most *engaged* shareholder will be able to appreciate the extent of innovative effort in such a firm: effort which must come at the expense of immediate profit.<sup>2</sup>

2. How good an indicator of the likely *outputs* from innovation would information on inputs be, anyway - to the extent that it is available?

The idea of risk, defined in terms of probability distributions of outcomes, applies to cases or projects aggregated by category. Some forms of innovative expenditure may be much more risky than others. It seems reasonable to suppose that incremental innovations in slowly-changing (that is, largely low-technology) sectors are low-risk. On the other hand in fast-changing (mostly high-tech) sectors, it will be more difficult to forecast the direction of change – and even incremental innovations may turn out to be a complete waste of money if there is a shift in technological paradigm. In the first case, therefore, it may be adequate for shareholders to monitor the overall intensity of innovative effort – if its *visibility*, or their *engagement*, permits. They will then be right to support management in keeping it up to the industry norm. In the second case we have a problem – for which there is apparently a familiar solution: where risk is high, avoid risk aversion. But that – achieving risk neutrality – may not be enough. If you have a one in ten chance of quintupling your money and a nine in ten chance of losing the lot, risk-neutral rationality says: don't play. You need a better forecasting technique – a better way of spotting losing moves. Get the chance of quintupling your money to (say) one in three, and then play.

In the industrial context this means that even risk-neutral shareholders should not, and probably will not encourage managers to pursue innovation strategies in high-tech, high-risk areas, *unless* either:

- they are confident that those managers have enough *industrial expertise* to choose promising strategies.
- they themselves have enough industrial expertise to vet and if necessary over-rule the choice of strategy.

The latter is perfectly credible: in fast-changing sectors a detached over-view may be worth quite as much as detailed knowledge of the established way of doing things. (See the examples of Canon's switch to digital cameras in Tylecote and Visintin 2008, and the more general case of sector-specialised venture capital.)

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<sup>2</sup> See the example of BICC and Pirelli in the 1990s cable market: the latter making good use of its sales reps to feed information about customer preferences back to its R&D labs, the former not doing so (because of the stronger immediate performance pressures on the reps). (Tylecote, .....

### **Innovation and the *scope* of the agency relationship.**

It is taken for granted in most discussion of principal-agent relationships in industry, that the principal(s) is/are the shareholders of a single firm, and the agents are the top management of that firm, seen as one cohesive group (or individual CEO). This is at best a simplification, and a rather dangerous one. In the first place the managers may not act as a cohesive group. It is normal in large firms to have a number of divisions or profit centres which have their own individual financial targets and individual managers 'incentivised' to meet them. Narrowing the spatial horizon may be as damaging to innovation as shortening the time horizon. The 'incentivised' divisional managers will focus on 'sectional' advantage, the financial performance of their division, not that of the whole firm: but innovation, unlike cost-cutting, tends to require co-ordination across the firm.

So the scope of the agency relationship can be narrowed, and if it is, this is likely to be adverse to innovation. It can also be broadened. Shareholders are treated as principals because they have committed capital to the firm and have thus gained an interest in its performance in general and its success in innovation in particular. Their status as principals also arises from their legally-sanctioned power over management. Laws may, and do, vary, so we should emphasise the first criterion for being treated as principal. But by that criterion there are others with an interest in the firm's performance: foremost, its employees. We can call employees accordingly, *stakeholders* in the firm. The laws of Germany and most of its European neighbours – including Austria, the Netherlands, Denmark, Sweden and Finland – recognise this and empower employees as co-principals with shareholders. In these countries employees are thus *enfranchised* stakeholders. (Employees may also of course be shareholders in a firm, individually or collectively, and be enfranchised accordingly.)

It is also reasonable to treat certain categories of related firms as stakeholders in a given firm. Suppliers and customers clearly have an interest in its performance. More arguably, so do its competitors, particularly those within a given economy. They may hire its employees and thus benefit from its training. By doing so, or otherwise, they may share in the intellectual assets it has created. The enfranchisement of related firms is more limited than that of employees, but in the European countries mentioned above (and in Japan) it is significant: they tend to have extensive cross-shareholdings matching supplier-customer relationships, and in the European countries there are legal arrangements obliging a degree of co-operation among firms in a sector, notably on training.

Even where such stakeholders have no legal enfranchisement, their interests may well be taken into account by management – either through custom, good nature, or enlightened self-interest. (Where shareholders and top managers live in the same community as their employees, for example, they may be reluctant to make themselves unpopular.) We would then use the broader, weaker term, *stakeholder inclusion*.

Any degree of stakeholder inclusion should increase the incentive for innovation, by broadening the scope of the agency relationship to include more principals who will gain

from it – with one reservation in relation to radical or disruptive innovations: existing stakeholders may have something to lose from these because they may require or lead to *new* suppliers, customers, employees.

## **Conclusion**

The moral hazard most adverse to innovation is not, as commonly supposed, risk aversion, since a policy of spending relatively heavily on innovation is generally not more risky than spending little. It is short-termism, since spending on innovation takes a considerable time to pay off . Given normal conditions, the remuneration strategies intended to reduce risk aversion – profit-based bonuses and stock options – will exacerbate short-termism. So will the employment strategies currently fashionable for top managers – recruiting from outside and for a relatively short period.

Since the closely-held firm, with large and probably *engaged* shareholders, exhibits much less information asymmetry than the widely-held firm, it will suffer less from short-termism. It may well suffer more from risk-aversion – but that, as argued, does not necessarily reduce innovation. In widely-held firms, innovation with *high-visibility* inputs will suffer relatively little from short-termism. Another favourable condition for innovation even in widely-held firms is *stakeholder enfranchisement* or some lesser form of stakeholder *inclusion* – the relevant stakeholders being employees and related firms. In industries where (or when) there really is a tendency for high uncertainty as to the outcomes of innovation strategies, there is a great advantage attaching to firms with principals with industrial expertise such as that possessed by the best venture capitalists.

## **References**

To follow.