TOP FLOOR

News from the Centre for Business Research, University of Cambridge

Issue 18: Winter 2011

Open Innovation

CBR

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Top Floor research gets top marks

Two CBR research projects have recently been graded 'outstanding' by the Economic and Social Research Council (ESRC). This means the research is considered as being of the highest international quality and impact.

One was a project researching the impact of Higher Education institutions on the UK and all forms of knowledge exchange between academia and the 'real world'. For *University-Industry Knowledge Exchange: Demand Pull, Supply Push and the Public Space Role of Higher Education Institutions in the UK Regions*, the CBR team surveyed 22,000 academics to generate evidence of all the ways in which they contribute to public life, ranging from engineering professors who work with construction firms to English lecturers who contribute to film scripts.

Hard evidence

The other outstanding CBR project arose from the CBR's Corporate Governance programme. *Law, Finance and Development* generated hard evidence that challenged previously received wisdom on the way in which 'law matters' to economic development. The aim of the project was to ask detailed questions about the relationship between law and economic development, in particular the so-called legal origins hypothesis, the theory that claims that systems of law have an effect on economic growth long-term.

The researchers took an econometric approach to this issue, producing new datasets that charted changes over time in laws relating to shareholder protection, creditor protection and labour regulation. Their findings called into question aspects of the 'legal origins' hypothesis and its use by policy-makers.

- **The *University-Industry* project (Principal Investigators Alan Hughes and Michael Kitson) is part of the Impact of HEIs on the Regional Economies Initiative supported by the ESRC in partnership with the Scottish Funding Council, Department for Employment and Learning in Northern Ireland, the Higher Education Funding Council for England and the Higher Education Funding Council for Wales.) It featured in Top Floors 15 & 16. (www.cbr.cam.ac.uk/publications/)**
- ***Law, Finance and Development*, (Principal Investigators Simon Deakin, Ajit Singh and John Armour) was funded by the ESRC. It featured in Top Floor 16. (www.cbr.cam.ac.uk/publications/)**

Editor's note

Open Innovation is a very hot topic in business. So hot, in fact, that two CBR researchers are worried that smaller firms are being pressurised to adopt a trend that may not always be good for them.

On pages 4 and 5, Top Floor features new research by Drs Andy Cosh and Joanne Zhang who have been studying smaller firms' behaviour in relation to open innovation. After hearing from 1200 businesses, they have concerns. "They see establishing a reputation for being innovative as a good way to attract clients," says Dr Zhang. "So some of them are jumping on the 'open innovation' bandwagon – collaborating more with users and customers, getting involved in joint R&D projects, collaborating with firms much bigger than themselves, etc - without always knowing what they are doing. Some think that simply by doing these things they will achieve aims like increasing productivity and speed to market, and enhancing their capabilities. But it is not always that simple."

Open innovation also featured in a seminar led by the UK~Innovation Research Centre (which is co-hosted by the CBR). At it, innovation academics talked to policy makers from the Department for Business, Innovation and Skills (BIS) about their research and how it could inform future innovation policy. You can read their thoughts on page 3.

Top Floor also covers other questions. On page 7, we discuss a new CBR report for the Arts & Humanities Research Council about the many ways in which arts and humanities academics are interacting with businesses. This report nails the myth that it is only science and engineering academics who are involved in knowledge exchange; it lifts the lid on the way arts and humanities academics provide research and ideas to industrial partners and community groups alike, working with organisations from museums and media studios to record companies and website developers.

And on page 8 Professor Simon Deakin, who leads the CBR's research into corporate governance, advances his ideas (which he submitted to a recent BIS consultation) about how can we best encourage Corporate Britain's directors and investors to focus on long-term stability rather than short-term gains.

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Informing innovation policy

> "Manufacturers in developing countries, not bogged down by historical infrastructure seem to be developing services more quickly whereas in the UK, many manufacturers are doing so in a reactive, rather than a proactive, fashion."

Innovation policy in the UK faces significant challenges. With public spending being cut back, fewer people and institutions will be supporting innovation in future. So policymakers want to know where they should be focusing their reduced resources, and to identify the key areas where government policy and support could have the greatest impact.

To address this need, the UK~Innovation Research Centre held a joint one-day 'Innovation Policy' seminar with the Department for Business, Innovation and Skills. (The UK~IRC is co-hosted by the CBR and Imperial College Business School.) The seminar aimed to give policymakers a deeper understanding of the research available and how it can help inform better policy.

Speakers came from Birmingham, Cambridge, Cardiff, Imperial College and Manchester universities, from NESTA (the National Endowment for Science, Technology and the Arts) and from the Institute for Fiscal Studies. Focusing on four areas (innovation systems and clusters, incentivising intangible investment, open innovation and services innovation), their presentations threw up some thought-provoking ideas.

For example, how do policy-makers address the issue that significant innovations often take many years, several failures and collaboration with a number of partners before they reach their potential? Some speakers suggested that institutions investing public money in innovation tend to be more concerned with the penalties for failure than with the benefits of success and argued that they should change their mind-set. (One speaker described the Treasury's fondness for facts and figures quantifying the impact of innovation as 'the tyranny of information'.) Though there are huge failure rates with innovation, some of those that succeed enjoy vast success - particularly over the longer term. Prof. Stan Metcalfe from the University of Manchester pointed out that the use of the artificial intraocular lens was pioneered in cataract treatment in 1949, but didn't really develop until a breakthrough in 1970 when cataracts were removed for the first time. Now, cataract treatments are the most frequent operations in the world.

Prof. Metcalfe argued that firms need more help in building the capabilities and networks that are often required to help innovations realise their potential. But he also suggested that policy makers need to imaginatively rethink and re-evaluate the policies and methods used to support innovation.

Re-evaluating current approaches became a common theme. Imperial College's Dr Keith Smith pointed out that "Recent work has shown that the traditional focus on Research and Development (R&D) figures to measure innovation is misplaced: half the innovating companies in the EU do not undertake R&D." Equally important in innovation, as he and NESTA's Stian Westlake argued, was investment in intangible areas like organisational design, training, IT, marketing and design.

The government could focus on stimulating investment in these areas if there is a perceived shortfall, he said.

Another area where focus on R&D is possibly misplaced is in the arena of services innovation. Imperial College London's Bruce Tether pointed out that, unlike product innovation, service innovation has little dependence on R&D. Where policy help might be needed, he argued, was in fostering a cultural shift among manufacturing firms, from delivering a fixed process or goods to delivering a responsive service. On the same theme Professor Andy Neely from Cambridge pointed out that a third of manufacturing firms worldwide sell services as well as core products (like farming equipment firm John Deere, which has developed a GPS service to improve the accuracy and efficiency of harvesting). But the UK might still need help in this area. "Manufacturers in developing countries, not bogged down by historical infrastructure seem to be developing services more quickly whereas in the UK, many manufacturers are doing so in a reactive, rather than a proactive, fashion."

Speakers also argued that government could help by engaging in more joined-up thinking: while one government department pushes to support innovation, policies introduced by others could hinder it. Professor Kevin Morgan from the University of Cardiff pointed out that innovation needs to be underpinned by town planners as well as by skills and R&D. (A firm's ability to build new facilities could be hindered by local planning policies, for example.) And the CBR's Andy Cosh, discussing open innovation, argued that the role that government policy plays in areas like space, energy and defence needs to be integrated into a broader view of innovation policy.

- **For a full report on the day's seminar, please visit: http://workspace.imperial.ac.uk/innovationstudies/Public/UKIRC/UK-IRC%20seminar%201st%20Feb%202011%20Note.pdf**
- **There is more about Andy Cosh and Joanne Zhang's latest research on Open Innovation on pages 4-5.**

Open Innovation – finding

Open innovation is the current hot topic in innovation research. It's of particular interest to two CBR academics: they are currently undertaking large-scale research into firms' open innovation practices – yet surprisingly they didn't actually mention the phrase in their recent survey of 1200 UK small and medium-sized businesses.

"No, we didn't", says project leader Dr Andy Cosh unapologetically. "The reason why is that we are trying to reveal the facts behind the hype. There has been such an explosion of interest in 'open innovation' in the last eight years, we feared that if we used that phrase firms would tell us what they felt they ought to be doing – and we want to know what they actually are doing."

His co-project leader Dr Joanne Jin Zhang agrees. "There is such a hot buzz around the concept of 'open innovation', some smaller firms feel they cannot be left out," she says. "They see establishing a reputation for being innovative as a good way to attract clients. (In fact in our survey, that was firms' most common motive.) So it seems that some of them are jumping on the bandwagon – collaborating more with users and customers, getting involved in joint R&D projects, collaborating with firms much bigger than themselves, etc - without always knowing what they are doing. Some think that simply by doing these things they will achieve aims like enriching their technology portfolio, increasing productivity and speed to market, and enhancing their capabilities. But it doesn't always work like that. It is not always that simple."

The man to thank, or blame, for all this activity (depending on your point of view) is University of California Berkeley professor Henry Chesbrough, who coined the phrase 'open innovation' in 2003 – and reignited interest in activities that firms had actually been engaging in for many years.

Since then many employees have added the words 'open innovation' to their job titles, and many case studies have been carried out of open innovation in large corporations. "What has been missing is large-scale surveys of smaller firms to find out about open innovation there," says Dr Cosh. "Researchers have also focused on inbound activities – ways in which 'hunter-gatherer' firms seek knowledge from external sources (like customers, trade bodies, or universities), bring it back and use it in-house. There has been less research into outbound activities – ways in which firms are transferring knowledge and technology externally. We wanted to address this and rebalance the debate a bit."

The CBR work, for the UK~Innovation Research Centre, is in the early stages but it is already delivering some very interesting findings – some of which were presented to practitioners recently at an Open Innovation Research Forum. *(See separate story on these pages.)* The responses from manufacturing and business services firms (including pharmaceutical and clean energy businesses) have already thrown up one issue that divides the two CBR colleagues. Despite all the hype, the majority of the

Top left, Dr Andy Cosh; ***bottom right***, Dr Joanne Zhang. In between, scenes from the Open Innovation Research Forum

1200 firms in the CBR survey reported they had not changed their collaboration activities in the last 3 years. Dr Zhang says, "We have to acknowledge the fact that more than 70 per cent of firms reported their collaboration activities had not changed in recent years." Dr Cosh swiftly adds: "But if we look at the firms who have changed their activities, we see that it is overwhelmingly on the increase." (The survey found that these firms were most likely to increase activities such as engaging directly with lead users and early adopters, joint-marketing/co-branding, and working with customers and users.)

The survey also reveals that some smaller firms are transferring their technology externally for free – ringing a few alarm bells about what return firms are making on their open innovation activities. Dr Zhang says: "We've seen in our survey some innovative young companies recognising they don't have the resources to take some of their technological developments any further on their own. At that point, they will sometimes collaborate with other firms on joint development – and sometimes will spin it out for free. Sometimes they get a return: for example, one company that feeds out their software development free of charge receives lots of ideas and sometimes some consultancy work in return. And sometimes they don't."

In fact, the survey reveals that smaller firms transfer knowledge externally for free more frequently than

the facts behind the hype

> "Open innovation is increasingly a fact of life. Fewer and fewer companies are totally self-sufficient. However the message to the policy wonks is not, how can they encourage open innovation, but what can they do to help to ensure that innovation (open or not) delivers a solid return to UK companies?"

Dr Gerald Avison, founder and Chairman of TTP Group.

larger firms, whereas larger firms are more active in using protection methods (confidentiality agreements, copyright etc). This shows a very different approach between smaller and larger firms to appropriating value from open innovation.

This is an area both researchers would like to explore more.

Dr Zhang says: "You naturally assume that a company planning to transfer knowledge externally would think about how to protect it and extract the maximum commercial value from it. Yet smaller firms seem to be less concerned about this than larger firms. That puzzles us. Is this because of small firms' lack of resources or experience in comparison with larger companies that have the advantage of greater knowledge and resources? Without wanting to stir up tensions, when we are seeing a lot of collaborations between small and large firms, we need to know if it is always the larger firm that gets more out of it. That wouldn't be good news for smaller firms."

Dr Cosh concurs. "At this stage of the research, this is only speculation, but sometimes such collaborations are the precursor to the larger firm taking control. This is something we need to examine further: if the government is going to promote open innovative adoption by small businesses, we have to be clear that there are benefits for them."

- **The first report on this research *'Open Innovation Choices: What is British Enterprise doing?'* was published in June 2011. For more details please email: a.cosh@cbr.cam.ac.uk or j.zhang@cbr.cam.ac.uk**

Open Innovation Research Forum

What role does geographic location play in a firm's ability successfully to implement open innovation? That was the key question as 40 business executives, intermediaries and academics met in Cambridge in April 2011 for the inaugural meeting of the **Open Innovation Research Forum** (sponsored by the UK Innovation Research Centre and Japan's Institute for Technology, Enterprise and Competitiveness.)

To kick off the event, the CBR's Drs Cosh and Zhang presented their research into the current open innovation practices of 1,200 UK firms. (See separate story on these pages.) They were followed by representatives from Kodak and Phillips, who highlighted the role of location in their open innovation strategies, and then by a presentation on how open innovation is attracting investment to the UK.

The discussions threw up a wide range of issues and attendees then worked through them to pick out key issues which, if addressed, could most benefit companies implementing open innovation and those that support them. They proposed six areas to research further: 1) Comparing open innovation best practices in developed countries and in emerging markets. 2) Identifying factors influencing successful open innovation implementation. 3) Open innovation for corporate growth and renewal. 4) Effective intra- and inter-organisation collaborations. 5) Developing leadership capabilities for open innovation. 6) The role of open innovation in stimulating cluster development. These proposals will be taken forward and resources sought to run them. And planning for the next OIRF meeting is already underway.

- **The Open Innovation Research Forum is coordinated by Cambridge University Engineering Department's Institute for Manufacturing. For further information, please contact: tim.minshall@eng.cam.ac.uk or visit: www.oirf.net**

Measuring the Socio-Economic Impact of Public Sector Expenditure on the Research Base

By Alan Hughes

One of the most persistent themes in policy discussion in recent years has been the need to justify public expenditure on the research base in terms of socio-economic "impact".

Two central problems must be confronted in any attempt to address this issue.

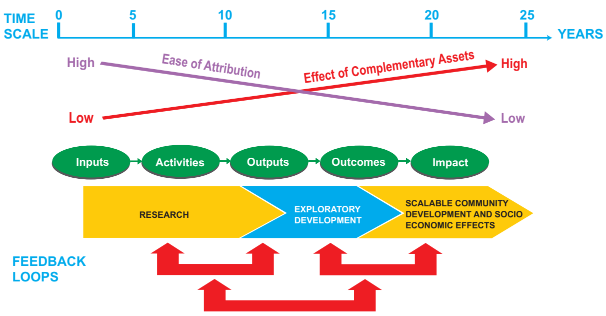
The first relates to the long gestation periods and complexities of the pathways linking the scientific invention to innovation and commercialisation. In health sciences, for example, a study of the ten most significant advances in cardiovascular medicine revealed the time-to-benefit was an average of 17 years. Moreover, the ten key advances could be traced to over 600 academic papers from different disciplines of which over 40% had no direct link with cardiovascular medicine (e.g. chemistry, engineering, physics, botany, agriculture and zoology). *(Source: Lord Krebs. Evidence to the House of Commons Innovation, Universities, Science and Skills Committee (2008-09; HC 168-1) cited in A Vision for UK Research 2010 CST).*

Attempting to link the overall return to any one particular breakthrough or the funding of any one particular project is therefore extremely difficult.

The second critical issue in the process of moving from invention to innovation is the central role played by agents outside the research base. Virtually all innovations connected with breakthroughs in scientific research involve a series of investments essential for the development, commercialisation, production and marketing of the final products and processes to which they give rise. An economy may invest a large proportion of its R&D effort in the higher education sector and yet not gain in terms of domestic value added or economic welfare if other parties in the innovation system fail to play their part.

The time period problem means that it is essential to take a long-term view before the attribution of impact can be established. On the other hand this long period typically involves sustained investment by other players so the attribution between the parties becomes more difficult. *See Exhibit 1.*

Exhibit 1: Time, Attribution and Impact

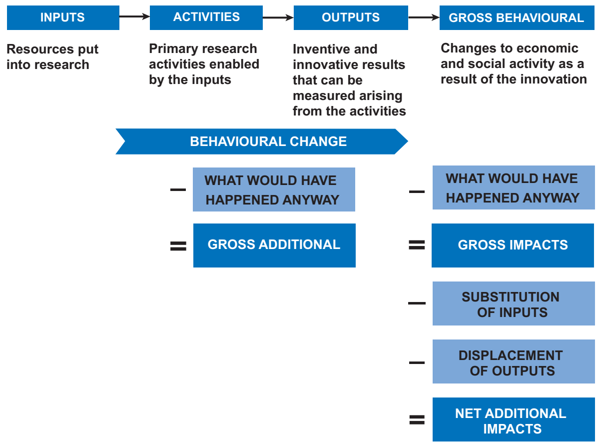


Source: Alan Hughes UK~IRC, Annual Innovation Summit 2010

Over short periods of time the most that might be possible is to identify whether or not the overall trajectory of the path from invention to innovation has the right slope and direction. This in turn implies that attention needs to be paid to intermediate behavioural stages along the transition path from activities funded by public sector research through to the outputs and outcomes to which they ultimately give rise.

This means that narratives can be very important as an account of how the direction of the translation of research is moving. Behavioural changes along the path to commercialisation should then be of as much of interest as the final outcomes themselves. Exhibit 2 illustrates the kind of impact evaluation model that may then be appropriate.

Exhibit 2: From Activities to Impact



Source: Derived from Hughes, A., Moore, B. and Ulrichsen, T. (2011) 'Evaluating Innovation Policies: A Case Study of the Impact of Third Stream Funding in the English Higher Education Sector' in Colombo, M.G., Grilli, L., Piscitello, L. and Rossi Lamastra , C. (eds) Policies for science and innovation: design and evaluation Edward Elgar (forthcoming).

- ***Alan Hughes's work on impact evaluation is funded by the EPSRC project on IKC Advanced Manufacturing Technologies for Photonic and Electronics (IKC) (EPSRC grant EP/E023614/1), by an EPSRC Pathways to Impact award and by the Higher Education Funding Council for England (HEFCE) in a project on the Evaluation of Third Stream Funding, carried out in collaboration with Barry Moore and Tomas Ulrichsen of PACEC.***

The UK~IRC Innovation Summit in December 2010 focused on measurement of the impact of public and private sector R&D (www.ukirc.ac.uk/newsandevents/events/article/?objid=3651).

Hidden Connections

The Arts and Humanities are in 'silent crisis'. Respected philosopher Martha Nussbaum says policy-makers view these academic disciplines as "useless frills, at a time when nations must cut away all useless things in order to stay competitive in the global market". But a brand new CBR study – the biggest of its kind, based on surveys of 22,000 academics and 2,500 businesses – reveals that far from being "useless", Arts and Humanities academics are highly connected to the UK economy.

The recently published CBR report *Hidden Connections* shows such academics are making an important contribution, particularly to the public and third sectors. They provide research and ideas to industrial partners and community groups alike, working with organisations from museums and media studios to record companies and website developers.

CBR researchers found that two-thirds of Arts and Humanities academics are involved in research relevant to non-commercial outside organisations. Almost a half have knowledge exchange links with the third sector (e.g. charities, voluntary groups and social enterprises) and 38 per cent have connections with the public sector. Thirty per cent are engaged with the private sector. And this figure rises to 49% when considering academics in Creative Arts and Media.

The poor relation

It is often thought that only science and engineering firms benefit from engagements with academia. But the report shows that many businesses want to interact with academics around management and business performance more generally, including in areas like service development, training and marketing. And many of the businesses that interact with the Arts and Humanities - 71% - do so in relation to innovation activities.

These are fascinating findings given that Arts and Humanities is often considered the poor relation in knowledge exchange. In recent years, much policy interest in university-business interactions has focused on ways of transferring more technology from the science base through patents, licences and spin-outs. But the CBR team that carried out this research for the Arts & Humanities Research Council argues that this view is too narrow and is incomplete. In their report, *Making Connections*, they say. "A much broader view should be taken of the commercialisation activities of academics in the Arts and Humanities."

Printing and patents

So what sorts of knowledge exchange are academics actually engaging in? Take as an example the Centre for Fine Print Research at the University of the West of England. It has filed three successful patents in the past 10 years. This might sound an unlikely activity by a University department investigating the development of quality fine print from the 19th century through to the digital age. But the Centre's focus on novel materials and processes to push forward innovation in

There are many hidden connections between Arts and Humanities academics and the UK economy

2D and 3D printing also attracts industrial partners, and around one third of the Centre's revenue derives from industrial projects.

For example, a team at the Centre recently investigated rapid prototyping for the creative arts, i.e. the possibility for artists to print ceramic objects directly in three dimensions, allowing them to produce unique works without incurring modelling and tooling costs. As the project progressed industrial firms became increasingly interested, both from the production angle and in terms of developing the equipment required to produce bespoke items. Six companies are now "*knocking at the door*", interested in a ceramic material developed during this project, and other potential applications include printing ceramic bone replacements for surgical use.

New directions

Another academic, Dr Helen Kennedy at the University of Leeds, also found that involving external partners in her research had a greater impact than originally planned. She started a research project to develop a virtual learning environment for people with learning disabilities and began recruiting web designers to build it and test it. By doing so, she hoped to persuade designers to adapt their existing design practices. But the response was much more positive than that. Web designers responded positively to the opportunity to work with people with learning disabilities, and several went on to do paid work for a centre for learning disability and innovation in East London.

As this shows, university-business interactions can open up new ideas and new directions for both research and business. So it is perhaps unsurprising that the report notes that businesses engaging with Arts and Humanities disciplines are more likely to have made major changes to their business structure, their management techniques or to their corporate strategy in the last three years.

- *Hidden Connections - Knowledge exchange between the arts and humanities and the private, public and third sectors* by Alan Hughes, Michael Kitson and Jocelyn Probert with Anna Bullock and Isobel Milner is published by the Arts & Humanities Research Council and the CBR.

  www.cbr.cam.ac.uk/news/index.htm#AHRC_Launch

A long-term focus for corporate Britain

How can we best encourage Corporate Britain's directors and investors to focus on long-term stability rather than short-term gains? This was the theme of a recent Department for Business Innovation and Skills (BIS) consultation. *Does the problem lie with shareholders or Boards of Directors?*, BIS asked. *And are there particular issues involved during takeover bids?* The CBR's Simon Deakin, whose key research interests include the role of law in corporate governance, responded on behalf of the CBR.

Company managements in Britain are increasingly orientated towards the short-term. There has been a growing emphasis since the 1980s on the paramount position of shareholders within corporate governance, and the related view that shareholders should be the principal beneficiaries of corporate activity.

The problem with this is that while shareholders have a mix of short- and long-term interests, too often the short-term interests dominate – particularly in takeover situations. Many institutional shareholders will say they take a long-term view of their holdings, but very few will refuse the opportunity of a short-term gain arising from a takeover bid or merger when they can sell their shares at a substantial premium over the pre-bid price. In practice, as the hostile bid by Kraft for Cadbury in 2009 showed, once a hostile bid is announced, institutions will generally be prepared to sell and take profits even before the outcome of a bid is known.

Reforming takeover legislation

One way of addressing this issue would be by reforming takeover regulation and legislation to encourage firms to take a longer- rather than a shorter-term view in a takeover situation. As it is currently drafted, the Takeover Code gives too much emphasis to shareholders, short-term financial concerns. It is thus out of line with section 172 of the Companies Act 2006, which allows boards more leeway in balancing the interests of the different corporate constituencies. So some realignment of the Code with section 172 is needed.

And there are other measures that could be considered in takeover battles. One option, though it would be complex to administer, could be weighted voting – i.e. granting increased voting rights to those shareholders with long-term holdings, and reducing the rights of short-term speculators. I also think the wider public interest should be given much more weight when competition regulators assess the impact of large takeovers.

Stock market bubbles

Consider the harmful and destabilising effect on equity markets – notably in the UK and the US - when 'bubbles', have occurred, leading to extremely overvalued equity. In the late 1990s and early 2000s, over-valuation of new economy stocks led to hostile takeovers being mounted in circumstances where the sums offered by bidders were excessive. This later resulted in the destruction of corporate value as deals had to be unscrambled.

We saw this phenomenon again during the recent global financial crisis, most notably in the takeover of ABN Amro by the consortium consisting of RBS, Fortis and Santander. This takeover reportedly went ahead without the board of RBS exercising due diligence. *The costs of the deal to shareholders in RBS and Fortis, to employees in RBS, Fortis and the former ABN Amro, and to taxpayers in the several countries affected by the various mergers and subsequent de-mergers associated with the deal, have been enormous.*

Tightening the rules

To avoid such disastrous events happening again, I recommend a number of specific reforms. These reforms could include tightening the rules on corporate restructuring, by increasing the costs to employers of collective redundancies; removing the advantageous tax treatment of corporate debt, which currently acts as a subsidy for certain types of restructuring which transfer wealth from taxpayers and employees to shareholders; and reforming competition policy as it is applied to takeovers.

I also strongly advocate reforms that allow other stakeholders besides shareholders to have more say in corporate governance. **A longer-term perspective on bids could be encouraged by mandating employee representation on corporate boards. In takeover bids, employees are the corporate constituency with the longest-term view. The best way of incorporating long-termism into the operation of the market for corporate control is to give them a more decisive say in change-of-control decisions.**

For examples of this, I suggest we look and learn from the system of codetermination practised in Germany and some other continental European countries. Codetermination involves, among other things, substantial employee representation on boards (at least a significant minority), coupled with extensive voice rights for employee representatives. This model has served the German economy well and has provided a basis both for industrial peace and economic competitiveness. The last time there was a serious debate about codetermination in this country was at the time of the Bullock Report in the late 1970s. A fresh look at this issue is long overdue.

- **For CBR research on the cause, effects and regulation of takeovers, see CBR Working Papers Nos. 30, 56, 145, 214, 215, 216, 252, 254, 266, 276, 298, 306, 331, 357, 363 and 365.**