

# Evaluating health research funding in Ireland: assessing the impacts of the Health Research Board of Ireland's funding activities

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Understanding the impact of research is important for funding bodies in accounting for funds, advocating additional resources and learning how better to achieve their aims. The Health Research Board (HRB) has funded research in Ireland for over 20 years. We analysed eight examples of HRB grants from between 10 and 15 years earlier using the Payback Framework to catalogue the impacts. They ranged from world-class academic articles and new clinical assays through to improvements in recovery time for acute myocardial infarction and development of a drug company worth over €5 million. Here we first describe the study, then examine the role of the Payback Framework in research impact assessment including examining impacts made by the HRB study itself following its completion in 2008. We discuss how that study has contributed to further development of research impact assessment methods that could be used by the HRB and others.

*Today's health research is tomorrow's health care.*

**T**HIS COMMENT FROM Mairéad O'Driscoll, Director of Research Strategy and Funding at the Health Research Board (HRB) in the foreword to *Health Research: Making an Impact*

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(Nason *et al.*, 2008) sums up the importance of health research. The HRB has been funding Irish health researchers since 1987, with the current commitments to various forms of funding totalling approximately €200 million investment in the Irish health research system. Accounting for the impact of this money, and being better able to fund research that is likely to achieve HRB and national strategic objectives, is crucial in a climate of increased fiscal prudence and public accountability.

Until 2008, understanding the impact from research in Ireland was limited to examining the extent of publications produced from research (i.e. number of publications, where these were published, citations received, etc.) and identifying any other immediate outputs from the work. By addressing the wider impacts of research funded by the HRB, this study was the first time a health research funder in Ireland had moved away from traditional research outputs and attempted to capture the return on investment (ROI).

The analytical framework for the study was based on the Payback Framework developed by the Health

Economics Research Group (HERG) in the 1990s to assess the benefits of health research (Buxton and Hanney, 1996). It is currently the most widely used and comprehensive method available for measuring payback in a systematic way (Boaz *et al*, 2008; CAHS, 2009; Banzi *et al*, 2011).

The framework has been used by various organizations including the Canadian Institute of Health Research (CIHR, 2005), the Health, Food and Welfare Bureau in Hong Kong (Kwan *et al*, 2007), ZonMW in the Netherlands (Oortwijn *et al*, 2008), and the Primary Health Care Research and Information Service in Australia (Kalucy *et al*, 2009). In the UK it has provided the basis of a number of studies to assess the payback of health research (Hanney *et al*, 1999; Buxton *et al*, 2000; Wooding *et al*, 2005).

The basic framework was extended in relation to economic benefits in work for the World Health Organization reported in Buxton *et al* (2004). The UK Evaluation Forum report on ways to assess returns on health research funding drew on the stream of work on the Payback Framework, including the developments of the 'Broader Economic Benefits' category, and concluded that the payback approach has the advantage of encouraging 'a more comprehensive and consistent approach to research evaluation' than previous techniques that focus on a single aspect of research impact (UK Evaluation Forum, 2006: 31).

In addition to capturing multiple impacts, use of the Payback Framework can also facilitate comparisons between the impacts from different mechanisms (or modes) of funding health research. For example, a study for the Arthritis Research Campaign (ARC) used the Payback Framework to compare the impacts from project grants, programmes, fellowships and centres and helped the funding body understand how it had facilitated impacts arising from its grants and might better facilitate them in the future (Wooding *et al*, 2005).

This current paper describes the application of the Payback Framework to assess the impact of eight examples of HRB-funded research conducted 10 to 15 years previously (in the early- to mid-1990s). The paper then analyses lessons that can be learned from this study about the state of the art in assessing the impact of health research. The analysis of the lessons learned is itself informed by exploring some of the impacts that are emerging from this study of the payback from the Health Research Board funding in the period since it was first reported by Nason *et al* (2008).

The HRB already had a strong programme in research evaluation but, building on the study reported here, it has undertaken a process of exploring how best to adopt aspects of the payback approach. Furthermore, the original HRB study is also helping to inform a wider range of developments that build on, or adopt, aspects of the Payback Framework.

## Methods

As with previous payback studies, this project used a variety of research methods to facilitate triangulation and strengthen the findings. The initial part of the project (Part 1) aimed to generate an understanding of the context in which health research has progressed in Ireland and how this context has changed. The second part of the project (Part 2) involved selecting case studies from HRB-funded projects. The final part (Part 3) was mainly made up of the case-study research itself, together with an academic literature review of the methods for assessing economic benefits that can accrue from health research. About half of the case-study research was undertaken by a member of staff from the HRB working with the research team in a deliberate attempt to build capacity to conduct such studies internally.

### Part 1 methods

With the input of the HRB we identified a range of stakeholders to consult over the methodology to be used in the study, to provide us with an understanding of the state of the Irish health research system over the last 15 to 20 years and to help identify high-impact researchers and research areas to feed into the case-study selection matrix. We identified eight key informants to interview across the range of stakeholders in the health research system. The interviews were recorded and the notes transcribed.

In order to place the case-study research in the fast-changing context of Irish health research, we utilized the expertise of the HRB by asking it to provide a paper describing the way that the health research context in Ireland has changed over the last 20 years or so, including changes in funding bodies, policy decisions and the evolution of the HRB funding portfolio. It builds on the tacit knowledge of senior staff at the HRB and a number of key policy documents from government and key research funders. In combination with the findings from the key informant interviews (KIIs), the paper provides a full contextual background in which to place the case studies. It informed the selection matrix for case studies and aided the identification of what should be considered an economic output from Irish health research according to different stakeholders.

### Part 2 methods

Selecting a suitable set of case studies was critical to the robustness and validity of this evaluation, and was important for producing a quality research product. Since the payback of health research is not instantaneous, we needed to identify research grants that would have had adequate time for the research results to feed through to any wider impact. From previous studies we have estimated this time-lag to be between 10 and 15 years for health research. As

we wished to identify case studies that would provide useful information on the activities of HRB-funded researchers, we deliberately selected those researchers who had a high impact (Yin, 2003), using a selection framework that took into account various proxies for research impact, including number of HRB grants, funding received, and recommendations from KIIs.

The eight case studies were split between basic/early clinical research and health services/public health/primary care research, as defined by the information about the HRB grants. Four studies were chosen in each of these two areas to include researchers who had also been funded recently, a breadth of research locations (not just in Dublin), and researchers of both genders. A long list of candidate case studies was identified and, with input from the HRB, we prioritized eight case studies. Selected case-study principal investigators (PIs) were approached by the HRB to test their ability and willingness to participate in the evaluation. Just one PI of the eight selected studies refused to participate, and was replaced by a reserve.

Having just eight case studies limits the number of comparisons that can be made. In this project we have not compared case studies with one another, but simply collated evidence from all the studies to produce a representative selection of the types of impact that might be expected. As the study progressed, greater emphasis was given to drawing very broad lines of attribution and, at least in some cases, considering the impacts from the PIs' later research that relied on other public funding inputs. The justification for this is that, as described below, the early funding from the HRB was key to sustaining health research in Ireland in the early 1990s, and without HRB funding some of the researchers might have quit research, or not started conducting research, or might have moved abroad to pursue their research careers.

### *Part 3 methods*

Case studies were built around the Payback Framework. Each case study involved a combination of approaches, but all included some review of archival material and face-to-face semi-structured interviews with the PI. Other stakeholders interviewed in the course of case studies included: research collaborators, co-researchers, students, industrial partners, medical practitioners, policy-makers and research users in industry. Archival research sources included: material from the HRB (grant applications, reviews, end-of-grant reports, and other reports), the researchers, and universities; academic publications; policy documents; and other information relevant to the grants (e.g. drug company or public health websites).

In the Payback Framework any assessment of the scientific quality of research (such as in journal articles, training future researchers and developing a

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## **In the Payback Framework any assessment of the scientific quality of research is part of the broader assessment of impact. Its societal impact is the key issue in a multi-dimensional categorization of the benefits of health research**

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career) is part of the broader assessment of impact. Its societal impact is the key issue in a multi-dimensional categorization of the benefits of health research. The Payback Framework consists of two elements: a model of the complete research process (for the purposes of research evaluation), and a series of categories to classify the individual paybacks from research. Key features of the Payback Framework are described earlier in this special edition (Donovan and Hanney, 2011).

In general, the standard version of the Payback Framework (Buxton and Hanney, 1996; Hanney *et al*, 2004) was used to organize the case studies. As noted above, some work was underway to expand and strengthen the final category in the multi-dimensional categorization of benefits, that is, 'Broader Economic Benefits'. It was intended that this payback category should receive more attention in this study than in most previous payback studies. In the account below of the findings from Part 1 of the study we explain how the context in which this study was conducted meant that the contribution of research to Ireland's national economic development was seen as particularly important. In practice, however, the limited number of case studies meant that the issues could only be addressed within the findings of the specific case studies rather than attempting any econometric analysis.

Case-study findings were analysed qualitatively in a workshop designed to organize impacts into the categories of the Payback Framework.

## **Findings**

The findings for this study are split into the study's three parts.

### *Part 1*

Key informant interviews and the HRB's own contextual paper provided an understanding of the changing spectrum of health research funding and the health research context in Ireland during the period covering the case studies in this project. The HRB budget increased from €2 million in 1987 to

€50 million in 2007. In terms of its role, however, the early years were crucial because it was almost the only domestic source of funding for health research in Ireland. Over the years various other research funding bodies were established, including Science Foundation Ireland (SFI) in 2001.

Nevertheless, the key informants all remarked that the roles of the SFI and HRB are quite different — while HRB's role is to fund research with potential to improve health, SFI's role is to focus on fundamental research and its commercial potential. The KIIs and contextual paper also emphasized the increasing importance of the 'knowledge economy' strategy. There was a strong imperative to enhance Ireland's research capacity and reputation, and attract research funding into the country. While at a global level the transfer of research funding from one nation to another does not *per se* generate economic benefits, from the perspective of one country it can be important, and was seen as a key economic outcome resulting from cutting-edge research funded by HRB.

### Parts 2 and 3

Case-study selection identified eight case studies across Ireland that represented HRB-funded projects or programmes from the mid-1990s. While the set of eight case studies does not represent the full profile of HRB funding, it aims to mirror the variety of HRB's funding portfolio by including case studies from all the key domains of research, balancing basic/clinical and health services/public health/primary care research (four from each).

### The eight case studies

As noted, the Payback Framework consists of two integrated elements: the multi-dimensional categorization of benefits and the model used to organize the assessments. In this paper we focus primarily on presenting the findings in terms of the impacts. In Table 1 we list the full benefits or impacts from each of the eight case studies. Another paper in this special edition of *Research Evaluation* (Klautzer *et al*, 2011) illustrates how the various stages of the logic model can also be used to present the findings from case studies undertaken using the Payback Framework. The discussion section below considers how working through the various stages of the logic model helps address issues of time lags and attribution.

Across the case studies described here, impacts were collated into the five payback categories as defined for this study:

- Knowledge production;
- Research-targeting and capacity-building;
- Informing policy and product development;
- Health and health sector benefits; and
- Broad social and economic benefits.

While academic impacts resulted from the research funding (with many publications, presentations and post-graduate degrees), these HRB-funded projects also had clear impacts beyond academia.

## Discussion

Discussion about the approach described in this paper is informed by an analysis of what has happened since the study was initially reported (Nason *et al*, 2008). As described above, the Payback Framework was selected for use in this study because it had successfully been applied to evaluate the impacts from various bodies of health research. In this instance, identifying the wide variety of impacts that occur from HRB funding shows how research that is often considered academic in nature can reach far beyond academia to influence the health and well-being of individuals, communities and the nation.

The usefulness of the Payback Framework was further demonstrated when the HRB integrated an adapted Payback Framework into their existing grant-reporting and evaluation procedures to be able 'prospectively' to track outputs and outcomes, which means they will be able regularly to monitor the impacts arising. The HRB also identified indicators for longer-term outcomes such as broader economic and social outcomes, but implementing a process to obtain data is more difficult. The HRB has not yet undertaken any further retrospective impact assessments, but is hoping to do so in 2011. The lack, thus far, of further case studies might reflect one limitation of the framework: concerns that it is resource-intensive to apply.

The study achieved quite a high profile within Ireland, with favourable press coverage of the launch of the report by the then Minister for Health and Children (Houston, 2008). In various countries there has been a determination to sustain funding of research, especially health research, despite the recession. It seems quite feasible that the report showing the impacts from the HRB funding (Nason *et al*, 2008) was helpful in supporting the maintenance of health research funding despite the severity of the overall budget cuts in Ireland.

One advantage of the Payback Framework is its considerable flexibility, which means it can be adapted to address concerns of different funders. In terms of modes of funding to which it might be applicable, the framework was originally developed to examine impacts from clinical and health services research largely commissioned in a targeted way. Some later applications of the framework have successfully expanded the scope of research to include responsive mode basic and other health research (Wooding *et al*, 2005). The current study confirms that the framework can successfully be both applied to a wide range of biomedical and health research, and focused on examples from the full portfolio of the main national funder of health research. In

adopting this national perspective it was particularly valuable to include an analysis of the full context and consider a timeline of the development of the Irish health research system.

Within the health field, the Payback Framework has been applied to assess the impacts of individual research projects and whole programmes and centres (Hanney *et al.*, 2007). In terms of its scope, this current study illustrates both the strengths and limitations of the framework. Several of the eight case studies have been extended to consider benefits that

have come from a whole stream of research in which HRB funding played a key — and often early — role, but which occasionally relied on subsequent funding from other agencies in addition to further HRB funding. This expansion of the case studies was important in enabling us to work through all the stages of both the model and the benefit categories and to identify various examples of wider economic benefits. Furthermore, we were able to do this from the perspective of what has been the major national funder specifically focussing on health research.

**Table 1. Benefits identified in eight case studies of research funded by the Health Research Board**

Payback category	Case study A (programme grant)	Case study B (programme grant)	Case study C (project grant)	Case study D (project grant)
<i>Knowledge production</i>	<ul style="list-style-type: none"> <li>• 24 articles in basic and clinical peer-reviewed journals</li> <li>• Better understanding of role of eicosanoids, characterizing the way this new class of compounds acts</li> </ul>	<ul style="list-style-type: none"> <li>• 27 peer-reviewed publications receiving on average 36.4 citations per year since 1996</li> </ul>	<ul style="list-style-type: none"> <li>• Two peer-reviewed publications: average citation rate of 5 per year</li> <li>• Improved understanding of how IL-1 acts, indicating possible novel drug targets for rheumatoid arthritis</li> </ul>	<p>Six peer-reviewed publications in various neuroscience and neurology journals receiving in total an average of about 30 citations per year</p>
<i>Research targeting and capacity building</i>	<ul style="list-style-type: none"> <li>• New science facilities (infrastructure)</li> <li>• New university department</li> <li>• Teaching pharmacology and medical students</li> <li>• Career development for PI and study team researchers (post-doctoral and PhD students)</li> <li>• Contribution to development of scientific and technological work-force in Ireland</li> <li>• Further research by clinical and industry sectors</li> </ul>	<ul style="list-style-type: none"> <li>• Two PhD degrees</li> <li>• Successful ongoing collaborations with researchers involved and additional collaborators</li> <li>• Further research funding, including from HRB and a US Foundation: Fighting Blindness</li> <li>• Leaders in Ireland in gene therapy for eye disease</li> <li>• Development of techniques applied to subsequent research projects</li> <li>• Development of viral delivery systems for exploitation in four areas of gene delivery</li> <li>• Development of new mouse models</li> </ul>	<ul style="list-style-type: none"> <li>• One PhD and post-doctoral position in the same laboratory</li> <li>• PI's career advancement, leveraging further funding</li> <li>• Research training for laboratory group</li> <li>• The techniques and approaches used in later studies</li> <li>• Subsequent research discovered a variant to the MAL protein that predicts malaria, TB and other infectious diseases and made significant contributions to the discovery of TLRs, leading to a paradigm shift in the field</li> </ul>	<p>PhD student trained on grant</p> <p>Interaction with pharmaceutical company led to funding for students in the PI's laboratory which continues today</p> <p>Work on preclinical research for industry identified which compounds should be further investigated as being potentially useful for clinical development</p>
<i>Informing policy and product development</i>	<ul style="list-style-type: none"> <li>• Assay development for prostaglandin metabolism</li> <li>• Advisory role in clinical trials</li> <li>• Drugs taken off the market</li> <li>• Drug development</li> <li>• Advisory role to pharmaceutical companies</li> <li>• Clinical guideline development for cardiology</li> </ul>	<ul style="list-style-type: none"> <li>• Development of therapeutics targeting primary disease mechanisms or secondary mechanisms of neuronal cell death were underway. This will be applicable to a broad sector of the patient population</li> <li>• Phase 1 clinical trials targeted for 2010</li> </ul>	<ul style="list-style-type: none"> <li>• Two lead drug products in development, both novel anti-inflammatory agents; target key inflammatory processes – specifically target TLRs</li> <li>• Phase 1 clinical trials targeted for 2009</li> </ul>	<p>IL-1 work fed into drug development, and Phase 2 trials</p> <p>Identified point of action of another drug for Huntington's disease, drug in Phase 3 trials</p>
<i>Health and health sector benefits</i>	<ul style="list-style-type: none"> <li>• Understanding dosing regimens of aspirin and pre-sampling drugs used in arthritis, leading to lower side-effects of high dosage</li> <li>• Decreased side-effects due to COX-2 inhibitor drugs taken off the market</li> </ul>	<ul style="list-style-type: none"> <li>• No direct health benefits arising from programme grant</li> <li>• Potential benefits: may lead to improved health of sufferers of retinal degeneration and other degenerative diseases if team are successful in providing a rationale for human therapeutic trials</li> </ul>	<ul style="list-style-type: none"> <li>• No current health benefits arising directly out of the early research project</li> <li>• Subsequent research has the potential to lead to health benefits for sufferers of TB, malaria, septic shock and rheumatoid arthritis, and may have the potential to save many lives globally</li> </ul>	<p>Work on neuro-inflammation sparked interest in medical community on neuro-degeneration and ageing, but not yet led to specific benefits</p> <p>The PI's total research stream helps explain why unsaturated fats in diet can be good for maintaining memory and learning abilities in old age</p>
<i>Broad social and economic benefits</i>	<ul style="list-style-type: none"> <li>• Attracting and maintaining high-quality researchers in Ireland</li> <li>• Three spin-off companies (employment and products)</li> <li>• Contributed to Ireland's increased research reputation</li> </ul>	<ul style="list-style-type: none"> <li>• Spin-off campus company set up to facilitate patenting process for IP</li> <li>• Economic returns are evident from the level of sustained employment generated by the success of the laboratory and increase of international research funds leveraged</li> </ul>	<ul style="list-style-type: none"> <li>• Subsequent research led to establishment of a drug development company which employs 19 people (14 researchers)</li> <li>• Spin-off company refinancing from US worth €5.25m</li> <li>• Interaction reaffirmed Wyeth's continued investment in Irish biotechnology sector</li> </ul>	<p>Input into drug development for lead drug, which was the major reason behind purchase of drug company in 2004 (net preliminary purchase price of US\$4.6m)</p> <p>Economic benefit of pulling in additional EU research funding</p> <p>Benefit of identifying Ireland as a centre of excellence</p>

(continued)

Table 1 (continued)

Payback category	Case study E (programme grant)	Case study F (programme grant)	Case study G (project grant)	Case study H (project grant)
<i>Knowledge production</i>	<ul style="list-style-type: none"> <li>Two peer-reviewed journal articles</li> <li>MDPH thesis and book chapter used findings</li> </ul>	<ul style="list-style-type: none"> <li>One peer-reviewed publication in a leading and respected journal of psychiatry, receiving an average of 3 citations per year</li> </ul>	<ul style="list-style-type: none"> <li>One peer-reviewed publication in a leading Irish medicine journal</li> <li>One award-winning presentation to the Irish Paediatric Society</li> </ul>	<ul style="list-style-type: none"> <li>National census report and 38 individualized hospital reports</li> <li>Two publications in peer-reviewed journals</li> </ul>
<i>Research-targeting and capacity-building</i>	<ul style="list-style-type: none"> <li>Follow-on research project to develop saliva assay, funded by Dental Health Foundation originally, then by DoHC and Northern Irish health research funders</li> <li>Research fed into undergraduate courses taught by PI</li> <li>Career progression and international reputation of PI is attributable to full research portfolio</li> <li>HRB-funded research allows generation of new ideas for public health and HSR work by PI</li> </ul>	<ul style="list-style-type: none"> <li>Successful ongoing collaborations</li> <li>Other researchers citing work from this project</li> <li>Ability to leverage grant funding from Stanley Research Foundation and HRB</li> <li>Research techniques applied to further grants that encouraged collaborations</li> <li>Subsequent research led to protocol being approved as a best practice intervention</li> <li>One masters degree and research experience facilitated career path in research</li> </ul>	<ul style="list-style-type: none"> <li>Successful ongoing collaboration and interdisciplinary contribution to PI's academic research</li> <li>Career benefits to co-authors from publishing in peer-reviewed journal</li> <li>Improved track record leading to further grant funding</li> <li>Development of databases</li> <li>Contribution to PI's career path</li> </ul>	<ul style="list-style-type: none"> <li>Career development of PI in cardiology and HSR (professorship at RCSI, head of HSR Unit)</li> <li>Postgraduate (PhD and master courses) research training on HRB projects</li> <li>Development of health services management and HSR courses at RCSI</li> <li>Contribution to development of health psychology as a subject</li> <li>Erasmus programme in health psychology</li> <li>Establishment of HSR Unit at RCSI</li> </ul>
<i>Informing policy and product development</i>	<ul style="list-style-type: none"> <li>Saliva assay for public health in development</li> <li>Works in association with Wrigley and Unilever based on saliva work</li> <li>Other research (including work funded later by HRB) has had a big impact on policy: specifically fluoridation research informing fluoridation policies; epidemiology research underpinning policy changes for groups at risk; and HSR allowing the DoHC to make funding cost-effective</li> </ul>	<ul style="list-style-type: none"> <li>Difficult to attribute policy or product developments directly to this study</li> <li>Subsequent research led to a pilot service providing care for individuals experiencing first-episode psychosis and their families</li> <li>Recommendations made to policy-makers to extend this service</li> </ul>	<ul style="list-style-type: none"> <li>Difficult to attribute any policy or product developments directly to this study</li> <li>Follow-on research led to clinical guidelines in chronic kidney disease management</li> <li>Chaired group that implemented the Heartwatch secondary prevention strategy</li> </ul>	<ul style="list-style-type: none"> <li>Helping DoHC to identify scope for future AMI- improvement programmes</li> <li>Planning and executing community project on rapid thrombolysis in Donegal region</li> <li>Work on the first cardiac health services strategy and BHH report, including recommendations on cardiovascular disease</li> </ul>
<i>Health and health sector benefits</i>	<ul style="list-style-type: none"> <li>Assay work yet to have an effect on health or the health sector, but if taken on as a public health tool it will prevent tooth decay and reduce cost of dental problems</li> <li>It may also reduce risk of death due to dental anaesthesia for children</li> <li>Other research is leading to a more cost-effective dental health system and to reduction in dental decay through fluoridation</li> <li>Potential to increase health equity through targeted treatment for disadvantaged groups</li> </ul>	<ul style="list-style-type: none"> <li>Original project not led to any significant health benefits, but has increased awareness of the usefulness of obstetric history in diagnosing schizophrenia</li> <li>No significant impact on obstetric practices</li> <li>Subsequent research pilot project had strong potential health benefits, e.g. shows how to reduce duration of untreated psychosis, severity of symptoms and suicidal behaviour</li> </ul>	<ul style="list-style-type: none"> <li>Without a direct link to this study, there is increased parental knowledge of importance of immunization</li> <li>Follow-on research showed that 3.2% of population can benefit from secondary prevention cardiac care</li> <li>An estimated 81 deaths prevented or postponed and 522 life years gained over the two years of Heartwatch programme</li> <li>Reduction in main risk factors for cardiovascular disease</li> </ul>	<ul style="list-style-type: none"> <li>Improvement in service delivery (time to AMI treatment in hospitals and by GPs in rural areas)</li> <li>Contribution to decrease in cardiovascular disease mortality in Ireland</li> <li>Change in recovery from AMI due to faster thrombolysis resulting in improved quality of life</li> </ul>
<i>Broad social and economic benefits</i>	<ul style="list-style-type: none"> <li>Saliva assay work has been part-funded by Northern Ireland, bringing in external research funding to Ireland</li> <li>Assay work will allow disadvantaged groups most at risk from dental complications to be targeted for intervention and reducing costs</li> <li>Contribution to Ireland's increased international reputation for research</li> </ul>	<ul style="list-style-type: none"> <li>Difficult to attribute socio-economic benefits to the original project</li> <li>Subsequent research has potential economic benefits as EIS have been shown to be cost-effective</li> <li>Brought in substantial external research funding from the Stanley Foundation</li> </ul>	<ul style="list-style-type: none"> <li>Difficult to attribute any socio-economic benefits to the original project</li> <li>From follow-on work economic benefits due to reduced mortality and morbidity of workforce</li> </ul>	<ul style="list-style-type: none"> <li>Development of HSR and planning in Ireland</li> <li>Benefits from decreased morbidity and mortality of workforce</li> </ul>

*Note:* AMI = Acute myocardial infarction; BHH = 'Building Healthier Hearts'; DoHC = Department of Health and Children; EIS = Early intervention service; HRB = Health Research Board; HSR = health services research; MDPH = Medical Doctor of Public Health; PI = principal investigator; RCSI = Royal College of Surgeons of Ireland; TLR = Toll-like receptor

So it is an undoubted strength that the framework facilitates assessment of the wider impacts that are of interest to health research funders such as HRB, and that the model facilitates consideration of attribution and time-lag issues by focusing attention on factors such as the background to the research, analysis of how findings and developments can feedback and inform further advances, and exploration of possible pathways to impact. Furthermore, the context paper and KII undertaken in Part 1 of the study provided an understanding of the wider context in which it was feasible to see how the early funding by the HRB could have been exploited by PIs drawing on opportunities provided by an increasingly wide range of research funders.

However, having just eight of the resource-intensive case studies, and incorporating a broad range of research funding in some of the cases, meant it was impossible to make comparisons between the case studies in terms of the benefits from different modes of funding as had been done in the ARC study (Wooding *et al*, 2005). Indeed, the impacts included in Table 1 clearly come from a much wider body of research funding than the original eight pieces of funding on which the case studies were based. Therefore, despite the capacity of the Payback Framework to facilitate analysis of attribution and time-lag issues, and the presentation of the relevant data in the case study narratives, limitations remain:

1. The resource intensity of the approach means it is not always possible to conduct sufficient case studies to allow comparisons to be made between modes of funding.
2. Because of the breadth of the impacts being considered, attribution issues remain challenging.

In terms of wider applications and further developments, the HRB study is itself contributing to various developments in research assessment, including the RAND/ARC Impact Scoring System (RAISS) that consists of a web-based questionnaire to catalogue the impacts from health research (Wooding *et al*, 2009). Analysis in Canada on the ROI from inter-professional care and education is also being informed by the HRB study.<sup>1</sup> Furthermore, the HRB report featured as one of the studies analysed in the review by the Canadian Academy of Health Sciences that led to the recommendation that a method building on the Payback approach should be adopted by all health research funders in Canada (Frank and Nason, 2009; CAHS, 2009).

In considering the potential for wider application of the Payback Framework in national research evaluation activities it is interesting to note observations from an academic whose work formed the basis of a case study, and who spoke at the ministerial launch of the report. The PI explained how she had been rather sceptical of the exercise when first invited to participate. Once she became involved in the

case study she found, however, that it was a worthwhile exercise with which she was pleased to engage. By the end of the study, she felt it had identified the impacts from her research in a way she had not anticipated. This could be important in terms of the acceptability of the approach to academics, and its potential use to inform other studies.

Overall, this study helps demonstrate the usefulness of the Payback Framework when assessing the impact of health research, including in the previously rather underdeveloped area of economic benefits. In the case described here it has facilitated the identification of a wide range of impacts resulting directly or indirectly from eight grants made by the HRB to researchers in Ireland in the 1990s. The study has also contributed to the Payback Framework's further development and application, and increased the potential for the framework to be used in future assessments of health research impacts.

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## Note

1. Ongoing work is being conducted in Canada by the lead author of this paper on the ROI of inter-professional care and education.

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