The Economic Benefits of Research

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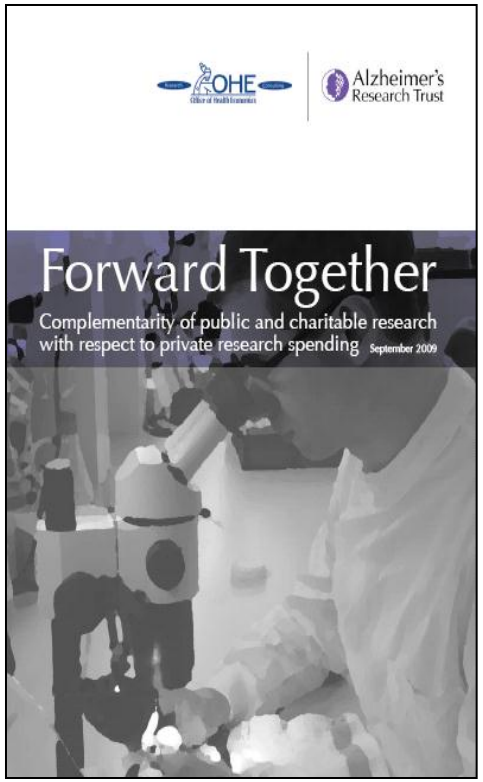
What's the Issue?

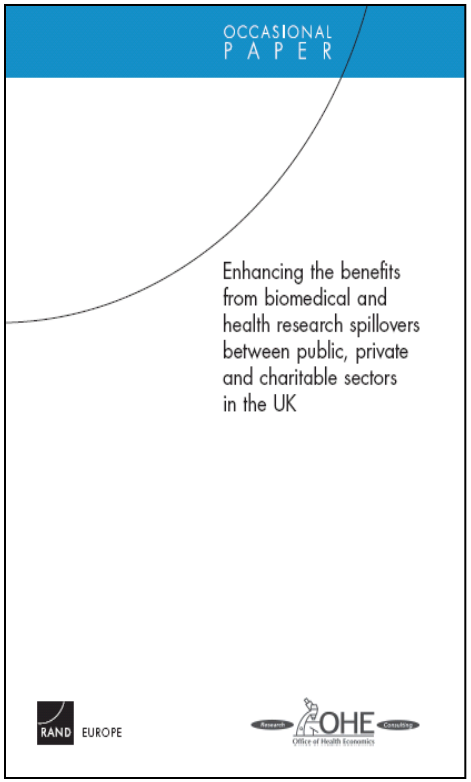
- UK government policy: realising the health, scientific and economic value of research ***in the UK***
- Maximising that value includes taking into account both **direct and indirect returns to** funding when devising research policies
- **Spillovers**: Research undertaken by one organisation, public or private, may benefit not only that organisation but also other organisations in the medical sector, other sectors, and other countries

Making the Case

2008



2009



2010

“Exceptional Returns”?

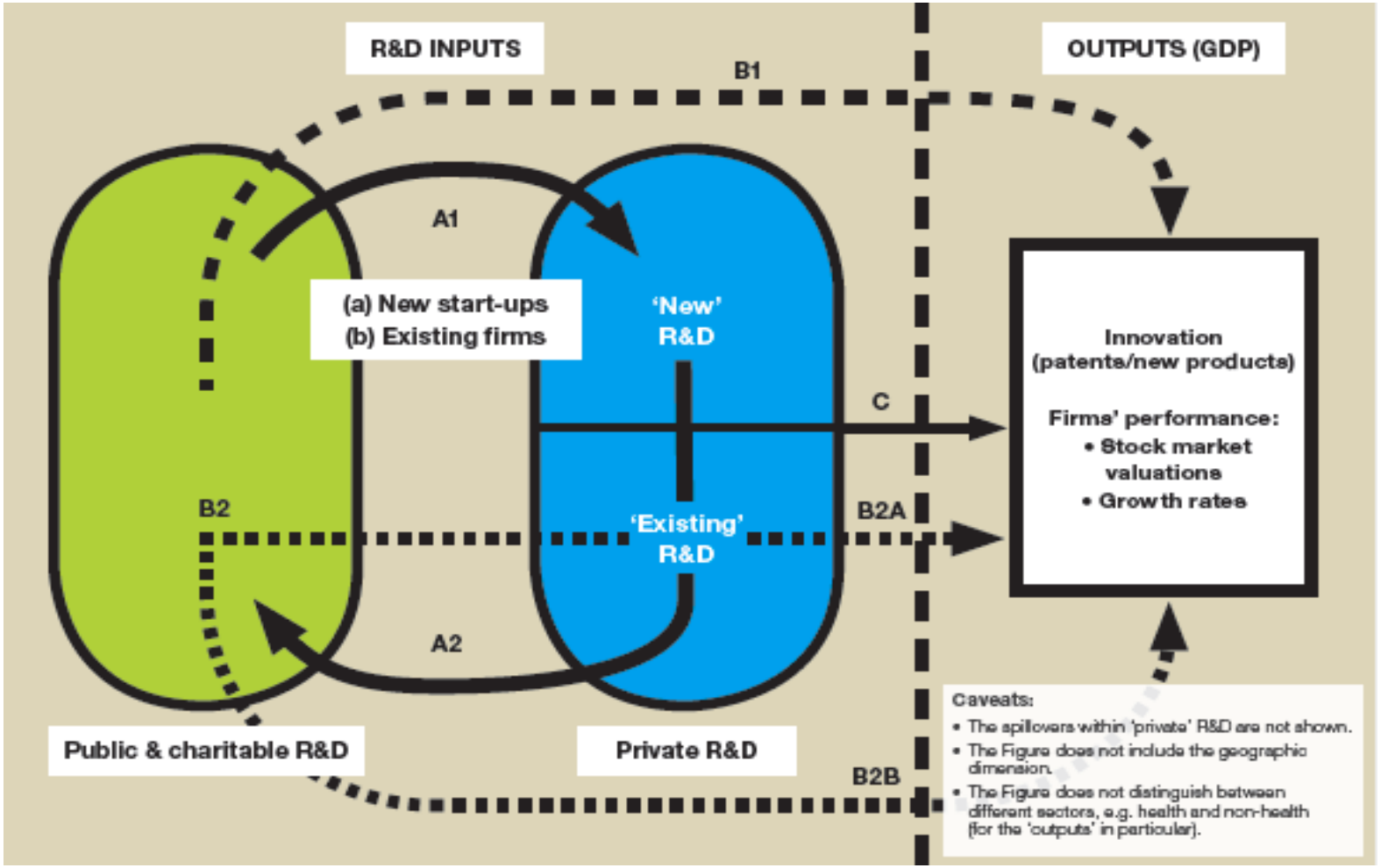
- Previous studies measuring the returns of medical research, particularly in the US and Australia, have attracted considerable attention

- They suggested that the returns in terms of the value of health gained due to medical research were ‘exceptional’
  - In the US, by informal comparison of recent gains and current research expenditures, mainly in the cardiovascular field;
  - In Australia, by formal comparison for all clinical areas of recent gains and current research expenditures

- But these analyses calculate implausibly large rates of return

Spillovers – Conceptual Model

Conceptual framework



Empirical Evidence: Quantification of Spillovers

Possible to use two approaches to quantify the social return to public medical research:

1. **One-stage approach**: a direct estimate of the social rate of return generated, by whatever transmission mechanisms, by public medical research (arrows B1, B2A and B2B)

2. **Two-stage approach**:
   - Estimating the private R&D stimulated by public research (arrow A1); and then
   - Estimating the social rate of return to the private R&D so stimulated (arrow C)

One-Stage Estimate of Social Rate of Return to Public Research

Study (all relate to agricultural sector)	"Social rate of return"
Griliches (1958)	20-40%
Griliches (1964)	35-40%
Huffman &Evenson (1993)	43-67%
Knutson-Tweeten (1976)	28-47%
Peterson (1967)	21-25%
Schmitz-Seckler (1970)	37-46%

Implies total rate of return as reflected in GDP is in the range **20% - 67%**

Two-Stage Estimate of Social Rate of Return to Public Medical Research

- At the margin, each £1 of extra public/charitable medical research yields £2.2 - £5.1 of extra private pharma R&D [Sources: Ward & Dranove, 1995; Toole, 2007]
- Each extra £1 of private pharma R&D yields a total social rate of return of ≈50% i.e. equivalent to an extra £0.50 of GDP per annum in perpetuity[Sources: Nadiri, 1993; PICTF, 2001; Griffith et al., 2004; Garau & Sussex, 2007]
- Thus the social rate of return to the *total (public + private) investment* stimulated by the initial £1 of public/charitable investment is ≈ **26%-34%**
- This lies within and towards the lower end of the 'one-stage' estimate range – as would be expected

Economic Rent

- Published literature implies approximately one-fifth of the additional GDP created by private pharmaceutical R&D constitutes economic rent (Garau & Sussex, 2007)
- I.e. investing the same resources in their next best alternative uses would yield only 80% as much GDP as investing them in private R&D
- Thus to the extent that UK public and charitable medical research stimulates UK private pharma R&D it is generating economic rent

(Weak) Evidence that Tax Funded Research Crowds-In Charity Funded Research

Evidence	Crowding-Out			Crowding-In		
	Health	Research University	Others	Health	Research University	Others
Khanna and Sandler (2000)				(✓) (UK)		✓ (UK)
Payne (2001)			✓ (US)		Yes (US)	
Andreoni and Payne (2003)			✓ (US)			
Heutel (2009)			(✓) (US)			✓ (US)

✓: The statistical relationships are not statistically significant.

Possible Research and Policy Agendas

- More robust ROI numbers
- Identifying and quantifying transmission mechanisms – beyond case studies
- Medical research can be expected to yield the highest return where? – e.g. Cancer v Dementia:
  - Unmet need
  - Tractability of the science
- And, and, and …….

END