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Measuring the Economic Consequences of Health Innovation

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Measuring the Economic Consequences of Health Innovation

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Measuring the Economic Consequences of Health Innovation: The Puzzle

There is widespread acceptance that good health is one of the foundations of economic growth and prosperity

- Nordhaus found that half of the increase in human welfare in the 20th Century came from improvements in health
- Many studies show the strong link between better health and growth

Yet expenditure on health innovation is widely treated as a cost not an investment

- Governments and others regularly seek to contain 'health costs'
- Many finance agencies project health costs on the assumption that health spending has no benefit in terms of better outcomes
- Stimulus or development programs rarely give a central place to health

Why are economies reluctant to support increased investment in health innovation, given its strong development benefits?

- Especially in the context on the emphasis on economic rebalancing?

Measuring the Economic Consequences of Health Innovation: The Puzzle

A continuing theme of LSIF is to understand the nature and benefits of health innovation, and the links to economic growth and welfare

- Through a wide range of specific studies and initiatives, including many presentations at LSIF VIII, and
- Through a continuing study of the costs and benefits of increased investment in health innovation

A related aim is to communicate the results of this work widely within the APEC community, including senior health and finance officials and ultimately to the Leaders

The study of the costs and benefits of investment in innovation can act as a coordination mechanism, bringing together in an integrated framework many different insights

Addressing the Puzzle: The Elements of this Presentation

1. The emerging health context in APEC developing economies
2. The value of and need for health innovation: some examples
 - Cardiovascular disease in developed economies and China
 - Vaccines
3. The role of health innovation – definitions and the framework
4. Health innovation and official projections of health costs
5. New evidence on the impact of workplace programs
6. The way forward

Some examples are given primarily from China. For its level of development China has had very strong health outcomes. The Government has given priority to other issues over the past two decades, but major health reforms have recently been adopted. China's data thus illustrate the health innovation challenges facing a rapidly developing country with good health outcomes.

1. The Emerging Health Context in APEC Developing Economies

Rapid growth is leading to 'Western' lifestyles, with rising risk factors for many chronic diseases

Pollution and rising temperatures pose health risks

While the incidence of infectious diseases is being reduced, a significant burden remains and some diseases are recurring

Populations are ageing rapidly in many APEC developed and developing economies

Many economies face an overlapping epidemiological transition:

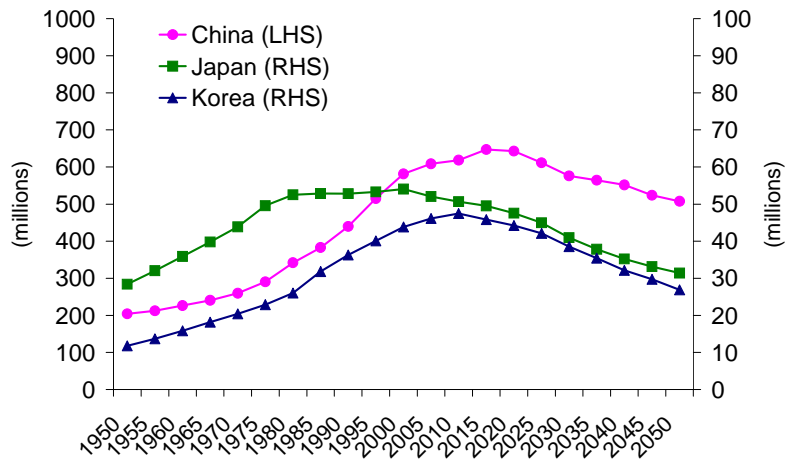
- a continuing burden of infectious disease, and
- a high and rising incidence of chronic disease

Many APEC economies are seeking to rebalance their growth path - health innovation should be a key element of the new growth paths

Age-standardised prevalence and number of Chinese with hypertension and obesity, and those who are overweight and smoke, 2002

	Age-standardised prevalence rate (%)	Average increase, compared with most recent survey	Estimated population at risk, millions
People with hypertension	17.7	2.7	177
Overweight people	17.6	3.2	218
Obese people	5.6	5.4	68
Current smokers	28.2	-2.9	303
Male current smokers	53.2	-3.0	290
Female current smokers	2.2	-8.3	13
Passive smokers	52.2	-0.5	530

Prime age population, (persons aged 25-54 years) China, Japan and Korea*

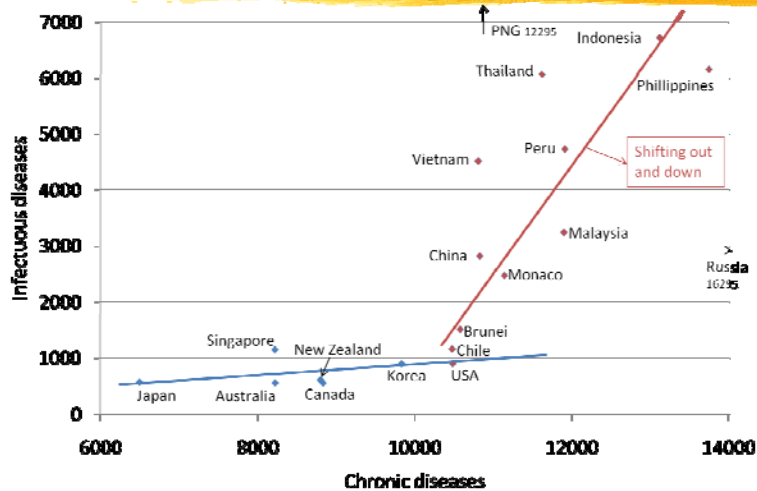


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Note: *Right-hand scale (RHS) 10 times left-hand scale (LHS).
Source: UN Population Projections (2006).

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Burden of disease in APEC economies: Age-standardized DALYs per 100,000, by cause, 2004



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Towards more balanced growth in some APEC economies

Three types of imbalance are evident in some APEC economies:

- In savings and investment, reflected in the current account
- In energy use and environmental outcomes: the pattern of growth contributes to unsustainable energy use and pollution
- In the provision and access to welfare-improving services: imbalance leads to low investment in education, health and other services

These imbalances are linked, but in complex ways

- The savings/investment imbalance reflects too low a level of consumption, perhaps especially on services
- If the high investment is in energy-intensive industries it leads to adverse energy and environmental outcomes
- In this case, increased spending on social and community services would ease both imbalances

Increased investment in health innovation may have a major role to play in this rebalancing

Employment in health: share in total non-agricultural employment, China (%)

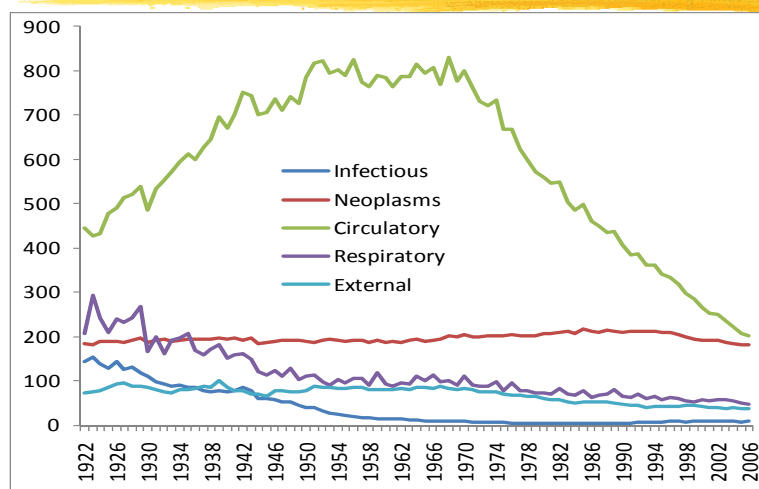
	Number (million)	Share (%)
Mining	9.1	3.6
Manufacturing	104.3	38.2
Construction (and EGW)	43.1	15.8
Transport and communication	14.0	5.1
Wholesale and retail trade	18.9	6.9
Education	17.2	6.3
Health	6.8	2.5
Culture, sports and entertainment	1.9	0.7
Public management	22.3	8.2
Other services	35.5	12.7
Total	273.1	100

2. Case Studies of the Value of and Need for Health Innovation

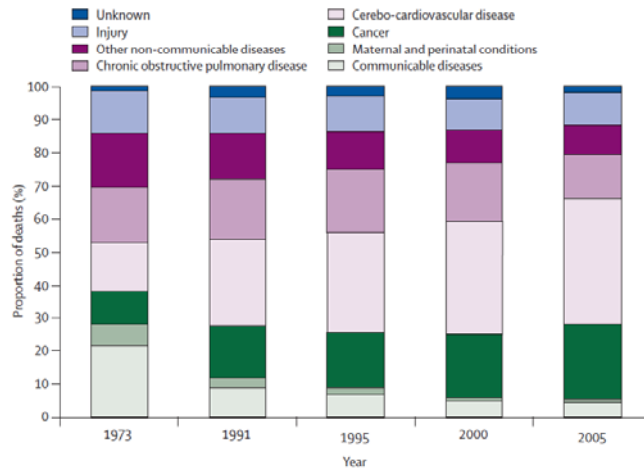
In this section we provide some examples of both the value of innovation in health, and the urgent need for further such innovation

- The dramatic reduction in cardiovascular disease in developed economies over the past fifty years
 - Reflects a wide range of health innovation, from changes in smoking and lifestyles to drugs and surgical treatments
 - Has occurred in spite of some worsening in risk factors (eg obesity)
- The rise in cardiovascular disease and in risk factors in developing economies (eg China)
 - Limited effective innovation for many chronic diseases
- The value to be obtained from more extended vaccine programs

Age standardised death rates by cause, Australia, 1922-2006 (deaths per 100,000 persons)



Distribution of Causes of Death, China, 1973 and 2005



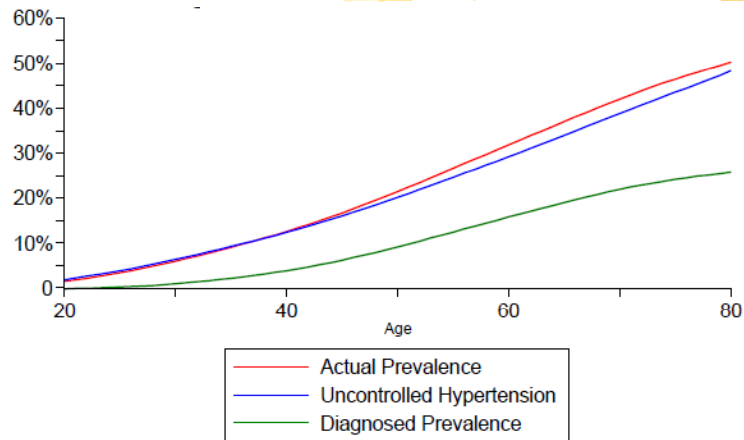
Centre for Strategic Economic Studies Source: Gonghuan Yang et al 2008 Emergence of chronic non-communicable diseases in China, *The Lancet*, vol. 372, 8 November, p. 1699. 13

Age-standardised rates of death from different causes, China, 2004 and 2008, (deaths per 100,000 population)

	2004		2008	
	Urban	Rural	Urban	Rural
Communicable diseases	16	27	n.a.	n.a.
Maternal and perinatal conditions	5	7	n.a.	n.a.
Cancer	127	125	167	157
Cerebro-cardiovascular causes	193	210	242	221
Chronic obstructive pulmonary diseases	52	81	73	104
Other non-communicable diseases	49	48	n.a.	n.a.
Injury	44	66	n.a.	n.a.
Unknown	13	8	n.a.	n.a.
Total	499	572	n.a.	n.a.

Centre for Strategic Economic Studies Source: 2004 data: Gonghuan Yang et al 2008 Emergence of chronic and non-communicable diseases in China, *The Lancet*, vol. 372, 8 November, p. 1699. 2008 data: China Statistical Yearbook 2009, National Bureau of Statistics 14

Diagnosed prevalence, actual prevalence and uncontrolled rate of hypertension, China, 2004-06

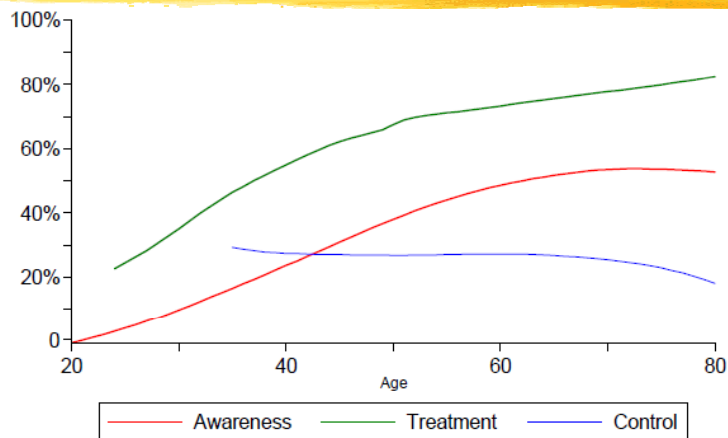


Source: CHNS, 2004 and 2006
Lowess smoothing, bw=0.8

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Source: Xiaoyan Lei et al. 2010, SES Health Gradients during the Epidemiological Transition: The Case of China, IZA DP No. 4914, Bonn, p. 21. 15

Awareness and treatment and control conditional on awareness, China, 2004-06



Source: CHNS, 2004 and 2006
Lowess smoothing, bw=0.8

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Source: Xiaoyan Lei et al. 2010, SES Health Gradients during the Epidemiological Transition: The Case of China, IZA DP No. 4914, Bonn, p. 21. 16

Further Increases in Vaccine Use Offer Major Health and Economic Benefits

Vaccination programs, such as the WHO EPI from 1974, have been key factors in improving global health over many decades
There is scope for further gains by increased use of vaccines, old and new:

- Vaccination rates are rising again, with government action and collaborative programs such as GAVI
- A range of new vaccines have and will become available

There is powerful evidence that most vaccinations programs are highly cost-effective, even in narrow assessment terms

- Need to take into account broader economic benefits
- Strong evidence of powerful herd immunity effects

An important area for further work within LSIF studies

3. The Role and Economic Consequences of Health Innovation – Definitions and Frameworks

The definition of health innovation

The distinction between innovation and treatment

A framework for analysing the costs and benefits of health innovation

Factors confounding the impact of health innovation

The initial results presented at LSIF VI in Peru

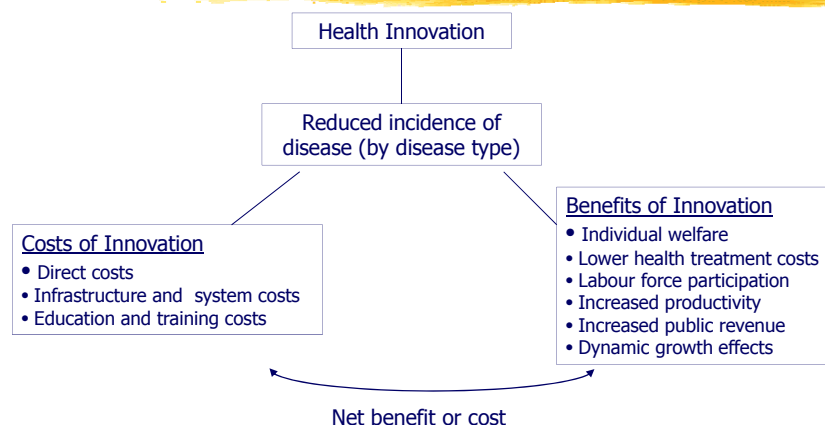
What is Health Innovation?

May be defined in many different ways – here we use the following approach:

Innovation in health: discovering or applying ideas new to the organisation/region in risk detection, prevention, treatment and cure

- required in all elements of the health system
- must be directed to the real health needs of the country (not technology push)
- for all countries involves drawing on global knowledge
- is always embedded in a broader economic and social context
- involves many different forms of innovation
- may be a major driver of growth and welfare

A Framework for Analysing the Impact of Health Innovation



The distinction between innovation and treatment

At a given time, a health system will embody a specific institutional, service delivery and technology profile to treat illness and disease: this we call the treatment pattern

- As populations grow, age or encounter new diseases, there will be greater demand for the services of a given treatment pattern
- As individuals become better off, they will demand more services from a given treatment pattern

Innovation is the application of new ideas to change any aspect of the local system for risk detection, prevention, treatment and cure

- Investment in innovation will change the incidence of illness and disease
- It may also increase the costs incurred in treatment, as here defined

Our interest is in the net costs and benefits of innovation

The Effects of Health Innovation may be Confounded by Other Factors

Health innovation may need to offset rising risks arising from lifestyle or environmental conditions (obesity, hypertension, stress)

- Positive effect of innovation may be obscured by the negative effects of rising risk factors

The effect of health innovation on treatment costs as a result of better health outcomes may be offset by increased demand for treatment or rising costs

- Need to separate out reduction in disease-related costs from rising per capita demand or rising unit costs

Broader benefits of better health outcomes are rarely studied

Some Earlier Results (LSIF VI): Overall benefits of increased innovation, 2010 to 2030, APEC developing economies

	2020	2030	2020	2030
	(US\$b 2005 prices)		(share of GDP, %)	
Innovation Costs	182	296	0.54	0.52
Economic benefits				
Reduction in treatment costs	248	639	0.74	1.13
Labour force and productivity	536	1530	1.57	2.68
Individual health benefits	910	2403	2.71	4.24
Total innovation benefits	1694	4572	5.02	8.05

Ongoing work: extend and improve the underlying model, and apply to some individual economies

1. Improved modelling of the three forms of health benefit
2. Quantification of other two forms of health benefit
3. Closer specification and quantification of innovation costs
4. Include estimates of infrastructure costs
5. Develop the time dimension; calculate rates of return
6. Extend to communicable as well as chronic diseases
7. More systematic sensitivity analysis
8. Apply the model to individual economies

4. Finance Officials and Health Innovation: Official Projections of Health Costs

For increased investment in health innovation, the views of finance officials, and their projections of health costs, are critical

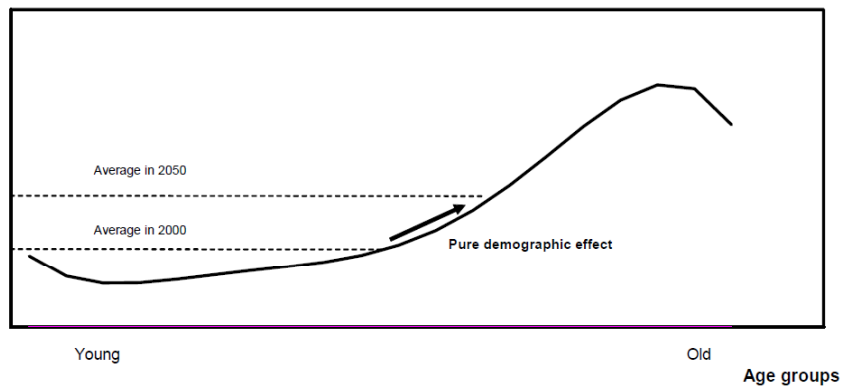
Standard official projections of health costs (eg IMF 2010, CBO, country studies) assume that:

- There is a fixed underlying schedule of health expenditure per capita, which remains unchanged as populations age
- Costs (in real terms) from this schedule rise for two reasons:
 - Increased demand for health care (broadly in line with GDP per capita) as GDP rises
 - Increased costs (typically 1-2% pa) from more expensive technology and other factors

Shifts in expenditure profiles, ageing and non-ageing effects

(1) Pure ageing effect

Health expenditure per capita

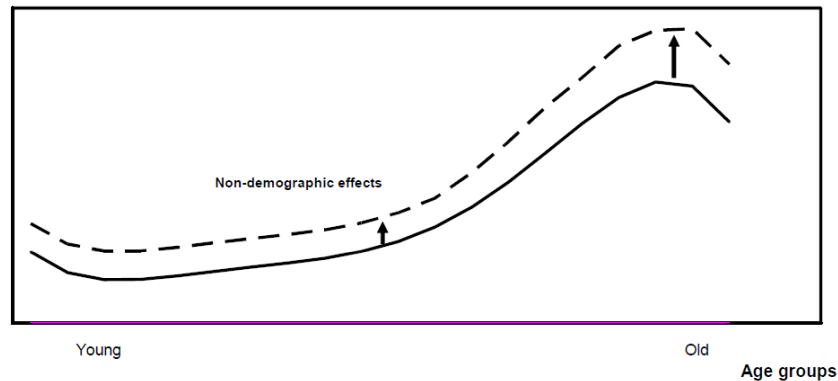


Source: OECD 2006, Projecting OECD Health and Long-term Care Expenditures, Paris, Fig. 2.3.

Shifts in expenditure profiles, ageing and non-ageing effects

(2) Non-ageing drivers (income and additional cost effects)

Health expenditure per capita



Source: OECD 2006, Projecting OECD Health and Long-term Care Expenditures, Paris, Fig. 2.3.

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4. Finance Officials and Health Innovation: Official Projections of Health Costs

Projections done on this basis typically show sharp increases in health spending as a share of GDP (eg for CBO to 25.2% (2025), 49% (2080))

Projections of this form make three critical assumptions:

- Spending on health innovation has no positive effect on health outcomes or costs
- Disease-specific trends can be ignored in projecting costs
- No other offsetting cost savings need to be considered

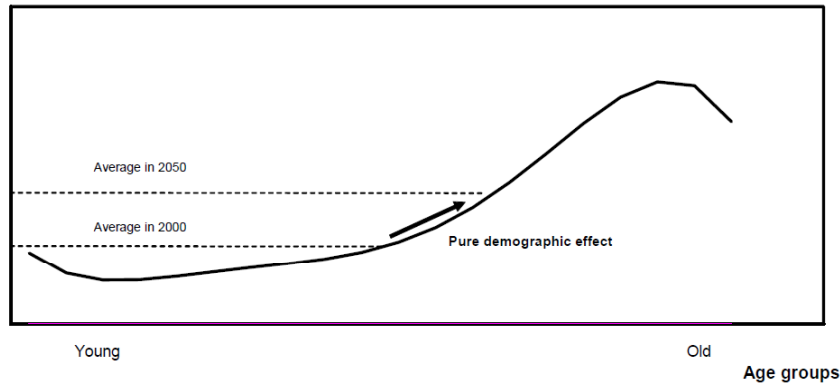
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Shifts in expenditure profiles, ageing and non-ageing effects

(1) Pure ageing effect

Health expenditure per capita



Source: OECD 2006, Projecting OECD Health and Long-term Care Expenditures, Paris, Fig. 2.3.

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Other Projections Vary These Assumptions: Ageing Later not just Ageing Longer

Some other projections (eg by the OECD 2006 and the European Commission 2009) vary these assumptions:

- In particular they allow that health innovation affects outcomes, so that the cost curve shifts to the right over time
- This implies a (gross) cost benefit from innovation, and reduces projected health costs

Neither study takes a disaggregated approach, looking at the influence of different disease profiles

However the European Commission study does go beyond pure health costs, to look at the broader impact of health

- Takes account of the impact of health on earnings, labour supply and productivity, earnings, education and savings

Valuable inputs to ongoing LSIF work

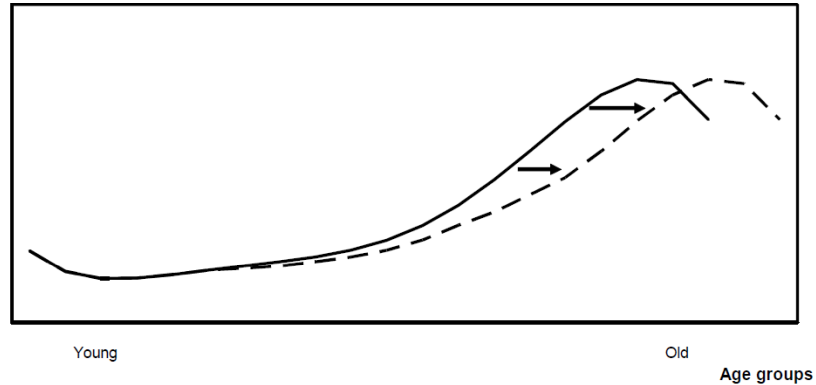
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Shifts in expenditure profiles, ageing and non-ageing effects

(3) Ageing effect adjusted for the effects of innovation and healthy longevity

Health expenditure per capita



Source: OECD 2006, Projecting OECD Health and Long-term Care Expenditures, Paris, Fig. 2.3.

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The Economic Consequences of Health Innovation: Lessons from the International Projections of Health Costs

For the broader study this brief review of the official projections has some lessons:

- (1) The importance of documenting clearly the impact of investment in innovation on health outcomes
 - This is likely to be best achieved through an analysis by disease types (therapeutic groups) and of specific innovations
- (2) It is necessary to distinguish the effect of innovation from factors that might confound it, namely:
 - The effect of adverse changes in risk factors in limiting the apparent effect of innovation
 - The effect of the rising demand for health services as incomes rise
 - The effect of increasing unit treatment costs, excluding those related to innovation
- (3) The value of including the wider benefits of improved health outcomes in a full analysis of the consequences of innovation

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5. New Evidence on the Impact of Workplace Programs

Both the forms of innovation and the nature of the benefits are diverse and complex:

- the ongoing analyses needs to cover the diverse forms
- draw on information from LSIF presentations and a vast literature

One form of innovation relates to health and wellness programs in the workplace – this will be discussed at a session in LSIF VIII

A recent study¹ reviewed 32 study of the impact of workplace wellness programs in the USA. The analysis found that

- - medical costs fell on average by \$3.27 for every dollar spent
- - absentee costs fell by \$2.73 for every dollar spent, and
- - the benefits were lower than those found in other meta studies

Thus this analysis concludes that, even just for two benefits, the savings are \$6 for every dollar spent

¹Baicker et al, Health Affairs, February 2010

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6. Understanding the Economic Consequences of Health Innovation: The Way Forward

LSIF plans ongoing efforts to

- understand the nature and benefits of health innovation, and
- the links to economic growth and welfare, together with the role of health innovation in new growth paths for APEC economies
- to communicate the results of this work to interested parties

This will be undertaken through a three-pronged strategy:

- through a wide range of specific studies and initiatives, including many presentations at LSIF VIII,
- through a continuing study of the costs and benefits of increased investment in health innovation, which will draw on these specific studies and initiatives, and
- applying this framework to some individual APEC economies

We thank you for attending LSIF VIII, and look for to working with you in these two days and in the year ahead

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