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Review of the Intergenerational Report and Pathology Funding Arrangements in Australia

This report was prepared for the Australian Association of Pathology Practices.

19 January 2011

ADVISORY

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Contents

Executive Summary

At the end of June 2009, the Memorandum of Understanding (MoU) that governed the funding arrangements of pathology services was allowed to expire with no replacement. This ended a long running period, starting in 1996, of stable funding arrangements governed by MoUs between the Australian Government and the pathology industry. The Government decided that it would not continue using MoUs to manage pathology expenditure and instead, announced that it would closely monitor pathology outlays going forward. In January 2010, the Government requested that the Department of Health and Ageing undertake a detailed review of pathology funding arrangements.

KPMG Econtech was commissioned to estimate the growth in pathology outlays, focusing specifically on the next five financial years, and developing estimates over the next 40 years to provide some context to the health expenditure projections presented in the Government's most recent Intergenerational Report (IGR). With this in mind, the Australian Association of Pathology Practices (AAPP) commissioned KPMG Econtech to undertake a rigorous analysis of funding arrangements for pathology services in Australia. For this, KPMG Econtech has:

- considered the veracity of the long-term projections of health costs presented in the Government's 2010 IGR;
- developed an alternative set of cost projections for the health sector using KMPG Econtech's Government Health Costs (GHC) model; and
- developed a set of cost projections for pathology outlays using a three-component framework, similar to IGR's 3Ps framework.

Key Findings

Pathology is the most accessible and affordable medical service. Pathology has few barriers in terms of how patients access pathology and how any patient can have any test virtually at any place and any time. Pathology has the highest bulk-billing rate of any medical service and aggregate government expenditure on pathology services has grown steadily outside of periods of major health care reform.

There are a number of reasons why steady growth in demand for pathology services in Australia is expected to continue, namely:

- services are expected to grow significantly with the ageing of the population and the shift in focus toward prevention of chronic illness;
- the dependence upon pathology testing will increase in the era of greater prevention and the development of new technologies for diagnosing and managing disease; and
- pathology remains an essential referred medical service which will be increasingly valued, relied upon and utilised in the future.

The projections presented in the IGR show health expenditure increasing from 4.0 per cent of GDP to 7.1 per cent by 2049-50. The projections are based on the non-demographic trend rates for the main components of health expenditure. The IGR is a highly effective framework for identifying likely pressures on government finances, however it is unable to generate the finer detail required to analyse sector specific issues.

The GHC model developed by KPMG Econtech allows pathology services to be identified and modelled separately to produce rigorous and robust estimates of health expenditure. Estimates of pathology outlays are based on a three-component framework, where growth in total outlays is a function of changes in unit price, intensity of usage and population. As such, outlays in pathology services reflect the cost of pathology services per head of population by age, combined with projected demographic changes.

While these demographic and non-demographic factors used to estimate pathology outlays are underpinned by economic models and econometric analysis, the overarching three-component framework is very simple, yet very powerful. That is, the framework allows for:

- total outlays to be unpacked;
- trends in key drivers to be more easily identified; and
- projections to be made.

Using the framework, KPMG Econtech estimate that following a period of subdued growth in pathology outlays, growth will begin to strengthen in 2010-11 and continue along a path to return to trend growth rates by 2012-13 that are reflective of per capita historical trends, combined with demographic change. Table A details the results along with the growth rates of the underlying components of the framework.

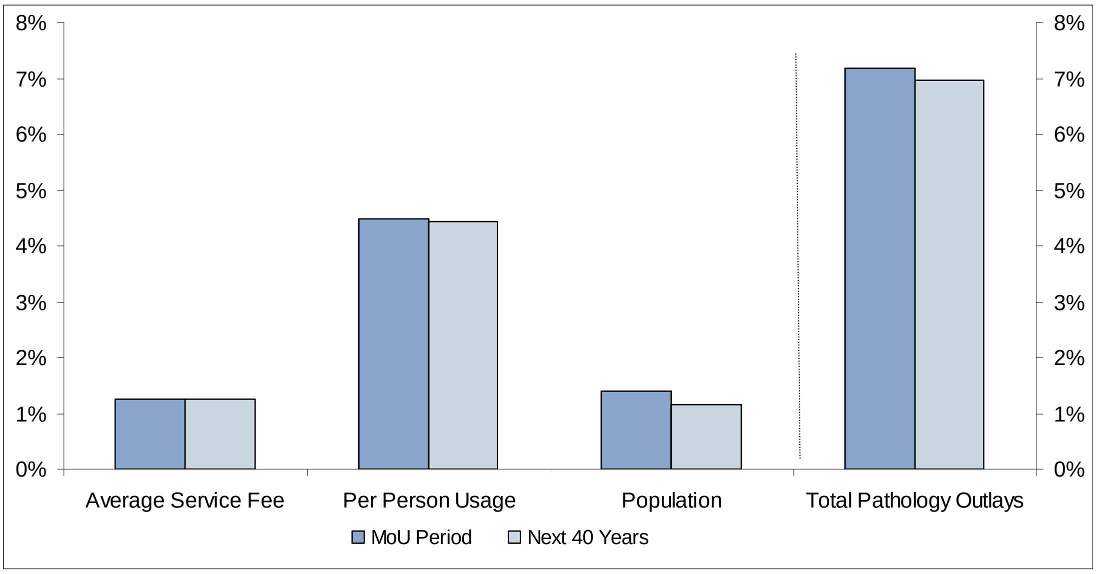
Table A: Estimates of Nominal Growth in Pathology Outlays to 2014-15

	*2008-09	*2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Total Pathology Outlays, %	**5.1%**	**2.1%**	**3.1%**	**6.8%**	**7.0%**	**7.0%**	**7.0%**
Average Service Fee, %	0.2%	-1.2%	-0.7%	1.3%	1.3%	1.3%	1.3%
Per Person Usage, %	2.8%	1.5%	2.2%	3.9%	4.1%	4.2%	4.2%
Population, %	2.1%	1.7%	1.6%	1.5%	1.5%	1.4%	1.4%

* Represents growth rates for actual outlays.

The strongest contributor to growth in outlays is the strength of growth in average per person usage rates relative to the other two components. Growth in the average service fee remains the smallest contributor to growth in pathology outlays, a finding reflective of historical expenditure. Chart A compares the nominal growth rates for pathology outlays over the past 13 years of the MoU period– a period where aggregate expenditure on pathology services has grown steadily – with growth rates projected over the next 40 years.

Chart A: Estimates of Nominal Pathology Growth to 2049-50, Average Annual Growth



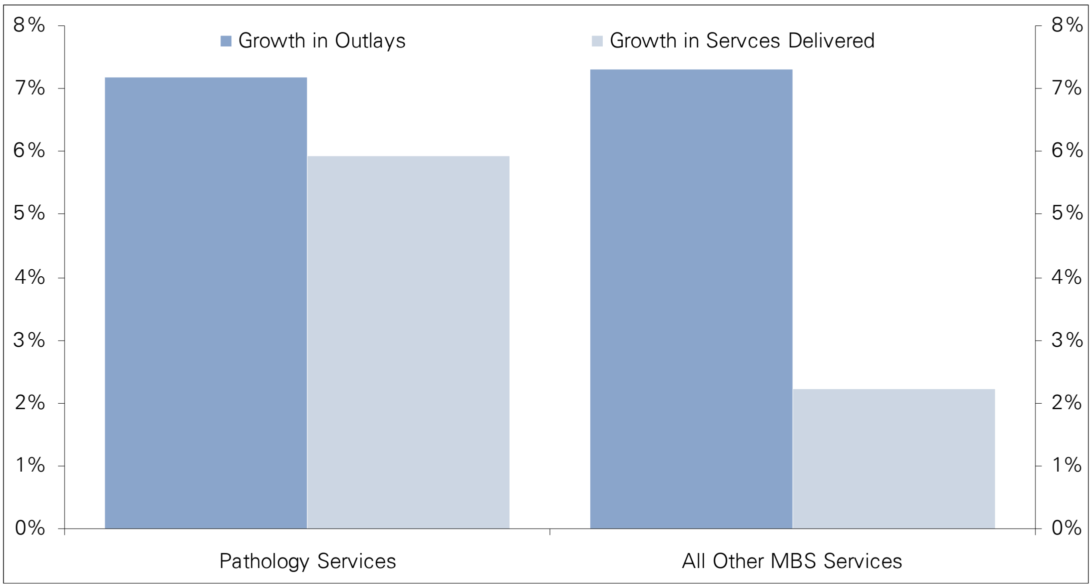
The modelling results presented in Chart A are based on growth rates from historical trends, and as such, assume that the average service fee will continue to grow at a rate less than inflation. This implies that:

- the average service fee will continue to fall in real terms over the forecast horizon;
- continued productivity gains will need to be delivered by the pathology industry; and
- the associated efficiency gains will be returned to the Australian Government.

Overall, this price assumption represents a conservative approach to the modelling and for growth in total outlays, and reflects the observation that growth in the average service fee is mainly driven by compositional changes over time rather than by prices changes. If the price assumption was relaxed and inflation indexation was added to growth in the average service fee, nominal growth in total pathology outlays would average around 9.7 per cent over the next 40 years.

A comparative analysis of growth in expenditure and services provided by the pathology sector and other medical sectors over the MoU period, shows aggregate outlays for pathology services have grown at an average of 7.2 per cent per annum , compared to 7.3 per cent per annum for all other services funded by the Medicare Benefits Schedule (MBS). At the same time, the volume of pathology services delivered has grown at an average annual rate of 5.9 per cent, compared to all other services at 2.2 per cent (Chart B). That is, the main driver of growth in pathology outlays has been volumes (contributing more than 80 per cent to total growth), whereas the main driver to growth in all other MBS outlays has been growth in prices (contributing around 70 per cent). In essence, while the pathology industry has faced cost pressures determined by market forces on one hand and real decreases in MBS rebates on the other hand, it has continued to meet increases in service demands and deliver efficiency dividends to Government finances.

Chart B: Medicare Benefits Paid and Number of Services, Average Annual Growth from 1996-97 to 2008-09 (MoU Period)



Conclusions

The framework used in this report to model and project pathology outlays isolates three main components of growth. As such, the framework allows for each of the three components to be modelled separately to clearly identify their contribution to total growth and impact on pathology outlays.

This has important implications for the purposes of controlling government expenditure. For example, past MoU agreements have focused on limiting both price and volume and have worked successfully. Using the framework, it is possible to target a desired growth rate in pathology outlays by adjusting the growth rates of either price and/or volume, acknowledging that population growth is largely independent of the control of any funding agreement.

Achieving the desired change in growth by adjusting prices could be achieved through a number of mechanisms including cuts across the board for pathology rebates, reducing MBS fees in areas not reflective of actual costs or rebalancing any potential over or under subsidisation of pathology services. That is, average prices may remain unchanged, but the composition may be adjusted to achieve a desired growth rate in outlays. While there is some flexibility in how prices could be adjusted under different scenarios, it remains outside the scope of this report, which is focused on the impact of any change rather than the process of the change itself.

The largest contributor to growth in pathology outlays remains the growth in the demand for services – the per person usage rates. It is estimated in the baseline projections, that if prices remained unchanged (representing a price fall in real terms), pathology outlays would grow at an average annual rate of 5.7 per cent over the forecast horizon based on historical growth trends in per capita demand, combined with demographic change. There is significant momentum around this driver in total outlays.

The smallest contributor to growth of the three components is price, and is the only component that can be controlled by the pathology industry. Price and volume can be controlled by Government policy, however, it is uncertain if volume can be further restricted beyond the current coning arrangements. The third component of population growth remains largely outside of any funding agreement.

The findings of this report support a holistic assessment of the drivers of growth in pathology outlays. It also acknowledges that the targeting of a desired growth rate in total outlays for pathology services achieves a number of outcomes, namely:

- it creates a level of budget certainty for government finances and industry investment decisions;
- it creates lasting effects through the rebasing of total levels in expenditure; and
- it enables a level of contribution analysis to be undertaken to assist with designing an effective approach.

This report is the first of its kind in Australia to publicly provide a comprehensive framework for deconstructing Government expenditure in pathology outlays. It draws together a number of datasets, using a number of advanced modelling techniques and econometric analysis. The report produces projections of pathology outlays and quantifies the impact of a number of funding scenarios. The findings of this report support the assessment of any changes to growth in total pathology outlays to be analysed at the component level.

Note: any references to Government expenditure on or outlays for pathology services refers to the Medicare rebate paid for pathology services as eligible under their Medicare item listing. Additionally, all dollar values expressed in this report are presented in nominal terms (except where specifically noted), reflecting the terms governing past funding arrangements between the Australian Government and the pathology industry.

KPMG Econtech
December 2010

1 Introduction

KPMG Econtech was commissioned by the Australian Association of Pathology Practices (AAPP) to undertake an analysis of the funding arrangements for pathology services in Australia. This study has been undertaken in the context of the most recent intergenerational report (IGR) and the Department of Health and Ageing (DoHA) review of funding arrangements for pathology services that is currently underway.

The costing methodology used in this study is consistent with the IGR framework and builds on the comprehensive Government Health Cost (GHC) model developed by KPMG Econtech which uses data from a number of national medical datasets, census material, official population projections and other data sources.

The report is structured as follows:

- **Section 2** details the role of pathology in mainstream health care, Australian health outcomes, historical and current funding arrangements for pathology, and the DoHA review;
- **Section 3** provides an analysis of the Government's 2010 IGR and its health expenditure projection, including a review of the forecasting methodology and discussion of the key assumptions and parameters;
- **Section 4** presents alternative health cost forecasts over the 40-year projection period using KPMG Econtech's GHC model. Importantly, this section also presents separate projections for pathology costs;
- **Section 5** details the three-component framework used to estimate pathology outlays, including a breakdown of the baseline projections of growth in pathology outlays;
- **Section 6** summarises the key findings of the report, highlighting the cost impact for government and industry;
- **Appendix A** provides more detail on the GHC model; and
- **Appendix B** provides details on the model used to forecast demand for pathology services.

2 Background

This section provides detail on the complex context that accompanies this study. Government funding of pathology services in Australia is currently being reviewed by DoHA. This review is being undertaken against a backdrop of:

- the highly integrated role of pathology in the Australian system of healthcare;
- the release of the Government's 2010 IGR which highlighted the potential for rapid growth in health expenditure over the next 40 years; and
- a cessation of a long running funding arrangement governed by a number of MoUs between the Australian Government and the pathology industry.

2.1 DoHA review of funding arrangements

The Medical Benefits Review Task Group of DoHA has been tasked with undertaking the "Review of the Funding Arrangements for Pathology Services". This follows a request from the Australian Government for a detailed review of pathology funding arrangements to ensure that the Government is paying the right amount to support access for patients to quality pathology services.

The pathology review is taking place in the context of a wider review of the Medicare Benefits Schedule (MBS). It will align with other review and reform agendas including the MBS Quality Framework, the Review of Health Technology Assessment, the Primary Care Strategy and the National Health and Hospital Reform Commission. One of the overarching aims of these reviews is the Government's broader agenda to ensure that spending on health is sustainable, affordable and provides maximum benefit to the greatest number of people, which will involve continued emphasis on savings and efficiencies.

The review of pathology has three key tasks:

- to establish appropriate fee relativities for MBS items for different pathology disciplines;
- to identify groups of pathology tests that might be appropriate for different funding arrangements; and
- to provide detailed options for implementing tendering for selected pathology services.[1]

The outcomes of the review will provide the Minister for Health and Ageing with options for consideration by the Government, which are expected to be reflected in the 2011-12 Federal Budget.

[1] Department of Health and Ageing (2010) Review of Funding Arrangements for Pathology Services, Australian Government, Canberra.

2.2 Pathology funding arrangements

The pathology industry in Australia is critically dependent on the funding arrangements that underpin it. Pathology services provided by public laboratories are generally block funded within the state government's public hospital funding allocation whereas private laboratories are funded on a fee-for-service basis through the MBS.[2] Approximately 90 per cent of all MBS-funded pathology is delivered by private pathology practices. Compared with other medical services, pathology has maintained consistently high rates of bulk-billing and observance of the MBS schedule fee – 87 per cent and 92 per cent of services respectively.[3]

Since 1985 when pathology was brought under the MBS framework, the Australian Government has implemented a number of measures to manage outlays resulting from increasing demand for services. These included scheduled fee cuts across the board as well as to pathology specific fees, legislative measures including episode coning arrangements, an accreditation procedure that restricted the number of laboratories and collection centres able to claim Medicare rebates, and between 1996 and 2009, capped funding arrangements (MoUs).[4]

The MoUs agreed between the Australian Government and the pathology sector since 1996 have governed both the price and volume of pathology services. These price/volume agreements were designed to principally achieve a fixed target rate of expenditure growth for pathology funding by Government. At the same time, the agreements provided the industry with a stable operating environment and guaranteed level of growth, which would allow for the private investment necessary to realise potential efficiency improvements.

2.2.1 Funding arrangements from 1996 – 2009

The first capped funding agreement was negotiated between the Australian Government and two peak industry bodies – the AAPP and the Royal College of Pathologists of Australasia (RCPA). It covered the period from 1 July 1996 to 30 June 1999.

The agreement contained a series of measures to manage and keep pathology expenditure within the 6 per cent per annum cap including a provision that there will be automatic fee discounting if the measures do not constrain growth. It also contained a number of elements to address inappropriate pathology practice and use in order to better manage service demand.

A second agreement, the Pathology Quality and Outlays Agreement, was negotiated between the same parties and applied from 1 July 1999 to 30 June 2002. It was later extended to 30 June 2004. The second agreement was expected to deliver savings to government of $110.4 million over the four years to 2002.[5]

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[2] PricewaterhouseCoopers, *International Review of Pathology Funding Arrangements*, March 2010 p1.
[3] Ibid p28.
[4] Ibid p88.
[5] DoHA website, Budget 1999-2000, <http://www.health.gov.au/internet/main/publishing.nsf/Content/health-pubs-budget99-fact-hfact8.htm> accessed on 24 November 2010.

Building on the first agreement, the second MoU aimed to:

- continue to constrain growth in pathology expenditure under the Medicare benefits arrangements;
- facilitate further structural reform of the pathology sector; and
- improve quality in pathology testing, use and practice.

The second agreement also provided for non-financial cost and quality measures including the introduction of a new collection centre accreditation system and the Quality User of Pathology Program and review of the regulatory framework for pathology under the MBS arrangements.[6]

The Pathology Quality and Outlays MoU 2004-2009 is the third funding agreement between the Australian Government, the AAPP, the RCPA and the National Coalition of Public Pathology (NCOPP). The MoU was intended to promote:[7]

- access to quality, affordable pathology services;
- effective management of Government outlays relating to the services described in the Pathology Services Table (PST) of the MBS;
- improved patient care through enhancing the quality of pathology services and the appropriate use of services; and
- co-operative strategies which promote affordability of services for patients.

The Government initially committed $8.0 billion for pathology outlays over the period of the agreement, which represented an average growth in outlays of 5.3 per cent per annum. However, following the significant growth in services, allowable adjustments were made to outlays under the MoU bringing actual annual growth rate closer to 7.0 per cent per annum than the estimated 5.3 per cent.

Generally, the MoU regulated price of rebates to control total outlays in light of fluctuating demand. That is, outlay targets can be adjusted if:

- government policy has a direct impact on outlays for pathology services in the MBS (clause 5.8), such a strengthening of Medicare or an extension of the Medicare Safety Net; and
- where growth in pathology cost index is more than 5 per cent or less than 2 per cent in any one year (clause 5.11)

[6] Ibid.
[7] Pathology Quality And Outlays Memorandum Of Understanding 2004-2009, p3.

If actual outlays exceed expected outlays, the Pathology Consultative Committee can recommend action including (clause 7.17):

- targeted or across the board fee adjustments;
- changes to schedule fees, item description and / or rules of interpretation under the PST; or
- defer action pending monitoring and review.

Fee setting for pathology items is negotiated between the Australian Government and the PST Committee (which comprise of representatives from the AAAP, RCPA, NCOPP, the Australian Medical Association, Medicare Australia and DoHA), where fees are based on actual cost structures plus profit margin.

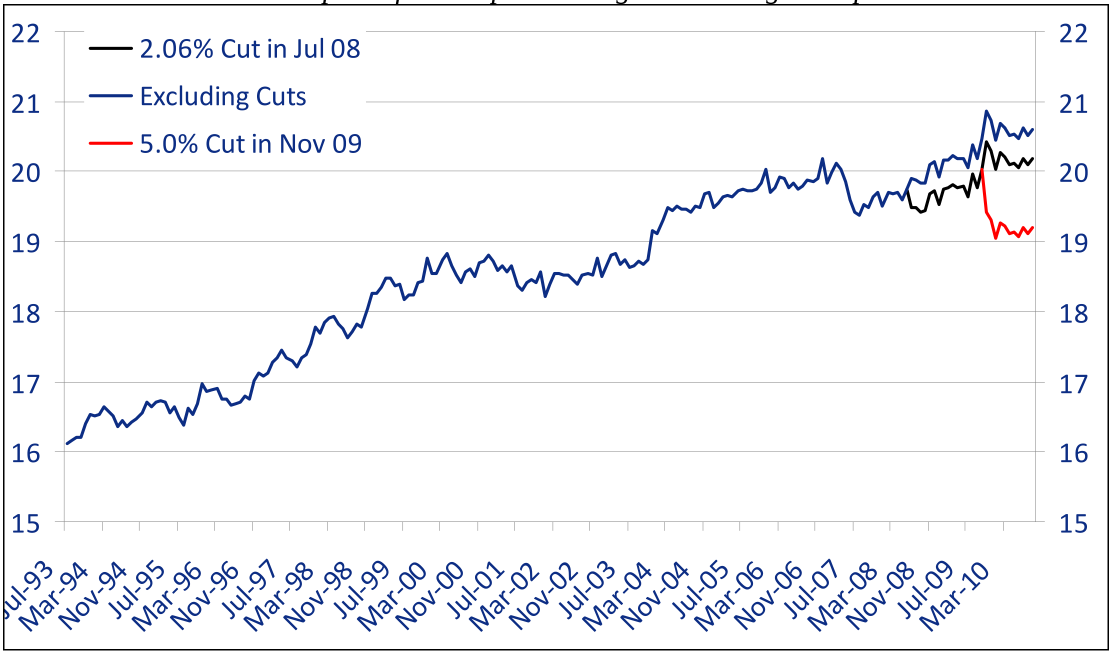
2.2.2 Impact of funding arrangements

Since the introduction of MoUs in 1996, the industry has undergone a process of consolidation and automation that has underpinned strong productivity gains. At the same time, quality and accessibility of services has not been compromised. Small providers, many of which are not-for-profit businesses associated with teaching hospitals and hospitals operated by major religious denominations, have also survived by occupying niche segments of the market.

Funding arrangements have also been affected by interim policy changes made outside the MoUs. Most recently, in the 2008-09 Budget, changes to selected MBS pathology items and collection fees resulted in stated savings to Government of approximately $113 million over four years to 2012-13.

The lasting effects of one-off changes to the growth rates in unit prices to a achieve target growth rate in pathology outlays can be seen historically in the data as level shifts in the data. Chart 1 represents the rebasing in the level of pathology unit prices from a one-off change of 2.08 per cent in July 2008 and a one-off change of 5.0 per cent in November 2009. The first change resulted in savings to Government from a reduction in outlays of $95 million to date. The second change resulted in savings of $96 million to date.

Chart 1: Impact of recent price changes on average unit prices



Source: Medicare Australia Statistics (2010) and KPMG Econtech Estimates

Despite the general effectiveness of the MoUs in managing outlays, there is scope for improvement as best shown by the fact the average annual growth rate of outlays was estimated under the MoU at 5.3 per cent per annum however, the actual rate neared 7.0 per cent. Critically, there needs to be a better understanding of the key drivers of growth in services and outlays, as well as better risk management of increasing outlays.[8]

Further, as part of the Government's broad agenda to ensure spending on health is sustainable following the release of the first IGR in 2002, the Government has introduced a number of measures to reduce costs in the health system. The Government is currently seeking to identify alternative funding arrangements which will continue to deliver to the Australian public accessible and high quality pathology services, at the most efficient cost to Government. To this end, DoHA is undertaking a review of funding arrangements for pathology services which will inform future funding arrangements for the industry.

The last MoU was allowed to expire at the end of June 2009 following the Government's decision to discontinue using MoUs to manage pathology expenditure. Instead of placing an artificial cap on pathology expenditure under Medicare, the Government has chosen to closely monitor outlays to ensure that they remain consistent with projected expenditure in the absence of any formal funding arrangements.

[8] ANAO, Audit Report No.34 2007-08 *Administration of the Pathology Quality and Outlays Memorandum of Understanding*, 2008 p14.

2.2.3 The Intergenerational Report

Total government expenditure on pathology services is a function of the price and volume of services. Since the cessation of the MoU arrangements that governed the funding of pathology services, the growth in the volume of pathology services has declined relative to recent history, while price has remained fixed. This has resulted in total government expenditure for pathology services growing at a much slower rate than the average rate during the MoU period.

This slower rate in growth (discussed in Section 5.3) is not expected to continue and growth in expenditure is expected to increase. The most recent IGR released in March 2010 points to a number of pressures driving increased demand for health services, and consequently potential increases in government expenditure. These pressures include demographic changes, user preferences and technological changes. These pressures also hold true for the pathology sector.

2.3 Role of pathology in mainstream healthcare

Pathology testing differs from many other health and medical services in that it is a referred service. This means that GPs and medical specialists request pathology tests on behalf of their patients and pathologists respond to these requests.

GPs directly request 70 per cent of all pathology tests and, through their critical gatekeeper role in the Australian health care system, control referral to specialists and admissions to hospitals which is responsible for the other 30 per cent of pathology test ordering.

- In 2009-10, there were 124.3 million attendances to GPs and 23.8 million to specialists.
- In the same period, there were 103.7 million pathology services funded by the MBS.[9]

Medicare counts services claimed through and paid by Medicare – for pathology this is a single test or group of tests, for GPs and specialists this is a single consultation or procedure. In 2009-10, pathology accounted for 33.6 per cent of all Medicare services and 13.0 per cent of all Medicare benefits.

Pathology provides a central pillar in the Australian health care system, playing a vital role in illness prevention and chronic disease management. Pathology testing requested by GPs is the mainstay of preventive health and the early detection of disease in the Australian health system. Seventy per cent of all medical diagnoses and 100 per cent of all cancer diagnoses rely on a pathology report for diagnosis and care management. On average, every Australian receives approximately four pathology services each year.[10]

The growing demand for pathology services is driven by the increasing demand for medical services in general. This demand trend can be attributed to:

[9] Medicare Australia (2010) Medicare Benefits Schedule (MBS) Group Statistics Reports.
[10] AAPP, Review of Funding Arrangements of Pathology Services Submission to the Department of Health and Ageing, May 2010

- greater expectations for positive health outcomes and an ageing population;
- by the medical advances including the development of new tests; and
- an increase in the number of medical practitioners and changes in their pathology ordering behaviours to include more careful screening and monitoring procedures, meaning doctors are increasingly using pathology testing to predict and prevent disease during general health check ups.

Pathology testing also supports the objectives championed by various government health care policies and strategies including the National Primary Health Care Strategy.

A large proportion of the medical conditions driving the growth in pathology testing are preventative health measures, including general check-ups or chronic disease management. Collectively, preventative health treatments account for 32 per cent of the increase in pathology orders by medical practitioners.[11] The management of chronic diseases, in particular diabetes, hypertension and lipid disorders, accounts for around 27 per cent of the increase in pathology orders by medical practitioners.[12]

The significant benefits to both patients and the general health system that flow from early detection and improved management of diseases include reduction of the incidence of the disease, the complication rate, incapacity, mortality and the costs associated with treating the disease. For instance, according to the Australian Institute of Health and Welfare (AIHW), the top ten causes of disease burden in Australia is chronic disease which accounts for nearly 43 per cent of the total disease burden in Australia.[13] Early detection and improved management of these diseases through the use of pathology testing could see significant easing of cost pressures on the Australian health system in the long run.

The role and relationship between pathology and the detection and management of the eight identified National Health Priority Areas (NHPA) further highlight the value of pathology to mainstream healthcare. The NHPA initiative aims to focus public attention and health policy on those areas that contribute most to the burden of illness in the community, particularly if the burden can be reduced significantly.[14]

Table 1 shows that, between 2000-02 and 2006-08, despite there being no significant increase in the management rate of most of the health priority areas, the rate of pathology ordering as part of problem management increased in all but one area.[15] This trend highlights the increasingly critical role pathology plays in not only detection, but management of some of Australia's most significant and potentially costly medical conditions.

[11] AAPP, An Analysis of Pathology Test Use in Australia, September 2008 p13
[12] Ibid p13.
[13] Ibid p28.
[14] AIHW, First report on National Health Priority Areas 1996, 1997 p. 3
[15] AIHW, General Practice in Australia: health priorities and policies 1998-2008, July 2009 pp. 64-74

Table 1: Pathology ordering behaviour in National Health Priority Areas

National health priority area	Change from 2000-02 to 2006-08		
	Management rate*	Pathology orders*	National change (%)**
Diabetes	▲	▲	8.0
Overweight/obesity	-	▲	1.2
Cardiovascular problems	-	▲	13.1
Musculoskeletal conditions including arthritis	-	▲	4.6
Mental health	-	▲	3.6
Cancer	▲	-	0.7
Respiratory problems including asthma	▼	▲	2.5
Injury prevention and control	n/a		

*Note: * per 100 encounters*
*** proportion of the total national increase in pathology tests that was attributable to each problem*
Source: AIHW, General Practice in Australia: health priorities and policies 1998-2008, July 2009

2.4 Australian health expenditure and outcomes

Government spending on health is expected to grow rapidly over the coming decades; a key growth driver of this is the ageing of the Australian population. Australia's demographic structure, the result of increased longevity and decreased fertility, is forecast to become heavy at the top of the demographic tree, and slim down the bottom.[16] This increase in the number of people aged 65 and above will be matched by a declining number of working-age people, generating less income to support the health costs for the aged, placing strain on government finances.

However, expenditure on all health components has been increasing beyond that which can 'be explained by changing structure and size of the population alone'.[17] In particular, rising health costs can be linked directly with the increasing demand for health services, including the use of doctors, tests and pharmaceuticals; the impact of new procedures, technologies, diagnostics, drugs; and the operation of the health system itself.

For example, ongoing studies have been made of GPs' activity and the pathology tests they request (BEACH – University of Sydney and AIHW). These show that primary care is changing: GPs are seeing a greater number of older and sicker patients, with more time spent on chronic disease management; fewer younger patients with minor acute illness are being seen. The pattern of pathology use is also changing – more testing is being done for chronic disease management and preventive health strategies.

[16] Lymer, Sharyn. 2009. "Population ageing and health outlays: assessing the impact in Australia during the next 40 years." NATSEM University of Canberra: Canberra.
[17] Begg, Stephen, Theo Vos, John Goss, and Nicholas Mann. 2008. "An alternative approach to projecting health expenditure in Australia." *Australian Health Review*, 32:1, pp. 148-55.

In the past decade, growth in health spending outstripped the growth of the Australian economy. Between 1997-98 to 2007-08, total health expenditure grew at 5.2 per cent per annum compared with GDP growth at 3.5 per cent per annum.[18] According to projections contained in the 2010 IGR, expenditure is expected to continue to grow rapidly over the longer term. Real health spending on those aged over 65 years will rise by around seven-fold and those aged over 85 years will rise by around twelve-fold by 2049-50.[19] Accordingly, this will see Australian Government spending on health almost double from 4.0 per cent of GDP in 2009-10 to 7.1 per cent of GDP in 2049-50.[20]

In a recent assessment, which combined health expenditure and health outcomes metrics in OECD countries, Australia was shown to have the best performance from its public health expenditure of any OECD country, and the fourth highest in total health expenditure (public and private spending).[21] That is, Australia achieved the greatest 'bang for its buck' from public health spending compared with other OECD countries.

Table 2 summarises the performance of a number of OECD countries based on combined health expenditure metrics and health outcome measures (life expectancy, premature mortality measured in years of life lost and perceived health status). This table shows that Australia is assessed to have the most effective health system based on its health outcomes and its level of health expenditure. The United Kingdom and United States perform relatively poorly in this assessment, thus highlighting the importance not just of the amount of government spending on health but the combined result of effective cost management to deliver the positive health outcomes sought.

Table 2: Health expenditure as a proportion of GDP and per person, OECD countries

Health outcomes				
	Rank in OECD	**Life expectancy (yrs)**	**Premature mortality (yrs of life lost)**	**Perceived health status (%)**
Australia	**1**	**80.9**	**6,444**	**84.1**
Spain	2	80.7	6,607	68.3
Switzerland	3	81.3	5,902	85.8
New Zealand	4	79.6	8,104	89.6
Korea	5	78.5	7,685	47.4
Mexico	6	75.5	n/a	65.6
Greece	7	79.3	6,782	n/a
Japan	8	82.1	5,512	38.7
Netherlands	9	79.4	6,193	76.6
Iceland	10	81.2	5,355	79.7
United Kingdom	19	79.0	7,103	73.9
United States	28	77.8	10,137	88.7

Source: Access Economics. 2009. "Health expenditure and outcomes." Report for the Australian Association of Pathology Practices. *Access Economics: Canberra.*

[18] Australian Institute of Health and Welfare. 2009. *Health Expenditure Australia 2007-08*. Canberra: AIHW.
[19] Australian Government. 2010. *Intergenerational Report 2010*. Canberra: Commonwealth of Australia.
[20] Ibid.
[21] Access Economics. 2009. "Health expenditure and outcomes." *Report for the Australian Association of Pathology Practices*. Access Economics: Canberra.

2.5 The real cost of pathology

Australia has accessible, affordable, high quality, low cost, and efficient pathology services achieved through long running co-operative arrangements between the Australian Government and the private pathology sector. The OECD reports that Australia ranks relatively high (8 out 21) among OECD comparators in terms of the share of current expenditure on ancillaries, which is comprised of pathology and diagnostic imaging expenditure (but are not separately identifiable).

A number of components make up the Australian health system – hospitals, medical benefits, pharmaceutical benefits, and private health insurance. The Medical Benefits Scheme, under which pathology falls, is the largest component of government health spending.

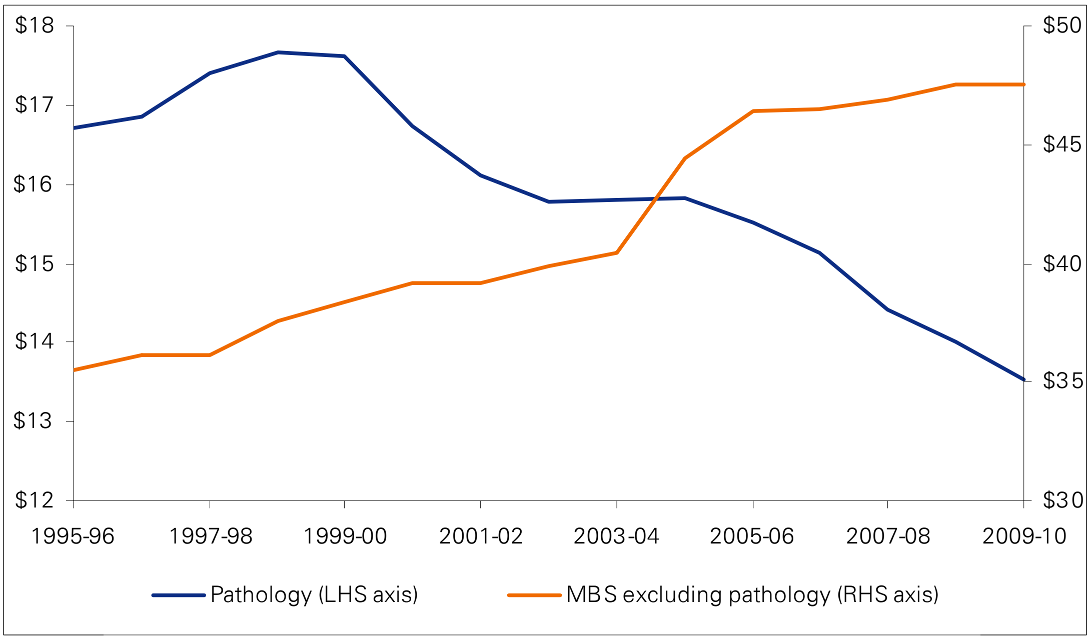
Although pathology services represent over one-third of all MBS services in 2009-10, it only accounts for 13 per cent of total benefits paid, compared with the largest MBS item – Professional Attendances – which claims a more equal share of MBS benefits (42.7 per cent) for its share of services (48.0 per cent).

Pathology is a key component of the health system and accounts for the bulk of diagnoses made by medical practitioners. In 2009-10, over 103 million pathology services were provided in Australia, a 3.3 per cent increase from the previous year that was matched by a 2.1 per cent increase in benefits paid. In a recent industry report on pathology services in Australia, pathology services were forecast to increase at an average rate of 5.0 per cent per annum over the next five years, while total benefits paid were forecast to grow by 3.5 per cent per annum in real terms[22]

Although pathology services represent over one-third of all MBS services in 2009-10, it only accounts for 13 per cent of total benefits paid, compared with the largest MBS item – Professional Attendances – which claims a more equal share of MBS benefits (42.7 per cent) for its share of services (48.0 per cent). This disparity is highlighted further when considering the real value for benefits after adjusting for inflation. Over the last 15 years, the number of pathology services has risen sharply from less than 48.7 million per annum doubling to 103.7 million per annum. This translates into an average annual growth rate of 5.6 per cent. In contrast, the nominal (unadjusted for inflation) benefits paid by the government increased by just 6.7 per cent on average per annum. This rate is substantially below the rate of inflation over this period. In fact, adjusting for inflation shows that government has been spending a declining amount per pathology service, compared to spending per service for other MBS items (Chart 2).

[22] Ibisworld, *"Pathology Services in Australia"* Industry Report, August 2010 pp4 – 10.

Chart 2: Average Medicare Benefit Paid Per Service, Inflation-Adjusted, 1995/96 – 2009/10



Source: Medicare Australia Statistics (2010) and ABS Cat No. 6401.0.

Additionally, despite the rising trend in the number of services provided, pathology's share of total MBS outlays has been declining in comparison to all other MBS items, requiring the industry, where possible, to delivery efficiency gains through productivity improvements in light of increasing service demands and real decreases in Government funding.

The trend between increasing demand for services, recent funding cuts and increasing competitive pressures has resulted in growing pressure on industry profitability. The 2010-11 annual industry turnover is estimated at $2.4 billion, $2.1 billion of which is estimated to be funded by the Government through the MBS.[23] The industry's profit margin however, sits around 9 per cent and average EBIT margin is 16 per cent – both below the weighted average for the S&P/ASX 200 health sector index.[24] Although margins have been positively affected by further industry consolidation and automation over the last year, more significant negative influences including cost pressures from Medicare funding cuts, deregulation and other competitive factors has seen industry profitability decline, as reflected by a 13 per cent decline in the value of the health index earlier this year.[25]

2.6 Impact of policy and regulatory arrangements

In order to understand fully the cost structure and drivers of the pathology industry, it is important to look beyond the statistics collected under the MBS and consider the impact of policy and regulatory arrangements including episode coning and the restriction on the number of collection centres per provider.

[23] Ibisworld, *"Pathology Services in Australia"* Industry Report, August 2010 p4.
[24] AAPP, Submission to the Strategic Review of Future Arrangements for Pathology and Diagnostic Imaging Services, May 2010 p18.
[25] Rebecca Urban, *Privateers circle an ailing healthcare sector*, The Australian, 29 May 2010.

Episode coning was introduced as a means of controlling service demand and provides that MBS rebates are made only to the three most expensive items per episode of care. It is estimated that industry revenue is reduced by up to 19 per cent as a direct result of coning, and up to half the tests that are performed in an average pathology practice are essentially provided as a free service (that is, at no cost to the patient nor rebated through MBS).[26] Episode coning therefore, not only impacts the pathology industry in terms of foregone revenue but distorts Medicare statistical information through the non-capture of 'coned out' services.

Effective from 1 July 2010, the Government removed the regulatory restriction on the number of collection centres a provider could operate. It was suggested that the restriction had resulted in counter-productive effects on industry competition by inhibiting the growth of smaller providers while facilitating the expansion of larger providers. The removal of this restriction aims to deliver greater consumer choice and enhance competition in the market.[27]

One of the most important and positive impacts resulting from the policy, regulatory and funding arrangements imposed on the industry is the significant productivity and efficiency gains achieved through consolidation and automation. Productivity improvements in the private pathology sector has largely been a result of dual pressures from the tightening of government funding arrangements (e.g. introduction of the MoUs and episode coning arrangements) whilst still maintaining delivery of high quality service levels (e.g. quality objectives of the Pathology Quality and Outlays MoU 2004-09 and funding programs such as the MBS Quality Use of Pathology Program).

Corporatisation and cost streamlining saw significant corporate amalgamation and centralisation of practices, and private investment into new technology and infrastructure delivered efficiency gains through process and service automation. These productivity gains have enabled the pathology industry to continue providing Australians with the high level of care and service expected whilst limiting the cost burden to the MBS.

Given the fundamental role pathology plays in modern medical practice now and in the future, it is important that policy decisions about pathology outlays and future funding arrangements need to be considered as an investment in the efficiency and effectiveness of the health system as a whole, and not in isolation.

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[26] AAPP, Submission to the Strategic Review of Future Arrangements for Pathology and Diagnostic Imaging Services, May 2010 p13.
[27] Ibisworld, *"Pathology Services in Australia"* Industry Report, August 2010 p25.

3 Intergenerational Report Projections

The 2010 IGR is the third in a series of Government released reports, following the first and second in 2002 and 2007. The 2010 IGR, as with all the IGRs, provides a framework for quantifying challenges to the Australian economy and government finances over the next 40 years. The framework is designed around demographic and economic projections, which are based on the "3Ps" of population, participation and productivity. Analysis within this framework is then conducted on revenue and expenditure items to make assessments of the fiscal pressures facing the Australian Government.

The key conclusion from the IGR is that an ageing population will present significant long-term risk for the economy and the sustainability of government finances. In particular, the ageing of the population is expected to result in a slowdown in the rate of economic growth and in government revenue growth. Pressure on government spending is also projected to increase, particularly in the health sector reflecting pressures from ageing, along with increasing demand for health services and funding of new technologies.

3.1 Health expenditure

The IGR projects that total government spending, as a proportion of GDP, is expected to increase from 26.0 per cent in 2009-10 to 27.1 per cent in 2049-50. While at the aggregate level this change appears modest, there are strong compositional changes within the major components of government spending.

Currently more than a quarter of Australian government spending is directed towards health, age-related pensions and aged care. Expenditure on these items is expected to climb significantly over the next 40 years, to represent almost half of all government spending. Health expenditure alone, is expected to increase from 4.0 per cent of GDP to 7.1 per cent. The projections are shown in Table 3.

Table 3: Intergenerational Report 2010 projections summary

Intergenerational projections summary	2009-10	2014-15	2019-20	2029-30	2039-40	2049-50
Economic projections						
Real GDP growth (%)	1.6	na	2.7	2.6	2.5	2.3
Real GDP per person growth (%)	-0.1	na	1.3	1.4	1.5	1.4
Total participation rate 15+ (%)	65.1	na	65.1	63.1	61.8	60.6
Male						
15+	72.4	na	72.0	69.7	68.1	66.8
25-54	90.4	na	92.2	92.5	92.6	92.7
55-69	58.5	na	60.6	60.5	61.0	61.0
Female						
15+	58.0	na	58.4	56.7	55.4	54.4
25-54	74.7	na	77.6	78.8	79.5	79.7
55-69	40.9	na	44.7	44.8	45.1	45.1
Fiscal projections (% of GDP)						
Primary balance	-4.2	na	1.5	0.2	-1.2	-2.7
Underlying cash balance	-4.5	na	1.0	0.4	-1.2	-3.8
Net debt	3.5	na	2.4	-6.6	-1.4	20.2
Net financial worth	-9.6	na	-2.5	10.2	7.6	-12.3
Net worth	-1.8	na	4.2	16.6	13.8	-6.2
Population projections						
Population (millions)	22.2	na	25.7	29.2	32.6	35.9
0-14	4.2	na	4.9	5.4	5.7	6.2
15-64	15.0	na	16.6	18.2	20.0	21.6
65-84	2.6	na	3.7	4.8	5.6	6.3
85 and over	0.4	na	0.5	0.8	1.3	1.8
Life expectancy at birth (years)						
Male	80.1	na	82.5	84.5	96.1	87.7
Female	84.4	na	86.2	87.8	89.2	90.5
Total fertility rate (%)	2.0	na	1.9	1.9	1.9	1.9
Dependency ratios						
Aged to working wage-ratio	20.0	na	25.3	31.0	34.7	37.6
Child to working wage-ratio	28.3	na	29.3	29.4	28.4	28.5
Net migration to population ratio	0.9	na	0.7	0.6	0.6	0.5
Health (% of GDP)						
Hospitals	1.0	1.0	1.1	na	na	na
Medical Benefits Schedule	1.2	1.2	1.2	na	na	na
Pharmaceutical Benefits Scheme	0.7	0.7	0.7	na	na	na
Private Health Insurance	0.4	0.3	0.4	na	na	na
Other	0.7	0.6	6.0	na	na	na
Total health	4.0	3.9	4.1	4.8	5.9	7.1

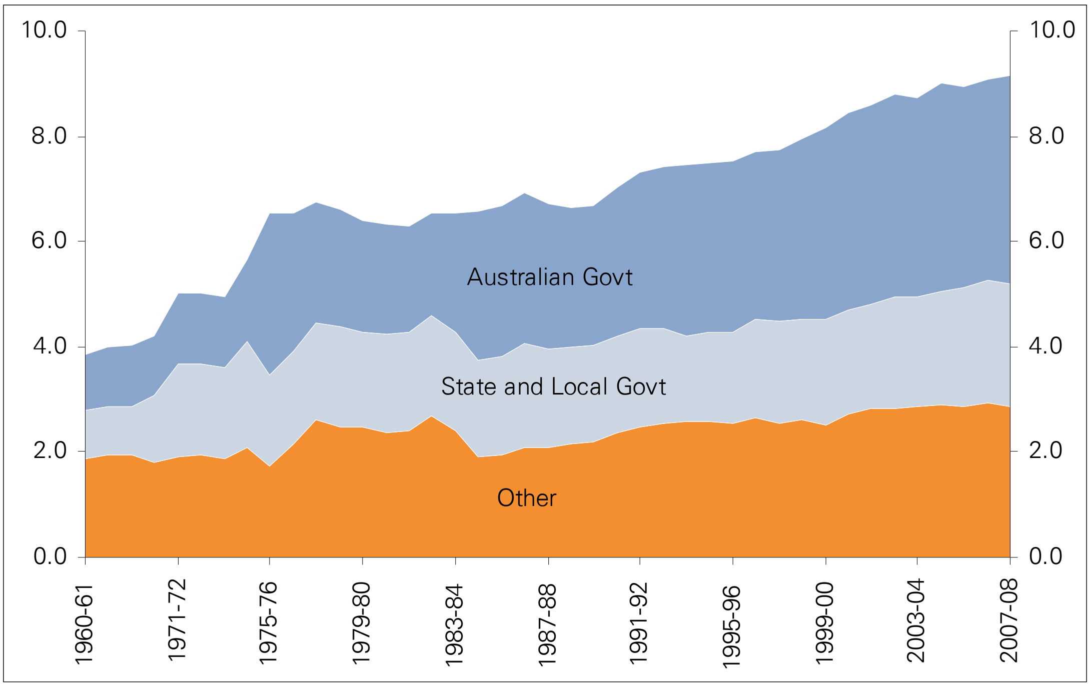
Source: IGR (2010)

3.1.1 Current health expenditure

Health care services are funded and provided by both the public and private sectors. The Australian Government currently provides 45.9 per cent of the total health funding in Australia (including Australian Government funding through the States and Territories). State and Territory governments provide 23.6 per cent, while non-government sources contribute around 30.6 per cent.

Chart 3 details the historical breakdown of national health spending by source. Since 1960, the fastest growing source of health care funding has been the Australian government.

Chart 3: Australian health expenditure by source, per cent of GDP



Source: AIHW (2009)

Australian health spending is comprised of the following categories: hospitals; MBS; PBS; private health insurance (PHI); and other. Major health programs funded by the Australian Government in 2008-09 were:

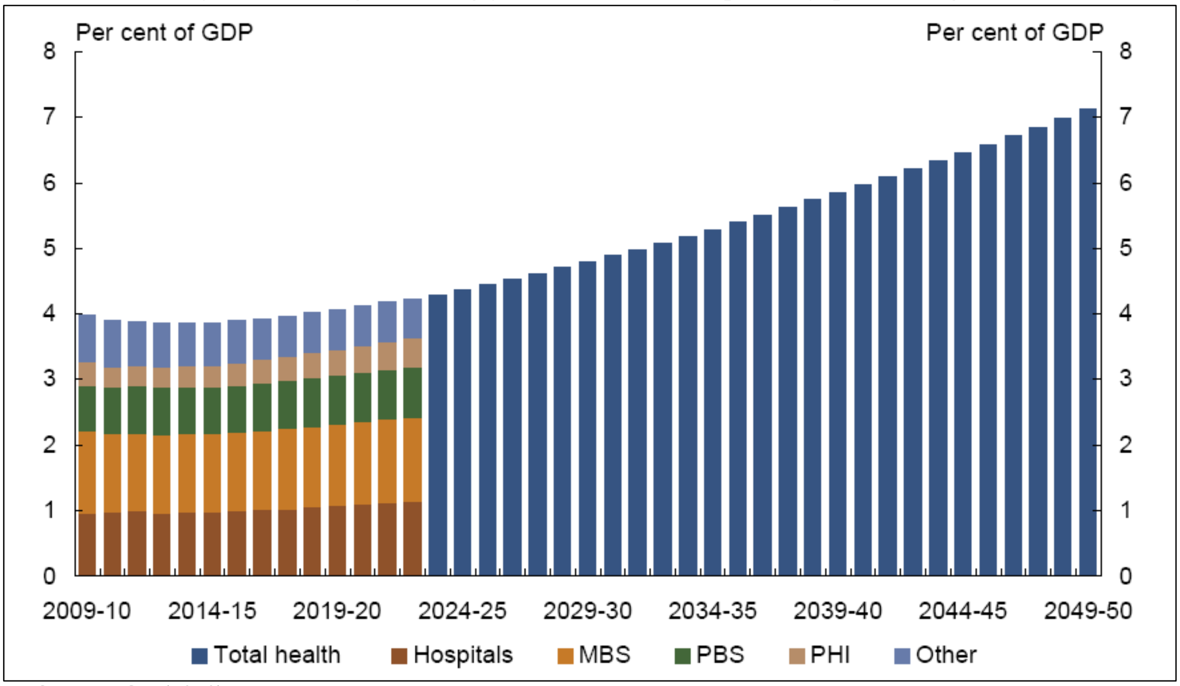
- Medical Benefits Scheme (Medicare) $14.1 billion; and
- Pharmaceutical Benefits Scheme $7.7 billion.

3.1.2 Projected health expenditure

Based on the demographic and economic projections used in the IGR, it is expected that as the population ages, more people will fall into older age groups, which are also higher users of health services. Combined with underlying population growth, increasing demand for health services and the funding of new technologies, these demographic changes will place increasing pressure on future health spending.

The IGR shows that real health spending over the period to 2049-50 on those aged over 65 years is expected to increase around seven-fold, and for those aged over 85 years is expected to increase around twelve-fold. The IGR models the health system components separately over the medium to 2022-23, from there onwards, total health expenditure is projected at the aggregate level to 2049-50 (Chart 4).

Chart 4: Intergenerational forecast of government health spending, per cent of GDP



Source: IGR (2010)

3.2 Forecast methodology

In the IGR, modelling of health expenditure is based on a primary model which simply projects health spending over the next 40 years based on trends in the cost of health services. These trends are estimated per capita by age and gender and are then combined with projected population changes.

The primary model is comprised of:

- a component model used for the short to medium-term projections; and
- an aggregate model used for the longer-term projections.

3.2.1 Component model

Australian health expenditure is readily disaggregated into a number of key areas of spending, the IGR presents the following: hospitals, MBS, PBS and all other. Each of these components has steadily experienced growth outside periods of major reform. In previous IGRs, health expenditure has been projected by modelling these health components separately over the entire forecast horizon based on each their historical trends.

Essentially, the component model represents a ‘bottom up’ approach, where each component is forecast separately and then they are combined to form a projection for total expenditure. The current IGR only uses the component model to produce projections to 2029-30. That is, the main components of health spending are projected separately for 10 years beyond the end of the forward estimates period. This allows different growth rates for each component to be used over a short to medium-term period.

It is argued that the primary reason for not using the component for the entire forecast horizon is due to the possibility of shares and trends changing significantly over the longer term. This is based on recent changes in the composition of total health expenditure. In particular, while pharmaceuticals make up a significant proportion of health expenditure, its growth has somewhat moderated in recent years. Similarly, expenditure on private health insurance is becoming a bigger driver of Australian government health expenditure.

3.2.2 Aggregate model

In the case of its long-term projections, the IGR uses an aggregate model of total Australian government health spending from 2023-24 onwards (Chart 4). The aggregate model assumes that non-demographic growth trends towards the historical growth rates for health spending by all levels of government over the longer-term. That is, projections of spending on individual components are not produced beyond 2023-24.

The aggregate model represents a ‘top down’ approach to modelling health expenditure. It is designed to minimise the risk of any compositional error, but balance the desire for policy insight with the need for longer-term stability in the IGR projections.

3.3 Key assumptions and parameters

The IGR sets out health cost projections over the next 40 years based on trends in the cost of health services per head of population by age and gender, combined with demographic ageing of the Australian population.

These projections of health expenditure are based on a number of underlying assumptions and parameters that are incorporated into the health modelling and the overall IGR framework.

3.3.1 Health expenditure assumptions and parameters

Government policy position

Health spending modelling in the IGR relies on historical data to generate non-demographic trend growth rates of per user expenditure, these trend rates are then used project future health expenditure. Implicitly, these projections assume a no-policy-change approach to government health expenditure.

This approach allows the historical growth paths in expenditure to continue and provides the basis for estimating the likely impact of past policy decisions on future funding requirements. The IGR notes that the projected high spending growth rates caused by the ageing of the population are building on an already high structural spending base. That is, average real growth in government spending over the 2000s economic expansion was 3.8 per cent of GDP, significantly faster than it was during the 1980s and 1990s expansions (1.9 per cent and 2.5 per cent of GDP, respectively).

Historical spending growth, combined with the size of the structural spending base, make responding to spending pressures of an ageing population more difficult.

Historical growth rates

The non-demographic growth rates for each component and total government health expenditure (used to calculate the growth rate for total Australian government expenditure on health) are derived from trends in the historical data. This is done by first adjusting historical spending data for CPI growth and changes in the size and age structure of the population to derive a series of real age-adjusted spending per person.

The non-demographic growth rates are then determined by fitting trends to each of the components and, where possible, calculating non-demographic growth by age group. For medical and pharmaceutical benefits, linear trends were used. As such, non-demographic growth is projected forward as a constant real dollar increase in spending.

For expenditure on private health insurance and total government health expenditure, an exponential trend was used, so non-demographic growth is projected as a percentage increase in spending each year.

Age profile of health expenditure

For all components of spending, per person spending rates are higher for older age groups than for younger age groups. This is most notable for pharmaceutical benefits and hospital spending. Spending rates tend to peak at age 75 to 84 years for most spending components, except for hospitals where the peak is for those over 85 years (Table 4).

Table 4: Index of the age profile of health spending per person

Age group	Pharmaceutical benefits	Medical benefits	Hospitals	Private health insurance
0-4	0.07	0.60	1.04	0.26
5-14	0.08	0.31	0.25	0.25
15-24	0.16	0.49	0.49	0.37
25-34	0.30	0.76	0.78	0.60
35-44	0.54	0.87	0.64	0.73
45-54	0.93	1.01	0.71	1.03
55-64	1.79	1.44	1.11	1.74
65-74	3.39	2.14	2.28	2.57
75-84	4.50	2.78	3.54	3.25
85+	4.17	2.71	5.45	2.79
All people	**1.00**	**1.00**	**1.00**	**1.00**

Source: IGR (2010)

As the population grows and ages more people will fall into the age groups that are the most frequent users of the health system. Nevertheless, nearly half the increase in expenditure over the projection period is on those under 65 years of age, indicative of the important role non-demographic growth plays in increasing health expenditure.

Hospitals

In the IGR, the hospitals component projects spending under the National Healthcare Specific Purpose Payment (SPP) and equivalent age-specific and gender-specific expenditure for veterans. In November 2008, the Council of Australian Governments agreed to a new indexation rate for the National Healthcare SPP under the new federal financial framework.

This new indexation rate, which is around 7 per cent, is used as the basis for projecting Australian Government hospital expenditure. The indexation rate is a composite index that reflects age-weighted population growth, growth in health prices as measured by the AIHW and a health technology growth factor of 1.2 per cent.

Funding for veterans is included by adjusting the forward estimates expenditure for the National Healthcare SPP to include equivalent age-specific and gender-specific expenditure for veterans. The indexation rate is then applied to this higher base, and thus equivalent expenditure on veterans is included in the projection.

The new methodology projects higher expenditure on hospitals than the methodology used in IGR 2007, consistent with the Government’s increased funding commitment for hospitals.

Medical benefits

The medical benefits model used in the IGR includes spending under the MBS and equivalent age-specific and gender-specific spending rates for veterans.

The data on medical benefits allows for the calculation of different non-demographic growth for men and women in a given age range. It was found that calculated growth was very low for age groups below 65 and highest for men aged 75 and over.

Projections for medical benefits were based on the observation of largely linear trends in non-demographic growth. While pathology makes up around 14 per cent of Australian government expenditure on medical benefits, this was not separately observed in the historical data or individually captured in the model on health expenditure.

Pharmaceutical benefits

The pharmaceutical benefits model covers spending under the Pharmaceutical Benefits Scheme (PBS) (including the Highly Specialised Drug Program) and the Repatriation Pharmaceutical Benefits Scheme.

The IGR notes that while there was rapid growth in real per capita PBS expenditure between 1991–92 and 2004–05 (mainly driven by the listings of high-volume drugs such as cholesterol-reducing drugs), growth in drug spending as a share of GDP has flattened out in recent years (Chart 4).

Notwithstanding this, the PBS remains a significant component of overall health costs.

Private health insurance

The private health insurance (PHI) model incorporates spending on the private health insurance rebate first introduced on 1 January 1999. Age-specific and gender-specific spending rates were calculated by using the age and gender profile of benefits paid out by private health insurers per person. This age profile is used to indicate the impact of ageing on private health insurers' costs which affects premiums and thus the rebate.

Historical information is compiled on the nominal total cost of the rebate each year, with 2000–01 chosen as the start year for the analysis. This start date excludes the rapid growth in spending in 1999–2000 related to the initial uptake of the rebate and effect of the introduction of Lifetime Health Cover on 1 July 2000.

An exponential trend for non-demographic growth was found to provide the greatest explanatory power, and was fitted to the real per person age-adjusted spending series, resulting in a growth rate of 4.5 per cent a year. The IGR notes that as the historical spending data does not fully reflect the recent increase in the rebate for older Australians, the growth rate is likely to be conservative.

Other health spending

Other health spending used in the IGR includes all other Australian government health spending but does not include administration expenses. Major components of other health include:

- health workforce programs, including payments to GPs for infrastructure, training and support, and the Practice Incentive Program;
- population health and safety programs, including funding of essential vaccines;
- health and medical research; and
- spending on veterans' health care.

Spending on veterans' health care included in the other health model represents additional Australian government spending on this group compared to other Australians. Spending is projected in a linear form based on trends in real spending per person from 1993–94 to 2004–05. These were then combined with population projections from the Department of Veterans' Affairs and CPI assumptions.

Remaining spending in the other health model is assumed to remain as a constant proportion of GDP. This approach is consistent with how other payments are modelled in the rest of the report. IGR 2007 modelled other spending using a linear trend as a proportion of GDP. Under the new approach, other spending is projected to be lower by 2022–23 than in IGR 2007.

Aggregate model

The IGR notes that historical trends suggest that the components of health spending will grow at different rates in the short to medium term. History also suggests that these differences are unlikely to be maintained over the long term. For this reason, the IGR transitions to an aggregate model of health expenditure from 2022–23. It does this by growing the projected real per capita spend in each age and gender group by an aggregate non-demographic growth rate.

The non-demographic growth rate is calculated from the growth in real, age-adjusted per capita spending from all government sources — Australian, State and Territory, and local governments. This is equivalent to assuming long-term stability in funding shares between levels of government, this is largely reflective of history with the exception of major reform periods. The growth rate is calculated from after the introduction of Medicare — the last major reform to have a pronounced impact on funding shares.

To aid a smooth transition between health expenditure models, non-demographic growth in the aggregate model starts out at the rate implied by the component models at the end of their projections — around 1.8 per cent. This is transitioned up to the all-government growth rate of 3.2 per cent using a logistic curve.

3.3.2 IGR assumptions and parameters

Beyond the forward estimates period, the IGR principally relies on the 3Ps framework, a growth function of:

- population — the number of people of working age (15 and over);
- productivity — the average output per hour worked; and
- participation — the average hours worked by each working person.

Projections of the 3Ps are determined by demographic and economic assumptions.

- The demographic assumptions about fertility, mortality and migration affect the number of people of working age (population) and the age and gender composition of the population.
- The composition of the population in turn affects participation and hours worked because different age-gender cohorts have different patterns of participation and hours worked. Changes in these patterns of work of individual cohorts over time will also affect aggregate labour market participation.
- Future average productivity is assumed to reflect historical experience.

Of the 3Ps, population, particularly population ageing, has the greatest impact on the health expenditure projections presented in the IGR. The ageing of the population will see the number of people aged 65 to 84 years more than double and the number of people 85 years and over more than quadruple over the next 40 years.

Ageing of the population reflects the effects of a decline in fertility rates which commenced in the 1960s and increasing life expectancy, which are expected to be only partially offset by future net overseas migration.

3.4 Conclusions

The IGR is a framework built around the 3Ps of population, participation and productivity. It enables analysis to be conducted on revenue and expenditure items over long time horizons. While it can be extremely effective at illuminating potential fiscal pressures on the horizon, it is nonetheless a blunt instrument.

The IGR projects that spending on health alone will increase from 15 per cent of Australian government expenditure in 2009-10 to 26 per cent in 2049-50 to become the single largest expenditure group. However, such a large component of expenditure is modelled at the aggregate level. The granularity of the modelling fails to capture any of the relationships of the other variables underlying health expenditure. In particularly, the ongoing efficiency gains of the pathology industry are not separately identified in the model.

This in itself is not a failing of the model, but serves to highlight that the approach of the IGR is very much at the aggregate level. The IGR effectively highlights pressure points in the major economic sectors, but should not be relied upon in isolation to inform policy on highly specific parts of the economy.

The situation is exacerbated by the combination of two models over the forecast period. Any ability to observe a greater level of detail in key drivers is hidden when the aggregate model is applied. While the transition path between the two models seems reasonable, a preferred method, would have been to continue with the more granular component model, cross-checking the results using the aggregate model. The use of the aggregate model is also inconsistent with all other expenditure items modelled in the IGR.

4 KPMG Econtech Alternative Health Cost Projections

KPMG Econtech's alternative health cost projections employs KPMG Econtech's GHC model. This model projects health funding by type of health service and source of funding. These projections are for a long-term horizon extending 40 years, in line with the 2010 IGR.

4.1 GHC model methodology

The GHC uses the IGR methodology as its starting point and then incorporates a number of enhancements, which makes its projections more robust.

- First, the GHC model also covers State and Territory government funding where the IGR only covers the Australian Government. This extension is important because both Australian and State and Territory Governments health budgets face some of the same pressures from rising costs. In addition to government funding, the GHC model also covers non-government funding, including private funding sources such as PHI benefits.

- Second, the GHC model captures the impact of PHI benefits on government health costs. The IGR model makes the simplifying assumption that PHI benefits have no impact on Government health costs. The GHC model, in comparison, allows for substitution; that is, the GHC model takes into account that to some extent they are substitutes. In particular, in the GHC model, a rise in PHI benefits will reduce government health costs to the extent that the type of health services funded by the PHI benefits would otherwise be funded by government.

- Third, the GHC model has been enhanced to separately identify pathology costs over the forecast horizon. Importantly, this enhancement to the GHC model is also able to capture the efficiency improvements made by the pathology sector over time.

The GHC model consists of two modules. These are:

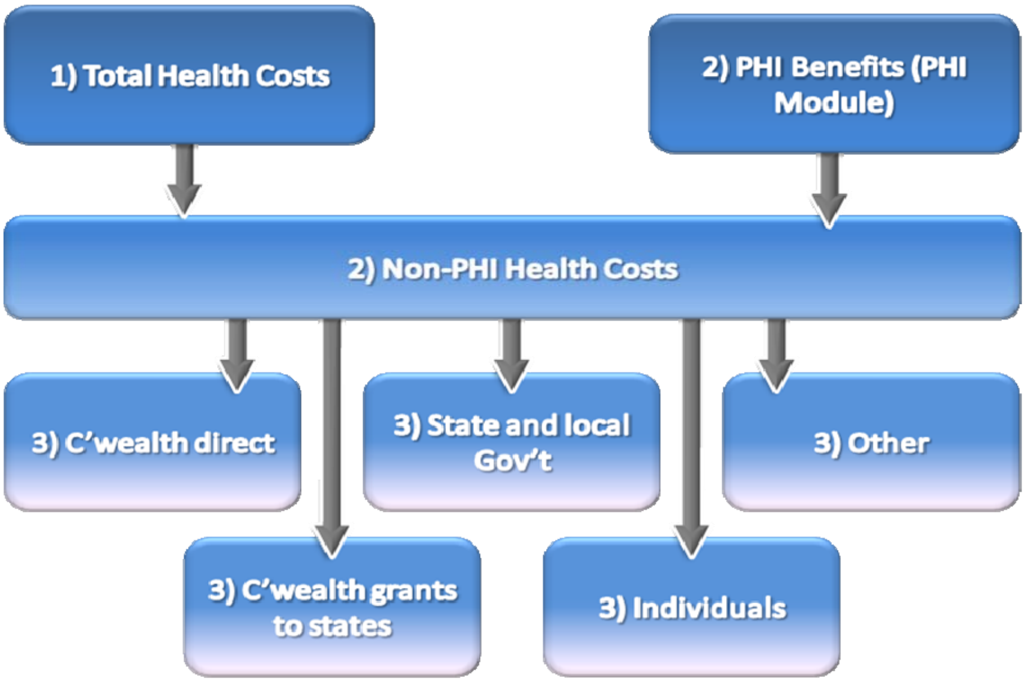
- the Health Costs (HC) module, which is concerned with modelling total health costs; and

- the PHI module, which is concerned with modelling PHI benefits.

Box 1 outlines the GHC modelling framework. Appendix A presents detailed information on both the HC and PHI modules.

Box 1: The GHC model

The GHC model follows a 3-step process, as shown in the figure below.



Note: "Other" refers to other private sources of funding such as Workers' Compensation and Third Party insurance pay-outs.

In the first step, the HC module is used to project demand, or the total amount to be spent on each type of health service. This involves applying projections of real spending on each type of health service by gender and by age to projections of the population by gender and by age.

In the second step, the PHI module projects the amount of spending on each type of health service that is funded by PHI benefits. This depends on separate projections for hospital and ancillary insurance of coverage by gender and by age, as well as associated projections of benefits. Government health expenditure is estimated by subtracting PHI Benefits from total health expenditure.

In the third step, the HC module allocates the balance of health costs across the various non-PHI funding sources based on existing relativities. Currently, the bulk of pathology services would be funded directly by the Australian Government, although alternative funding arrangements may see a larger burden placed on individuals.

The approach in Box 1 is applied separately for each type of health service. The GHC model distinguishes nine categories of health services, as shown in the middle column of Table 5. These are an aggregated version of the health service categories used by the AIHW, and are shown in the final column of the table. By comparison, the IGR uses five broader categories that are shown in the first column of the table, which can be compared with the GHC and AIHW categories.

Table 5: Health service categories

IGR categories	GHC categories	AIHW categories
Hospitals	Hospitals	Hospitals
		Public (non-psychiatric)
		Public (psychiatric)
		Private
Medical Services	Medical services	Medical services
	Pathology	
Pharmaceuticals	PBS pharmaceuticals	PBS pharmaceuticals
	Non-PBS pharmaceuticals	Non-PBS pharmaceuticals
Aged Care	High-level residential aged care	High-level residential aged care
Other	Ancillary	Ancillary
		Ambulance
		Other health professionals
		Aids and appliances
		Dental services
	Miscellaneous	Miscellaneous
		Community/public health
		Research
		Capital outlays
	Health administration	Health administration

4.2 Alternative forecasts

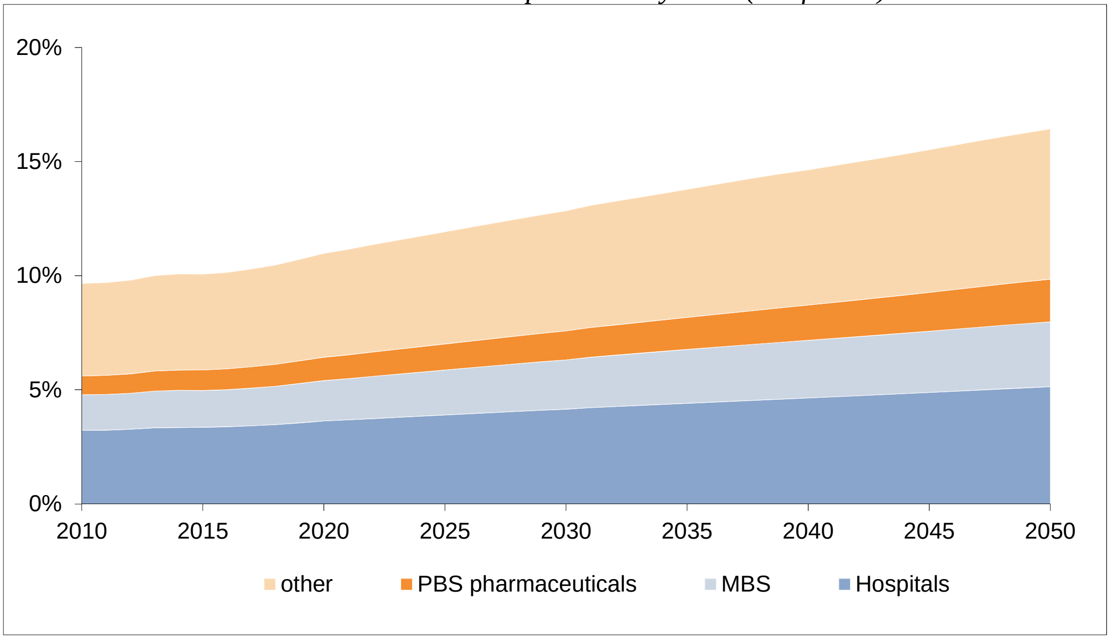
As discussed earlier, the GHC model is able to project health expenditure by its components over the entire forecast horizon. Additionally, it has been customised to incorporate pathology in the MBS component. Importantly, it is able to capture the efficiency improvements made by the pathology sector over time.

The Baseline scenario projections presented below are based on existing policy arrangements in the health sector. The Baseline scenario has been modelled for two important reasons. First, modelling the existing policy arrangements provides an insight into the future level of government spending and hospital expenditures (assuming that there is no change to the existing policy arrangements). Second, the Baseline scenario can be used as a reference point to examine the impacts under various policy changes to health funding arrangements, including pathology funding arrangements.

4.2.1 Health expenditure projections

Chart 5 shows the Baseline scenario projections of expenditure on health by all funders according to the type of health service. As mentioned earlier, these projections involved applying projections of real spending on each type of health service by gender and by age to projections of the population by gender and by age. The base year gender and age pattern of expenditure for each type of health service was obtained from the AIHW, while future real average annual growth rates were based on projections from the IGR.

Chart 5: Total Health Expenditure by Area (% of GDP)



Source: KPMG Econtech's GHC model simulations.
Note: In "other", the chart combines five separate categories of health services from the GHC model, namely non-PBS pharmaceuticals, high-level residential aged care, ancillary, miscellaneous and administration health costs.

Expenditure on hospital services can be used as an example to explain the expenditure growth projections. The expenditure growth projections can be considered to be made up of three components: the 'non-demographic' effect; population growth; and ageing of the population. These three growth components can be added together to arrive at overall average annual real growth in spending on each type of health service.

Each of these components is discussed in more detail below.

- The first component, referred to in the IGR as the "non-demographic" effect, is real growth due to changes in the nature and relative price of hospital services. This non-demographic effect is driven mainly by new health technologies. The GHC model uses a non-demographic growth component of around 1.8 per cent per annum for hospitals, which is in line with the IGR's long-term forecasts.

- The second component is average annual population growth. Average annual population growth to 2049-50 is estimated at 1.1 per cent.

- Finally, the ageing population means an increasing proportion of the population will fall in age ranges that are high users of hospital services. This gives a third 'ageing' component that is estimated at 0.9 percentage points.

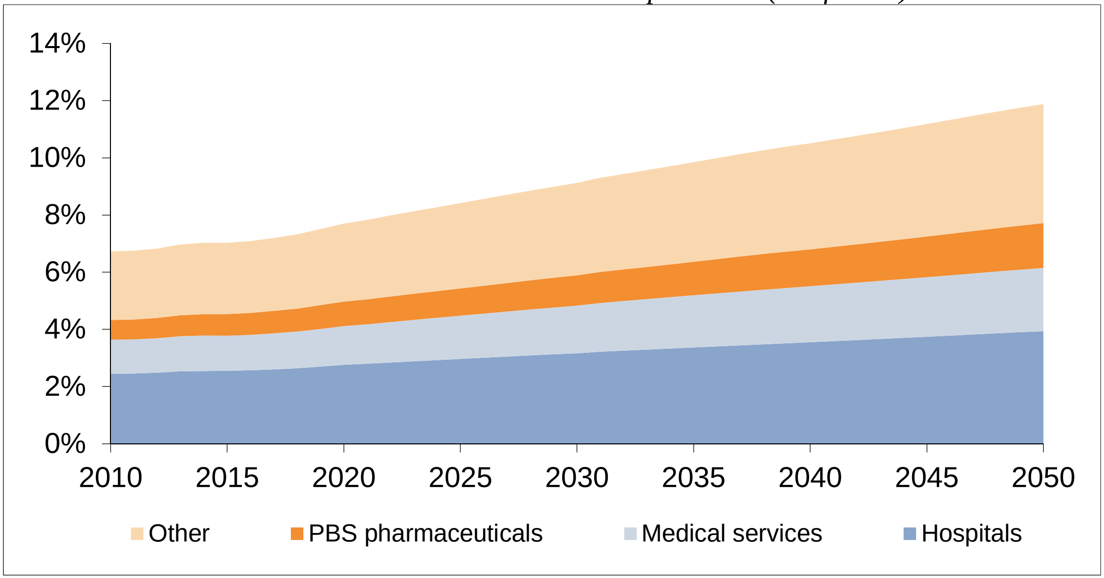
Adding the three components together gives total average annual growth in real hospital spending of 3.8 per cent. Allowing for CPI inflation of 2.9 per cent, this translates into nominal growth of 6.8 per cent.

The annual real growth for hospital expenditure of 3.8 per cent can be compared to an estimated 2.5 per cent annual real growth in GDP. This means that hospital expenditure rises as a share of GDP over the forecast period of 2009-10 to 2049-50.

Similar rising trends are observed for other areas of health expenditure. The clearest example is expenditure on PBS pharmaceuticals, which is projected to rise rapidly due to the assumption of a very high 'non-demographic' effect in this area of health expenditure.

In comparison to the total health outlays presented in Chart 5, Chart 6 and Chart 7 focus on health expenditure by government only. This means the next two charts provide more detailed information on the sources of the projected increases in government health outlays. Chart 6 projects total Australian and State Government health outlays by type of health service, while Chart 7 shows this information for the Australian Government alone.

Chart 6: Total Government Health Expenditure (% of GDP)



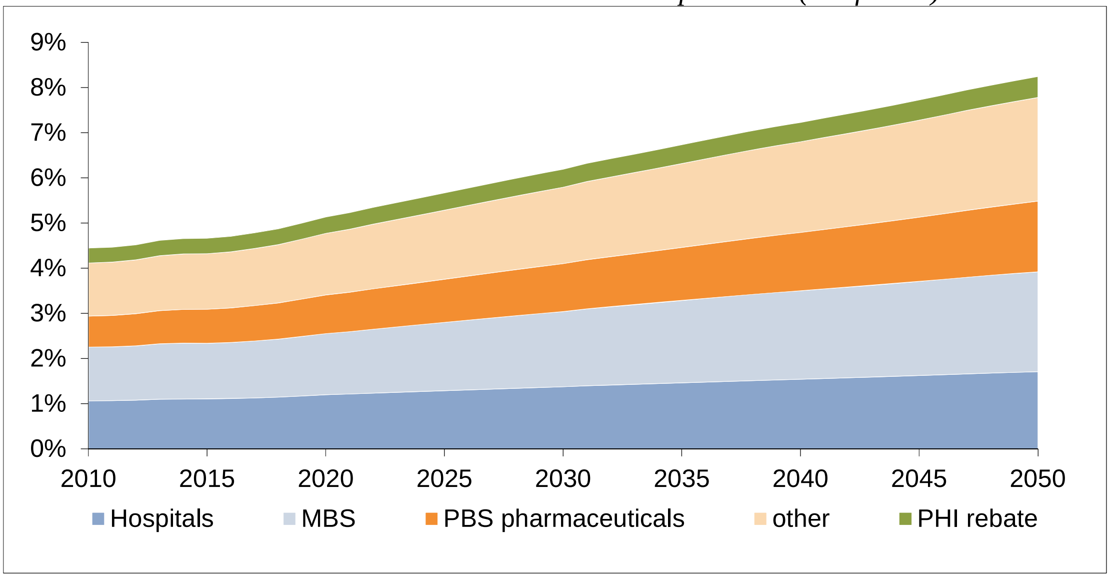
Source: KPMG Econtech's GHC model simulations.
Note: "Other" includes non-PBS pharmaceuticals, high-level residential aged care, ancillary, miscellaneous and administration health costs.

Chart 6 shows that the PBS and Hospitals are the biggest drivers of the projected increase in total government health outlays. Government expenditure on PBS is expected to climb steeply from 0.7 per cent of GDP to around 1.6 per cent of GDP over the next 40 years while expenditure on Hospitals are expected to increase from 2.4 per cent to 3.9 per cent. The PBS result reflects the assumption of a strong non-demographic effect, as past experience shows rapid real growth in the PBS due to increased drug availability and the listing of newer drugs.

Other areas of total government health outlays are also expected to rise, but to a lesser extent. In the next 40 years, total government outlays are projected to increase by about 3 percentage points of GDP.

The Australian Government is the sole funder of the PBS. As such, the weight of the increase in total government outlays will largely fall on the Australian Government. Chart 7 isolates the Australian Government health outlays (by removing the state government own-funded outlays).

Chart 7: Australian Government Health Expenditure (% of GDP)



Source: KPMG Econtech's GHC model simulations.
Note A: "Other" includes non-PBS pharmaceuticals, high-level residential aged care, ancillary, miscellaneous and administration health costs.
Note B: These projections are slightly higher than then IGR (2010) projections. This difference is due to the GHC model projections including high level residential aged care whereas, this is not included as health expenditure in the IGR (2010)

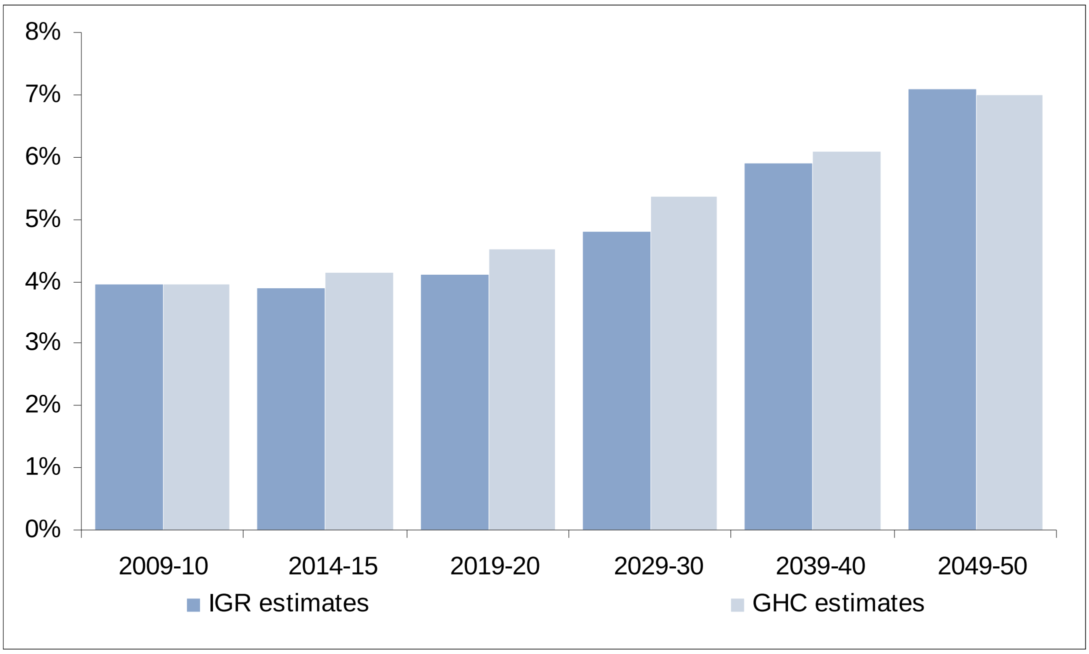
In addition to highlighting the PBS contribution, Chart 7 shows that other areas of Australian Government health outlays are also projected to increase as a share of GDP (but at a slower rate). Importantly, the MBS is projected to grow at a steady rate over the forecast horizon.

4.3 Comparison with the Intergenerational Report

As noted earlier, in the Baseline scenario, the GHC projects health costs through to 2049-50 assuming that existing policies and arrangements remain in place over the entire simulation period. As such, the projections of health expenditure funded by the Australian Government the model generates are comparable to corresponding findings of the IGR.

The 2010 IGR pointed to the pressures on the Australian Government Budget arising from a projected increase in the Australian Government's health costs. Ageing of the population and the uptake of new technologies are projected to drive the Australian Government's health costs from 4 per cent to 7 per cent of GDP in the forty years to 2049-50. Chart 8 presents the comparison of the GHC model and IGR projections. It shows that the GHC model projects similar Australian health expenditure to the IGR, although the projected growth is slightly flatter.

Chart 8: Australian Government Health Expenditure: GHC Model vs. IGR Model (% of GDP) (excluding high level aged care)



Source: KPMG Econtech's GHC model simulations and IGR (2010).

Chart 8 shows that the GHC model and the modelling underlying the IGR produce very similar projections of future Australian Government health costs (under the assumption that existing health policies remain in place).

4.4 Pathology cost projections

Projections of government expenditure on pathology services over the next 40 years are based on the cost of pathology services per head of population by age, combined with projected demographic changes.

4.4.1 Measuring pathology outlays

Pathology is the most accessible and affordable medical service and has the highest bulk-billing rate of any medical service. In measuring total pathology outlays funding by the Australian Government, it is important to define the types of services that are covered according their Medicare item listing.[28] There are around 430 individual pathology services listed under Medicare that have been identified as eligible to receive a rebate. These individual items are classified according to the following 13 main categories.

[28] Pathology services in Australia are heavily subsidised by Medicare, a universal healthcare system financed through income tax and an income-related Medicare levy. Governed by the Australian Health Care Agreements between the Commonwealth and the states and territories.

1. Haematology
2. Chemical
3. Microbiology
4. Immunology
5. Tissue Pathology
6. Cytopathology
7. Cytogenetics
8. Infertility and Pregnancy Tests
9. Simple Basic Tests
10. Patient Episode Initiation
11. Specimen Referred
12. Management of Bulk Billed Services
13. Bulked Billed Pathology Episode Incentive Items

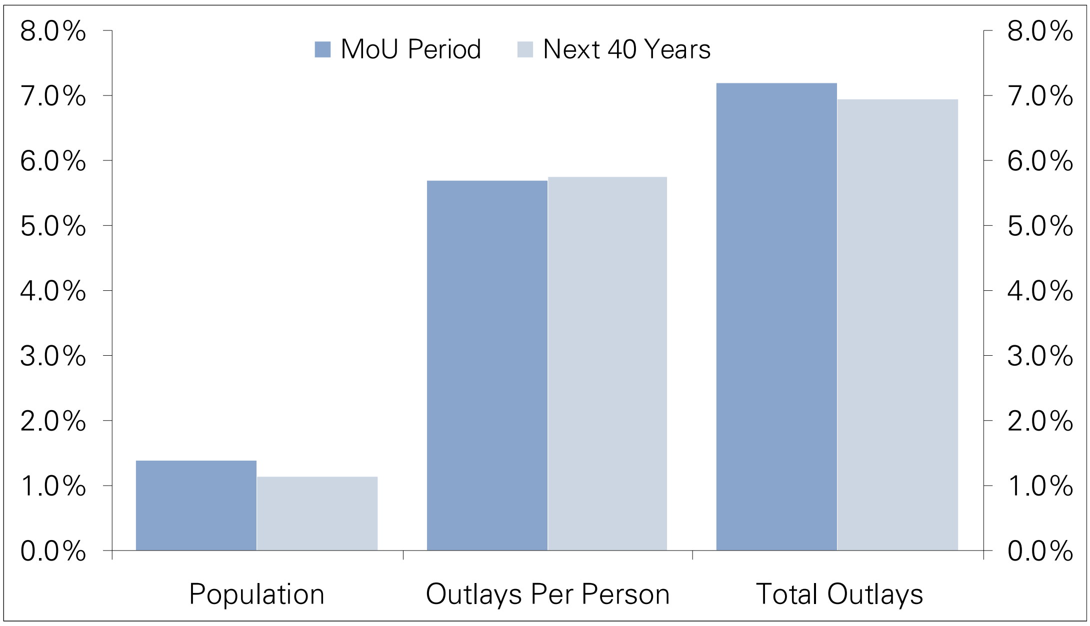
Medicare expenditure and service data by age and gender on individual pathology items are available on a monthly, quarterly and financial year basis starting from July 1993 through to October 2010. This provided a rich dataset for interrogation and modelling purposes.

4.4.2 Growth in nominal pathology outlays

For the past 13 years of the MoU funding period, aggregate government expenditure on pathology services has grown steadily outside of periods of major health care reform. Nominal growth in pathology outlays averaged 7.2 per cent per annum. This was composed of average annual growth in outlays per person of 5.7 per cent and average annual growth in the total population of 1.4 per cent (Chart 9).

This compares with the projected average growth of 7.0 per cent per annum projected over the next 40 years, during which average annual growth is expected to be 5.7 per cent for pathology outlays per person and 1.1 per cent for the total population.

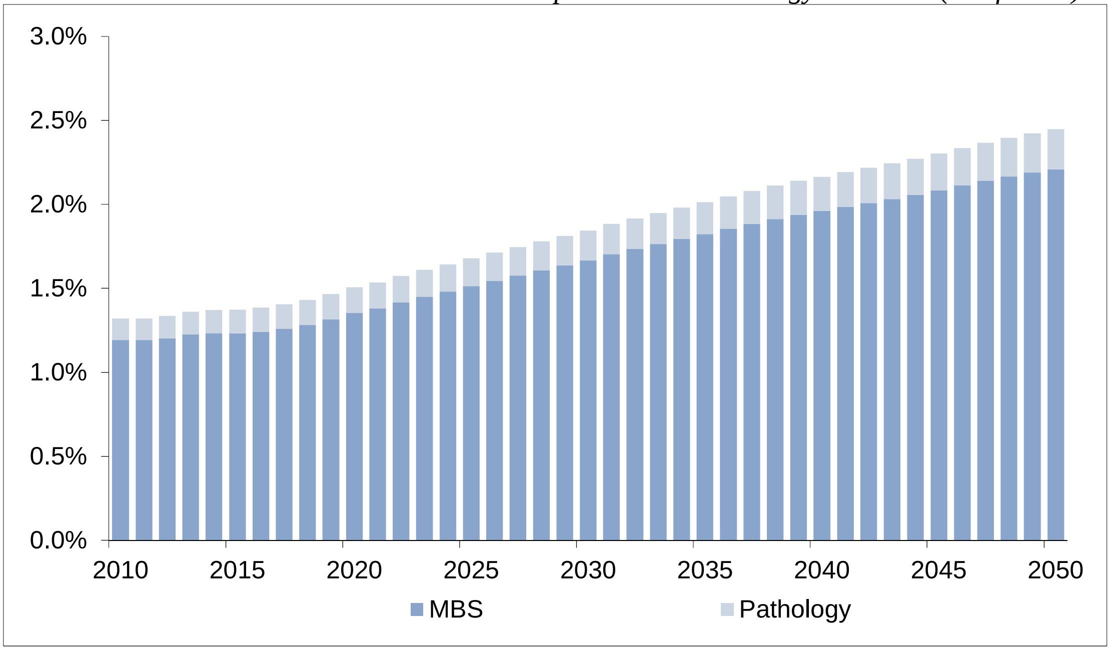
Chart 9: Pathology Outlays and Pathology Outlays Per Person, Average Annual growth



Source: KPMG Econtech's GHC model simulations.

The GHC model has been customised to incorporate pathology in the medical benefits component of expenditure. Importantly, this enhancement is able to capture the efficiency improvements made by the pathology sector over time. That is, Australian Government expenditure on pathology remains in proportion to expenditure on the MBS, as pathology volumes increase over time, while average services fees fall in real terms. Chart 10 outlines the Australian Government Expenditure projections for pathology and the MBS more broadly.

Chart 10: Australian Government Health Expenditure – Pathology and MBS (% of GDP)



Source: KPMG Econtech's GHC model simulations.

Over the forecast horizon, both MBS and Pathology expenditure as a percentage of GDP remains relatively stable. This stability can, in part, be attributed to the continued efficiencies in the pathology sector.

As with the expenditure on hospitals outlined previously, the projections of pathology expenditure are driven by three components of growth: 'non-demographic' growth, population growth and aging of the population.

The decomposition of pathology expenditure allows us to capture the effects of recent trends in the pathology sector. We obtain this non-demographic growth by using the real, per capita expenditure on pathology. To do this we capture the effects of trends in access to pathology services per capita as well as trends in cost per service.

Trends in the industry have seen more subdued growth in this non-demographic component than in other areas of expenditure (e.g. PBS) which is largely attributable to efficiency gains in pathology services.

By separately assessing the non-demographic growth rates of pathology expenditure, the GHC model can account for a differing trend from the MBS and expenditure overall.

5 Modelling Pathology Outlays

Outlays on pathology services represent around 13 per cent of government expenditure on the MBS, with pathology expenditure around $2.0 billion annually.[29] To properly estimate future government expenditure on pathology services, it is important to identify the main drivers of pathology outlays. This section provides details on the framework used to model alternative funding arrangements for pathology over the forward estimates and beyond, including breakdown of the baseline projections of growth in pathology outlays.

5.1 Framework for estimating pathology outlays

Given the large volume of pathology services provided in Australia each year, estimation of total outlays lends itself to be being best analysed through the construction of a robust economic framework. The framework developed for estimating pathology outlays is consistent with the framework used for the IGR and for future health expenditure. That is, the framework used defines growth in pathology outlays as a function of:

- growth in non-demographic factors (intensity and unit cost); and
- growth in demographic factors (population growth).

While the demographic and non-demographic factors are underpinned by economic models and econometric analysis, the overarching framework used to estimate pathology outlays is very simple, yet very powerful. That is, the framework allows for:

- total outlays to be unpacked;
- trends in key drivers to be more easily identified; and
- projections to be made.

5.2 Unpacking the composition of pathology outlays

Expenditure on pathology services is a function of three main components:

- unit price – the average annual MBS rebate per service, comprising:
  - growth in the MBS rebate; and
  - patient enrichment of pathology tests;
- intensity – the average annual usage of services per person per annum, reflecting:
  - preferences for pathology services; and
  - the compositional effects of preferences at different age groups;

[29] Medicare Australia Statistics (2010)

- population – capturing dynamic changes in the population, through:
  - growth in the population size; and
  - demographic change across age groups and an ageing population.

For illustrative purposes, the table below constructs total government expenditure on pathology outlays using the three components of the framework.

Table 6: Example of Framework

	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Total Pathology Outlays, $m	**1,522**	**1,642**	**1,742**	**1,876**	**1,972**	**2,013**
% Change	**8.1%**	**7.9%**	**6.1%**	**7.7%**	**5.1%**	**2.1%**
Average Unit Price	19.58	19.81	19.89	19.59	19.63	19.41
% Change	2.6%	1.2%	0.4%	-1.5%	0.2%	-1.2%
Per Person usage	3.81	4.00	4.15	4.47	4.59	4.66
% Change	4.0%	5.1%	3.7%	7.5%	2.8%	1.5%
Population, '000s	20,395	20,698	21,072	21,432	21,875	22,255
% Change	1.3%	1.5%	1.8%	1.7%	2.1%	1.7%

Source: Medicare Australia Statistics (2010) and KPMG Econtech Estimates

5.3 Trends in key drivers of pathology outlays

Projections of the three components of the framework for analysing pathology outlays are determined by economic models, econometric analysis, and demographic and economic assumptions.

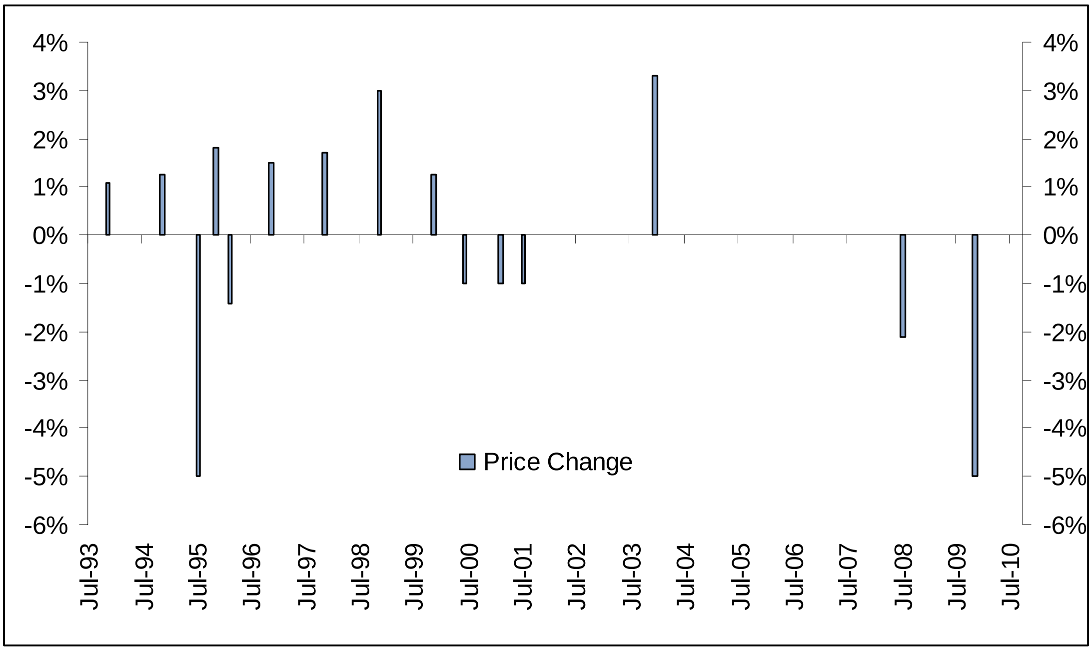
5.3.1 Unit price

Unit price in the framework is defined as the average rebate received for a single pathology service weighted by volume, price and frequency. Changes in the unit cost of pathology services reflect principally two drivers:

- growth in the MBS rebate; and
- patient enrichment of pathology tests;

Any changes in the MBS rebate provided to pathology services has reflected periods when the Government has elected to change the nominal benefit of each Medicare item. Over the MoU period this has occurred on an ad hoc basis reflecting the terms of the each individual MoU. From July 1993 through to October 2010 (the entire MBS dataset) – a total of 18 years or 208 months, MBS rebates for various pathology services were changed 16 times (Chart 11). On eight occasions prices were increased, on seven occasions prices were reduced, and in one instance there was no net change to price, although the pathology category of Histology was restructured.

Chart 11: Government Changes to the MBS Rebates for Pathology Services, %

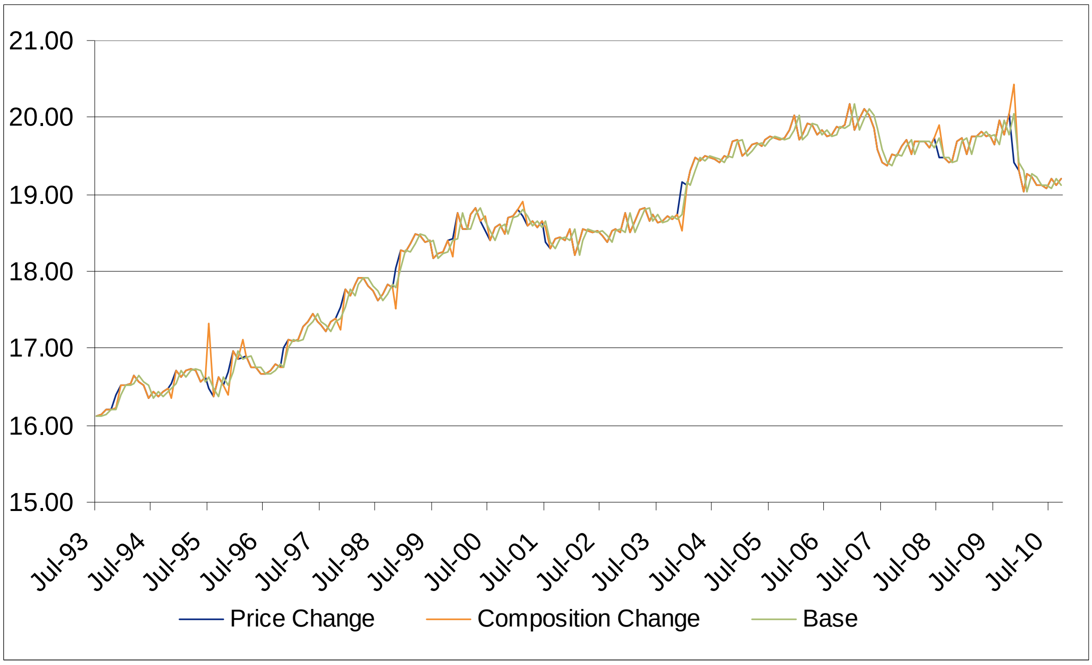


While the MBS rebate for pathology services has experienced ad hoc changes following government decision, the unit price of pathology services has historically continued to grow at a regular pace. The continued growth of around 1.25 per cent per annum on average, has reflected a second component driving price growth – patient enrichment.

Patient enrichment refers to the phenomenon that, on an average weighted basis, more expensive pathology services are being undertaken more often relative to all other pathology services. This trend drift upwards in average price reflects such things as referral preferences and technological advancements in testing.

The changes in growth in unit price from ad hoc rebate changes and patient enrichment can be observed in the data. Effectively, the impact of patient enrichment is the residual change to unit price after netting out the impact of changes in the Medicare rebate through time (Chart 12). The compositional effects have had the greatest impact on price growth over time and the impact of Government price changes has been very small, with the average change slightly less than zero, that is, Government increases in MBS rebates have effectively been offset by decreases.

Chart 12: Change in average unit price from patient enrichment and ad hoc price movements

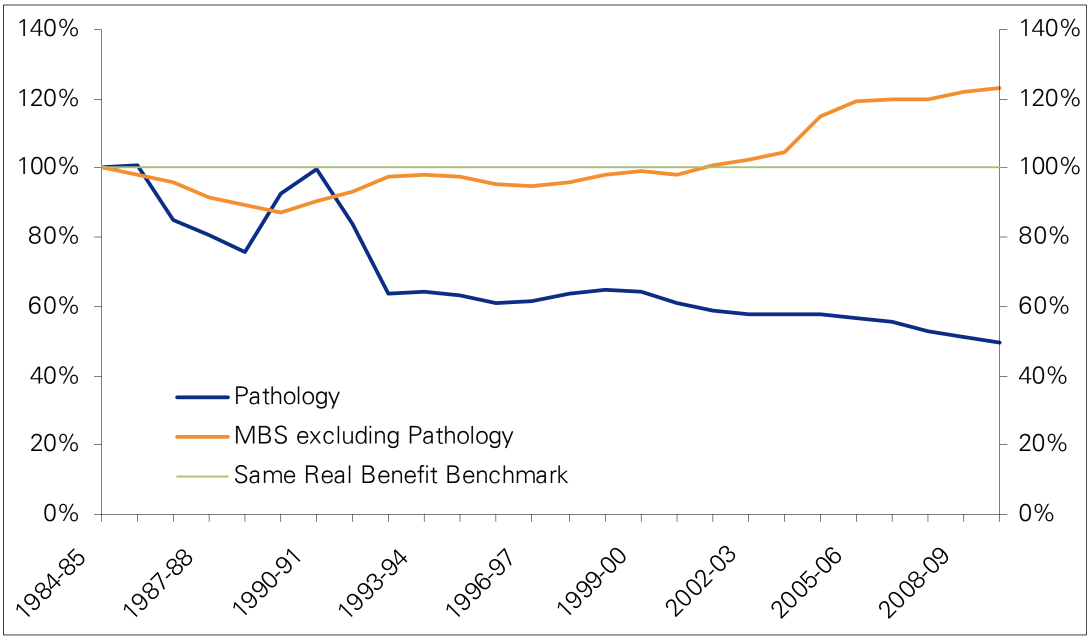


Source: Medicare Australia Statistics (2010) and Ed Wilson Consulting Pty Ltd

The pathology industry like any other industry must compete in the wider economy for its input factors to production. That is, it cost base for inputs such as labour, reagents, information and communication technology, rent, transport and infrastructure generally increase with inflation.

It is acknowledged however, that due to the high volumes of testing leading to economies of scale, specialisation of testing and industry consolidation, productivity gains have led to achieving significant efficiency dividends. These productivity gains have enabled the industry to remain viable in the face of unit prices increasing at a rate less than inflation. Chart 13 illustrates the real benefit paid by Government for pathology services over time compared to the real benefit paid to all other MBS items.

Chart 13: Real average unit price



Source: Medicare Australia Statistics (2010) and ABS Cat No. 6401.0

Pathology services have delivered substantial efficiency dividends to government finances in comparison to all other MBS items. This has been achieved through a continued process of productivity gains. However, there remains the risk if cuts to unit prices for pathology services are too severe, it may adversely impact on the longer-term viability of the industry. Additionally, the absence of government commitment to a funding arrangement also increases uncertainty in the industry and may impact on long term investment decisions.

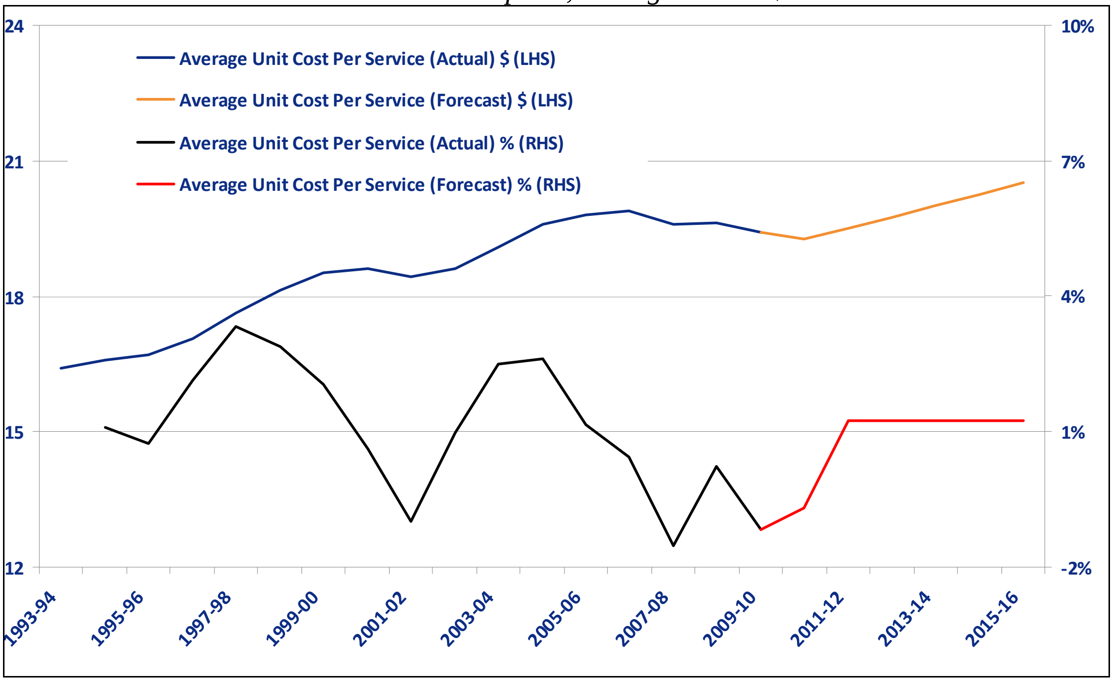
The unit price (MBS fee) used in the framework represents average annual unit price weighted by price and volume. That is, the unit price reflects the composition of all pathology services. A number of submissions to the DoHA review on funding arrangements referred to the profitability of pathology practices and the viability of the pathology industry in reference to the MBS rebate received for pathology services. In particular, it was noted:

- that there was the possibility that MBS fees for pathology items did not necessarily reflect true cost plus a profit margin, with some under and overfunding; and
- that the fee-for-service arrangements has meant pathology providers that are in a position to offer the full spectrum of pathology services can cross-subsidise the earnings from certain services to other more expensive services.

This would suggest that it may be possible to achieve an adjustment to average weighted unit price through cuts across the board for MBS fees, targeted cuts to pathology service fees where rebates are not reflective of actual cost, or a rebalancing of items to address any over or under subsidisation. While the exact mechanism of how this could be achieved is beyond the scope of this study, the three-component framework provides a powerful tool for assessing any compositional effects on unit price at the headline and its impact on total pathology outlays.

In estimating the unit price over the forward estimates and medium term (2010-11 to 2014-15), non-demographic growth rates based on historical trends were used in the modelling. In the case of the current financial year, actual monthly data to October 2010 was utilised. The results are presented in Chart 14.

Chart 14: Unit price, average annual $



Source: Medicare Australia Statistics (2010) and KPMG Econtech Estimates

5.3.2 Intensity

Intensity refers to the average annual usage of services per person per annum. Again, there are two key components that drive growth in intensity, namely:

- preferences for pathology services; and
- the compositional effects of preferences at different age groups;

Changes in preferences of pathology services have seen a steady increase in demand for pathology services over the historical series. On average there were 2.6 tests per capita per annum undertaken in 1993, which increased to an average of 4.6 tests per capita per annum in 2009-10.

Understanding the drivers of preferences is important to modelling future preferences. As mentioned, pathology testing differs from many other health and medical services in that it is a referred service. This means that GPs and medical specialists request pathology tests on behalf of their patients and pathologists respond to these requests. There is a range of mechanisms through which referring doctors' patterns of requesting pathology testing can change. These can be broadly grouped into three categories:

- increases in referring doctors' own activity (i.e. referring doctors seeing more patients);
- increases in the rate that referring doctors initiate pathology investigations (i.e. referring doctors ordering tests for a higher proportion of patients); and
- increases in the number of tests requested on each occasion (i.e. referring doctors ordering more tests per patient).

These three mechanisms can operate separately, but more often occur simultaneously to result in a combined effect on demand for pathology testing. These mechanisms are themselves influenced by a number of factors, both internal and external to the health and medical sector. Some of these are as follows:

- changes in population demographics (for example, the ageing of the population resulting in an increase in chronic disease, an increasing birth rate resulting in a need for more pregnancy care);
- the emergence of new diseases or conditions (for example, HIV, Avian flu);
- the development of new treatments for existing conditions (for example, more sophisticated treatments for breast cancer which require targeting of drugs to specific types of tumours);
- increased community awareness of specific conditions (for example, as a result of a government information campaign or a high profile celebrity contracting a disease);
- changes in the GP workforce (for example, workforce shortages which reduce access to GP services);
- changes in funding arrangements for GP services (for example, the introduction of new item numbers for chronic disease management);
- the implementation of new government health policies (for example, support for the introduction of practice nurses into general practices);
- the introduction of new government general practice programs (for example, wellness checks for specific age groups);
- changes in the education and training of GPs (for example, an increased emphasis on prevention in medical school curricula);
- changes in the affordability of GP services, resulting in increased or decreased access for some groups in the community;

- changes in the location where specific conditions are managed (for example, the shift out of hospitals for pregnancy care to 'shared care' between GPs and hospitals);
- the introduction of screening programs for specific diseases (for example, the faecal occult blood testing program for colorectal cancer); and
- changes in guidelines for the management of specific conditions (for example, new and lower targets for cholesterol in certain patients).

Importantly, it is also recognised that different age groups have different relative per person usage rates of pathology services in Australia. Given the rich Medicare dataset that was available for all pathology services across all age groups, it was possible to establish non-demographic trend rates of intensity on a per capita basis by age cohort. In general, per person usage rates for pathology services are higher for older age groups than for younger age groups, the exception is the 0-5 age group (Table 7).

Table 7: Intensity Rates of Pathology Services – Average Per Capita Usage Per Annum by Age Cohort

	1993-94	1999-00	2004-05	2009-10
0-4	0.88	0.82	0.83	1.01
5-14	0.50	0.50	0.54	0.74
15-24	1.71	1.82	1.86	2.27
25-34	2.48	2.70	2.98	3.56
35-44	2.35	2.79	3.26	3.99
45-54	2.84	3.59	4.31	5.04
55-64	3.91	5.07	6.25	7.24
65-74	4.70	7.24	9.38	10.71
75-84	5.42	7.25	10.43	14.07
>=85	5.29	7.60	9.37	10.97
Weighted Total	**2.40**	**3.07**	**3.81**	**4.66**

Source: Medicare Australia Statistics (2010)

As the population grows and ages, more people will fall into the age groups that are more frequent users of pathology services. The non-demographic growth rates of usage for each age group are projected forward and applied to changes in the population.

5.3.2.1 Estimating demand for pathology services

In recent history, it was observed in the data that usage rates deviated from long-term trend. Additional econometrical analysis was undertaken to model the demand for pathology services based on other observable data.

In addition to the key drivers of demand for pathology services listed above, there are a number of environment and economic factors which influence decisions to visit a GP and, by extension, a specialist.

As economies expand and household incomes increase, the proportion of the budget spent on services tends to increase relative to purchases of goods in the economy. This is true for Australia and expenditure on health services has steadily increased over time.[30] The purchase

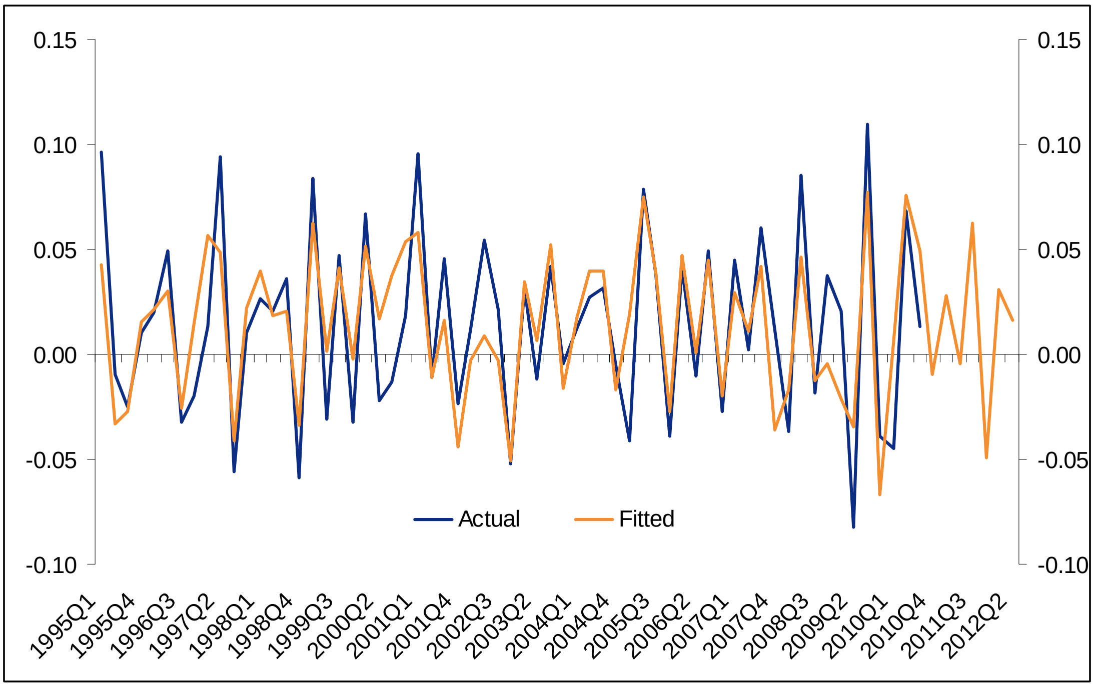
[30] According to the 2003–04 HES, health expenditure, as a proportion of total household expenditure on goods and services, rose from 3.9% in 1984 to 5.1% in 2003–04. Additionally, 31% of household's overall medical care and

of health services can be split into those that are a necessity or urgent and those that can be discretionary or non-urgent. That is, there is likely to be some flexibility in demand for GP visits (and consequently pathology referrals) during periods of volatility for households.[31]

KPMG Econtech developed an error correction model to better understand the demand for pathology services at the aggregate level and to better inform projections of usage over the next two financial years. The model specification is detailed in Appendix B and the dependant variables in the model were obtained from Australian Bureau of Statistics (ABS) sources and the projections from KPMG Econtech's highly regarded MM2 forecasting model.

The modelling results from the error correction model are presented in Chart 15.

Chart 15: Forecast Demand for Pathology Services, % Change



Source: ABS Cat Nos: 5206.0. 6401.0 and 3201.0 and KPMG Econtech Estimates

5.3.3 Population

Estimation of total outlays in the framework used in the study is determined lastly by the demographic factors of the Australian population. The inclusion of demographic modelling captures dynamic changes in the population through:

- increases in the population size; and

health expenditure were spent health practitioner's fees, and 25% spent on and medicines, pharmaceutical products and therapeutic appliances. ABS Cat No. 4836.0.55.001 (2008).

[31] In an analysis of the main areas of household expenditure, health was ranked in the middle of the nine broad areas of household expenditure. This ranking as a 'big-ticket' household expenditure item did not change between 1998-99 and 2003-04. NATSEM (2008)

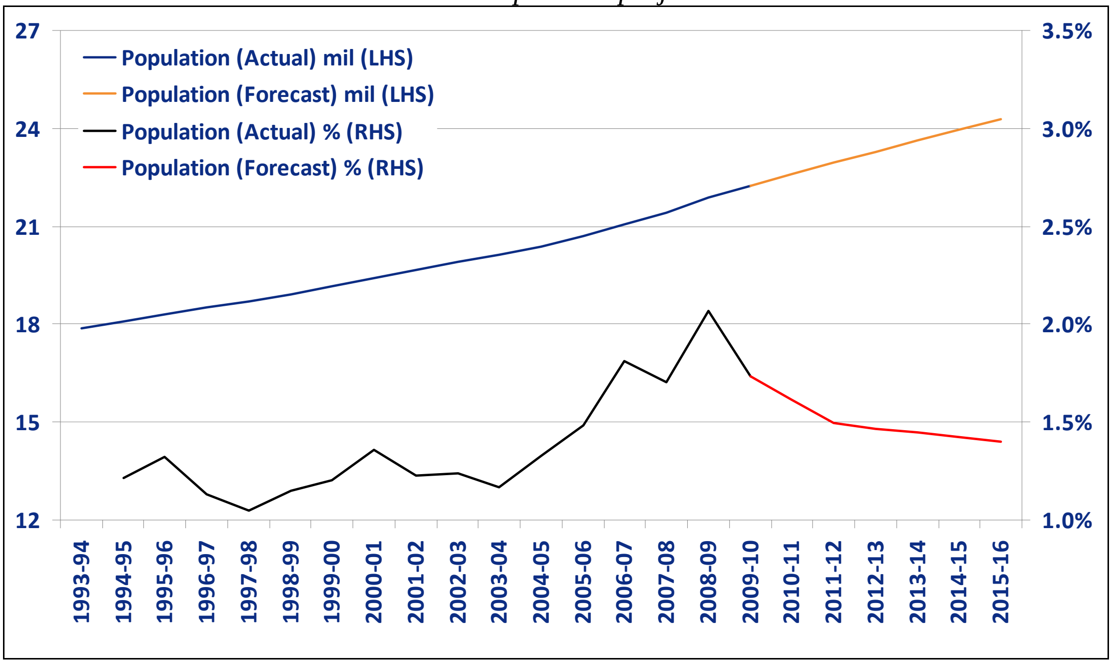
- compositional changes resulting from demographic change across age groups and an ageing population.

The demographic assumptions about fertility, mortality and migration affects the number of total number and the aged and gender composition of the population. The composition of the population in turn affects usage rates of pathology services because different age-gender cohorts have different patterns of usage rates. Changes in these patterns of usage rates of individual cohorts over time will also affect aggregate usage rates and total expenditure on pathology services.

In order to estimate future usage rates the pathology services, the age-specific usage rates for pathology services have been applied to ABS population projections, which have been adjusted according to KPMG Econtech assumptions.

While population will continue to grow, annual rates of population growth are projected to slow gradually, from 2.1 per cent in 2008-09 to 0.9 per cent in 2049-50. The projected annual growth rate of population growth of 1.1 per cent over the next 40 years is slightly lower than the average annual rate of 1.4 per cent over the previous MoU period. Chart 16 shows the population projections over the forward estimates period based on demographic modelling.

Chart 16: Population projections



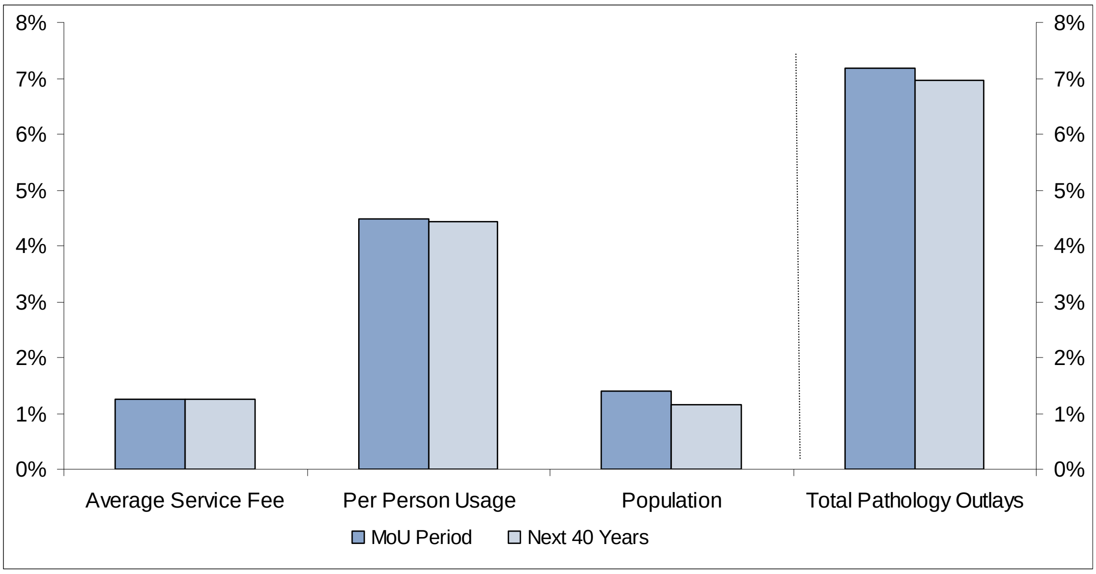
Source: ABS Cat No. 3222.0 (2008) and KPMG Econtech Estimates

5.4 Baseline projections

This section draws together the findings from the previous sections and provides estimates of expected growth in government expenditure on pathology services using the three-component framework.

Estimated growth rates for pathology outlays are a function of the growth rates for unit cost, intensity and population, and based on their growth estimates as presented in Section 5.3 and shown in Chart 17.

Chart 17: Total Pathology Outlays, by the 3 Components



Source: Medicare Australia Statistics (2010) and KPMG Econtech Estimates

Table 8 details the projected growth in pathology outlays and the growth rates of the underlying components.

Table 8: Total Pathology Outlays, by the Three Components

	*2008-09	*2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Total Pathology Outlays, %	**5.1%**	**2.1%**	**3.1%**	**6.8%**	**7.0%**	**7.0%**	**7.0%**
Average Service Fee, %	0.2%	-1.2%	-0.7%	1.3%	1.3%	1.3%	1.3%
Per Person usage, %	2.8%	1.5%	2.2%	3.9%	4.1%	4.2%	4.2%
Population, %	2.1%	1.7%	1.6%	1.5%	1.5%	1.4%	1.4%

* Represents growth rates for actual outlays.

The modelling results presented in Table 8 are based on growth rates from historical trends, and as such, assume that the average service fee will continue to grow at a rate less than inflation. This implies that:

- the average service fee will continue to fall in real terms over the forecast horizon;
- continued productivity gains will need to be delivered by the pathology industry; and
- the associated efficiency gains will be returned to the Australian Government.

Overall, this price assumption represents a conservative approach to the modelling and for growth in total outlays. Essentially, it assumes the discipline placed on price growth in the pathology industry over the MoU period is maintained over the forward estimates. If the price assumption was relaxed and inflation indexation was added to growth in the average service fee, nominal growth in total pathology outlays would average around 9.7 per cent over the next 40 years.

The growth in the intensity rate moderated sharply in 2008-09 and 2009-10. It is possible that the onset of the global financial crisis and its impact on the Australian economic environment and on household budgets was one cause of this moderation. The growth path in usage rates in 2010-11 and 2011-12 reflects its formal econometric relationship with variables in the economy and household budget. The medium growth rate reflects a move back to its historical trend.

Population has grown at a more rapid rate recently due to an increase in the fertility rate. Fertility peaked at 3.5 births per woman in 1961. Subsequently, the total fertility rate of Australian women declined rapidly during the 1960s and 1970s, stabilised during the 1980's, then declined further until 2001. Since that time, fertility has been generally increasing to reach almost 2 births per women in 2008, the highest fertility rate since 1977. While the population has experienced a moderate expansion of late, it is expected that population growth will return to historical trend rates over the projection period.

6 Conclusions

Historically, the MoU agreements which focused on both limiting both price and volume worked successfully. These MoUs were a method for the Australian Government to extract a share of efficiencies that it considered possible in the pathology sector. The need for the sector to manage within the MoU spending caps was a driver for increased efficiency in the sector, and it was achieved through a range of changes including industry consolidation, centralisation and automation to generate economies of scale.

While it has been suggested that the increased efficiencies and economies of scale associated with high volume tests and centralisation that facilitated increased efficiency through industry consolidation, they have not impacted evenly across the different disciplines of pathology. Some areas of pathology, such as anatomical pathology, while gaining some benefits from automation of specimen preparation, continue to be largely dependant upon individuals examining specimens and using clinical judgement to diagnose disease.

At the end of June 2009, the then MoU that governed the funding arrangements of pathology services was allowed to expire with no replacement. This ended a long-running period, starting in 1996, of stable funding arrangements governed by MoUs between the Australian Government and the pathology industry. The Government decided that it would not continue using MoUs to manage pathology expenditure and instead, announced it would closely monitor pathology outlays going forward. In January 2010, the Government requested that DoHA undertake a detailed review of pathology funding arrangements.

This report provides a robust framework to model pathology outlays over the forward estimates and beyond. The framework isolates three main components of growth and allows for each of these components to be modelled separately to clearly identify their contribution to total growth and their impact on pathology outlays.

6.1 Containing costs

Based on the demographic and economic projections used in the IGR, it is expected that as the population ages, more people will fall into older age groups, which are also higher users of health services. Combined with underlying population growth, increasing demand for health services and the funding of new technologies, these demographic changes will place increasing pressure on future health spending. It is essential that the Government continues to monitor outlays across all items of health expenditure to ensure value for money both in terms of effectiveness and efficiency.

In the case of pathology, the framework developed for this report isolates the three main components of growth in outlays and provides a robust tool for the purposes of controlling government expenditure. For example, past MoU agreements have focused on limiting both price and volume and have worked successfully. Using the framework, it is possible to target a desired growth rate in pathology outlays by adjusting the growth rates of either price and/or volume, acknowledging that population growth is largely independent of the control of any funding agreement.

This has important implications for negotiating any funding arrangements between government and industry going forward. Achieving the desired change in growth by adjusting prices could be achieved through a number of mechanisms including cuts across the board for pathology rebates, reducing MBS fees in areas not reflective of actual costs or rebalancing any potential over or under-subsidisation of pathology services. That is, average prices may remain unchanged, but the composition may be adjusted to achieve a desired growth rate in outlays. While there is some flexibility in how prices could be adjusted under different scenarios, it remains outside the scope of this report, which is focused on the impact of any change rather than the process of the change itself.

However, it is noted that the smallest contributor to growth of the three components being price, which has been falling in real terms, is the only component that can be controlled by the pathology industry. Price and volume can be controlled by government policy, however, it is uncertain if volume can be further restricted beyond the current coning arrangements. The third component of population growth remains largely outside the control of any funding agreement.

The largest contributor to growth in pathology outlays remains the growth in the demand for services – the per person usage rates. It is estimated in the baseline projections, that if prices remained unchanged (representing a price fall in real terms), pathology outlays would grow at an average annual rate of 5.7 per cent over the forecast horizon based on historical trends in growth in per capita demand, combined with demographic change. There is significant momentum around this driver in total outlays. It may be the case that going forward, Australians choose to accept this as a feature of its health system and this acceptance would be reflective of community preferences and thus budget outlays should be directed appropriately.

The findings of this report support a holistic assessment of the drivers of growth in pathology outlays. It is also acknowledges that the targeting of a desired growth rate in total outlays for pathology services achieves a number of outcomes, namely: it creates a level of budget certainty for government finances and industry investment decisions; it creates lasting effects through the rebasing of total levels in expenditure; and enables a level of contribution analysis to be undertaken to assist with designing an effective approach.

This report is the first of its kind in Australia to publicly provide a comprehensive framework for deconstructing government expenditure in pathology outlays. It draws together a number of datasets, using a number of advanced modelling techniques and econometric analysis. The report produces projections of pathology outlays and quantifies the impact of a number of funding scenarios. The findings of this report support the assessment of any changes to growth in total pathology outlays to be analysed at the component level.

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Appendix A – GHC Model

A.1 Health costs module

A..1 Introduction

Section 4 of the main report provides an overall perspective on the GHC modelling framework. This Appendix describes in more detail the two modules that make up the GHC model. These are the Health Costs (HC) module and the Private Health Insurance (PHI) module.

A..2 Health costs module

The overall function of the HC module is to project spending on eight categories of health services according to six funding sources.

The historical data on spending on health services by funding source is from the Australian Institute of Health and Welfare (AIHW). There is one exception, which arises because Australian Government spending is shown only as a single category in the AIHW data. This is split between direct spending and spending via grants to the states and territories using information in Australian Government budget papers.

HC module data sources

Australian Institute of Health & Welfare (AIHW)

- health funding by source by service: 1993-94 to 2007-08
- health services per capita by gender and by age group: 1993-94

Intergenerational Report 2010 (IGR)

- real growth in health services per capita by age group: average annual growth to 2049-50

KPMG Econtech

- population by gender and by age: June 30 each year to 2050

The HC module is used to model total health costs and to allocate non-PHI funded health costs between the other five funding sources. These two steps are now described in turn in more detail.

A..3 Total health costs

The first step in the modelling process is to project demand for health services for each of the nine types of health service categories, where pathology is included as part of medical services. Hospitals has been used as an illustration of this method.

Hospital expenditure

Hospitals[t]/Hospitals[0] = {CPI[t] X Σ R[t,x,g] X Pop[t,x,g]} /

{CPI[0] X Σ R[0,x,g] X Pop[0,x,g]}

R[t,x,g] = real per capita spending on hospitals in year t for age group x and gender g

CPI[t] = Consumer Price Index in year [t], as projected in the IGR

Hospitals[0] and R[0,x,g] from AIHW

annual growth in R[t,x,g] from IGR

Pop projection from Econtech (similar to IGR)

The methodology used is similar to that employed in the IGR and is shown in the box above. Real hospital costs are modelled by age and by gender. Base levels for nominal hospital costs by gender and by age in 1993-94 were obtained from the AIHW. These base levels were then converted to real terms by deflating by the CPI. Real hospital costs by gender and by age were then forecast to grow at an annual rate of 2 per cent to match the IGR projected hospital expenditure as a percentage of GDP in 2049-50. These real hospital costs by gender and by age were then applied to KPMG Econtech's projection of the population by gender and by age, which is similar to that contained in the IGR, being based on similar fertility and migration assumptions. Finally, hospital costs were aggregated over gender and age groups and then converted to nominal terms using the IGR's projection for the CPI.

A similar approach was used for projecting costs of most other health services. This includes medical services, PBS and non-PBS pharmaceuticals services, high-level residential aged care services, ancillary services and miscellaneous services. The only exceptions to this approach were for medical services and administration services.

Administration costs were projected using a constant expense ratio for each funding sector. The expense ratio was calculated as the ratio of administration costs to total expenditure on health services. For example, in the case of PHI, the expense ratio is calculated as the ratio of administration costs to payment of PHI benefits.

A..4 Funding of non-PHI health costs

After the first step determines total demand/spending for each type of health service, the second step (described in Section A3) determines the portion of this demand that is met by PHI benefits. The remaining portion is then met by other funding sources, according to existing (2007-08) relativities, as shown in the box below, which uses hospital funding as an illustration.

Hospital funding

Hospitals[t,source] = Hospitals ratio[source] X {Hospitals[t] – Hospitals[t,PHI]}

Source = Commonwealth direct, Commonwealth grants to states, state & local government, individuals, other

A.2 PHI Module

A..5 Introduction

The purpose of the PHI module is to project PHI benefits as the middle step of the modelling process. These benefit levels by type of health service are then fed into the HC module to determine the balance of health funding to be met from other (non-PHI) funding sources.

The major driver of PHI benefits is PHI coverage. Coverage rates have been modelled in detail, according to the type of cover (hospital and ancillary), sex and age group, and taking into account the driving role of the balance between premiums and expected benefits.

PHI module data sources include:

- Public Health Insurance Administration Council (PHIAC). Coverage by age group by sex and benefits by age group by sex

- Time span of historical data: for hospital - September quarter 1997 to September quarter 2009; for ancillary - September quarter 2002 to September quarter 2009.

A..5 Coverage rates

This report assumes that people make separate decisions about whether to take out hospital cover and ancillary cover. Coverage rates are modelled in detail, according to two types of cover (hospital and ancillary), both sexes and 14 age groups (extending from 20-24 through to 80-84 and 85+), giving a total of 84 equations. The form of the coverage equation is shown in the box below.

Coverage equations:

$$logit[cov_{hospital(x,g,t)}] = \ln\left(\frac{cov_{hospital(x,g,t)}}{1 - cov_{hospital(x,g,t)}}\right) =$$

$$a[x,g,t] + b \times \left(\frac{premium_{hospital[x,g,t]}}{CPI}\right) / \left(\frac{benefits_{hospital[x,g,t]}}{CPI(health)}\right)$$

$$logit[cov_{ancillary(x,g,t)}] = \ln\left(\frac{cov_{ancillary(x,g,t)}}{1 - cov_{ancillary(x,g,t)}}\right) =$$

$$c[x,g,t] + d \times \left(\frac{premium_{ancillary[x,g,t]}}{CPI}\right) / \left(\frac{benefits_{ancillary[x,g,t]}}{CPI(health)}\right) \text{logit(cov\_hospital[x,g,t])}$$

Where:

$cov[x,g,t]$ = coverage rate for age group x, sex g and year t

$premium[x,g,t]$ = cov[x,g,t] = effective premium net of rebate per insured adult for age group x, sex g and year t

$benefits[x,g,t]$ = expected benefit per insured adult for age group x, sex g and year t

b and d =b,d = parameters representing sensitivity of logit(coverage) to the balance between effective premiums and expected benefits for hospital and ancillary coverage respectively

The sensitivity of coverage to premium/benefits is difficult to estimate – there have been frequent structural changes that have affected the private health system. Therefore, instead of estimating ‘b’ (sensitivity of hospital coverage to premium/benefits) directly, it has been modelled indirectly in the GHC model via age. The indirect equation used to estimate ‘b’ is:

$$\begin{aligned} &sensitivity\ of\ logit(coverage)\ to\ age\ [1] \\ &\quad = sensitivity\ of\ logit(coverage)\ to\ premium/benefit\ [2] \\ &\quad \times sensitivity\ of\ premium/benefits\ to\ age\ [3] \end{aligned}$$

In this approach the age-related parameters of [1] and [3] were estimated to calculate [2].

The estimate for [1], the sensitivity of coverage to age, was derived from John Wilson (1999), "An Analysis of PHI Membership in Australia". Wilson used cross-sectional data to estimate a logit equation for PHI coverage. Table B1 shows the parameter for ages estimated by Wilson. This implies that each year of age by itself adds 0.035 to the logit of coverage.

Table A1: Sensitivity of logit(coverage) to age, taking other factors into account

	25-34	35-44	45-54	55-64	per year of age
Age group effect	-0.1848	0.2346	0.3663	0.8540	0.035

Source: (Wilson, 1999)

The estimate for [3], the sensitivity of the premium/benefit ratio to age, was obtained using a simple regression with age and sex as independent variables. The age parameter of this regression was -0.056, implying that each year of age reduces premium/benefits by 0.056.

The parameter 'b' can now be calculated. The sensitivity of the logit of coverage to premium/benefit = 0.035 / -0.056 = -0.6.

The parameter 'd' was chosen so that the model accurately predicts the combined effects on hospital and ancillary coverage of the introduction of lifetime health cover and the PHI rebate. The 'intercept' parameters, 'a', 'c' and 'e' were chosen so that each equation accurately predicts actual coverage rates by age by sex in June 2005.

A..6 Lifetime health cover

The GHC model is designed to take into account the Lifetime Health Cover (LHC) system and its effects on coverage. The purpose of LHC is to reduce the extent of adverse selection in the insurance pool by setting premiums to take into account that expected benefits depend on age. This objective could have been achieved by basing premiums on the current age of those in the insured pool or their entry age to the pool.

The current age approach is the more straightforward. Premiums by current age could be determined as a mark up on expected benefits by current age.

Current age premiums:

$$PC \times RC_x = kc \times B_x \quad [1]$$

where:

x = age

PC = base current age premium

RC_x = current age premium loading multiple

B_x = expected benefits at age x

kc = current age premium mark-up factor

LHC is in fact based on the entry age approach. In an actuarially fair system, the entry age loadings multiple would be set so that the present value of expected future premiums is a markup on the present value of expected future benefits. The calculation of entry age premiums in the following box is similar to Gale and Brown (2003).

Equation [5] is derived for a 'funded' system but could be applied to an 'unfunded' system after modifying the entry age premium mark-up factor, 'ke'. This distinction between a 'funded' and 'unfunded' system arises under an entry age system but not under a current age system. Under an entry age system, benefits are expected to be less than the premium in the early years of insurance, but are expected to exceed the premium as the insured person ages and makes more use of hospitals. Under an 'unfunded' system, planned total premium income (and in turn the base premium) for a year is derived from expected benefits in that year. Under a 'funded' system the base premium also makes allowance for the higher level of benefits expected in future years as insured persons age i.e. there is a pre-payment component. In terms of equation [5], this lower base premium, 'PE', under an 'unfunded' system, could be achieved by setting the entry age premium mark-up factor, 'ke', to be lower than under a 'funded' system, such that planned total premium income for a year bears the desired relationship to expected benefits in that year. However, the premium loadings, 'RE_x', may be the same for both 'funded' and 'unfunded' systems.

Entry age premiums:

$$PV(premiums) = PE \times RE_x \times \sum_{t=0}^{w-x} \frac{(1+i)^t}{(1+d)^t} \times L_{x+t} \qquad [2]$$

$$PV(benefits) = \sum_{t=0}^{w-x} \frac{(1+i)^t}{(1+d)^t} \times L_{x+t} \times B_{x+t} \qquad [3]$$

$$PV(premiums) = ke \times PV(benefits) \qquad [4]$$

Using [2] and [3] in [4] and simplifying gives the entry age premiums in [5].

$$PE \times RE_x = \{ke \times \sum_{t=0}^{w-x} \frac{(1+i)^t}{(1+d)^t} \times L_{x+t} \times B_{x+t}\} / \{\sum_{t=0}^{w-x} \frac{(1+i)^t}{(1+d)^t} \times L_{x+t}\} \qquad [5]$$

where:

PE = base entry age premium

RE_x =entry age premium loading multiple i = individuals' expected rate of inflation in premiums and benefits

d = individuals' discount rate

ke = entry age premium mark-up factor

Gale and Brown (2003) find that LHC is approximately actuarially fair. However, because it is not precisely fair, there are discrepancies between the actuarially fair entry age loading multiples that can be calculated using equation [5], and the entry age loading multiples that apply in practice. To avoid such discrepancies, the GHC model is based on the loadings that apply in practice. These actual loading multiples rise smoothly in annual steps of 2 percentage points from a 100 per cent multiple (i.e. no loading) at age 30 to a 170 per cent multiple at age 65.

A literal modelling of the entry age system would introduce complexities to the GHC model that are unwarranted for the general purpose of this report of generating scenarios for government PHI policy and health costs. The PHI module is sufficiently complex for these general purposes. It projects 84 groups of persons with health insurance, where the different groups are distinguished by three groups of insurance cover, two sexes and 14 age groups. Further, these 84 groups are projected over 40 single years, extending to 2046-47. This makes GHC far more sophisticated than comparable models that have been used to assess government health and PHI policy. A literal modelling of entry age premiums would require a further distinction, based on entry age, which would increase the number of groups from 56 to 420. Such an extension would be important for a model that is designed to produce detailed projections of the PHI industry for business planning purposes, but not for a model with the general policy purposes of the GHC model.

Instead, the GHC model proxies the LHC system of basing premium loadings on entry age with an actuarially equivalent system of basing premium loadings on current age. The current age loadings are actuarially equivalent to the entry age loadings in the sense that the hypothetical age profile of benefits under which the entry age loadings would be actuarially fair is use to construct the current age loadings.

Of course, the actual age profile of expected benefits will differ from this hypothetical age profile of expected benefits. This is because the LHC entry age loadings are not precisely actuarially fair. However, since the current age loadings are based on the same hypothetical age profile of expected benefits as the entry age loadings, both systems of loadings will depart from fairness to the same degree. Therefore, in theory at least, the current age loadings system may deliver the same degree of effectiveness in countering age-based adverse selection as the LHC entry age loadings. It is therefore reasonable, particularly for our general purposes, to proxy the entry age loadings system with an actuarially equivalent current age system.

The formula for converting entry age loadings to actuarially equivalent current age loadings is derived in the box below as equation [11].

Current age premiums as a function of actuarially equivalent entry age premiums

Equation [5] for entry age premiums was derived in the previous box and is reproduced below. However, RE_x is now interpreted as the actual entry age loadings under LHC and B_x as the hypothetical expected benefits under which those actual loadings would be actuarially fair.

$$PE \times RE_x = \{ke \times \sum_{t=0}^{w-x} \frac{(1+i)^t}{(1+d)^t} \times L_{x+t} \times B_{x+t}\} / \{\sum_{t=0}^{w-x} \frac{(1+i)^t}{(1+d)^t} \times L_{x+t}\} \quad [5]$$

From equation [5], the equivalent equation for someone aged x+1 is as given in equation [6].

$$PE \times RE_{x+1} = \{ke \times \sum_{t=0}^{w-x-1} \frac{(1+i)^t}{(1+d)^t} \times L_{x+t+1} \times B_{x+t+1}\} / \{\sum_{t=0}^{w-x-1} \frac{(1+i)^t}{(1+d)^t} \times L_{x+t+1}\} \quad [6]$$

Equation [7] simply re-indexes the summations in equation [6].

$$PE \times RE_{x+1} = \{ke \times \sum_{t=1}^{w-x} \frac{(1+i)^{t-1}}{(1+d)^{t-1}} \times L_{x+t} \times B_{x+t}\} / \{\sum_{t=1}^{w-x} \frac{(1+i)^{t-1}}{(1+d)^{t-1}} \times L_{x+t}\} \quad [7]$$

The numerator and denominator can be multiplied by the same factor of (1+i)/(1+d).

$$PE \times RE_{x+1} = \{ke \times \sum_{t=1}^{w-x} \frac{(1+i)^t}{(1+d)^t} \times L_{x+t} \times B_{x+t}\} / \{\sum_{t=1}^{w-x} \frac{(1+i)^t}{(1+d)^t} \times L_{x+t}\} \quad [8]$$

Equation [9] expands equation [5] for the entry age premium of someone aged x.

$$PE \times RE_x = \{ke \times [L_x \times B_x + \sum_{t=1}^{w-x} \frac{(1+i)^t}{(1+d)^t} \times L_{x+t} \times B_{x+t}\} / \{\sum_{t=0}^{w-x} \frac{(1+i)^t}{(1+d)^t} \times L_{x+t}\} \quad [9]$$

Comparing equations [8] and [9], they both contain the same summation involving B_{x+t}. Substituting out for this summation and simplifying gives equation [10], involving the entry age premiums at age x and x+1.

$$ke \times L_x \times B_x = L_x \times PE \times RE_x + \sum_{t=1}^{w-x} \frac{(1+i)^t}{(1+d)^t} \times L_{x+t} \times [PE \times RE_x - PE \times RE_{x+1}] \quad [10]$$

The final step is to use equation [1] for current age premiums to eliminate B_x and then simplify.

$$PC \times RC_x = (kc/ke) \times \{PE \times RE_x + \sum_{t=1}^{w-x} \frac{(1+i)^t}{(1+d)^t} \times \frac{L_{x+t}}{L_x} \times [PE \times RE_x - PE \times RE_{x+1}]\}$$

[11]

The final equation in the box, equation [11], is the premiums conversion equation for a person of a given age, ‘x’. It expresses the current age premium in terms of the entry age premium. The first term allows for the possibility of a different mark-up factor between the entry age and current age systems. Abstracting from that complication, the interpretation of the equation is straightforward. It simply states that the current age premium equals the entry age premium plus a negative adjustment if the entry age premium loading at entry age ‘x+1’ exceeds that at age ‘x’. So the current age premium in the first year of insurance is less than the entry age premium for that year if there would have been a rise in the premium loading from deferring entry to the following year.

Equation [11] has been used to translate entry age premium loadings, ‘RE_x’, to actuarially equivalent current age premium loadings, ‘RC_x’, for use in the coverage equations. Thus it is only used to determine relative premiums across age groups. Because the current system is unfunded, total premiums are determined beforehand as a markup on total current benefits. The PHI module solves for the level of base premium, ‘PC’ that delivers this required level of total premiums, given the current age premium loadings, ‘RC_x’.

Note that the derivation of equation [11] confirms that our conversion of premium loadings does not rely on premiums being actuarially fair. Indeed, equation [11] does not involve benefits at all, but simply relates current age loadings to entry age loadings. As noted above, the current age loadings will be actuarially fair to the same extent as the entry age loadings. This is because both systems of loadings are actuarially fair under the same hypothetical age profile for expected benefits. This is the profile that satisfies equation [5] after the actual entry age loadings are inserted on the left-hand side. The current age loadings in equation [11] are consistent with the same hypothetical age-profile for benefits, making the two systems actuarially equivalent in that sense.

If, in the future, the PHI rebate were to vary by age then equation [11] would need to be applied carefully. In particular, age-specific rebates would need to be applied before the premium conversion from entry age to current age, not after.

No allowance was made for the complication that LHC is grandfathered, but this has little impact. Under grandfathering, those aged over 30 on 15 July 2000 and with continuous cover from that date are exempt from loadings that would otherwise apply. Given the long 40-year horizon of this study, the transitional complications from grandfathering are small – on a rough estimate the grandfathered group will account for only about 10 per cent of the insured population by 2042-43. In any case, grandfathering is a cross-subsidy of the grandfathered group by the non-grandfathered group of insured. It will encourage the grandfathered group to remain insured, while discouraging others from taking up or maintaining their coverage. In this zero-sum game, there is no presumption that the effect on total coverage will be positive or negative.

Under an entry age system, someone exiting faces the penalty of a higher loading on any subsequent re-entry. This acts both as a barrier to entry and exit compared with a current age system. This means that turnover is likely to be less than under a current age system and so the dynamics of membership will be different. However, it is clear from economic principles that this barrier to both entry and exit will have a net effect in either direction on coverage levels in the long-term, relative to the actuarially equivalent current age system contained in the GHC model.

In summary, the current age loadings in the GHC model are based on the same hypothetical age profile of expected benefits as implied by the LHC entry age loadings, so both systems of loadings will depart from fairness to the same degree. Therefore, in theory at least, the GHC current age loadings system may deliver the same degree of effectiveness in countering age-based adverse selection as the LHC entry age loadings.

Appendix B – Modelling Demand for Pathology Services

B.1 Econometric approach to forecasting pathology services

Broadly two forecasting approaches are available. One approach draws on data movements themselves without any considerations of the underlying behavioural relationships with the potential economic and demographic drivers. This approach is often referred to the univariate time series modelling approach. The other approach relies heavily on the likely behavioural relationships and requires a search for statistically significant underlying drivers. This approach is often referred to as a structural modelling approach. In general, the first approach is considered to be better in terms of forecasting performances, but it is not possible to assess any potential implications of policy changes.

These two approaches are a bit extreme; a third approach has been developed to capture the characteristics of the two approaches – the Error Correction Model (ECM) approaches. This approach not only captures the theoretical relationships but also short dynamics inherent in the data. This approach particularly takes into account the implications of the (stochastic) trends inherent in the time series data on econometric estimation.

The ECM approaches undertake three forms of data analysis:

1 Whether the underlying data has (stochastic) trend components using the unit-root tests.

If the underlying variables have a (stochastic) trend, the usual regressions approach will result in spurious relations, leading to poor forecasting performances although the historical relations look fine.

If the underlying variables have the (stochastic) trends, the second step involves examining whether there is a long-run relationship between the target variable (the number of pathology services in the current case) and the selected underlying drivers. This procedure is referred to as "co-integration" tests, using the Johanson[32] maximum likelihood tests, or Engle-Granger first-step approach[33]. In this report, the Engel Granger approach is used, and the Engle-Granger first step is based on the analysis using the level form of data. Because of the nature of the level form analysis, this first step approach is referred to the long-run or equilibrium relationships.

Once a long-run relationship is found, the second-step is to establish an ECM to capture the short run dynamics. This second step is undertaken in terms of the first difference form, or the growth rates if the level form is defined in the logarithmic transformation. The usual regression tests such as t-tests and the autocorrelation tests of the residuals are applicable to this second step.

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[32] Johansen, S.J. (1988), 'Statistical Analysis of Co-integration Vectors', *Journal of Economic Dynamics and Control*, 12, 231-54.
[33] Engle, R.F. and Granger, C.W.J. (1987), 'Cointegration and Error Correction: Representation, Estimation and Testing', *Econometrica*, 55, 251-76.

B..1 Unit root tests – Step 1

The number of pathology services (psno) is turned out to have a stochastic trend, i.e., the integrated order of one, I(1). This implies that the psno should be driven by another set of I(1) variables in the long run.

Initially, for the assessment for the potential drivers, five economic variables and six demographic variables are selected.

The five economic variables are:

- Real household disposable income (rhhd),
- Real gross state products (rgdp),
- Real private consumption (rpc),
- Household subsidy receipts from the government (sub), and
- Consumer price index (cpi).

The six demographic variables are:

- Total residents (pop)
- Population share of aged 55 to 64(spop5564)
- Population share of aged 65 to 74(spop6574)
- Population share of aged 75 and above(spop75+)
- Population share of aged 4 and below (spop04)
- Population share of aged 6 to 10(spop610)

Table B.1: Unit Root Test Results

Variable Name	Order of Integration
log of psno	I(1)
log of rhhd, rgdp, rpc, sub	I(1)
log of cpi	I(1)
log of pop	I(1)
spop5564, spop6574, spop75+	I(1)
spop04, spop610	I(0)

Except for spop04 and spop610, all of the selected variables have a stochastic trend, implying those variables can be a candidate for the long-term drivers of the pathology services.

B..2 Long term model – Step 2

The selection of the long term drivers is made on the following two conditions:

- The first condition is whether the sign of the corresponding coefficient is theoretically defendable. For example, the coefficient of population should be positive and the income related economic drivers should also have a positive coefficient as the pathology services tend to increase as the household income increases, i.e., positive income elasticity.

- The second condition is the residual of the long run equation should not have any stochastic trends.

The following details the results from the long run model. Note that the t-statistic is not valid in the long run model analysis. Also the high R-squared is expected and not relevant to testing the validity of the model specifications.

Table B.2: Long Run Estimation Results

Dependent Variable: LPSNO
Method: Least Squares
Date: 13/12/10   Time: 14:44
Sample: 1993Q4 2010Q3
Included observations: 68
LPSNO=AA(1)+AA(2)*LPOP+AA(3)*LRPC+AA(4)*LRSUB+AA(5)*SPOP5564
+AA(6)*SPOP6574+AA(7)*SPOP75

	Coefficient	Std. Error	t-Statistic	Prob.
AA(1)	-18.76263	11.35428	-1.652472	0.1036
AA(2)	1.612360	0.899575	1.792358	0.0780
AA(3)	0.598184	0.342716	1.745421	0.0859
AA(4)	0.024076	0.061240	0.393143	0.6956
AA(5)	2.414982	2.035119	1.186654	0.2400
AA(6)	7.362663	13.00432	0.566171	0.5734
AA(7)	5.484219	7.625191	0.719224	0.4747

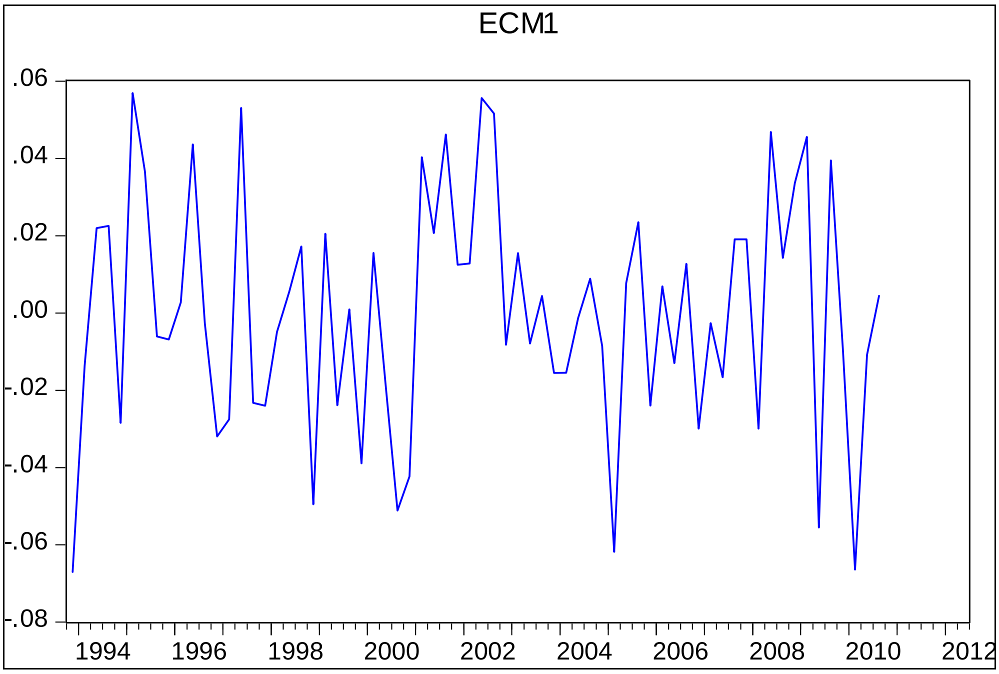
R-squared	0.987630	Mean dependent var	16.64348
Adjusted R-squared	0.986413	S.D. dependent var	0.276669
S.E. of regression	0.032249	Akaike info criterion	-3.933407
Sum squared resid	0.063440	Schwarz criterion	-3.704928
Log likelihood	140.7358	Hannan-Quinn criter.	-3.842876
F-statistic	811.7194	Durbin-Watson stat	1.951304
Prob(F-statistic)	0.000000		

In the long run, if the population grows by 1%, the pathology services grow by 1.6%. The pathology services turn out to be highly sensitive to the changes in the shares of the older age groups. In the long run, if the share of the age cohort between 65 and 74 increases by 1% point, then the pathology services increases by 7.3%. The older cohort is also highly sensitive, but lower then those aged between 65 and 74. The younger age cohort has the lowest responses among the three mature aged groups, though its sensitivity is relatively high.

The income elasticity in terms of real private consumption turns out to be moderate at around 0.6, implying that if the real private consumption increases by 1%, the pathology services increase by 0.6% in the long run.

Chart B.1 shows the residuals of the above long run model. They do not show any presence of a stochastic trend.

Chart B.1: Residuals of the Long Run Model



B..3 Final Model Specification: Short Run Model (ECM) – Step 3

Table 3 shows the short run model specification. The short run model has the first difference of log of pathology services (it is noted by the difference operator, D, in the table), equivalent to its growth rates as the dependent variable. The coefficient, b(2), is for the error correction term generated from the long run relationship. This coefficient is the so-called speed of adjustment, indicating the extent to which the previous-period gap between the actual and long-term trend pathology services is corrected in the current period. This coefficient should be negative and fractional, i.e. its absolute value should be less than one. If this condition is not met, the whole short run relationship is not stable.

For the short run model, the usual regression diagnostic tests are applicable.

Table B.3: The short run model estimation results

Dependent Variable: D(LPSNO)
Method: Least Squares
Date: 13/12/10 Time: 14:44
Sample (adjusted): 1995Q1 2010Q3
Included observations: 63 after adjustments
D(LPSNO)=B(1)+B(2)*(LPSNO(-1) - (AA1+AA2*LPOP(-1)+AA3*LRPC(-1) +AA4*LRSUB(-1)+AA5*SPOP5564(-1)+AA5*SPOP6574(-1)+AA5 *SPOP75(-1)))+B(3)*D(SPOP5564)+B(4)*D(SPOP6574)+B(5) *D(LRPC(-1))+B(6)*D(LRSUB)+B(7)*QDUM3+B(8)*QDUM4 +B(9) *D(LPSNO(-4))+B(10)*(SPOP05)

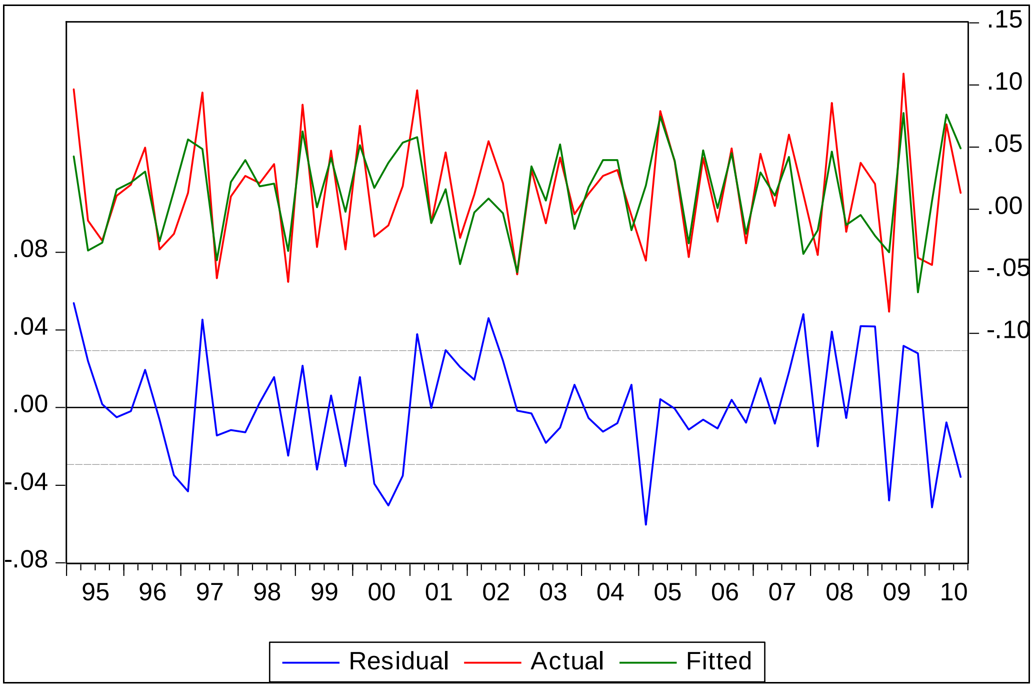
	Coefficient	Std. Error	t-Statistic	Prob.
B(1)	0.634172	0.135566	4.677950	0.0000
B(2)	-0.984445	0.133464	-7.376114	0.0000
B(3)	15.92517	8.536866	1.865459	0.0677
B(4)	31.30995	13.78296	2.271642	0.0272
B(5)	-1.563459	1.047818	-1.492109	0.1416
B(6)	0.041214	0.042163	0.977485	0.3328
B(7)	-0.019566	0.019338	-1.011785	0.3162
B(8)	-0.024174	0.010467	-2.309620	0.0248
B(9)	-0.136499	0.105849	-1.289562	0.2028
B(10)	-1.169124	1.204267	-0.970818	0.3360

R-squared	0.618908	Mean dependent var	0.013985
Adjusted R-squared	0.554194	S.D. dependent var	0.043917
S.E. of regression	0.029323	Akaike info criterion	-4.076265
Sum squared resid	0.045572	Schwarz criterion	-3.736085
Log likelihood	138.4023	Hannan-Quinn criter.	-3.942470
F-statistic	9.563778	Durbin-Watson stat	1.974709
Prob(F-statistic)	0.000000		

The speed of adjustment is almost equal to one, implying that the gap between the actual and long-term trend in the previous period is almost fully corrected in the current period. To take into account the data mining process and its subsequent loss of the power, the variables with the t-statistic above one are selected. The third and fourth quarter dummies turn out to be statistically significant. The short term elasticities of the older age cohort shares are also very high. This short run specification has passed the LM test for AR(4).

Chart B.2 shows that actual and predicted and residuals for growth rates of PSNO

Chart B.2: Actual, Predicted and Residuals of the Short Run Model



B..4 Forecasting pathology services

To forecast the pathology services, it is necessary to obtain the forecasts of the right hand side variables of the ECM specification discussed above. The KPMG in-house dynamic macro/industry forecast model, MM2[34], has been used to generate the forecasts of the selected drivers. Therefore, the pathology services forecasts are critically dependent not only on the model specifications but also the forecasts of the selected drivers. Table B.5 reports the summary forecast results based on the short run model discussed above.

Table B.5: Pathology Services - History and Forecasts

Period		No of Pathology Services, mill (Level form history/forecasts)	% growth
History	2009Q4	25.8	-3.91
	2010Q1	24.7	-4.48
	2010Q2	26.4	6.84
	2010Q3	26.8	1.31
Forecast	2010Q4	26.5	-0.94
	2011Q1	27.3	2.78
	2011Q2	27.1	-0.45
	2011Q3	28.9	6.27
	2011Q4	27.5	-4.92
	2012Q1	28.4	3.07
	2012Q2	28.8	1.61

[34] KPMG Econtech's forecasting model of the Australian economy. For more information, please see http://www.econtech.com.au/MM2.aspx

The complete historical/forecast series are reported in the following charts.

Chart B.3: Actual (PSNO) and Predicted (FPSNO) Pathology Services

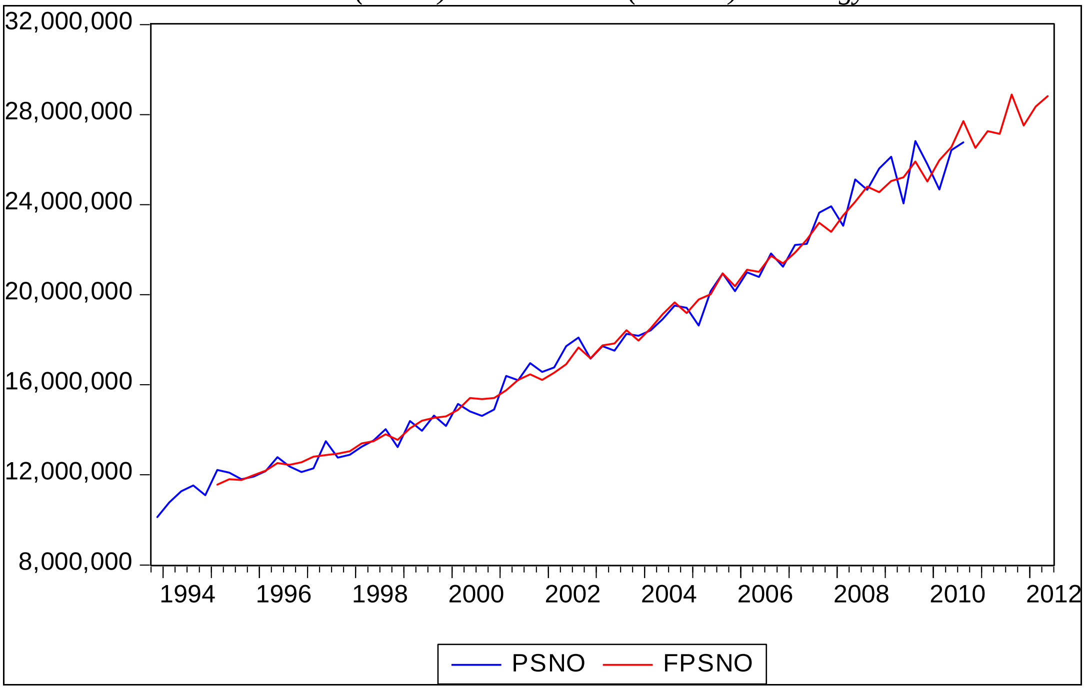


Chart B.4 Actual (PSNO) and Predicted (FPSNO) Pathology Services Growth Rates