Deloitte Access Economics

Macroeconomic drivers of private health insurance coverage

nib Health Insurance

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Executive Summary

Macroeconomic factors were found to predict demand for health insurance policies. In particular, changes to the unemployment rate, average weekly earnings and the Australian SPI 200 Total Return Index[1] were all found to have a statistically significant impact on demand. For statistical reasons the demand for health insurance was specified using the change in the year on year growth rate of health insurance policies. It was found that growth in PHI policies would be lower:

• three quarters after a worsening (increase) in the unemployment rate;

• two quarters after a fall in the growth rate of average weekly earnings; and

• one quarter after a fall in the growth rate of the SPI 200 Total Return Index.

Using Deloitte Access Economic' forecasts for the macroeconomic inputs to the model, it was estimated that over the next three years demand for health insurance policies would grow at an average rate of 3.08% per year, resulting in total policies held reaching 6.2 million at the end of the forecast horizon.

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[1] A total return index is the price level index plus the dividend reinvested. It assumes that any cash distributions, such as dividends, are reinvested back into the index. This type of index is usually considered a more accurate measure of actual equity market performance than if dividends and distributions were ignored, as in the typically reported SPI 200 index.

1 Methodology and modelling results

A regression model was constructed to estimate the change in the year on year growth rate in the total number of health insurance policies held. Since total policies held trends upward, a growth rate was used to reduce the risk of finding spurious relationships between the macroeconomic variables and the number of health insurance policies. Year ended growth was chosen because it exhibited less seasonal volatility then growth over the previous quarter. The year ended growth rate still showed signs of a trend, which necessitated the use of the change in the growth rate.

The sample includes data from the September quarter in 2002 to the March quarter in 2011. The starting date was chosen make sure that the effect of the Life Time Health Cover policy in July 2000 was not included. This is to avoid the temporary large increase in the number of policies.

A regression model of the change (first difference) in policy growth was developed using a forward stepwise approach. This began with a model that only included the previous quarter change in the growth in policy holders. Including this lag of the dependant variable removed the serial correlation that would otherwise have been in the residuals, making inference on statistically significance impossible. Macroeconomic explanatory variables were then added one at a time. These included (see Appendix A for more detail):

- Real GDP growth.
- Consumer price inflation.
- Unemployment rate.
- Australian SPI 200 Total Returns Index
- Average weekly earnings.
- Mortgage rates.
- Retail sales.
- Consumer confidence.
- Job advertisements.
- Household savings ratio.

Each macroeconomic variable also had up to four lags included in the model selection process to determine whether changes have a delayed impact on the change in policy growth.

If adding a variable improved the Akaike information criterion (AIC), then the variable was left in the model, otherwise it was removed. Statistically insignificant variables were removed in each round.

The results for the chosen model are shown in Table 1.1. Interpretations of coefficient estimates are a function of the final model and include the following.

- A one percentage point increase in average weekly earnings growth rate (year on year) is estimated to increase the change in the policy growth rate by 0.09 percentage points.

- A one percentage point increase in the unemployment rate is estimated to reduce policy growth by 0.53 percentage points in three quarters time.

- A one percentage point increase in the SPI 200 Total Returns Index growth rate (year on year) is estimated to increase the change in the policy growth rate by 0.013 percentage points in the following quarter.

Table 1.1: Modelling results

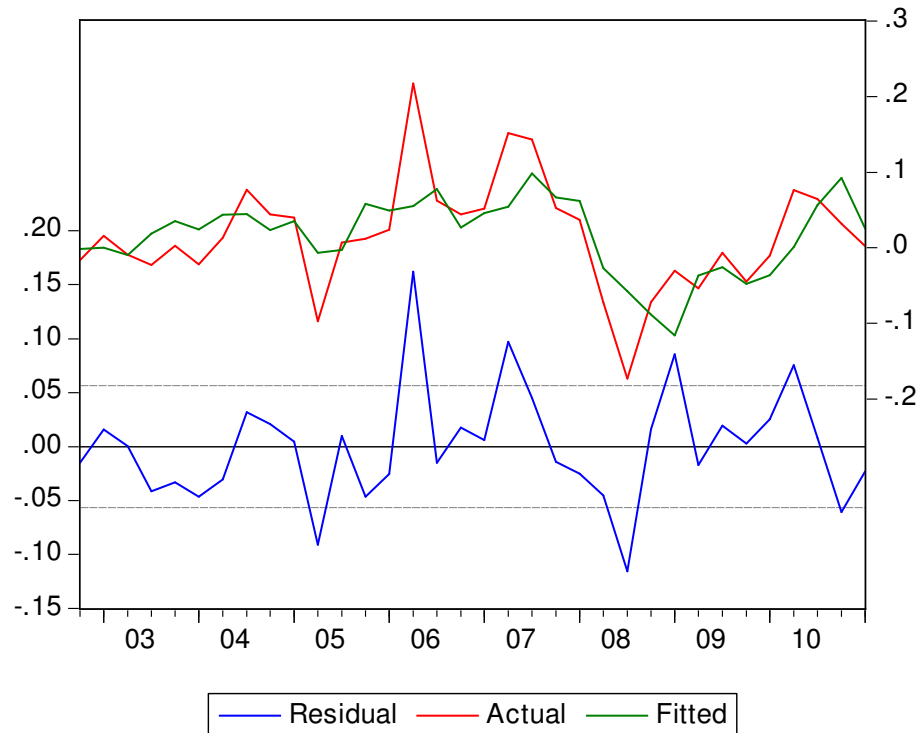|	Coefficient estimate	Standard error
Previous quarter policy growth	0.371**	0.133
Average weekly earnings growth, two quarters prior	0.087*	0.048
Change in the unemployment rate, three quarters prior	-0.531**	0.197
SPI 200 Total Returns Index growth, one quarter prior	0.013**	0.006
Constant	-0.390*	0.209

Note: * indicates statistically significant at the 10% level. ** indicates statistically significant at 5% level. There were 35 observations. Growth is calculated year-on-year.
Source: Deloitte Access Economics estimates.

The model fitted values and residuals are shown in Chart 1.1. The fitted values are the model predictions at each actual data point and when compared with the actual data series demonstrate the model's ability to capture the pattern in the data. The residual line shows the unexplained component of model and should be free from explainable patterns.

This model explained 45% of the variation in the change in policy growth (based on the adjusted R^2). All independent variables had a constant mean over time and no serial correlation was found. Accordingly, the standard errors are correct and conclusion on statistical significance is valid.

Chart 1.1: Model fitted values and residuals

Source: Deloitte Access Economics' modelling.

It is difficult to interpret coefficient estimates in the context of a change in a macroeconomic variable on the impact on policies. This is because the dependent variable is the change in policy growth rate and some independent variables are represented in growth rates (average weekly earnings and SPI 200 Total Returns Index) while others in first differenced growth rates (unemployment rate).

To provide a more natural interpretation, each macroeconomic variable was increased by 10% and the impact on the number of policies was forecasted while holding all other variables constant. The results include the following.

• A 10% increase in average weekly earnings from $1,004 to $1,104 is estimated to increase the number of policies by approximately 39,277 in two quarters time.

• A 10% increase in the unemployment rate from 5% to 5.5% is estimated to decrease the total number of policies by 16,402 in three quarters time.

• A 10% increase in the SPI 200 Total Returns Index from 33,826 to 37,208 is estimated to increase the number of policies by 6,322 in the following quarter.

The results suggest that the macroeconomic variable with the greatest impact on policy growth is average weekly earnings, followed by unemployment and then the SPI 200 Total Returns Index.

Intuitively this makes sense as a change to average weekly earnings is a direct proxy to a change in personal and household income across all employed persons. Unemployment can also be interpreted as a measure of income, and the negative impact of unemployment on the demand for PHI has also been found in the literature. The SPI 200 Total Returns

Index can be interpreted as a measure of wealth and therefore may impact people who rely on income derived from wealth (e.g., retired people who rely on income derived from superannuation invested in the stock market).

2 Forecasts

The change in total policy growth was forecast 12 quarters (three years) ahead. This was done by forecasting statistically significant macroeconomic variables and applying these to the derived regression model. The unemployment rate and growth in average weekly earnings were forecasted using Deloitte Access Economics' (2011) forecasts. Growth in the SPI 200 Total Returns Index was forecast using an autoregressive model of order two (AR2), which essentially provided a flat forecast for quarterly growth.

Table 2.1 shows the model forecasts for growth in the total number of policies held and the number of policies held over the forecast horizon. It was estimated that annual growth in the number of policies would average 3.08% over the next three years. Converting this growth into the number of policies, it was forecasted that policies will increase to 6.2 million in March 2014.
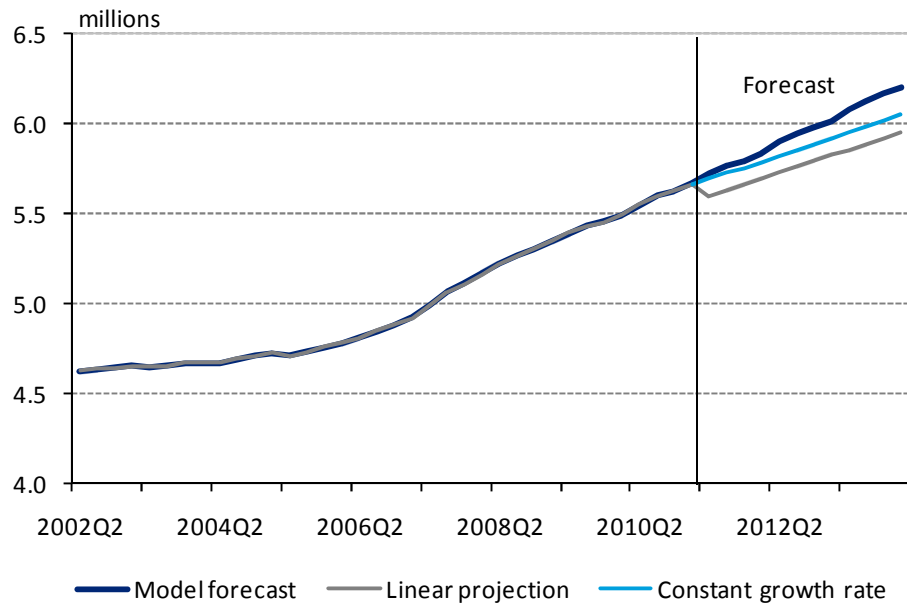
Table 2.1: Model forecasts

	Growth in policies held	Policies held
	%	No.
June quarter 2011	3.10	5,721,635
September quarter 2011	3.03	5,765,913
December quarter 2011	2.94	5,794,106
March 2012	2.95	5,829,536
June quarter 2012	3.06	5,896,827
September quarter 2012	3.13	5,946,588
December quarter 2012	3.16	5,977,406
March 2013	3.10	6,010,450
June quarter 2013	3.09	6,078,758
September quarter 2013	3.05	6,128,246
December quarter 2013	3.12	6,163,631
March 2014	3.16	6,200,237

Source: Deloitte Access Economics' estimates.

Chart 2.1 shows the model forecast for the number of policies over the next three years. Forecasts using a linear trend and a constant growth rate of 2.2% per year (the average rate of growth over the data shown in Chart 2.1) are included for comparison. The model forecast is the highest followed by a constant growth rate and then the linear projection. An additional 247,700 policies are forecast using the model compared with a linear projection. The model forecasts are the highest primarily because they are dependent on more recent growth rates, which have been higher than the average of the series.

Chart 2.1: Number of policies

Source: Deloitte Access Economics estimates.

References

Australian Bureau of Statistics (ABS) 2011a, *Australian National Accounts: National Income, Expenditure and Product*, ABS Cat 5206.0.

2011b, *Labour Force, Australia*, ABS Cat No 6202.

2011c, *Average Weekly Earnings, Australia,* ABS Cat No 6302.

2011d, *Retail Trade, Australia, Jun 2011,* ABS Cat No 8501.

Deloitte Access Economics, Business Outlook, March 2011.

Appendix A: Data description

Table A.1: Data description

	Definition	Source
Real GDP growth	Year on year growth in gross domestic product, chain volume measure, seasonally adjusted.	ABS (2011a).
Consumer price inflation	Year on year growth in consumer price index, trimmed mean.	RBA (2011).
Unemployment rate	Seasonally adjusted unemployment rate, person full-time or part-time.	ABS (2011b)
Australian share price index	S&P/ASX 200 Index, total return, end of period.	Ecowin.
Average weekly earnings	Total earnings, all persons; seasonally adjusted.	ABS (2011c)
Mortgage rates	Standard bank variable mortgage rate.	Deloitte Access (2011).
Retail sales	Year on year growth in seasonally adjusted quarterly retail turnover.	ABS (2011d)
Consumer confidence	Westpac - Melbourne Institute Survey, Consumer sentiment index, total, seasonally adjusted.	Ecowin.
ANZ job adds	ANZ newspaper job advertisements, total, seasonally adjusted, year on year growth.	Ecowin.
	ANZ newspaper and internet job advertisements, total, seasonally adjusted, year on year growth.	
Household savings ratio	Household savings ratio to income.	Deloitte Access Economics Business Outlook (2011).
Population growth	Change in population from previous quarter.	Deloitte Access Economics Business Outlook (2011).

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