What Determines General Insurance Demand and Expenditure

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Insurance Council of Australia

By: University of Western Sydney
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## Glossary of Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2SLS</td>
<td>two-stage least squares</td>
</tr>
<tr>
<td>ABS</td>
<td>Australian Bureau of Statistics</td>
</tr>
<tr>
<td>ARIA</td>
<td>Accessibility/Remoteness Index of Australia</td>
</tr>
<tr>
<td>CNEF</td>
<td>Cross-National Cross National Equivalent File</td>
</tr>
<tr>
<td>CPQ</td>
<td>Continuing Person Questionnaire</td>
</tr>
<tr>
<td>FE</td>
<td>Fixed effects</td>
</tr>
<tr>
<td>FFM</td>
<td>Five factor model</td>
</tr>
<tr>
<td>HF</td>
<td>Household Form</td>
</tr>
<tr>
<td>HQ</td>
<td>Household Questionnaire</td>
</tr>
<tr>
<td>HILDA</td>
<td>Household Income and Labour Dynamics</td>
</tr>
<tr>
<td>ML</td>
<td>Maximum likelihood</td>
</tr>
<tr>
<td>NPQ</td>
<td>New Person Questionnaire</td>
</tr>
<tr>
<td>PSID</td>
<td>Panel Study of Income Dynamics (America)</td>
</tr>
<tr>
<td>PQ</td>
<td>Person Questionnaire</td>
</tr>
<tr>
<td>RE</td>
<td>Random effects</td>
</tr>
<tr>
<td>SCQ</td>
<td>Self-Completion Questionnaire</td>
</tr>
<tr>
<td>SOEP</td>
<td>Socio-Economic Panel (German)</td>
</tr>
</tbody>
</table>
Executive Summary
The aim of this study is to examine the determinants of individuals obtaining general insurance and the factors that impact on the amount of insurance expenditure. The study uses the Household, Income and Labour Dynamics in Australia (HILDA) survey panel from 2006 to 2010 to assess the extent to which demographic and socioeconomic variables and major life effects impact on the probability and extent of having general insurance.

Findings
- The probability of being insured increases with income and there is a significantly positive elasticity of expenditure on general insurance with respect to income.
- Households with health insurance are significantly and positively related to the probability of being insured and their level of expenditure on general insurance.
- Expenditure on insurance increases with the level of educational attainment, suggesting a higher level of education leads to a greater degree of risk aversion and demand for more insurance.
- A major life event, either a substantial increase or a decrease in finances has a negative and significant effect on the probability of households being insured and amount of insurance expenditure.
- Being a victim of property crime is found to be statistically significant with regard to expenditure on general insurance.
- Being in a permanent relationship has a higher probability of being insured and thus a propensity/tendency to spend relatively more on general insurance compared to single persons.
- The probability of being insured and the marginal propensity to insure increases with the number of household members.
- Households living in urban areas are more likely to be insured and tend to spend relatively more on general insurance.
- Age and gender are found to be statistically significant for the probability of taking out general insurance, while gender also affects the amount of general insurance.
- Households who own residential property are more likely to be insured and spend more on general insurance than those who rent. In addition, those who are currently paying mortgage instalments are more likely to have general insurance.
insurance. This may be partly explained by the property insurance requirement of mortgagers.

Below, comparison is made of averages for individuals that have general insurance and for those that don’t.

Table 1: Comparisons between the average insurer and non-insurer HILDA

<table>
<thead>
<tr>
<th></th>
<th>Insured</th>
<th>Non-Insured</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disposable Income</td>
<td>$65,994</td>
<td>$50,765</td>
</tr>
<tr>
<td>Monthly Mortgage Repayments</td>
<td>$ 656.91</td>
<td>$614.75</td>
</tr>
<tr>
<td>Victim of Property Crime</td>
<td>4.78%</td>
<td>5.29%</td>
</tr>
<tr>
<td>Household Total Assets</td>
<td>$736k</td>
<td>$302k</td>
</tr>
<tr>
<td>Age</td>
<td>44</td>
<td>42</td>
</tr>
<tr>
<td>Bank Savings</td>
<td>$31,701</td>
<td>$16,180</td>
</tr>
<tr>
<td>Emotional Stability*</td>
<td>5.21</td>
<td>5.05</td>
</tr>
<tr>
<td>% Married</td>
<td>62.56%</td>
<td>46.27%</td>
</tr>
<tr>
<td>Portion male</td>
<td>47.53%</td>
<td>42.76%</td>
</tr>
</tbody>
</table>

*all other personality traits strongly similar

The research is expanded to test individuals’ personality, in the form of psychological measures of emotional stability, openness to experience and extroversion as potential determinants on the take up of insurance. These are all identified to be not statistically significant.
**Data Description**

The data for this study is the HILDA Survey. This survey is designed and managed by the Melbourne Institute of Applied Economics and Social Research at the University of Melbourne and funded by the Australian Government through the Department of Families, Housing, Community Services and Indigenous Affairs. It is a household-based panel study that began in 2001 and is at its 10th wave as at 2010. HILDA has the following key features:

- collects information about economic and subjective well-being, labour market dynamics and family dynamics with questions repeated each year;
- wave 1 panel consisted of 7,682 households and 19,914 individuals and has a low attrition rate; and
- surveys are conducted annually with all adult members, aged 15 and over, of each household.

The HILDA survey comprises four different instruments. These are Household Form (HF), Household Questionnaire (HQ), Person Questionnaire (PQ), and Self-Completion Questionnaire (SCQ).

For this study, the combined data from the different instruments from 2001 to 2010 inclusive is used. Not all variables are available for all waves and in particular household annual expenditure – other insurance. This only began to be collected from 2006 onwards.

**Other Insurance Expenditure**

Since 2006, data on household annual expenditure on other insurance (home/contents/motor vehicle) is obtained via two questions - one question asks the person who has responsibility for paying the household bills if they have this insurance and the second asks the amount that is spent. When compared to the Australian Bureau of Statistics Household Expenditure Survey (HES), HILDA survey questions are well designed to obtain a measure of the general or typical level of expenditure of each household (Wilkins and Sun, 2010: 11) in similar way to HES. The HES provides detailed data on general insurance and would be the ideal data to use. However, the HES is collected on a cross-sectional basis every six years while HILDA provides the panel nature for households and individuals every year and currently has 6 years of information. In addition, family dynamics can also be better
captured with HILDA. For instance as children leave households they are matched back to their original household.

**Summary Statistics**

Analysis of the data is conducted on the sample and no attempt was made to apply weights.

There were 130,211 observations for the period 2001 to 2010 and 65,306 for the years 2006 to 2010. The age of the respondents ranged between 15 to 93 years with an average of 44 years. The respondents are almost evenly split by gender with 52.7% females and 47.3% males.

By geographical location, there is almost equal representation in the different Australian states and territories (Table 2).

Table 2: Geographical location of HILDA households (2001 to 2010)

<table>
<thead>
<tr>
<th>Major Statistical Region</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sydney</td>
<td>21,601</td>
<td>16.59</td>
<td>16.59</td>
</tr>
<tr>
<td>Balance of NSW</td>
<td>17,747</td>
<td>13.63</td>
<td>30.22</td>
</tr>
<tr>
<td>Melbourne</td>
<td>22,541</td>
<td>17.31</td>
<td>47.53</td>
</tr>
<tr>
<td>Balance of Victoria</td>
<td>9,706</td>
<td>7.45</td>
<td>54.99</td>
</tr>
<tr>
<td>Brisbane</td>
<td>11,759</td>
<td>9.03</td>
<td>64.02</td>
</tr>
<tr>
<td>Balance of QLD</td>
<td>14,871</td>
<td>11.42</td>
<td>75.44</td>
</tr>
<tr>
<td>Adelaide</td>
<td>8,209</td>
<td>6.30</td>
<td>81.74</td>
</tr>
<tr>
<td>Balance of SA</td>
<td>4,019</td>
<td>3.09</td>
<td>84.83</td>
</tr>
<tr>
<td>Perth</td>
<td>9,077</td>
<td>6.97</td>
<td>91.80</td>
</tr>
<tr>
<td>Balance of WA</td>
<td>3,371</td>
<td>2.59</td>
<td>94.39</td>
</tr>
<tr>
<td>Tasmania</td>
<td>3,974</td>
<td>3.05</td>
<td>97.44</td>
</tr>
<tr>
<td>Northern Territory</td>
<td>838</td>
<td>0.64</td>
<td>98.09</td>
</tr>
<tr>
<td>ACT</td>
<td>2,492</td>
<td>1.91</td>
<td>100.00</td>
</tr>
<tr>
<td>Total</td>
<td>130,205</td>
<td>100.00</td>
<td></td>
</tr>
</tbody>
</table>

The marital status is calculated from responses to questions on registered marital status and (if not married) whether living with de facto partner or not. Two thirds of the population, are legally married or in a de facto relationship.

Less than half of the sample had tertiary qualifications including 19.9% with a university degree. In addition, approximately 36% had the highest level of education achieved of year 11 and below
Table 3: Highest education level achieved of HILDA sample (2001 to 2010)

<table>
<thead>
<tr>
<th>Highest education level achieved</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postgrad - masters or doctorate</td>
<td>4,086</td>
<td>3.14</td>
<td>3.14</td>
</tr>
<tr>
<td>Grad diploma, grad certificate</td>
<td>6,108</td>
<td>4.69</td>
<td>7.83</td>
</tr>
<tr>
<td>Bachelor or honours</td>
<td>15,694</td>
<td>12.05</td>
<td>19.88</td>
</tr>
<tr>
<td>Adv. diploma, diploma</td>
<td>10,869</td>
<td>8.35</td>
<td>28.23</td>
</tr>
<tr>
<td>Cert III or IV</td>
<td>24,567</td>
<td>18.87</td>
<td>47.10</td>
</tr>
<tr>
<td>Cert I or II</td>
<td>1,873</td>
<td>1.44</td>
<td>48.53</td>
</tr>
<tr>
<td>Certificate not defined</td>
<td>746</td>
<td>0.57</td>
<td>49.11</td>
</tr>
<tr>
<td>Year 12</td>
<td>19,659</td>
<td>15.10</td>
<td>64.21</td>
</tr>
<tr>
<td>Year 11 and below</td>
<td>46,549</td>
<td>35.75</td>
<td>99.95</td>
</tr>
<tr>
<td>Undetermined</td>
<td>60</td>
<td>0.05</td>
<td>100.00</td>
</tr>
<tr>
<td>Total</td>
<td>130,211</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

For those who own their own home, the approximate average value of the home today is $443,210 and a median of $350,000.

**General insurance**

In this subsection, summary statistics are presented for general insurance over time and for various demographic variables.

Between the years 2006 and 2010, 1,902 individuals stated they did not have any insurance while 20,841 consistently responded they had insurance.

The chart below segments individuals into insured or non-insured and demonstrates movement from one state to another. For individuals that were not insured in 2006, over 60% continued to be uninsured in 2007. A similar trend is noted for 2007 to 2008 and 2008 to 2009. For 2009 to 2010, approximately 70% of individuals that were uninsured remained uninsured. On average 96% of insured households remained insured over the period. Primary movements are seen within the non-insured sample base where roughly one third of individuals without insurance will purchase general insurance in the following year (Figure 1).
For the individuals that had insurance, the average annual premium expenditure for the period 2006 to 2010 was $1,452.35. On a yearly basis, the average annual expenditure rose from $1336.60 in 2006 to $1556.09 in 2010 (Figure 2).

**Insurance by Geographical Location**

General insurance take-up by geographical location differed from state and territory with 92% of households in the Australian Capital Territory having insurance compared with 82% in South Australia in 2010. In examining responses over two periods, 2010 and 2006, it is notable that there was substantial increase in the rate of insurance in the two
territories while there was a small drop in the states of South Australia, Queensland and New South Wales (Figure 3).

Figure 3: Percentage of General Insurance take-up by region in 2006 to 2010

As a percentage of disposable income, the expenditure on general insurance in 2010 was 1.6% slightly less than 1.7% in 2006. By region, it ranged from 1.2% in the Australian Capital Territory to 2.1% in New South Wales in 2010 (Figure 4). Over the five years, as a percentage of income, households spent less in South Australia and Western Australia but more in Northern Territory.

Figure 4: General insurance expenditure as percentage of disposable income by region in 2006 to 2010

For each household, the remoteness area is derived using the Accessibility/Remoteness Index of Australia (ARIA) scores from the 2001 Census. ARIA scores are assigned based on the Census Collection Districts. Each household is assigned a
value score ranging from 0 for major city to 4 for very remote Australia. HILDA has an additional label (5 for migratory) that was ignored for this study. The HILDA participants are representative of the Australian population with 61% of households in a major city followed by 25% in inner regional Australia (Table 4).

Table 4: Number of households by remoteness area in HILDA (2010)

<table>
<thead>
<tr>
<th>HH: Remoteness area</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major City</td>
<td>8,335</td>
<td>61.65</td>
<td>61.65</td>
</tr>
<tr>
<td>Inner Regional Australia</td>
<td>3,404</td>
<td>25.18</td>
<td>86.83</td>
</tr>
<tr>
<td>Outer Regional Australia</td>
<td>1,521</td>
<td>11.25</td>
<td>98.08</td>
</tr>
<tr>
<td>Remote Australia</td>
<td>212</td>
<td>1.57</td>
<td>99.64</td>
</tr>
<tr>
<td>Very Remote Australia</td>
<td>48</td>
<td>0.36</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td>13,520</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

In examining general insurance expenditure by remoteness area, in most years the amount spent by households in major cities is larger than in other regions. The exceptions being in 2007 with very remote’s average expenditure at $1,952.86 and in 2009 with remote at $1802.75. It is interesting to note that inner regional Australia in almost all years spends on average the lowest amount on general insurance.

Figure 5: Average annual expenditure ($) on general insurance by remoteness area (2006 to 2010)
Ownership Structure and Assets

In 2010 69% of individuals stated that they owned their homes, compared with 72% in 2002. A slight shift in preference is observed from property ownership to renting between 2002 and 2010 (Figure 6). This could be due to macroeconomic factors such as lower capital appreciation expectations in real estate in the period 2009 and 2010; or changing attitudes or behaviour with regards to home or direct property ownership.

Figure 6: Ownership Structure from 2002 to 2010

For individuals that owned their own home or are currently paying it off, 94% stated they had general insurance in 2010. This compares to 65% and 79% of individuals that are currently renting or are living rent free or have life tenure having general insurance. The amount spent on general insurance (insurance premium) for those who own their own home in 2010 was $1683.37 compared $1,425.62 in 2006 for the same cohort; representing an 18% increase. The amount spent on insurance (insurance premium) for those who are renters in 2010 was $676.36 compared to $545.08 in 2006 representing a 24% increase.

For individuals that currently own or are paying off a mortgage, the rate of insurance is 90% compared to 80.0% for individuals that are renting. The rate of insurance differs by geographical location with 96.0% of households in the Australian Capital Territory that own or are paying off their mortgage having insurance compared to 84% in Northern Territory. For individuals that are renting (or pay board), the highest rate of general insurance use is in Western Australia at 86% compared to 57% in Tasmania (Figure 7).
Age of the Respondent

The rates of general insurance take up differs by age of individual with 43% of those aged less than 25 years stating they do not have general insurance. This rate drops dramatically to 17% for those aged 25 to 34 years. The rate of non-insurance declined between 2006 and 2010 for individuals aged less than 35 years and for individuals older than 55 years of age. However, the rate of insurance increased slightly for individuals aged between 35 to 54 years of age over the same time period (Figure 8). By gender, younger women had a slightly higher general insurance take up (aged less than 35 years) than men while for individuals aged over 65 years of age men on average had a higher insurance take up than women (90.5% compared to 85.6%)

Figure 8: Rates of non-insurance by age group between 2006 and 2010.
In assessing the average annual expenditure per household by age groups, the highest is for those aged between 45 to 54 at $1,786.29 and the lowest is for those aged 24 or less or those aged 65 plus. If further analysis is conducted with the annual expenditure adjusted by the number of person’s in-scope in the household aged above 18, the average is lowest for those aged 35 to 44 at $536 per person and then increases steadily to those aged 65 plus (Figure 9).

Figure 9: Average annual expenditure ($) on general insurance by age grouping unadjusted and adjusted (2010)

<table>
<thead>
<tr>
<th>Family Type</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ninety per cent of couple families with or without children stated they took out general insurance in 2010. This differs significantly from other family types of lone parent household with children or other related family members with around one third not having general insurance (Figure 10). In addition, the amount spent on general insurance for couple with children was $1,637.95 in 2010 compared to the lowest amount by group households of $786.88 in the same time period. For lone parent with children, the average amount spent was $905.70, less than lone person at $936.92. In part, this cannot be explained by the level of disposable income for each household type. For lone parents with children and other related family with children, the average disposable income was approximately $65,000; almost double the average income of lone persons at $35,858. While for couples with children income was higher than income of couples without children by around forty-two per cent ($110,619 compared to $77,552 respectively).</td>
<td></td>
</tr>
</tbody>
</table>
There is a positive association between the level of education that individuals have and whether they have general insurance. The higher is the level of education, the greater is the propensity to hold general insurance, and vice versa with the lower is the highest level of education, the greater is the response that they do not have general insurance. For individuals with a university education in 2010, 93% stated they had general insurance compared to 78% of individuals with year 11 or below education. This in part could be explained by the higher income for individuals with a university degree, averaging at $109,130 per year compared to individuals with year 11 or less whose average income was $69,353. However, for individuals with a year 12 education level the average income is higher than for those with a Certificate or Diploma level of education. (Figure 11).

Education

Figure 10: Rates of non-insurance by family type 2010.

Figure 11: Rates of insurance by highest education level at 2010.
Financial Risk

HILDA in its SCQ administered to individuals aged 15 or over asks the question: “Which of the following statements comes closest to describing the amount of financial risk that you are willing to take with your spare cash? That is, cash used for savings or investment”. This has been identified to be a good proxy to individuals’ attitudes to financial risk-taking. The question is asked every second year and in the data cleaning exercise the data was recoded to remove any missing data values and the response to 5 “never has any spare cash”. The higher is the score, the more risk averse is the individual. The more that an individual states they are not willing to take risk to obtain higher return, the greater is the proportion that has general insurance. In 2010 78.0% of individuals that indicated they would take average financial risks for the expectation of average return had insurance compared 60.0% of individuals that stated they would take substantial risk. The rate of insurance for all risk categories has risen since 2006 with the largest increase occurring for the greatest risk takers. (Figure 12).

Figure 12: Rates of insurance by financial risk attitude 2010 and 2006

Health Insurance

Information is collected on individuals’ health insurance expenditures. There appears to be a positive correlation between the take up of general insurance and health insurance with 61% of individuals in 2010 stating they had purchased general insurance also reporting they had purchased health insurance (Pearson $\chi^2=863.95$) (Table 5).
Table 5: Annual household expenditure on general and health insurance in HILDA (2010)

<table>
<thead>
<tr>
<th>General Insurance</th>
<th>Health Insurance</th>
<th>No</th>
<th>Yes</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td></td>
<td>1,012</td>
<td>180</td>
<td>1,192</td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td>2,574</td>
<td>4,056</td>
<td>6,630</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>3,586</td>
<td>4,236</td>
<td>7,822</td>
</tr>
</tbody>
</table>

**Loss Probability**

In HILDA two neighbourhood questions are asked that are used as a proxy for loss probability. These are: “How common are the following things in your neighbourhood? i) Vandalism and deliberate damage to property? ii) Burglary and theft?” These questions were asked of individuals in the SCQ in 2006, 2008 and 2010. As would be expected, there was a strong positive correlation between the responses for each of these questions (correlation coefficient = 0.74). For the 1470 households in 2010 who stated that burglary and theft never happens, 1162 also stated that vandalism and deliberate damage to property never happens (Table 6).

Table 6: Neighbourhood property crime cross-tabulation (2010)

<table>
<thead>
<tr>
<th>Vandalism and deliberate damage to property</th>
<th>LS: Neighbourhood: Burglary and theft</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Never happens</td>
</tr>
<tr>
<td>Never happens</td>
<td>1162</td>
</tr>
<tr>
<td>Very rare</td>
<td>261</td>
</tr>
<tr>
<td>Not common</td>
<td>33</td>
</tr>
<tr>
<td>Fairly common</td>
<td>10</td>
</tr>
<tr>
<td>Very common</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>1470</td>
</tr>
</tbody>
</table>

Average annual expenditure on general insurance for households in 2010 is highest for those who responded that neighbourhood property crime is very rare. It is lowest for those that responded that vandalism and deliberate damage to
property or burglary and theft were very common (Figure 13). This may be due to the types of neighbourhoods that the households are living in being a function of income and/or it might reflect the fact that households in low socio-economic areas have both higher crime rates and fewer or less valuable assets to insure.

Figure 13: Average annual expenditure ($) on general insurance by neighbourhood property crime (2010)

**Personality Traits**

HILDA had two waves of data available for personality traits in 2005 and 2009 and derives results for five personality factors for each respondent in the SCQ. These are openness, agreeableness, extroversion, emotional stability and conscientiousness. The higher is the score, the better that personality trait describes the respondent person (Summerfield, 2010). Analysis was conducted on the relationship between personality factors and general insurance expenditure. Broadly the more individuals are described as being agreeable, conscientious, open or emotionally stable the higher is the average annual expenditure. There does not appear to be an association between the extroversion rating and level of expenditure (Figure 14).
In 2009, HILDA began to collect data from individuals using the SCQ as part of major events that have happened in their lives over the past 12 months by asking the question: “Has a weather related disaster (flood, bushfire, cyclone) damaged or destroyed their home?” The number of HILDA individuals that responded positively to that question ranged from 1.16% in 2009 to 2.70% in 2011.

Table 7: Responses to whether weather related disaster damaged or destroyed their home by year (2009 to 2011)

<table>
<thead>
<tr>
<th>Year</th>
<th>Yes</th>
<th>No</th>
<th>% of total that answered yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>154</td>
<td>13147</td>
<td>1.16%</td>
</tr>
<tr>
<td>2010</td>
<td>214</td>
<td>13312</td>
<td>1.58%</td>
</tr>
<tr>
<td>2011</td>
<td>475</td>
<td>17137</td>
<td>2.70%</td>
</tr>
</tbody>
</table>

Examining the average general insurance that is held on the basis of individuals experiencing damage to their home is difficult and potentially misleading without further and deeper analysis being conducted. For example, if 2010 is examined, of the 214 that experienced a disaster, 122 had general insurance and the average premium payment was $1,809.60. This is compared to 6446 that had general insurance and were not a victim of natural disaster had an average premium of $1,551.52. It is reasonable to expect that people that have experienced a disaster will have a higher average insurance premium because of the higher risk. For those individuals that
did not have insurance but did suffer a natural disaster their response will be explored in the last section of the report.

**Empirical Model**

This report studies the demand for general insurance observed over the period of several years. In the HILDA data, there were two responses on general insurance – one is on whether they do have general insurance – a binary response (no or yes) and annual expenditure on general insurance. The term general insurance refers to home/contents/motor vehicle. The empirical model is in this section sought to answer two questions:

1) which factors drive the probability of the individual buying general insurance; and

2) Which factors impact on the amount of general insurance expenditure per year?

The data is analysed using the panel nature of HILDA with analysis conducted on the same individuals over five years, between 2006 and 2010. In the earlier section, there was some use of panel nature of the data – but it was more descriptive. The bulk of earlier analysis conducted is on a cross-sectional basis and mainly for the 2010 responses. All the analysis is performed using Stata v12.

For the first research question on the probability of individuals buying general insurance random effects logistic regression was used as our criterion variable is dichotomous. The variable describing if the individual possesses general insurance is called Insured. It equals 1 if there is general insurance and 0 otherwise. Predictor variables Sex, Age, Education (proxy for risk aversion) and HousAssets (proxy for wealth) are of particular interest given their ability to predict the insurance demand.

For the second research question on the amount of general insurance expenditure per year, a random effects linear regression model was used. The variable describing the magnitude of general insurance is called InsuranceValue. Similar predictor variables are used as in the first research question but with extension into examining interaction terms – meaning that for some variables their effect on InsuranceValue is dependent on a third variable.
Random effects logistic regression for the probability of buying general insurance

Random effects logistic regression modelling is undertaken on dependent variable Insured. The optimal model is obtained to understand the relationship between the probability of buying general insurance and various characteristics reflected in the set of candidate predictors.

From the model, the following observations are made:

- The likelihood of buying general insurance is positively related to the level of education. As the education level increases, the odds of taking out insurance also increases. After controlling for all other factors, the odds of those with year 12 education purchasing general insurance are 2.01 times those with year 11 or less education. The relative odds for those with a certificate or diploma are similar to those with year 12 education at 2.02. There is a significant increase in the relative odds for those with a university education to 4.32.

- The size of the mortgage for owners of property is statistically significant in effecting the take-up of insurance. For every $1 per month increment in mortgage repayment, the odds of taking up general insurance increases by a factor of 0.02.

- The geographical location measured by remoteness used the major city as the baseline. Individuals living in inner Regional, after controlling for all other factors, were 1.33 times more likely than major city residents to take up general insurance. While for individuals in remote locations, they were less likely to take up general insurance with the odds ratio decreasing to 0.30 relative to major city. The odds ratios for individuals in outer regional and very remote were not significantly different to major city individuals.

- In testing for age, the baseline used was the age group 25 to 34 years. After controlling for all other factors, the relative propensity to take up general insurance increases slightly with age. The relative odds for individuals in the age group 35 to 44 was 1.98; for 44
to 54 it was 2.03; for 55 to 64 was 2.22 and for those aged 65 and over 2.42.

• Labour market attachment was assessed using three categories of employed, unemployed and not in the labour force. Using employed as the baseline and controlling for all other factors, for those that were unemployed and not in the labour force, the relative odds were significantly lower, 0.47 and 0.52 respectively.

• Effect on take up of general insurance was assessed from changing financial circumstances using responses on the question on whether individual’s financial circumstances is worse off from year to year. The baseline was no change, and controlling for all other factors, those whose financial status worsened had significantly lower propensity to take up with relative odds of 0.59.

• The gender of the individual was not found to be statistically significant in deciding to take out general insurance.

• The marital status of the individual has an important effect on take up of general insurance. If the individual is separated or has never married, then the odds of taking out general insurance decreases with an odds ratio for separated individuals of 0.40 and never married of 0.20. The effect is not as strong for women who have never been married.

• If the financial situation has worsened, the individual is less likely to buy general insurance with an odds ratio of 0.54. This was obtained from HILDA data that asked individuals if in the past year their financial situation has worsened.

• Individuals who demonstrate conscientiousness were 1.22 times more likely to take up general insurance. While those who exhibit extroversion are statistically significantly less likely to take up general insurance (odds ratio=0.87). As compared to men, women are
more likely to take up general insurance the more they demonstrate extroversion.

Household total value of assets, which is the sum of financial and non-financial assets, for the households and financial risk attitudes were determined to be not statistically significant in effecting take-up of general insurance.

**Random effects linear regression for the general insurance value**

The second model used was on the dependent variable general insurance value. The log of insurance value was regressed on a range of individual predictors using random effects linear models to account for the idiosyncratic variation and using the option maximum likelihood estimates of the random effects estimator. Iterative modelling is undertaken with the addition and removal of variables based on their statistical significance. This continues until the optimal model is obtained with fully significant random effects model with the lowest Akaike score possible. This model provides insights into the relationship between the magnitude of general insurance and the complete set of predictors. From this, the following observations are made:

- Conditional on having general insurance, women spend more on insurance than men. While gender of the individual was not significant in determining the take-up of general insurance, the amount of general insurance taken up is higher by women by 13% as compared to men.

- Education level is a significant determinant of general insurance expenditure. Relative to year 11 or less education level, having year 12, certificate or diploma, and university education increases the amount spent on general insurance by 9.2%, 8.7% and 13.2% respectively.

- The amount of general insurance expenditure, all else fixed, was found to be not statistically affected by age or age squared.

- Marital status was determined to be an important factor in the amount of general insurance. Relative to being legally married and all else fixed, the amount of general insurance is reduced by 23.7% for individuals in a de facto relationship, by 31.5% if separated, by 30.7% if divorced, 25.3% if widowed and 31.5% if never
married. If individuals had a change in their marital status or got married, this would reduce the amount of general insurance by 13%.

- The geographical location was found to be an important predictor of the amount of general insurance expenditure in two areas – inner regional and very remote. Expenditure by residents in the inner regional area is 3.4% less than the average expenditure of major city residents while expenditure in the very remote area is 26.8% lower. Due care needs to be taken in interpreting the very remote results given the relatively small number of participants from this area.

- The amount of general insurance expenditure was determined to be positively related to health insurance expenditure. Health insurance of the value of $1000 would increase the value of general insurance by 3.5%.

- The amount of general insurance was determined to be effected by the housing tenure of the individuals. Rental households spent 35.1% less than owner households while rent free/life tenure households spent 19.5% less than owner households.

- The amount of general insurance expenditure is positively affected by the amount of disposable income that individuals have. If disposable income increases by $10,000, the amount of general insurance expenditure increases by 1.3%.

- Individual’s attachment to the labour force has an important effect on the amount of general insurance expenditure. Relative to being employed, for those who are unemployed and not in the labour force, the amount of general insurance expenditure decreases by 16.7% and 11.5% respectively.

- The neighbourhood effect was determined to be an important determinant of the amount general insurance expenditure. The more frequent that burglary and theft occurs, as there is an increase in the mean value general insurance expenditure by 0.06.

- The mean value of households total assets effect the amount of general insurance expenditure. An increase in the mean value of households' total assets by $50,000 would increase the amount of general insurance by 1.5%.
Personality scores of conscientiousness and emotional stability and financial risk attitudes were not found to impact on the amount of general insurance expenditure, all else fixed.

**Discussion and Future Research**

The research is currently being extended to consider the testing of additional variables on insurance take up and expenditure including wealth, financial risk, employment status, cultural background and value of the asset being insured.

Examination of impact of major incidents, such as natural disasters, on individuals’ demographics; geographical location, levels of insurance, and other factors will be conducted. In addition, greater linkage of different datasets will be undertaken such as using the households’ geographical location with statistics on natural disasters. In addition, other variables, such as employment, education and so on will be explored with regards to take-up of general insurance.
References


Cameron, A.C., Trivedi, P.K. (2010), Microeconometrics Using Stata, Revised Edition, Stata Press Publication, College Station, Texas.


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1West and Worthington (2012) used this question as a dependent variable for their analysis on financial risk attitudes.