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Private Health Insurance in Ireland: Trends and Determinants

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Private Health Insurance in Ireland: Trends and Determinants

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Private Health Insurance in Ireland: Trends and Determinants

Abstract

This study examines the determinants of demand for private health insurance in Ireland. Survey data commissioned by the Health Insurance Authority from 2009 to 2017 are used to estimate multivariate models of health insurance demand. The results show that older and sicker individuals are more likely to have private health insurance. Irish-born are found to be more likely to have private health insurance. Preferences for health insurance also play an important role in predicting the purchase of health insurance. After controlling for the role of socio-economic factors and individual preferences, annual variations in the economy are not found to affect private health insurance coverage.

JEL Code: I13

Key Words: Health Insurance, Ireland

Introduction

This paper examines the demand for private health insurance in a setting where public and private coverage co-exist. The demand for private health insurance (PHI) depends on the institutional context within a country. The availability and quality of public insurance and the structure of a country's PHI market and regulations will likely affect the purchase of PHI.

This study examines the determinants of demand for PHI in Ireland from 2009 to 2017. Studying PHI in the context of Ireland is interesting for several reasons. Only 15% of the Irish population was covered by PHI thirty years ago. Now, over 40% of the population is covered by PHI. This sharp increase has occurred with a back-drop of universal entitlement public health care system. Over the past decade, the steep rise of PHI coverage appears to have been stemmed by the down-turn in the Irish economy. With higher unemployment and lower incomes, PHI coverage fell between 2009 and 2013; however, in the last few years, possibly reflecting improving economic conditions, PHI coverage is on the rise again.¹ The changes in the rates of PHI coverage in Ireland over the past decades, in the context of its role as supplementary insurance, make Ireland an interesting case study for PHI.

Theoretically, the demand for PHI will depend on an individual's expected loss due to health expenditures, and on an individual's degree of risk aversion. Individuals with poor health status are likely to have a higher expected demand for health care, and as a result may have a higher demand for PHI. This results in the problem of adverse selection in the PHI market (Cutler and Zeckhauser 2000). Empirically, the evidence on adverse selection has been mixed. While a few studies on PHI have found evidence of adverse selection (for instance, Cutler and Zeckhauser 2000), several others have found quite the opposite – advantageous selection, where individuals with poor health are found to be less likely to purchase insurance (Bolhaar, Lindeboom, van der Klaauw, 2012, Finkelstein and McGarry, 2006, Fang, Keane, Silverman, 2008). Advantageous selection could occur if individuals with better mental health are more able to make insurance purchases. Alternatively, if insurers select healthier individuals for PHI, we may observe advantageous selection.

In the Irish context, concerns about adverse selection in the PHI market increased with the recession. Since PHI in Ireland is community rated, using risk rating directly to adjust premiums for the young and healthy is not allowable. With worsening economic conditions, the young and healthy were disproportionately likely to exit the PHI market, and this may have led to rising premiums (Turner, 2015). Concerns about stabilising the PHI market led to the implementation of Lifetime Community Rating in 2015 – a policy that places a premium loading factor on individuals who are first-time buyers of PHI after the age of 35. The goal of Lifetime Community Rating was to encourage people to join the PHI market at a younger age to keep rising premiums in check.²

¹ Author's calculations based on survey data.

² <https://www.hia.ie/consumer-information/lifetime-community-rating-explained>

This paper uses data from a biannual survey from 2009 to 2017, conducted by the Health Insurance Association, to analyse the key determinants of PHI coverage in Ireland. This survey contains detailed data on individual demographics, health status, PHI coverage, and preferences. This paper aims to investigate the importance of year to year variations in economic conditions over this period. It also will investigate the role of key socio-demographic and economic factors that are associated with PHI coverage. In particular, we are interested in the role of health status in PHI purchase to shed light on the importance of adverse selection within the Irish health insurance market.

The Irish Health Care System

Ireland's health care system is a blend of public and privately funded and provided care. The public health care system provides universal entitlement to acute hospital care in public hospitals, subject to certain charges. Individuals with incomes below a certain threshold are entitled to a Medical Card and do not have to pay charges for public hospitals, visits to the GP or medical specialists in public hospitals.³ Furthermore, they do not pay for dental, aural and ophthalmic care, and pay a nominal charge for prescribed medication. The rest of the population pays fee-for-service for GP visits, and pays heavily state subsidized charges for inpatient and outpatient public hospital services. In practice, there are long waiting lists for access to non-emergent inpatient and outpatient procedures in public hospitals (Finn and Hardiman, 2011, Nolan, 2006).

Almost half of the Irish population have supplementary private health insurance, despite access to the universal public alternative. Private health insurance in Ireland is community rated, and premia are subject to income tax relief. Private health insurance can be purchased from multiple insurers (VHI, Irish Life Health, Laya) and plan benefits, coverage, and premiums vary. Private health insurance can be used to pay for care in private hospitals and care in public hospitals in private or semi-private beds. In practice, having private insurance can reduce waiting times to access care, and increase access to specialists. Many private health insurance policies also provide some coverage for GP visits and other outpatient health visits. (Harmon and Nolan, 2001 Finn and Hardiman, 2011).⁴

³ Currently, the income threshold for a Medical Card for a single person under age 66 is €184 per week. Individuals with income above €184, but below a €276 per week are eligible for a GP Visit card that entitles them to free GP care only. Different thresholds apply for families and over-66s.

⁴ See Finn and Hardiman (2011) and Nolan (2006) for a detailed review of the evolution of the Irish health care system.

Related Literature

Several studies have examined the demand for PHI in Ireland. Harmon and Nolan (2001) used data from the 1994 Living in Ireland Survey to estimate a probit model of PHI demand that showed that older individuals, those with higher incomes, and those without Medical Cards were more likely to have PHI. Poor health was found to lower the probability of having PHI. Finn and Harmon (2006) extended the analysis in Harmon and Nolan (2001) by estimating a dynamic panel data model using the Living in Ireland Survey from 1994 to 2001. Education, age, and income were all found to increase PHI coverage. In a similar result to Harmon and Nolan (2001), poor health status was found to decrease PHI coverage. Finn and Harmon also showed significant persistence in PHI coverage – individuals who had PHI coverage in the previous period were substantially more likely to be covered in the current period. Bolhaar, Lindeboom, and van der Klaauw (2012) also used the Living in Ireland Survey for the same period as Finn and Harmon and estimated dynamic panel data models to determine the role of asymmetric information and selection in the purchase of health insurance. They found that general health problems did not appear to drive insurance purchase, but poor mental health was associated with a lower propensity to purchase insurance, providing evidence for advantageous selection in PHI demand. Age, education, and income were found to increase PHI coverage. Lagged PHI coverage played an important role in current PHI coverage.

A much larger literature exists on PHI demand in other countries. Like Ireland, the UK also has a system where public health care and supplementary private health insurance co-exist. The literature on PHI demand in the UK has examined the importance of the quality of the public health care system as a determinant of PHI demand. For instance, Bíró and Hellowell (2016) found that PHI demand in the UK increased as waiting times in the public health care system increased. Good health was found to have a small negative effect on PHI demand in models that included individual fixed effects. Earlier work by Propper, Rees, and Green (2001) found that the number of senior doctors employed by the public sector negatively affected PHI demand. Socio-demographic characteristics such as age and income also increased PHI demand. King and Mossialos (2005) also using data from the UK, found that education, income, age, and political affiliation affected PHI demand. Health was not found to be a significant determinant of PHI demand. Consistent with other work from the UK, waiting times and the supply of private surgeons was found to increase PHI demand.

Several studies on German PHI exploit the somewhat different institutional structure of the German health insurance market, where individuals are covered by either public or private health insurance. Unlike Ireland, in Germany private health insurance premiums are risk rated, and individuals below a specified income threshold are covered by public health insurance. In this context, Polyakova (2016) found no evidence of advantageous selection in PHI: healthier individuals were no more likely have PHI than sicker individuals. This study found evidence that heterogeneity of preferences affected purchase of PHI – individuals with preferences for

convenience chose PHI. In contrast, Bunnings and Tauchmann (2015), Grunow and Nuscheler (2014) and Panthöfer (2016) found evidence of advantageous selection into PHI.

A strand of literature from the US that investigates the purchase of optional long-term care insurance and Medicare add-on plans also investigates issues of selection in health insurance purchase. For instance, Finkelstein and McGarry (2006) investigated the effect of preferences on long-term care insurance, while Fang, Keane, and Silverman (2008) found evidence of advantageous selection into Medicare add-on plans.

Understanding and modelling PHI demand is intrinsically tied to the institutional structure of public health insurance availability and quality. Furthermore, PHI regulations such as community rating and premium regulations are also likely to affect PHI demand. For this reason, results from the international literature may not necessarily apply to the Irish context. The literature on Irish PHI demand is essentially based on a single survey -- Living in Ireland, that is now quite out of date. This current study uses a different, new source of data, to update and add to the literature on PHI demand in Ireland.

Data

The Health Insurance Authority (HIA) has commissioned biannual nationally representative surveys of the Irish population. The Authority is the statutory regulator of the Irish private health insurance market. The Authority is independent in the exercise of its functions, and the surveys are designed to provide information on health insurance coverage, attitudes, affordability, and related areas of policy relevance. Interviews were conducted face-to-face, and to ensure a representative sample of the adult population in the Republic of Ireland (aged 18+), quotas were set around gender, social class and region. This study uses data from 2009, 2011, 2013, 2015 and 2017. Data for the years 2011 to 2017 were collected by Millward Brown; data from 2009 were collected by Red C. Descriptive statistics and charts based on these data are published on the HIA website (HIA 2010, 2012, 2014, 2016, 2017).⁵ The survey instrument and variables of interest are very similar across years, and so we have combined data from 2009 to 2017 to construct a repeated cross-sectional analysis data set. The combined sample consists of 7758 individuals.⁶ The surveys do not interview the same individuals across years, so it is not possible to match individuals longitudinally.

The HIA surveys contain detailed information on demographics, including age, gender, marital status, occupational class, family structure, and country of birth. Self-reported health

⁵ The descriptive statistics on the HIA website are produced on an annual basis, and do not pool multiple years of data. No multivariate analysis of PHI coverage based on pooled data are available. This paper pools the data across multiple years and conducts multivariate analyses based on these data.

⁶ The sample sizes for 2009, 2011, 2013, 2015 and 2017 were 1002, 1011, 2022, 1832 and 1891 individuals respectively.

status was also collected. This question asks individuals to choose one of the following statements about their health:

- I am generally healthy and rarely make visits to the doctor
- I am generally healthy but sometimes make visits to the doctor
- I have some health problems and therefore regularly make visits to the doctor
- I have some health problems that sometimes require visits to the hospital, either for day care or overnight.

We classified individuals who identified in each of these four groups as Very Healthy, Healthy, Unhealthy, and Very Unhealthy.

Individuals were also asked to report private health insurance coverage and whether they were covered by a Medical Card. A set of questions that aimed to ascertain individuals' attitudes towards private health insurance was also included. Individuals were to state how much they agreed or disagreed with the following statements:

- Private health insurance is a necessity not a luxury
- I will always have private health insurance
- Private health insurance is good value for money
- There is no need for private health insurance, public services are adequate
- Having private health insurance means always getting a better level of health care service
- Private health insurance is only for the wealthy
- Having private health insurance means you can skip the queues
- Only old people and sick people need private health insurance

Responses to all these questions were captured by a 5-point Likert scale, with 5 representing an answer of "strongly agree" and 1 representing an answer of "strongly disagree". Our analyses use these questions to capture attitudes to private health insurance coverage.

All analyses conducted using these data are weighted using survey weights to be nationally representative.

Descriptive Analysis

Descriptive Profile by Year

The percentage of individuals who reported having private health insurance coverage dropped from 46% in 2009 to 40% in 2013, and then recovered to 43% in 2017. The graph below shows the trend in health insurance coverage between 2009 and 2017. These changes in PHI may be brought on by changes in the economy. Unemployment was 10.2% in 2009, 13.2% in 2011, and dropped to 8.6% in 2015, and further dropped to 5.7% in 2017 (CSO, 2018).

However, it is also possible that survey methodology variations may explain some of the differences that we see from year to year. Note that the HIA survey was conducted by a different company in 2009 compared to later years, so some caution in interpreting year to year differences is important.

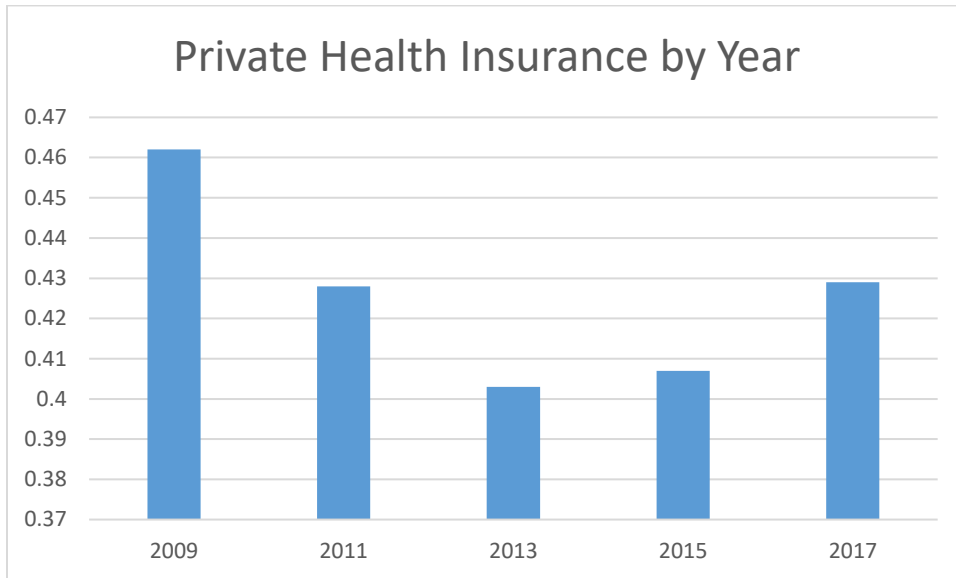


Table 1 reports a full set of means for the key variables used in the analysis. Means for the full 2009 – 2017 sample are reported in the first column. The next four columns report means for each survey year separately. All means are weighted. The surveyed sample has a similar proportion of men and women. There is a decline in the percentage of the youngest age category over time, relative to the older age categories. There are two main explanations for this shift in age composition. During the recession, the age cohort between 18 and 34 were more likely to emigrate than older age cohorts. In addition to these migration effects, the youngest adult age cohorts are smaller than older ones because of birth rate trends (CSO, 2017).

The proportion of Irish born has declined somewhat over the years reflecting the change in national composition. The percentage in professional occupational classes has remained stable over time, while farming shows a small decline.

About half the sampled individuals report being “Very Healthy”, however the proportion fell from 55.9% in 2009 to 47.6% in 2013, and then increased to 50.9% in 2017. On the flip side, the proportion who report being “Very Unhealthy” increased steadily from 4.1% in 2009 to about 11% in 2015 and 2017. These changes in health status may reflect the effect of the economy on health status (Ruhm 2016). However, it is also possible that the shifting demographic composition of the population over time may influence reported health status.

The decreasing share of younger adults, relative to older adults, is likely to reduce the overall health of individuals in the data.

Individuals reporting Medical Card coverage has increased rapidly with only 31% reporting coverage in 2009 compared to 44% in 2015, and then dropping back to 40.3% in 2017. Since Medical Card eligibility is needs-based, the economic crisis resulted in more individuals becoming eligible for a Medical Card based on their loss of income.

The attitudes to PHI can range from 1 to 5 with 5 representing strong agreement with the statement on PHI and 1 representing strong disagreement. It is interesting to note that attitudes to PHI have shifted slightly over time with the rating for attitudinal variables such as “PHI is a necessity” and “I will always have PHI” declining over time. It is possible that with the rising cost of PHI and the tightening economic conditions in Ireland, individuals’ priorities regarding PHI have changed. As discussed earlier, the unemployment rate increased from 2009 to 2013, but by 2017 unemployment had fallen and the economy was in recovery. In tandem with these changes in the economy, PHI in Ireland had marked premium increases between 2009 and 2014, but these premium increases slowed from 2014 onwards, largely driven by a change in the trend of total claims value (HIA, 2017). These premium changes coupled with the changes in the economy may have been responsible for individuals’ shifts in attitudes to PHI. Table 1 shows that rating that “PHI is a necessity” dropped from 3.78 points to 3.44 points from 2009 to 2013, but then stabilized at 3.52 in 2015 and 2017. Similarly, the rating for “I will always have PHI” dropped from 3.09 to 2.89 from 2009 to 2013 but recovered to 2.96 in 2017. Similar trends are seen across several of the other attitudinal variables. The responses to these questions were probably influenced by the large changes in consumer disposable incomes and consumer sentiment over the period given the big recession from 2009 to 2012 and the strong economic recovery especially in the 2015 to 2017 period.

TABLE 1: DESCRIPTIVE PROFILE FROM 2009 TO 2017						
Variable	All Years	2009	2011	2013	2015	2017
Private Health Insurance	42.1%	46.2%	42.8%	40.3%	40.7%	42.9%
<i>Gender</i>						
Male	49.1%	50.0%	49.0%	49.0%	49.0%	49.0%
Female	50.9%	50.0%	51.0%	51.0%	51.0%	51.0%
<i>Age Categories</i>						
Age 18 - 34	32.2%	37.0%	34.2%	34.0%	30.0%	29.0%
Age 35 - 44	20.3%	19.0%	19.8%	20.0%	21.0%	21.0%
Age 45 - 54	17.1%	16.0%	17.0%	17.0%	18.0%	17.0%
Age 55 - 64	14.1%	13.0%	13.6%	13.0%	14.0%	16.0%
Age 65 plus	16.3%	15.0%	15.4%	16.0%	17.0%	17.0%
<i>Marital Status</i>						
Married	53.8%	50.5%	55.2%	53.0%	54.7%	54.8%
Partnered, not married	7.6%	8.5%	6.8%	7.0%	7.5%	8.1%
Single	28.9%	30.5%	28.8%	31.0%	28.8%	26.1%
Divorced/Separated	9.7%	10.5%	9.2%	9.0%	9.0%	11.0%
<i>Country of Origin*</i>						
Irish	91.6%	94.1%	92.7%	91.5%	89.9%	--
UK	2.0%	1.9%	1.5%	2.4%	1.7%	--
EU	4.0%	2.5%	3.1%	4.1%	5.3%	--
Non-EU	2.4%	1.5%	2.8%	2.0%	3.1%	--
<i>Occupational Class</i>						
Professional	12.0%	12.9%	10.3%	10.9%	12.6%	13.0%
Lower Middle	28.7%	28.1%	30.2%	29.1%	28.4%	28.0%
Skilled	25.7%	23.8%	29.1%	28.6%	26.6%	21.0%
Unskilled	26.9%	26.2%	23.1%	24.4%	26.4%	32.0%
Farming	6.8%	9.0%	7.3%	7.0%	6.0%	6.0%
<i>Health Status</i>						
Very Healthy	50.2%	55.9%	50.2%	47.6%	49.2%	50.9%
Healthy	27.1%	26.2%	29.3%	28.7%	27.6%	24.4%
Unhealthy	13.0%	13.6%	11.7%	13.2%	12.2%	13.8%
Very Unhealthy	9.7%	4.1%	8.9%	10.6%	11.0%	10.9%
<i>Other Variables</i>						
Children in household	35.0%	35.8%	30.7%	31.0%	39.0%	37.3%
Medical Card	39.4%	31.0%	38.5%	38.9%	43.9%	40.3%
<i>Attitudes to PHI (Rating 1-5)</i>						
PHI is necessity	3.53	3.78	3.52	3.44	3.52	3.52
I will always have PHI	2.95	3.09	2.95	2.89	2.94	2.96
PHI is good value	2.64	2.88	2.78	2.42	2.60	2.72
There is no need for PHI	2.32	2.52	2.17	2.22	2.42	2.32
PHI means better care	3.53	3.77	3.54	3.42	3.49	3.55
PHI only for wealthy	3.01	2.89	2.92	3.06	3.04	3.04
PHI enables queue skipping	3.61	3.75	3.56	3.67	3.53	3.56
PHI only for old and sick	2.12	2.29	1.94	2.00	2.14	2.20
Number of Individuals	7758	1002	1011	2022	1832	1891

*Note: Country of Origin data are not available for 2017. Means for "All Years" are based on 2009-2015

Descriptive Profile by PHI and Year

Table 2 presents a descriptive profile of individuals who have PHI and table 3 presents the profile for individuals who do not have PHI. Comparing these two tables provides a useful picture of the shifting composition of individuals in these two groups.

For the PHI sample, the percentage in the youngest age category (18 to 34) has declined by 8.8 percentage points while the percentage in the oldest category of age 65 plus has increased by 4.5 percentage points respectively. Older individuals are an increasing share of PHI holders over time. This shift in the age profile for the insured may be partly responsible for the premium increases observed in the market over this period. In comparison to the PHI sample, the sample without PHI experienced a marginally smaller drop in the percentage in the youngest category of 8.4 percentage points and experienced relatively stable population shares in the oldest age category. Some of this shift in age composition, especially for the youngest cohort, reflects the changing demographic structure in the sample over this period, as discussed earlier. For the sample without PHI, we observe an increase of almost 5 percentage points in the share of 45 to 54-year olds from 2009 to 2015, showing that relatively more middle-aged individuals chose to forgo PHI faced with higher premiums and tighter economic conditions.

In the sample with PHI, no large shifts in the composition by nationality are observed. However, in the sample without PHI, the Irish fell by 5.4 percentage points. The share represented by EU and non-EU nationals rose by 3.9 and 2 percentage points respectively. This suggests that the take-up of PHI may differ by nationality, and this possibility will be explored further in the multivariate analysis.

In other results, the proportion of the individuals in most of the occupational classes has remained relatively stable, with a few exceptions. The proportion of the PHI sample who were unskilled fell from 14.5% in 2009 to a low of just over 8 percent in 2011, but then recovered to 14.7% in 2017. There is also a small decline of the share accounted for by the farming occupational class.

We see a shift in composition of individuals covered by PHI by health status as well. The percentage of "Very Healthy" individuals fell by 10 percentage points between 2009 and 2015, and correspondingly, the percentage of "Very unhealthy" rose by over 10 percentage points over the same period. In 2017, this trend is partially reversed. Older and sicker individuals are expected to have higher health care costs, and as a result, this shift is likely to lead to higher health insurance costs on average. For the non-PHI sample, we see smaller shifts in health status. The percentage of "Very Healthy" has fallen by 5 percentage points, and the percentage of "Very Unhealthy" has increased by 5.8 percentage points.

Compared to those who have PHI, those who do not have PHI have systematically lower attitudinal scores when asked about PHI coverage. Not surprisingly, the non-PHI sample is less

likely to view PHI as a necessity and think that it is good value. They are more likely to believe that PHI is for the wealthy, old, and sick.

TABLE 2: INDIVIDUALS WITH PRIVATE HEALTH INSURANCE						
Variable	All Years	2009	2011	2013	2015	2017
<i>Gender</i>						
Male	50.4%	49.3%	51.0%	49.8%	49.7%	51.7%
Female	49.6%	50.7%	49.0%	50.2%	50.3%	48.3%
<i>Age Categories</i>						
Age 18 - 34	23.1%	28.8%	25.5%	24.1%	20.6%	20.0%
Age 35 - 44	20.8%	20.5%	19.7%	19.6%	21.0%	22.7%
Age 45 - 54	19.2%	20.0%	17.7%	19.7%	19.0%	19.3%
Age 55 - 64	17.2%	15.7%	16.2%	16.1%	18.5%	18.4%
Age 65 plus	19.6%	15.0%	20.9%	20.6%	21.0%	19.5%
<i>Marital Status</i>						
Married	67.6%	61.7%	67.4%	68.5%	69.5%	68.2%
Partnered, not married	4.6%	5.7%	4.3%	4.1%	4.0%	5.3%
Single	20.8%	23.2%	22.6%	22.4%	20.2%	17.8%
Divorced/Separated	7.0%	9.4%	5.7%	4.9%	6.3%	8.7%
<i>Country of Origin*</i>						
Irish	95.1%	95.6%	97.7%	95.1%	93.4%	--
UK	1.7%	1.9%	0.4%	2.0%	2.2%	--
EU	1.7%	1.5%	0.9%	1.4%	2.5%	--
Non-EU	1.4%	1.0%	1.0%	1.5%	1.9%	--
<i>Occupational Class</i>						
Professional	21.7%	21.4%	19.2%	20.1%	22.3%	24.0%
Lower Middle	37.7%	33.8%	40.1%	37.5%	39.3%	37.4%
Skilled	21.0%	20.1%	24.0%	23.4%	22.8%	16.2%
Unskilled	11.3%	14.5%	8.4%	10.0%	8.4%	14.7%
Farming	8.3%	10.3%	8.3%	8.9%	7.2%	7.6%
<i>Health Status</i>						
Very Healthy	50.1%	56.5%	49.7%	48.4%	46.5%	51.5%
Healthy	27.8%	27.5%	30.3%	29.3%	28.3%	24.7%
Unhealthy	11.1%	11.9%	10.0%	10.9%	10.9%	11.6%
Very Unhealthy	11.0%	4.0%	9.9%	11.4%	14.3%	12.2%
<i>Other Variables</i>						
Children in household	34.6%	35.1%	28.8%	30.3%	37.3%	38.9%
Medical Card	16.9%	10.1%	18.9%	12.6%	20.8%	20.1%
<i>Attitudes to PHI (Rating 1-5)</i>						
PHI is necessity	4.07	4.42	4.06	3.93	4.04	4.03
I will always have PHI	4.00	4.29	4.09	3.86	3.90	4.00
PHI is good value	2.99	3.37	3.13	2.63	2.93	3.10
There is no need for PHI	1.88	1.89	1.72	1.76	1.92	2.03
PHI means better care	3.73	3.94	3.76	3.65	3.68	3.70
PHI only for wealthy	2.43	2.26	2.31	2.47	2.49	2.50
PHI enables queue skipping	3.66	3.76	3.59	3.74	3.60	3.63
PHI only for old and sick	1.95	2.07	1.80	1.80	2.00	2.07
Number of Individuals	3243	462	424	799	739	819

*Note: Country of Origin data are not available for 2017. Means for "All Years" are based on 2009-2015

TABLE 3: INDIVIDUALS WITHOUT PRIVATE HEALTH INSURANCE						
Variable	All Years	2009	2011	2013	2015	2017
<i>Gender</i>						
Male	48.2%	50.6%	47.6%	48.4%	48.5%	47.0%
Female	51.8%	49.4%	52.4%	51.6%	51.5%	53.0%
<i>Age Categories</i>						
Age 18 - 34	38.8%	44.1%	40.7%	40.7%	36.4%	35.7%
Age 35 - 44	19.9%	17.7%	19.9%	20.2%	21.0%	19.7%
Age 45 - 54	15.6%	12.5%	16.5%	15.2%	17.3%	15.2%
Age 55 - 64	11.8%	10.7%	11.7%	10.9%	10.9%	14.2%
Age 65 plus	13.9%	15.0%	11.3%	13.0%	14.4%	15.1%
<i>Marital Status</i>						
Married	43.8%	40.9%	46.1%	42.5%	44.5%	44.7%
Partnered, not married	9.7%	10.9%	8.6%	8.9%	9.9%	10.3%
Single	34.8%	36.8%	33.5%	36.8%	34.7%	32.4%
Divorced/Separated	11.7%	11.4%	11.8%	11.8%	10.8%	12.6%
<i>Country of Origin*</i>						
Irish	89.1%	92.8%	88.9%	89.0%	87.4%	--
UK	2.1%	2.0%	2.3%	2.7%	1.5%	--
EU	5.7%	3.4%	4.7%	5.9%	7.3%	--
Non-EU	3.0%	1.9%	4.0%	2.4%	3.9%	--
<i>Occupational Class</i>						
Professional	4.9%	5.7%	3.6%	4.6%	5.9%	4.7%
Lower Middle	22.1%	23.2%	22.8%	23.4%	21.0%	21.0%
Skilled	29.0%	27.1%	32.9%	32.1%	29.2%	24.6%
Unskilled	38.2%	36.2%	34.1%	34.2%	38.7%	45.0%
Farming	5.7%	7.9%	6.6%	5.7%	5.2%	4.8%
<i>Health Status</i>						
Very Healthy	50.3%	55.4%	50.6%	47.0%	51.0%	50.4%
Healthy	26.6%	25.1%	28.5%	28.2%	27.2%	24.2%
Unhealthy	14.3%	15.1%	12.9%	14.7%	13.1%	15.4%
Very Unhealthy	8.7%	4.1%	8.1%	10.1%	8.7%	9.9%
<i>Other Variables</i>						
Children in household	35.4%	36.4%	32.1%	31.4%	40.1%	36.1%
Medical Card	55.8%	49.0%	53.2%	56.7%	59.8%	55.5%
<i>Attitudes to PHI (Rating 1-5)</i>						
PHI is necessity	3.14	3.23	3.12	3.10	3.16	3.15
I will always have PHI	2.19	2.06	2.11	2.24	2.28	2.17
PHI is good value	2.40	2.47	2.52	2.29	2.38	2.43
There is no need for PHI	2.65	3.06	2.51	2.53	2.76	2.54
PHI means better care	3.39	3.62	3.38	3.27	3.36	3.43
PHI only for wealthy	3.44	3.43	3.37	3.47	3.43	3.45
PHI enables queue skipping	3.57	3.75	3.54	3.63	3.48	3.51
PHI only for old and sick	2.23	2.49	2.05	2.14	2.24	2.30
Number of Individuals	4515	540	587	1223	1093	1072

*Note: Country of Origin data are not available for 2017. Means for "All Years" are based on 2009-2015

Multivariate Analysis

The descriptive analysis provides a useful picture of the characteristics associated with PHI and how these characteristics have changed over time. We expect, though, that a number of these characteristics are correlated with each other, and we wish to isolate the key determinants of PHI using a multivariate model to control for the effect of all potential explanatory variables. For instance, we know that the yearly changes in the economy have been associated with a fall in PHI; however, we would like to explore whether these yearly variations can in turn be explained by socio-demographic or other factors. The multivariate analysis presented in this section aims to isolate the key factors associated with PHI. A caveat to the analysis is that many of the explanatory variables used are arguably endogenous, so we cannot assert that our estimates are causal.

Determinants of PHI

Our key dependent variable of interest is the propensity to be covered by private health insurance. To examine the factors that determine private health insurance coverage, we estimated a probit model. A probit model is an appropriate choice in this case since private health insurance coverage is a binary variable.⁷ We estimated several probit models, building on the set of explanatory variables included in each successive model. Table 4 reports results from 3 different models, each with a larger set of explanatory variables. The first column under each model heading reports the marginal effect, and the second column reports the p-value. A p-value of less than 0.05 denotes statistical significance at the 5% confidence level.

The first model, reported in Table 4 column 1 (Model 1), essentially replicates the results of the simple descriptive statistics of health insurance coverage by year. A set of year dummy variables are included as explanatory variables to capture the effect of the economy on private health insurance coverage.⁸ While year dummies are a somewhat blunt measure of economic conditions, we do not have access to geographic identifiers that would allow us to link in local economic conditions. The year dummies may also capture annual variations in premium levels. From 2015 onwards, Lifetime Community Rating was implemented in Ireland that also may have affected PHI demand. Any effects of this policy would also be captured by the year dummies for 2015 and 2017. Marginal effects from the probit model, reported in column 1, show that compared to the base category of 2009, individuals in 2011 were 3.4 percentage points less likely to have PHI, however this difference is not statistically significant ($p=0.15$). Individuals in 2013 were 5.8 percentage points less likely to have PHI, and individuals in 2015 were 5.4 percentage points less likely to have PHI than in 2009, and these differences are statistically significant. Furthermore, the year indicators included in the model are jointly

⁷ A logit model provided very similar results for the models presented in this paper.

⁸ A measure of the national unemployment rate was statistically insignificant in all models.

statistically significant ($p < 0.05$). Lifetime Community Rating was implemented in 2015. However, there is no evidence that the year effects for 2015 or 2017 are statistically different from the year effect in 2013. It is possible that the sample sizes for this survey do not provide the requisite power to find an effect for this policy.

In Model 2, we supplement the simple year dummy specification with a full set of socio-economic explanatory variables. We expect that socio-demographic factors are likely to be correlated with the demand for PHI. For instance, individuals who are older or in a higher occupational class should be more likely to hold PHI. Individuals who are in poorer health should be more likely to demand PHI if there is adverse selection in the market. However, if there is advantageous selection, we would see the opposite effect. We include the following set of explanatory variables to capture demographic, socio-economic, and related explanatory factors. We include an indicator for a female respondent.⁹ We also include a full set of age categories capturing if the respondent is between ages 18 to 34, 45 to 54, 55 to 64, or 65 plus (ages between 35 and 44 are the reference category). Marital status is captured by the following indicators: partnered, but not married, single, and divorced/separated (married is the reference category). We also include an indicator for whether there are children in the household. Occupational indicators include Lower, Skilled, Unskilled, and Farming (Professional Occupation is the reference category). We include an indicator for whether the respondent holds a Medical Card. Medical Cards are means-tested for the vast majority of holders, and so Medical Card eligibility is a proxy for low income status. We would expect PHI take-up to be far lower among Medical Card holdings because they are low income and because they have an alternative source of medical coverage. A set of indicators capturing self-reported health status is also included in the model – Healthy, Unhealthy, Very Unhealthy (Very Healthy is the reference category). Results in Model 2 columns show the marginal effects and p-values from a probit model. The first interesting result is that the year indicators for 2011, 2013, 2015, and 2017 have all dropped in magnitude and statistical significance after the inclusion of the socio-demographic and other control variables. Only in 2013 is PHI coverage statistically significantly lower than in 2009. Furthermore, the year indicators are no longer jointly significant showing that economic conditions as captured by the year indicators are no longer as important in explaining PHI coverage as they were before the inclusion of the additional explanatory variables.

⁹ In families, women typically make decisions about PHI coverage for family members, so male respondents may not in fact be primary decision makers. We explored the possibility of differential effects for men and women, but did not find any statistically significant evidence of this in the data.

TABLE 4: DETERMINANTS OF PHI (MARGINAL EFFECTS FROM PROBIT MODELS)								
	Model 1		Model 2		Model 3		Model 4 *	
	Effect	P-Value	Effect	P-Value	Effect	P-Value	Effect	P-Value
<i>Year (2009 base category)</i>								
Year: 2011	-0.034	0.151	-0.024	0.366	-0.011	0.742	-0.008	0.810
Year: 2013	-0.058	0.003	-0.055	0.012	-0.018	0.514	-0.018	0.503
Year: 2015	-0.054	0.006	-0.041	0.062	-0.012	0.662	-0.004	0.892
Year: 2017	-0.033	0.086	-0.022	0.321	0.008	0.759	--	--
<i>Gender (Male base category)</i>								
Female			0.025	0.064	0.016	0.316	0.028	0.127
<i>Age Categories (Age 35-44 base category)</i>								
Age 18 - 34			-0.073	0.000	-0.094	0.000	-0.085	0.001
Age 45 - 54			0.080	0.000	0.083	0.001	0.090	0.003
Age 55 - 64			0.195	0.000	0.190	0.000	0.176	0.000
Age 65 plus			0.354	0.000	0.308	0.000	0.332	0.000
<i>Marital Status (Married base category)</i>								
Partnered, not married			-0.139	0.000	-0.103	0.000	-0.115	0.000
Single			-0.086	0.000	-0.081	0.000	-0.088	0.000
Divorced/Separated			-0.138	0.000	-0.125	0.001	-0.135	0.002
<i>Occupational Class (Professional base category)</i>								
Lower Middle			-0.163	0.000	-0.138	0.000	-0.142	0.000
Skilled			-0.315	0.000	-0.263	0.000	-0.244	0.000
Unskilled			-0.420	0.000	-0.359	0.000	-0.350	0.000
Farming			-0.226	0.000	-0.196	0.000	-0.202	0.000
<i>Other Variables</i>								
Children in household			0.020	0.263	0.017	0.404	0.011	0.650
Medical Card			-0.403	0.000	-0.321	0.000	-0.342	0.000
<i>Health Status (Very health base category)</i>								
Healthy			0.028	0.096	0.014	0.484	0.016	0.478
Unhealthy			-0.023	0.291	-0.021	0.422	-0.029	0.349
Very Unhealthy			0.105	0.000	0.090	0.003	0.081	0.021
<i>Attitudes to PHI</i>								
PHI is necessity					0.036	0.000	0.037	0.000
I will always have PHI					0.213	0.000	0.206	0.000
PHI is good value					0.014	0.064	0.006	0.456
There is no need for PHI					-0.056	0.000	-0.052	0.000
PHI means better care					0.006	0.413	0.009	0.299
PHI only for wealthy					-0.061	0.000	-0.061	0.000
PHI enables queue skipping					-0.003	0.671	-0.010	0.270
PHI only for old and sick					-0.007	0.365	-0.009	0.287
<i>Country of Origin (Irish base category)</i>								
UK							0.002	0.974
EU							-0.173	0.000
Non-EU							-0.107	0.053
Pseudo R-Squared	0.001		0.252		0.495		0.5009	
Number of Individuals	7758		7758		7758		5867	

*Note: Country of Origin data are not available for 2017. Model 4 is estimated on data from 2009-2015

The results for Model 2 show that female respondents are 2.5 percentage points more likely to report PHI, but this result is statistically significant only at the 10% level. The age indicators reveal a steep age trajectory in PHI coverage. As expected, older individuals are more likely to have PHI, with individuals who are 65 or over being 35 percentage points more likely to have PHI than individuals who are 35 to 44. The youngest age group (18 to 34) are 7 percentage points less likely to have PHI than individuals who are 35 to 44. This steep age profile is not as dramatic when examining the descriptive statistics. The age profile becomes starker after controlling for the role of other socio-economic characteristics, highlighting the importance of multivariate analysis in this context.

Marital status plays an important role in PHI coverage as well, with individual who are partnered, single, divorced, or separated being between 8 and 14 percentage points less likely to have PHI coverage than individuals who are married. We also see evidence of the effect of occupational class on PHI. Compared to individuals in the professional class, individuals in the skilled class, the unskilled class, the farming class were 31, 42, and 22 percentage points less likely to have PHI. These are large and statistically significant differences. Not surprisingly, individuals with a Medical Card are 40 percentage points less likely to have PHI. We also see some evidence of a varying demand for health insurance based on medical need. Individuals who report their health as “very unhealthy” are 10 percentage points more likely to have PHI than individuals who report their health as “very healthy”. Even those who consider themselves “healthy” are more likely to have PHI than those who report themselves “very healthy”, but this result is only significant at the 10% level. However, there is no statistically significant difference between the unhealthy and the very healthy, or between the healthy and unhealthy. It is important to note that the HIA survey’s measure of health status is closely linked to expected health care utilisation, unlike the self-reported health status measures commonly used in most other surveys.¹⁰ Individuals who are classified as “Very Unhealthy” in the HIA survey agree with the statement that they have “some health problems that sometimes require visits to the hospital, either for day care or overnight.” Given the wording of this survey question, the indicator for “Very Unhealthy” is likely to be a good measure of high health care demand.

Next, we include a full set of health insurance attitudinal variables in the multivariate model presented above. While these attitudinal variables are likely to be endogenous, we think their inclusion provides some suggestive findings that may clarify PHI take-up. We interpret the results with caution given that we cannot assign causality to these variables. Model 3 presents results with the attitudinal variables included in the multivariate model. Most of the attitudinal variables line up with our a priori expectations on their role in PHI. Individuals who agree more strongly with statements that they will always have health insurance or that health insurance is a necessity are 4 and 21 percentage points respectively more likely to have PHI. Individuals who think that there is “no need for private health insurance” or that PHI is “only for the wealthy”

¹⁰ Most surveys use a measure of self-reported health status that asks individuals to state if they consider their health status to be Excellent, Very Good, Good, Fair, or Poor.

are 5 and 6 percentage points respectively less likely to have PHI. Believing that PHI is “good value” or that PHI means “better care” or that PHI means you can “skip the queue” or that health insurance is “only for the old and sick” are not statistically significantly associated with being more likely to have PHI. In the media, queue skipping and access to care have been widely publicised as being important reasons for PHI purchase; however, the empirical results do not support this view (Mullahy, 2016).

It appears that, as expected, individuals whose stated preferences highlight the importance of PHI are more likely to have PHI coverage. While this may be unsurprising, it is interesting to note the effect of controlling for attitudinal variables on the other variables in the model. The effect of the year indicators diminishes sharply, with none of the year indicators being individually or jointly statistically significant. It appears that individuals’ attitudes towards health insurance are correlated with year indicators, and the effect of the changing economy has been reflected in attitudes. As a result, attitudes are more strongly correlated with PHI than the year indicators when both these sets of variables are included in the same model. The effect of occupational class and health also drops somewhat in magnitude when attitudinal variables are added to the model, although for the most part they continue to be sizeable and statistically significant. In contrast, the effect of age is largely similar despite the inclusion of attitudinal variables, suggesting that the attitudinal variables are not strongly correlated with age, and that age retains its direct independent effect on PHI coverage. In terms of explanatory power, Model 3 explains just under 50% of the variation in PHI compared to only 25% for Model 2.¹¹

Lastly, in Model 4, we report results from a probit model that includes country of origin variables. Indicators for country of birth include UK, EU, and non-EU (Irish is the reference category). This model is estimated using data from 2009 to 2015 only, since country of origin information is not available for 2017. We see that country of origin affects PHI coverage. Compared to the Irish-born, individuals born in EU countries (other than the UK) are 17 percentage points less likely to have PHI and individuals born in non-EU countries are 11 percentage points less likely to have PHI.¹² There is no statistically significant difference between UK-born respondents and Irish-born respondents.

¹¹ We use the Pseudo-R Squared to measure explanatory power.

¹² Results from a probit model that excludes the attitudinal variables yield larger and more statistically significant estimates for country of origin. Compared to the Irish-born, individuals born in EU countries (other than the UK) are 20 percentage points less likely to have PHI and individuals born in non-EU countries are 16 percentage points less likely to have PHI, with both results statically significant at the 5 percent level. This suggests that differential attitudes to PHI by country of origin partly explain the difference in PHI take-up.

Decomposition of Year Effects

The results in Table 4 show that the effect of the year dummies falls in magnitude and statistical significance after controlling for socio-economic characteristics and attitudes to health insurance. In this section, we explore the relative contribution of socio-economic characteristics and attitudes to health insurance to this change in the magnitude of the year dummy coefficients. We use Gelbach's (2016) method for decomposing the change in the year effects between Model 1 and Model 3.¹³ The advantage of this decomposition is that we can account for the share of explanatory power due to socio-economic characteristics and attitudes, using a method that is robust to the order in which these variables are included in the model.

We conduct this decomposition for 2013 and 2015 since these two years had large and statistically significant coefficients in Model 1, but smaller statistically insignificant coefficients in Model 3.¹⁴ We find that attitudes to health insurance account for 74% of the change in the 2013 coefficient and for 73% of the change in the 2015 coefficient. All the other variables in the model, including socio-economic status, occupational class, health, and family characteristics account for the remaining 26% for 2013 and 27% for 2015. Thus, it appears that attitudes to health insurance play a substantial role in explaining the effect of annual variations in the economy on PHI demand.

Do the Determinants of PHI change over Time?

In the next set of models, we examine if the effect of the explanatory variables on PHI shown in Table 4 varies by year. Essentially, we ask if the role of demographics, health, and occupational class has changed over time. We estimate a model that includes a full set of interactions of each of the explanatory variables with the year indicators. This model is fairly cumbersome, so we prune this model by dropping the year interactions for variables that were found to have a similar effect on PHI from year to year. Only interactions for those variables that were found to have estimates that varied statistically significantly by year are retained. For the remaining variables, a single estimate that is constant for all years is estimated. The results from this model show that most of the key explanatory variables have similar effects on PHI over time. Table 5 reports a selected set of estimates from this model. Essentially only the variables that have statistically significant interactions with year are reported; all the others are retained in the model but are not reported in Table 5 for brevity. Like in Table 4, the results in Table 5 show that older individuals are more likely to have PHI; however, individuals who are over age 65 are substantially more likely to have PHI in 2011, 2013, 2015 and 2017 than they were in 2009. Despite the implementation of Lifetime Community Rating in 2015, we found no

¹³ We use an Ordinary Least Squares (OLS) model to conduct this decomposition. OLS estimates are virtually identical to the Probit estimates reported in the tables.

¹⁴ We do not focus on Model 4 since it is estimated on a subset of the data.

evidence of a statistically different effect for the younger age cohorts after 2015. This may reflect the lack of power due to limited sample sizes.

Occupational class appears to a statistically different effect on PHI in later years compared to 2009 as well. Individuals in the unskilled occupational class are about 13 percentage points less likely to have PHI in 2011 and 2015, compared to 2009. However, the 2011 interaction is statistically significant at 10% level rather than the 5% level. A caveat in interpreting these findings is that the HIA survey methodology may have differed in 2009 compared to later years due to a change in survey provider. For this issue to have affected these findings, it would have to be the case that the survey methodology systematically altered the relationship between PHI and socio-demographic characteristics. While this is possible, it does not seem likely; however, we interpret these findings with caution. In summary, it appears that most variables have a relatively stable relationship with PHI over time. The only exceptions are for unskilled individuals and for individuals over the age of 65. The unskilled appear to be somewhat less likely to have PHI over time, while the over 65 appear to be progressively more likely to have PHI over time.

The interactions discussed above are statistically significant using the conventional 5% threshold for statistical significance. However, if we use the Bonferroni correction for multiple hypothesis testing, the threshold for statistical significance is 0.001, since 45 explanatory variables were included in the full model (15 variables interacted with 3 Year Indicators). Using this more stringent Bonferroni correction threshold for statistical significance, none of the interactions are statistically significant. The Bonferroni correction is viewed as being very conservative; however, given the concern with multiple hypothesis testing, the interaction effects should be interpreted with caution.

TABLE 5: DETERMINANTS OF PHI -- INTERACTION MODELS (PROBIT MARGINAL EFFECTS)			
Selected Estimates from the full model			
	Interaction Model		
	Effect	P-Value	
<i>Year (2009 base category)</i>			
Year: 2011	-0.026	0.388	
Year: 2013	-0.057	0.024	
Year: 2015	-0.039	0.124	
Year: 2017	-0.026	0.302	
<i>Age Categories (Age 35-44 base category)</i>			
Age 18 - 34	-0.072	0.000	
Age 45 - 54	0.080	0.000	
Age 55 - 64	0.193	0.000	
Age 65 plus	0.221	0.000	
<i>Age-Year Interactions</i>			
Age 65 plus & Year 2011	0.197	0.023	
Age 65 plus & Year 2013	0.140	0.036	
Age 65 plus & Year 2015	0.187	0.005	
Age 65 plus & Year 2017	0.128	0.048	
<i>Occupational Class (Professional base category)</i>			
Lower Middle	-0.162	0.000	
Skilled	-0.315	0.000	
Unskilled	-0.362	0.000	
Farming	-0.224	0.000	
<i>Occupational Class-Year Interactions</i>			
Unskilled & Year 2011	-0.127	0.052	
Unskilled & Year 2013	-0.080	0.109	
Unskilled & Year 2015	-0.138	0.006	
Unskilled & Year 2017	-0.065	0.191	
Number of Individuals: 7758			
Note: The model includes the full set of covariates listed in Model 2 of Table 4. Selected interactions are reported here from the full model			

Conclusion

This paper investigates the importance of economic conditions, socio-demographic factors, and health in explaining the demand for PHI in Ireland. We estimate multivariate models that reveal several interesting findings. Year to year variations, captured by year indicators in a multivariate model, initially appear to play an important role in explaining PHI demand. However, their magnitude and statistical significance diminishes when we control for socio-demographic factors and individual preferences. Individual preferences appear to play an important role in explaining PHI demand. Clearly, preferences themselves are endogenous, and may respond to economic conditions. Our results on the importance of preferences are consistent with previous research in the US and Germany (Finkelstein and McGarry, 2006, Polyakova, 2016).

Socio-demographic factors are important in explaining PHI coverage. Not surprisingly, older individuals are far more likely to have PHI. Furthermore, over 65s are significantly more likely to hold PHI over time. This effect is stark in the multivariate models, compared to the raw data, highlighting the importance of controlling for the effect of other socio-economic characteristics. Despite worsening economic conditions, over 65s appear to prioritise maintaining PHI coverage. This result is to be expected in a community rated system where it is rational for over 65s who can afford health insurance to have it. It is also possible that some of the age profile in PHI coverage incorporates cohort-based differences. For instance, in 2007, only 12% of PHI holders were over 65 and 13% of PHI holders were between 55 and 64. By 2015, these percentages had increased to 21% and 19% respectively. It is possible that preferences for PHI are higher among current cohorts who are at age 65 plus, compared to other cohorts (HIA, 2008).

PHI demand also reflects a strong occupational gradient, that does not diminish despite controls for attitudes and other economic factors. Professionals are more likely to have PHI than all other occupational classes. The unskilled are substantially less likely to have PHI and this disparity has increased over time. The demand by unskilled for health insurance appears to be sensitive to the big swings in the economy from 2009 to 2017. During the high growth phase up to 2008, there was a substantial increase in this group, especially high paid construction workers. But the 2009 to 2012 recession caused a disproportionate number of these workers to lose their jobs and give up health insurance. In 2017, the partial recovery of demand for PHI among the unskilled is consistent with the recovery of construction jobs.

Country of origin also appears to be an important determinant of PHI demand, with the Irish born being more likely have PHI than the non-Irish born (except for the UK).

Our results show some evidence for the presence of adverse selection in PHI in Ireland. The “very unhealthy” are about 10 percentage points more likely to have PHI than the “very healthy”, after controlling for the influence of socio-demographic characteristics and

preferences.¹⁵ Since PHI is community rated in Ireland, individuals in poor health do not face higher premiums than those in good health, so theoretically, they are expected to have a higher demand for PHI. However, previous research has not found consistent support for this effect, with several studies finding evidence for advantageous selection instead (Harmon and Nolan 2001, Finn and Harmon 2006, Bolhaar et al. 2012). The results on adverse selection in health combined with the increasing demand for PHI from the oldest age group suggest that the PHI market will continue to attract groups that have a high expected demand for health care. The implementation of Lifetime Community Rating is potentially an important step to stem the potential adverse selection issues in the Irish PHI market.

¹⁵ Not all health indicators differences showed support for adverse selection. For instance, we found no statistical difference between the healthy and the unhealthy, or between the very healthy and the unhealthy.

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