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Doctoral Thesis

Consumer mobility in the Irish health insurance market

determinants, incentives and risk equalisation

Author:
Conor Keegan

Supervisors:
Dr. Steve Thomas
Dr. Conor Teljeur
Dr. Brian Turner

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Declaration of Authorship

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Summary

Consumer choice of, and competition among, insurers is becoming a more common feature of many health insurance systems, internationally. For competition, theoretically, to work as a tool of resource allocation in these markets it is important to consider both the ease of consumer switching and the quality of risk equalisation.

Consumers should be able to switch insurers without incurring significant switching costs, of which there can be many. Importantly, where consumers are motivated to switch for reasons of price and quality, insurers will be motivated to compete along these dimensions. Furthermore, absence of (or presence of poor quality) risk equalisation in community rated markets can encourage insurers to risk select profitable (e.g. young and healthy) risks at the expense of unprofitable (e.g. older and sicker) risks. Risk selection can have a number of detrimental competitive effects and the best, and most common, way to mitigate against this behaviour is to organise risk equalisation payments between insurers that reflect consumer risk.

This thesis uses the Irish private voluntary health insurance market to explore these issues. While a competitive private health insurance market has been in existence in Ireland for close to 20 years, little is known about the motivations and characteristics of switchers in the market. Furthermore, the evolution of the community rated market, in the absence of, for the most part, any risk equalisation payments resulted in strong incentives for risk selection. This contributed to large risk asymmetry observable between the former state-backed monopoly insurer, the Voluntary Health Insurance Board, and the newer entrants. In 2013, risk equalisation payments commenced, however, no detailed understanding exists in terms of their impact. Moreover, this investigation takes place at a time when serious consideration had been given to expanding the role competitive health insurance financing played in the Irish market. More broadly, empirical analysis of these issues in duplicative voluntary health insurance markets has been very limited to date.

Taking the above into consideration, and guided by the construction of a conceptual framework of consumer mobility, this thesis examined, in the context of the Irish health insurance market:

- consumer-reported motivations for switching, and not switching, insurer

- actual switching behaviour, and
- the performance of the belatedly introduced risk equalisation scheme.

These issues were analysed through three quantitative empirical studies each based on three distinct datasets obtained exclusively from the Health Insurance Authority and the Voluntary Health Insurance Board, respectively.

A low annual switching rate is reported in the Irish market, estimated at slightly less than four percent. In this regard, a large proportion of consumers appear happy with their health insurer and do not switch for that reason. However, a number of costs to switching were also identified. Most notably, over one in seven consumers cited transaction costs as a reason for not switching while a number of non-rational motivations were also reported. The distribution of switching costs also fell disproportionately on high-risk individuals and this was reflected in lower switching propensities for these groups.

When individuals did switch, price was reported as the dominant motivation while quality was considerably less important. Reflecting this, strong price effects were also identified when modelling actual switching behaviour, although price responsiveness decreased with age and prior healthcare utilisation, respectively.

Evidence from this thesis also points towards the need to improve risk equalisation design if market asymmetry and selection incentives are to be appropriately addressed. Evidence is also found that the replacement of the current risk equalisation design with one predicated on diagnostic information may be a way to achieve this.

Overall, results from this thesis provide much deeper and clearer insights into consumer choice of, and competition between, insurers in the Irish market than has heretofore existed. Particularly, concern over barriers to switching, their distribution in the insured population, and the quality of risk equalisation raise questions over the competitive environment in which the Irish voluntary health insurance market currently operates. A corollary of these empirical findings is that they also question the wisdom, on competitive grounds, of transitioning to a mandatory competing health insurer financing model, a reform that up until very recently was being strongly considered by policymakers.

Publications and presentations

- Keegan, C. et al (2015). "Switching insurer in the Irish voluntary health insurance market: determinants, incentives, and risk equalization". *The European Journal of Health Economics.* [Epub ahead of print]

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- Keegan, C. et al (July 2015). "Competitive incentives in Ireland's health insurance market: improving the design of Ireland's risk equalisation scheme". Presented at iHEA 11th World Congress 2015, Milan.

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Abbreviations

AME	**A**verage **M**arginal **E**ffects
BKK	**B**etriebs**K**ranken**K**assen
BUPA	**B**ritish **U**nited **P**rovident **A**ssociation
CAHPS	**C**onsumer **A**ssessment of **H**ealthcare **P**roviders and **S**ystems
CI	**C**onfidence **I**nterval
CQI	**C**onsumer **Q**uality **I**ndex
CDHP	**C**onsumer **D**irected **H**ealth **P**lan
CPM	**C**umming's **P**rediction **M**easure
DCG	**D**iagnostic **C**ost **G**roup
DRG	**D**iagnosis **R**elated **G**roup
DOH	**D**epartment **O**f **H**ealth
EEE	**E**xtended **E**stimating **E**quations
ESRI	**E**conomic and **S**ocial **R**esearch **I**nstitute
EU	**E**uropean **U**nion
GLM	**G**eneralised **L**inear **M**odel
GDP	**G**ross **D**omestic **P**roduct
GP	**G**eneral **P**ractitioner
HEDIS	**H**ealth **E**ffectiveness **D**ata and **I**nformation **S**et
HCC	**H**ierarchical **C**ondition **C**ategory
HHI	**H**erfindahl **H**irschman **I**ndex
HIA	**H**ealth **I**nsurance **A**uthority
HSE	**H**ealth **S**ervice **E**xecutive
HMO	**H**ealth **M**aintenance **O**rganisation
HSW	**H**ealth **S**tatus **W**eight

ICD-9-CM	**I**nternational **C**lassification of **D**iseases -**9**th - **C**linical **M**odification
ISQSH	**I**rish and **S**ociety for **Q**uality and **S**afety in **H**ealthcare
LPM	**L**inear **P**robability **M**odel
MAPE	**M**ean **A**bsolute **P**rediction **E**rror
MEM	**M**arginal **E**ffects at **M**eans
MEP	**M**arket **E**qualising **P**ercentage
NCHD	**N**on-**C**onsultant **H**ospital **D**octor
NTPF	**N**ational **T**reatment **P**urchase **F**und
OECD	**O**rganisation for **E**conomic **C**o-operation and **D**evelopment
OLS	**O**rdinary **L**east **S**quares
PCG	**P**harmaceutical **C**ost **G**roup
PPO	**P**referred **P**rovider **O**rganisation
PR	**P**redictive **R**atio
SDU	**S**pecial **D**elivery **U**nit
UHI	**U**niversal **H**ealth **I**nsurance
US	**U**nited **S**tates
VHI	**V**oluntary **H**ealth **I**nsurance Board
WHO	**W**orld **H**ealth **O**rganisation

Chapter 1

Introduction

1.1 Background and motivation

Using competitive forces as a means of financing healthcare has become an integral component of policy in a number of healthcare systems. In recent decades, a large number of European countries have turned to competition as a means of allocating scarce resources in mandatory (statutory) health insurance markets (Thomson et al., 2013). Similarly, the introduction of the Affordable Care Act in the United States (US) is expanding the role competition between insurers plays in allocating resources in the US system (van Ginneken and Swartz, 2012). The development of the theoretical foundations for such competition to take place are largely credited to Alain Enthoven and his formulation of 'managed competition' (Enthoven, 1988). Under this framework, competition is designed to take place on three fronts; between consumers and insurers (for health insurance coverage), between providers and insurers (insurers contracting with providers for care) and between providers and consumers (for healthcare provision) (van Ginneken and Swartz, 2012; van Ginneken, Swartz, and Van der Wees, 2013).

In terms of markets for health insurance provision, it is well recognised that understanding the dynamics of consumer mobility is a key component to understanding the competitive environment under which these markets operate (Thomson et al., 2013; Laske-Aldershof et al., 2004; Bevan and van de Ven, 2010). Under competitive pressures, the threat of consumer exit should motivate insurers to be responsive to consumer preferences. Particularly, if consumers are willing to switch out of price and quality considerations it will promote productive and allocative efficiency on the part of insurers. Ease of switching is also important, however, consumers may face a number of potential costs to switching health insurer, which may weaken competitive forces (Duijmelinck, Mosca, and van de Ven, 2015). Particularly, if certain groups of consumers are identified as facing higher barriers to switching then it may lessen insurer motivation to respond to their preferences (Duijmelinck and van de Ven, 2015).

Consumer mobility can also be influenced by the regulatory environment under which insurance markets operate. In this context, many health insurance markets concern themselves with ensuring affordability of healthcare for high-risk individuals. A common regulation towards this end is known as community rating which restricts the ability of insurers to match premiums to consumers' expected costs. As a consequence, insurers may be motivated to focus their attention on attracting low-risks (e.g. young and healthy) while avoiding high-risks (e.g. old and less healthy), a phenomenon known as risk selection. Risk selection can have a number of negative consequences including poor service to high-risks, market segmentation, and welfare loss as insurer incentives are focused on risk selecting activities rather than price and quality competition. The best way to address these selection incentives is through allocating risk-adjusted premium subsidies to insurers, generally organised through risk equalisation schemes (van de Ven, 2011).

The focus of this thesis is on analysing issues of consumer mobility in the Irish voluntary private health insurance market. There are a number of reasons that motivated this choice. First, while issues of consumer mobility in the Irish market have received attention in the past (for example, see Armstrong (2010), Competition Authority (2007), and YHEC (2003)), the debate has predominantly been descriptive in nature with a distinct lack of detailed quantitative analysis available to inform policy. This is particularly important in terms of research into risk equalisation. Following liberalisation of the community rated Irish market in the mid-1990s there was a shift in new and existing consumers away from the incumbent, former monopoly insurer, the Voluntary Health Insurance Board (VHI)[1] and toward the newer market entrants. However, the market evolved until recently in the absence of any mechanism to provide insurers with risk-adjusted subsidies to reflect the risk they held. Most notably, although a system of risk equalisation was implemented in 2003, a successful legal challenge by the first market competitor BUPA blocked the commencement of actual payments (Turner and Shinnick, 2013). As a consequence, large market segmentation developed between the incumbent insurer, VHI, and the newer entrants. This undermined community rating principles and was exacerbated by strong incentives for risk selection. A system of age-related tax credits was introduced in 2009 and replaced by bona-fide risk equalisation in 2013. To date, however, there has been a dearth of research into how well risk equalisation actually performs in its task of addressing market segmentation and reducing incentives for risk selection.

This doctoral research also takes place at an important time for broader national health policy. In 2014, the Government published a White Paper on plans to expand the role competitive health insurance financing plays in the Irish health system (DOH, 2014a). Specifically, it was envisaged that the current two-tier public/private system of healthcare would be replaced by a more equitable single-tier system predicated on mandatory purchase of a community rated basic insurance package (with an option to purchase further risk rated supplementary cover). Very recently, however, these proposals appear to have been rejected as too costly following the publication of recent costing reports (Wren, Connolly, and Cunningham, 2015; KPMG, 2015). However, an understanding of the competitive nature of the current voluntary system may provide additional insights in terms of whether competitive foundations are in place to expand the role of multi-payer health insurance financing. Specifically, ease of consumer switching and robust risk equalisation have previously been identified as important pre-conditions for effective managed competition (Bevan and van de Ven, 2010; Thomson et al., 2013).

[1] Now trading as Vhi Healthcare.

Finally, from an international research perspective, most research on consumer mobility has either focused on consumer movements across health plan in the US (for example, Strombom, Buchmueller, and Feldstein (2002), Atherly, Dowd, and Feldman (2004), and Marquis et al. (2007)) or movements across insurer in mandatory European health insurance systems (for example, Thomson et al. (2013), Laske-Aldershof et al. (2004), Reitsma-van Rooijen, de Jong, and Rijken (2011), and Boonen, Laske-Aldershof, and Schut (2015)). Little empirical evidence exists to date on consumer mobility in voluntary markets underpinned by a public healthcare system. As consumers who purchase insurance in such systems differ in characteristics from the overall population (Kiil, 2012) and face a greater choice set given that exiting the market is also an option, separate investigation may be merited. Discussion of the role risk equalisation can play in voluntary health insurance markets has been of particular interest in recent years yet regulations have been slow to develop in these settings (Armstrong et al., 2010). The recent implementation of risk equalisation in the Irish market provides an opportunity to contribute empirical evidence in this area and may be of interest to other voluntary markets looking to provide risk-adjusted payments to insurers.

1.2 Aim and objectives

The aim of this thesis is to understand and evaluate the factors that impact on consumer mobility in the Irish health insurance market and similar contexts.

The specific objectives of this study then relate to:

- Developing a conceptual framework to explain consumer mobility in health insurance markets (see Section 1.3).
- Answering a number of specific research question related to consumer mobility in the Irish market (see Section 1.2.1).
- Developing recommendations to improve the competitive functioning of the Irish health insurance market and similar contexts.

1.2.1 Research questions

Specifically, the primary research questions addressed in this thesis are:

- What factors do consumers see as encouraging and discouraging switching in the Irish private health insurance market? What barriers to switching do consumers face and how are they distributed across the insured population? (*Chapter 5*)
- What are the determinants of actual switching behaviour in the Irish private health insurance market? (*Chapter 6*)
- How well has the recently introduced risk equalisation scheme addressed incentives for risk selection in the market? Can the design of risk equalisation be improved? (*Chapter 6 and 7*)

The first set of research questions empirically examined in this thesis relate to understanding the benefits and costs to switching faced by consumers in the Irish private health insurance market. Standard economic theory suggests that consumers should act rationally in weighing up the benefits and costs when considering switching insurer. In terms of benefits it is important that consumers switch out of consideration for price and quality so that insurers are motivated to compete along these parameters. In addition, switching costs should be low so they do not restrict otherwise beneficial switching behaviour. However, general typologies of switching costs (Klemperer, 1987a; Klemperer, 1995) and those more specific to health insurance markets (Duijmelinck, Mosca, and van de Ven, 2015) recognise the existence of non-rational costs to switching which undermine standard economic assumptions and reflect behavioural biases in decision-making.

Perhaps just as important as understanding what barriers consumers face when switching, is understanding whether these barriers differ across risk groups. Theory would suggest that certain groups may experience lower levels of switching costs. For instance, younger or more educated individuals may be better equipped to navigate the market, while those in better health may be less concerned about issues of continuity of coverage that might otherwise discourage switching. If certain groups perceive much greater barriers to switching insurer it might point to evidence of inequalities in the system (Reitsma-van Rooijen, de Jong, and Rijken, 2011).

Identifying consumer reported reasons for switching and not switching, and whether differences exist between groups, also provides an empirical foundation for understanding actual switching behaviour in the market. Understanding actual switching behaviour is the focus of the second main research question of this thesis. For instance, it would be expected that if low-risk individuals cite lower barriers to switching then this will also be reflected in higher switching propensities for this group. Additionally, there is need for an understanding of how price influences actual switching behaviour. As argued, price sensitivity, to the extent that it motivates efficient behaviour by insurers, is an important requirement of a competitive market. However, an awareness of whether price sensitivity differs between groups is also important. For instance, if certain insurers (for example, newer entrants) have a better risk profile than competitors they may have advantages in charging lower community rated premiums. If low-risks display higher price sensitivities this could create a situation whereby certain groups of insurers attract a disproportionate number of low-risks, which may contribute to market segmentation (Buchmueller, 2009). If insurers explicitly engage in this behaviour it is known as 'price-shadowing' and can be considered a form of risk selection. It is likely it played a contributory role in the large risk segmentation that developed between VHI and the newer market entrants (Armstrong, 2010).

As outlined above, the Irish market evolved largely in the absence of any form of risk-adjusted payments to insurers. The resulting incentives for risk selection and market segmentation that developed created a poor environment for health insurance competition to take place. Cognisant of this, the introduction of additional age-related tax credits to insurers in 2009 followed by bona fide risk equalisation in 2013 were hoped to address these issues. However, little is known empirically in terms of how well risk equalisation (or indeed age-related tax-credits) actually performed in this regard. Understanding the efficacy of the current Irish risk equalisation design and whether improvements can be made to its specification is, therefore, the concern of the third set of research questions posed in this thesis.

1.3 Methodological approach

The research questions outlined in the previous section were formulated based on a broad search of relevant literature related to consumer mobility in health insurance markets. Consumer mobility is generally understood from the perspective of consumer decision theory. This assumes that consumers are utility-maximising, rational actors who will only switch insurer if the benefits of doing so outweigh the costs. Recently Duijmelinck, Mosca, and van de Ven (2015) set out a framework, built on more general typologies (for example, see Klemperer (1987a) and Klemperer (1995)), for understanding switching benefits and costs as they related specifically to health insurance markets. This framework is used as a starting point for empirical investigations. However, consumer decision-making does not operate in a vacuum and for a holistic understanding of switching behaviour other factors need to be considered. Particularly, these were identified as the regulatory environment and market structure, respectively, under which competitive health insurance markets operate.

A review of the literature highlighted the need to tie all these various strands of understanding together into a coherent whole, as they were often given separate treatment. Specifically, research into risk equalisation and market structure, respectively, often occupy their own specific research niches and are not explicitly discussed in terms of their association with consumer mobility. As a consequence, a conceptual framework of consumer mobility is constructed in Chapter 2. As noted by Miles and Huberman (1994, pg. 18),

> A conceptual framework explains, either graphically or in narrative form, the main things to be studied, the key factors, constructs or variables - and the presumed relationships among them.

Developing a conceptual framework is an important element of any research exercise as it aids the researcher in clearly and explicitly detailing about 'why and how' a topic has been chosen to study and to use the literature review process to 'develop, refine, and evolve these arguments' (Ravitch and Riggan, 2012, pg. 27). It is important to emphasise that the conceptual framework is not merely an aggregation of prior literature or theories. Rather a conceptual framework is *constructed*, not found (Ravitch and Riggan, 2012). It involves tying the various conceptual factors identified, into a unifying, cohesive whole.

Three main data sources, one for each empirical study conducted, are utilised in this thesis. All data sources were uniquely acquired and had not been utilised previously for external research. These relate to,

- HIA (Health Insurance Authority) 2010, 2012 and 2014 consumer surveys
- VHI consumer attrition data 2013-2014
- VHI claims expenditure data 2010-2012

Biennial consumer surveys conducted on behalf of the HIA (HIA, 2010c; HIA, 2012; HIA, 2014e) capture representative responses from a sample of the adult national population, with quotas set around age, sex, social class and region. Access was also granted to two separate VHI administrative databases. Consumer attrition data relates to policy-level observations on plan and consumer characteristics for individuals, who at the time of contract renewal, either renewed their contract with VHI or switched to a competitor. Claims expenditure data captures detailed healthcare expenditure information in addition to plan and consumer characteristics, at the individual consumer level, for all VHI consumers over the period 2010 - 2012. Efforts were also made to access administrative data from other market insurers, however, requests were declined due to concerns over commercial sensitivity.

The empirical methods adopted in this thesis are entirely quantitative in nature and primarily relate to modelling binary outcomes and healthcare expenditures. Detailed descriptions and justifications for statistical methods adopted are discussed at relevant points throughout this thesis. However, a number of sensitivity analyses are also conducted (see Appendix A) in order to understand the robustness of results to changes in both model and variable specifications.

1.4 Research contributions

This thesis identifies a number of important contributions to research. Particularly, much quantitative research on competition in the Irish health insurance market has been constrained due to lack of available data. The uniquely acquired data sources utilised as part of this thesis therefore allow for the specification of a number of important empirical research questions related to consumer mobility in the Irish market that, to date, could not be addressed.

However, the development of a conceptual framework also offers fresh theoretical insights into consumer mobility dynamics; while the voluntary nature of the Irish health insurance market offers an untested setting, in an international context, in which to explore these issues. As a detailed account of the contributions of this thesis is left until Chapter 8, a summary is provided below. Contributions identified in this thesis relate to:

- An improved conceptual understanding of the factors influencing consumer mobility in health insurance markets and the interrelationships that exist between them.
- A first empirical analysis of switching behaviour and risk equalisation performance in a voluntary private health insurance market underpinned by a

public healthcare system. This fills an important gap in overall understanding of consumer mobility in multi-payer health insurance markets.

- A detailed analysis of motivations for (not) switching in the Irish market. Including,
  - A first empirical analysis of the distribution of switching costs in the Irish market.
  - Insights into consumer awareness of market information provided to improve decision-making.
- A first statistical analysis of actual switching behaviour in the Irish market.
- A first statistical analysis of risk equalisation in the Irish market. Specifically,
  - Analysis of the performance of the current risk equalisation design.
  - Insights into potential improvements to the current design.

1.5 Outline of chapters

The remainder of this thesis is structured as follows: Chapter 2 introduces the literature review and conceptual framework of consumer mobility used to guide the empirical analyses in later chapters. Consumer mobility, in this context, is understood, broadly, in terms of consumer decision theory, the governing regulatory environment, and the market structure. The characteristics of those who take out voluntary health insurance and the regulatory environment in these markets is also briefly discussed.

Chapter 3 provides a contextual overview of the Irish private health insurance market. First, a description of the Irish health system is provided in terms of financing and coverage, including the position occupied by the private health insurance market. The role private health insurance plays is then examined in more detail. It is considered controversial by many, given the unique public/private mix of services and government subsidisation of private healthcare. Yet it remains popular, with slightly under half the population choosing to take out private cover. In this context, the motivations and characteristics of consumers of private health insurance are considered. The regulatory environment is then examined, focusing particularly on the unbalanced development of community rating and risk equalisation legislation. Penultimately, the structure of the market is considered, particularly barriers to entry/exit and market concentration. Finally, recent actual and proposed health system reforms are discussed. Emphasis is placed on recently abandoned reform to expand the role of competitive health insurance financing through the introduction of universal health insurance.

Chapter 4 provides an introduction to the empirical analyses conducted in this thesis. The specific research questions examined required the use of three primary quantitative data sources. The nature of these data sources along with their acquisition are outlined. Arguments are then made to justify the main statistical techniques adopted in this thesis.

Chapter 5 is the first of the empirical analyses. The focus of this chapter is on identifying and analysing what are considered key conceptual elements of switching behaviour, that is the benefits and costs to switching faced by consumers. Embodied in this, is testing whether switching costs differ between consumers based on their socio-demographic and health-related characteristics. Efforts are also made to understand consumer awareness in terms of knowledge of the HIA and its functions and, separately, the socio-economic and health-related correlates of switching behaviour.

Chapter 6 then takes a detailed look at actual switching behaviour within the Irish market in terms of policy and consumer characteristics. Particular attention is placed on the role price plays in the switching decision and whether actual switching behaviour corresponds with analysis of search and switching costs in the previous chapter. This study then shifts focus to consider the ability of risk equalisation to address any differences in costs that may exist between switchers and stayers.

Chapter 7 is the final empirical study conducted. The focus of this chapter is to take a closer look at the ability of risk equalisation to address risk selection and support community rating. The current risk equalisation design, along with a number of alternative specifications, are examined.

Chapter 8 provides an overview and synthesis of the results and outlines contributions and policy recommendations emerging from the analyses.

Chapter 2

Literature review and conceptual framework

2.1 Introduction

The purpose of this chapter is to conduct a detailed theoretical and empirical literature review of consumer mobility in health insurance markets. The process involved in carrying out this literature review is detailed in Section 2.2. Analysis of the literature suggests that consumer mobility can be best understood in terms of three central broad constructs or categories, referred to by Miles and Huberman (1994) as *intellectual bins*. The most widely discussed and intuitive of these is termed *consumer decision theory*. This is discussed in Section 2.3. In addition, the *regulatory environment* under which an insurance market operates can also impact on consumer mobility. This is discussed in Section 2.4. Finally, the pervading *market structure* may also have implications for consumer mobility and this is examined in Section 2.5. Section 2.6, takes a closer look at voluntary health insurance markets and tries to understand potential implications for consumer mobility distinct to such environments. The theoretical and empirical literature is summarised in Table 2.4.

However, as outlined in Section 1.3, in terms of a comprehensive understanding consumer mobility simply reviewing an aggregation of literature may not be sufficient. As such, and predicated in the heavy-lifting done in previous sections of this chapter, a conceptual framework of consumer mobility is constructed out of the literature review. This conceptual framework is presented graphically and narratively in Section 2.7. This framework is then used to guide the empirical analyses conducted in Chapters 5, 6 and 7 and the overall discussion of findings in Chapter 8. Finally, Section 2.8 summarises the findings of the chapter.

2.2 Literature review

As a starting point it was considered important to search for all literature (both theoretical and empirical) focusing on consumer mobility in competitive health insurance markets. As a working definition, this thesis understands consumer mobility as primarily the decision to switch health insurer, however, encompassed in much of this framework is also an understanding of the decision to switch health plan or policy[2] [3].

Preliminary searches, however, indicated that definitions of consumer mobility were not homogeneous. Most notably, in US markets focus was placed on switching between health plan rather than health insurer. This is most likely due to the dominant employer-based provision of health insurance in the US where employers choose between a range of alternative health plans for their employees. In contrast, European research focused more on switching between insurer. While switching between insurer is likely to have more ramifications for competition, it was decided not to discount health plan switching for fear of overlooking valuable theoretical and empirical material.

[2]Health insurer switching, however, can be deemed more relevant in terms of competitive implications.

[3]Consumer mobility is also interchangeably referred to as consumer switching throughout this thesis.

2.2.1 Electronic database search

PubMed and Econlit were the main electronic databases searched. PubMed comprises more than 24 million citations for biomedical literature from MEDLINE, life science journals, and online books. Econlit, is an economics-specific database providing links to articles from all fields of economics. Econlit helped capture potentially relevant articles that may not have been indexed specifically to health or health economics literature. Choice of databases and construction of the search string was informed through the help of the Duty Librarian in Trinity College Dublin in January 2015. The original search took place on 17/02/2015. For both database searches the following search string was used,

(((consumer or insuree or policyholder) AND (mobility or choice or switching or selection)) AND (health insurance or health insurer or health plan))

2.2.2 Search criteria

Given the broad nature of this search, inclusion and exclusion criteria needed to be defined[4]. In order to refine the search and capture the actual phenomena I was seeking to explain, a number of criteria were finally adopted (see Table 2.1). Particularly, to narrow focus, any studies detailing the decision to take-up or drop health insurance were excluded, as were any involuntary switching decisions (e.g. group contracts)[5]. As interest lay in consumers of health insurance, not consumers of healthcare, any patient-focused studies were also discounted. Empirical studies were restricted to those focusing on adult populations. Searches were also refined to peer-reviewed articles with available abstracts. Finally, the search was restricted to English language literature published after 01/01/2000. Both quantitative and qualitative studies, as well as reviews, were considered.

[4]For example, entering the above search string into PubMed alone, returned in excess of 1,600 articles.

[5]This did not exclude switching decisions related to family plans, where decision-making was primarily the responsibility of the main policyholder.

Subsequent to this search, monthly alerts were set up with both PubMed and Econlit databases using the same search string, defined above. Alerts were sent to the researcher's email informing the researcher of any articles matching the search string and inclusion/exclusion criteria. Any relevant articles were included in the literature review up to the time of submission.

TABLE 2.1: Inclusion and exclusion criteria for literature search

Inclusion Criteria	**Exclusion Criteria**
–Primary focus on health insurer or health plan switching	–Primary focus on the decision to take out health insurance or drop health insurance
–Focus on individual decision-making	–Focus on group switching decisions
–Adult populations	–Non adult populations OR patient populations
–Theoretical OR Empirical studies	
–Quantitative OR Qualitative OR Review studies	
–English language articles with access to full text	
–Articles published after 1999	

This procedure identified a number of potentially relevant articles in both PubMed (n=836) and Econlit (n=147). Abstracts of all articles were examined and then downloaded if deemed relevant[6]. Following removal of duplicates this left a total of 155 relevant articles downloaded from these databases. These articles were supplemented by additional sources of literature identified through the following process.

2.2.3 Additional sources of literature

First, bibliographies of all articles flagged as relevant through the electronic database search were screened to capture other potentially suitable articles that may have

[6] 147 articles downloaded from PubMed; 62 articles downloaded from Econlit.

been originally overlooked.

Secondly, Google Scholar was used to identify any relevant grey literature that would not have been identified in the database search.

Finally, the publication sections of the HIA website[7] and the Department of Health (DOH) website[8] were searched for any relevant Irish-specific policy documents related to the private health insurance market.

2.3 Consumer decision theory

Consumer decision theory is predicated on standard neoclassical economic theory which encompasses three main assumptions (Weintraub, 2007). First, given a set of choices, it is assumed individuals will make decisions that maximise utility. Utility relates to the satisfaction received from consuming a good or service. Secondly, utility maximisation holds that individuals choose rationally - that is, given a set of choices an individual will rank these choices and choose the most preferred option. Finally, individuals act independently on the basis of full and relevant information.

Under this framework, when consumers make their initial decision to insure, they are assumed to pick the option that maximises their expected utility. That is given a set of n insurers (or plans), consumer i will choose insurer j over insurer k if

$$EU_j > EU_{in} \tag{2.1}$$

Utility, in this context, should be a function of plan benefits, such as price and quality. However, after the initial choice is made, consumers must now decide whether or not to remain with their current insurer (or plan) or switch in subsequent enrolment periods. The decision to switch insurer brings with it additional considerations. Particularly, consumers may now experience ‘state dependence’

[7]http://www.hia.ie/publication
[8]http://health.gov.ie/publications-research/

(Atherly, Florence, and Thorpe, 2005). State dependence implies that there may be significant switching costs involved in changing states (i.e. switching plan or insurer) and consumers therefore prefer to remain in their current state even if switching states would increase utility *in the absence of these costs*. Under the standard utility framework outlined, consumers will be expected to switch insurer only if the benefits of switching outweigh these costs (Laske-Aldershof et al., 2004). Recently, Duijmelinck, Mosca, and van de Ven (2015) proposed a framework for understanding potential switching benefits and costs in health insurance markets.

The main switching benefits in this context, can be understood as,

- Price
- Quality
- Supplementary insurance
- Gifts

Low switching rates in health insurance markets are sometimes explained in that the benefits of switching tend to be low, given high observed satisfaction rates with current insurers (Duijmelinck, Mosca, and van de Ven, 2015). However, switching costs can be substantial and can also create barriers to mobility. Switching costs are not unique to health insurance markets and are prevalent in any markets where there are substantial changeover costs associated with switching from one product to another (Klemperer, 1987b). Such examples include financial services, telecoms and the airline industry (Kim, Kliger, and Vale, 2003; Maicas, Polo, and Javier Sese, 2009; Lunn, 2012; Carlsson and Löfgren, 2006).

Importantly, the costs of switching do not just arise when switching takes place. It is important to distinguish between search and switching costs. Search costs relate to,

> 'the total costs spent by a consumer in identifying and interpreting a firm's product and price offering, regardless of whether the consumer buys the product from the firm of not (Wilson, 2007, pg. 3).'

While switching costs relate to,

> 'the total costs incurred by a fully informed consumer through deciding to change suppliers that would not have been incurred by remaining with the current supplier (Wilson, 2007, pg. 3).'

While search costs can be incurred numerous times, switching costs on the other hand are one-time costs incurred when switching takes place (Competition Authority, 2007).

Klemperer (1987a) and Klemperer (1995), provided original taxonomies for understanding switching costs in markets. An important insight of these analyses is that, undermining the standard utility framework, switching costs may be psychological or (in other words) non-rational, in nature. Even when there is no justifiable economic reason for individuals to remain with their current supplier, they do. Indeed, the assumption that consumers always make rational decisions is a strong one. It is well known that economic decision-making is subject to a range of behavioural biases whereby individuals may not act according to neoclassical microeconomic assumptions (Simon, 1955; Kahneman and Tversky, 1979).

Incorporating Klemperer's formulation, Duijmelinck, Mosca, and van de Ven (2015) recently developed a bespoke taxonomy of switching costs specific to health insurance markets. This thesis follows this framework closely[9]. Broadly, these can be described as,

- Search costs
- Transaction costs
- Uncertainty costs
- Learning costs

[9] One point of departure from this taxonomy is that I specifically distinguish between search and transaction costs of switching. The authors describe only 'pre-switching' transaction costs. Transaction costs, however, may also arise at the time of switching (see Klemperer (1987a) and Klemperer (1995)).

- Benefit-loss costs
- Provider-switching costs
- Psychological (sunk) costs

A fairly consistent empirical finding across many health insurance markets is that consumer characteristics have a strong impact on switching behaviour. These are normally explained in that the distribution of switching costs is assumed not to be homogeneous. For example, those with lower expected healthcare costs may be less concerned with issues around continuity of care, while those with greater cognitive abilities may be better equipped to find and interpret health insurance related information which may aid decision-making (Lako, Rosenau, and Daw, 2011). Empirically, evidence would suggest that younger, healthier, wealthier and more educated consumers tend to have higher switching propensities across a number of settings (Atherly, Florence, and Thorpe, 2005; Buchmueller, 2000; Nuscheler and Knaus, 2005; de Jong, van den Brink-Muinen, and Groenewegen, 2008; Boonen, Laske-Aldershof, and Schut, 2015; Frank and Lamiraud, 2009; Thomson et al., 2013)[10] [11].

Endogenous versus exogenous switching costs

It is important at this point to also make the distinction between the exogenous and endogenous nature of switching costs. On the one hand, switching costs may be exogenous, and experienced largely regardless of any behaviour by firms. Good examples of such costs may relate to certain psychological costs of switching (discussed in Section 2.3.2.2). In contrast, endogenous switching costs relate to costs that are influenced by firm behaviour (Shi, 2013; Farrell and Klemperer, 2007). For instance, firms may use marketing, product design or promotional offers

[10] Although women are generally taken to utilise more healthcare than men (Bertakis et al., 2000), evidence on gender effects in switching behaviour is quite inconsistent (for example see Atherly, Florence, and Thorpe (2005), Buchmueller (2000), Nuscheler and Knaus (2005), de Jong, van den Brink-Muinen, and Groenewegen (2008), Boonen, Laske-Aldershof, and Schut (2015), and Frank and Lamiraud (2009)).

[11] One notable exception is the Israeli health insurance system where switching is found to be an inferior good - those with higher labour-income were found to be less likely to switch (Shmueli, Bendelac, and Achdut, 2007).

to artificially manipulate costs faced by consumers. This type of behaviour may be particularly relevant to health insurance markets whereby it may be possible to earn predictable profits by focusing resources on attracting low-risk cohorts of insurees[12]. A detailed discussion of this type of behaviour is left until Section 2.4.

The benefits and costs to switching faced by consumers are discussed in detail in Section 2.3.1 and Section 2.3.2.

2.3.1 Switching benefits

2.3.1.1 Price

A central argument for promoting competition within health insurance markets is that it will lead to an efficient provision of health insurance (Thomson et al., 2013). A necessary condition, however, is that consumers purchasing insurance, all else equal, will gravitate towards the lowest cost alternatives. If this were not the case, insurers would have no incentive to compete on price and would consequently lack motivation for efficiency.

In this context, there has been a substantial amount of empirical research conducted into analysing the relationship between price and health plan/insurer choice. The vast majority of this literature finds that consumers display price-sensitivity. That is, consumers are willing to, all else equal, select insurance plans that offer the best value. The bulk of this empirical literature stems from the US and focuses on privately insured employees (Dowd, 2001; Strombom, Buchmueller, and Feldstein, 2002; Parente, Feldman, and Christianson, 2004; Atherly, Florence, and Thorpe, 2005; Florence, Atherly, and Thorpe, 2006; Wedig and Tai-Seale, 2002; Beaulieu, 2002) and Medicare (Buchmueller, 2000; Dowd, Feldman, and Coulam, 2003; Atherly, Dowd, and Feldman, 2004; Buchmueller et al., 2013) populations,

[12] Obviously, important switching benefits such as price and quality tend to be endogenously determined as firms adjust these factors in response to market conditions. If profitable, one strategy may be for firms to manipulate pricing decisions in order to capture certain risk cohorts. A example of this is 'price-shadowing' and is discussed in detail in Section 3.5.1.

respectively[13]. The price effect will differ depending on whether total or out-of-pocket premium is being analysed. This is relevant to the US as employers or Government generally pay part of the premium on behalf of the consumer. In terms of competitive implications it is more important to consider out-of-pocket premium effects as this is the more likely to influence consumer behaviour (Dowd and Feldman, 2012).

Results of price effects are generally reported in terms of price-elasticities, that is, the percentage change in demand given a percentage change in premium. In terms of employer-based markets, out-of-pocket price elasticities are generally estimated to be less than -1, while total premium elasticities (taking into account employers' contributions) range from -1 to -8 (Buchmueller et al., 2013). For Medicare populations, estimates of out-of-pocket price elasticities range from -0.02 to -0.65 (Buchmueller, 2000; Dowd, Feldman, and Coulam, 2003; Atherly, Dowd, and Feldman, 2004; Buchmueller et al., 2013). Total premium elasticities, when calculated, range from -1 to -4.57 (Atherly, Dowd, and Feldman, 2004; Buchmueller et al., 2013). In the individual insurance market, Marquis et al. (2007) find a price-elasticity effect of -2.

In the mid-1990s, many social health insurance systems in Europe introduced reforms to expand freedom of choice of insurer (Greß et al., 2002). These reforms were accompanied by empirical research into price-sensitivity. Particularly, early research focused on analysing price as a determinant of insurer choice in both the German and Dutch systems. Studies focusing on the Dutch health insurance system found negative, but small, price elasticities (Schut and Hassink, 2002; Schut, Gress, and Wasem, 2003; van Dijk et al., 2008). Schut and Hassink (2002) suggested that these weak price effects may be partly explained in that Dutch consumers had a lack of experience with switching insurer and that individual insurance markets, as compared to the employer-based US system, confer higher search costs. However, much stronger price effects were observed in the German system (Schut, Gress, and Wasem, 2003; Tamm et al., 2007; Pendzialek et al.,

[13]The effect of price on plan choice is not of concern in Medicaid populations given that plans are free and copayments, if applicable, are nominal and may not be collected (Brandon et al., 2005).

2015), suggesting that even within broadly similar social health insurance systems (Greß et al., 2002) consumer price-sensitivity could vary significantly.

As an explanation for this, premium differences have been shown to be much larger in the German (and Swiss) system(s) (Greß, 2006). This in turn may be explained to a large extent, by what was, at the time, relatively poor risk equalisation (see Section 2.4.2) in the German system. More robust risk equalisation in the Dutch system meant price-variation between insurers was lower (Schut, Gress, and Wasem, 2003; Greß et al., 2002; Greß, 2006). Greß et al. (2002) highlight the trade-off between a high degree of price competition in Germany and a lower degree of price competition in the Netherlands accompanied by less financial risk for insurers and more effective risk equalisation. Other contributory factors related to the more competitive market structure that existed in the German system and the greater incentives for employers to encourage switching (Schut, Gress, and Wasem, 2003). Recently, Pendzialek et al. (2015) found evidence that elascticites in Germany may actually have been lower than previously estimated and than would have been expected. However, contribution reform in 2009 had the effect of increasing price elasticities substantially (Pendzialek et al., 2015).

Furthermore, price-sensitivity may differ based on the expected healthcare costs of consumers. As noted (see Section 2.3.2), high-risk individuals tend to face higher switching costs and as a consequence may see less of a benefit in switching in response to better-priced alternatives (Buchmueller, 2009). However, studies that measure how price-sensitivity differs across risk-type tend to report mixed results (Buchmueller, 2000; Strombom, Buchmueller, and Feldstein, 2002; Atherly, Florence, and Thorpe, 2005; Parente and Feldman, 2013; Florence and Thorpe, 2003; Beaulieu, 2002). For example, Strombom, Buchmueller, and Feldstein (2002), analysing data from the health benefits program of the University of California, found younger, healthier employees were between two and four times more sensitive to price than employees who were older and who had been recently hospitalized or diagnosed with cancer. Beaulieu (2002) found similar age effects. In contrast, Atherly, Florence, and Thorpe (2005) found no evidence that older employees were less-price sensitive. While, perhaps most surprisingly, research by Parente and Feldman (2013) found that employees with a chronic health condition themselves or in their family were in fact more price-sensitive. The authors speculate that the plans analysed were close substitutes and may have characteristics that would be of more interest to high-risk, rather than low-risk, individuals (large provider networks, or open access to providers). This may have increased the own-price elasticity of demand for high-risks. Moreover, Medicare-eligible retirees have been shown to be less price-sensitive than active employees (Buchmueller, 2000). Outside the US, price-sensitivity has been shown to fall with age in both the German and Dutch health insurance systems (Schut, Gress, and Wasem, 2003; van Dijk et al., 2008).

Differing price-sensitivities between high and low-risks may also have important implications for insurer competition (Buchmueller, 2009). For example, in the presence of higher price-sensitivity on the part of low-risks, if one or a group of insurers/health plans are able to offer insurance at a lower price than their competitors they will attract a higher proportion of low-risks. The relatively higher cost plans/insurers are then left with a worse-risk pool which makes it even more difficult to compete on price. This can result in market segmentation between plans/insurers or in a worst-case scenario a 'death-spiral' driving some plans/insurers out of the market (Cutler and Zeckhauser, 1997). Evidence from the US has shown that unrestricted plans that offer greater choice of provider, find it difficult to compete on price with tightly managed Health Maintenance Organisation (HMO) plans. As a consequence, many of these plans have been driven from their respective markets due to a worsening risk-pool (Buchmueller, 2009). Insurance markets are also susceptible to this phenomenon when new insurers enter the market and adopt a 'price-shadowing' strategy, that is, charging a price below that of incumbents in an effort to attract favourable risks (Armstrong, 2010). This may be particularly relevant to the Irish situation and is discussed in Section 3.5.1. If such imbalances exist, the best way to address them is through robust risk equalisation. Risk equalisation is explored in Section 2.4.2.

2.3.1.2 Quality

In addition to price, consumers should also be motivated to choose insurer based on quality considerations so that insurers are motivated to provide products that match consumer quality preferences. In contrast to price, quality is a multi-dimensional concept and incorporates many elements (Kolstad and Chernew, 2009). Service quality relates to factors such as the speed of payment, coverage decisions and customer care (Duijmelinck, Mosca, and van de Ven, 2015). Another aspect of quality, however, is quality of care (Duijmelinck, Mosca, and van de Ven, 2015). This aspect of quality may relate to quality of contracted providers, the freedom to choose a provider or drug or the organisation of healthcare provision. It is important to note that differences in quality of care mainly arise in health insurance systems where it is possible for insurers to selectively contract (e.g. US, Netherlands).

Quality, therefore, is a complex concept, often difficult to measure and at a fundamental level consumers may often lack the ability to understand what defines good quality (Spranca et al., 2000). Empirically, therefore, it is important to consider two separate questions (Kolstad and Chernew, 2009). Firstly, is health insurance choice related to quality? And secondly, are choices influenced by the release of information on quality? This section will deal with the former question, while the latter will be discussed as it relates to the impact of consumer information on consumer mobility, in Section 2.4.1. In terms of both questions, however, Kolstad and Chernew (2009) provide an excellent summary of these issues.

A priori, it could be suggested that consumers may not have sufficient information to choose health insurance based on quality, without the benefit of readily available information. However, evidence would suggest that this might not be the case. For instance, Jin and Sorensen (2006) show that both unpublished and published plan quality data had independent positive and statistically significant effects on insurance choice. Similarly, Dafny and Dranove (2008), analysing the Medicare HMO market, found evidence that consumers tended to switch into higher quality plans even in the absence of public report card information. They describe this phenomenon as 'market-based learning' and is thought to be facilitated through private information, word-of-mouth and prior experience (Dafny and Dranove, 2008).

Outside the US much less detailed analysis has taken place on the relationship between quality and health plan choice. However, Thomson et al. (2013) analysing health insurance competition in Netherlands, Germany, Belgium and Switzerland, suggest quality may be a reason for switching insurer in all markets. Service quality is seen as an important reason for switching in Belgium and Germany, while quality of care may also influence switching in Switzerland (through preferred provider networks). In terms of the Netherlands, Thomson et al. (2013) suggest that greater product differentiation and modes of customer service since the 2006 reforms may have enhanced quality as a reason for switching insurer. However, consumer survey responses are at odds with this view. Evidence suggests that neither quality of care (Reitsma-van Rooijen, de Jong, and Rijken, 2011; de Jong, van den Brink-Muinen, and Groenewegen, 2008) nor quality of service (Duijmelinck, Mosca, and van de Ven, 2015; de Jong, van den Brink-Muinen, and Groenewegen, 2008) are strong motivations for switching in the Dutch market. Much more important, in this context, are factors such as price and level of cover.

2.3.1.3 Supplementary insurance and gifts

Two final potential benefits of switching health insurer relate to supplementary health insurance and gifts. Supplementary health insurance relates to additional benefits that consumers are able to purchase above basic health insurance provision. Examples include superior hospital accommodation or complementary coverage for out-of-pocket costs associated with basic benefits (Duijmelinck, Mosca, and van de Ven, 2015). As noted by Duijmelinck, Mosca, and van de Ven (2015) the benefits of supplementary insurance will only encourage switching if consumers are either legally obliged to take out basic and supplementary insurance with the same insurer (for example, in Belgium) or if there are close ties between the sale of basic and supplementary insurance (for example, in the Netherlands and Switzerland).

Duijmelinck, Mosca, and van de Ven (2015) find that after price (63.8%), supplementary insurance is the next most frequently cited reason (15.6%) for switching insurer. Furthermore, de Jong, van den Brink-Muinen, and Groenewegen (2008) find that Dutch consumers who are chronically ill or disabled switch more often in response to supplementary insurance benefits than do the general population.

Finally, gifts provided by insurers upon switching can be considered a final potential switching benefit. For example, in 2013, Dutch insurers offered €75 cash-back to new enrolees. A sizeable minority (6.9%) of Dutch consumers considered a welcome gift the main reason for switching insurer (Duijmelinck, Mosca, and van de Ven, 2015).

2.3.2 Search and switching costs

2.3.2.1 Search costs

Time is valued and as a consequence costs may arise in terms of the effort it takes to understand and compare alternative products. Thus, the more choice consumers face, rather than aiding decision-making and mobility, may in fact impede it. Research in this area has primarily focused on the Medicare Part C (where Medicare benefits are provided by private plans) and Medicare Part D (covering outpatient pharmaceuticals) coverage. Both provide a fertile environment for studying aspects of consumer choice given the abundance of plans offered. Medicare Part C tends to offer an average of 24 plans for consumers to choose from (Nadash and Day, 2014), while Part D can provide upwards of 100 choices for drug coverage (Hanoch et al., 2009). In terms of both Medicare Part C (Uhrig et al., 2006; Hibbard, Greene, and Tusler, 2006) and Part D beneficiaries (Hsu et al., 2008), consumers understand both programs poorly. Moreover, the more options consumers faced, the more difficulty they tended to find decision-making in both programs (Nadash and Day, 2014; Tanius, Wood, and Hanoch, 2009; Bundorf and

Szrek, 2010; Cummings, Rice, and Hanoch, 2009; Hanoch et al., 2009). Experimental studies have also found that search costs tend to increase along with the size of the choice set (Besedes et al., 2012; Schram and Sonnemans, 2011).

While competitive European social health insurance systems also tend to offer a variety of health insurance plans, relatively less research exists on the impact of search costs in these markets. One study on the Swiss health insurance system, however, found that as the number of choices offered to consumers grew, their willingness to switch plans declined (Frank and Lamiraud, 2009). The authors conclude that reducing the size of the choice set might improve competition in the Swiss market. In a similar vein, Heinemann, Leiber, and Gress (2013, pg. 118) in a qualitative study of managed competition in the Netherlands suggested that one of the major barriers to consumer mobility is that the insured 'may not understand what it is they are buying when they choose health insurance'.

Search costs can also differ by risk-type in some instances. Hanoch et al. (2009) found that not only did decision quality with regard choice of Medicare Part D plans deteriorate as the number of plans increased but that this effect was larger for older individuals. Similarly, Besedes et al. (2012) found that while probability of selecting the optimal option declined as the number of options increased, the decline was more pronounced for older subjects. However, in contrast to these findings, Tanius, Wood, and Hanoch (2009) showed that while choice set size is negatively related to decision-making performance, age did not influence decision-making capabilities.

Moreover, in a broader context, those with lower educational attainment have been shown to have lower levels of understanding regarding health insurance offerings (Cunningham, Denk, and Sinclair, 2001; Bann et al., 2003; Uhrig et al., 2006; Hibbard, Greene, and Tusler, 2006). For example, Cunningham, Denk, and Sinclair (2001) showed that consumers with at least a high school education had greater accuracy in reporting on attributes associated with their specific plans than those with less than high school education. Similarly, Uhrig et al. (2006), analysing a sample of 2,634 Medicare beneficiaries found that those with more than high-school education had greater knowledge of Medicare than those with lower levels of educational attainment. Those with lower levels of educational attainment may therefore be expected to face higher search costs given they may find it more difficult to identify and interpret an insurer's product and price offerings. Consistent with this, some empirical evidence has suggested that those with lower educational levels are less likely to switch (Atherly, Florence, and Thorpe, 2005; Nuscheler and Knaus, 2005; de Jong, van den Brink-Muinen, and Groenewegen, 2008; Reitsma-van Rooijen, de Jong, and Rijken, 2011; Boonen, Laske-Aldershof, and Schut, 2015). Boonen, Laske-Aldershof, and Schut (2015) also find that searching for health plan information had a stronger impact on the switching propensity of higher rather than lower educated individuals, pointing towards the fact that educated individuals may make better use of available health plan information.

2.3.2.2 Switching costs

Transaction, learning and uncertainty costs

Transaction costs can be defined as the costs associated with the time and effort it takes to complete administrative processes (Competition Authority, 2007). In this context, they can be considered common to many markets. In Klemperer's original formulation he described a situation where two banks may offer identical current accounts but there are high transaction costs involved in closing one account and opening another (Klemperer, 1987a; Klemperer, 1995). Similar costs may exist in health insurance markets where administrative costs are apparent in switching between health insurers.

Learning and uncertainty costs may also be common to many markets. Learning costs relate to the time and effort it takes to learn about a new product or service (Burnham, Frels, and Mahajan, 2003). Klemperer (1995) gives an example of high learning costs associated with switching suppliers of functionally identical computers but with different software packages. In a health insurance context, learning costs may relate to the time and effort it takes to learn the rules and procedures of a new insurer.

Uncertainty costs relate to the untested quality of alternative brands (e.g. consumers tend to re-use medication that works for them rather than risking to choose an alternative brand that may or may not suit them). Duijmelinck, Mosca, and van de Ven (2015, pg. 666) give the example of 'the costs of accepting the psychological uncertainty surrounding the performance other insurers with a potential for negative outcomes e.g. additional costs or waiting times'.

Following the introduction of managed competition in the Netherlands in 2006, some studies tried to identify whether these types of costs were present in the new system. Reitsma-van Rooijen, de Jong, and Rijken (2011) found that fear of getting into administrative difficulties was not too significant in the Dutch market with only 5-6% of consumers citing it as a perceived barrier to switching, however prevalence was higher for those classified as chronically ill or disabled (10-11%). Those with bad self-assessed health were also more likely to consider this a barrier to switching. Similarly, Duijmelinck, Mosca, and van de Ven (2015), found that between 4-5% of consumers cited transaction and learning costs as switching costs in the Dutch system, however this rate did not increase for unhealthy consumers.

Benefit loss

'Benefit-loss' costs relate to the benefits lost following contract termination with a provider (Duijmelinck, Mosca, and van de Ven, 2015). In contrast to other markets, arrangements distinct to health insurance markets mean that 'benefit-loss' costs can be significant. Particularly, potential for these costs arise where the provision of both basic and supplementary health insurance exists. While additional administrative expenses may exist in holding basic and supplementary insurance with alternative providers, a potentially more significant cost is created where basic and supplementary insurance must be purchased from the same insurer (Belgium) or where the sale of both types of insurance is closely linked (e.g. Netherlands and Switzerland) (Duijmelinck, Mosca, and van de Ven, 2015). For example, in the Netherlands and Switzerland, basic insurance is community rated and subject to open enrolment regulations while supplementary insurance is risk rated and insurers have the right to refuse applicants (Dormont, Geoffard, and Lamiraud, 2009; Duijmelinck and van de Ven, 2014). In this context, consumers who want to keep basic and supplementary insurance with the same provider may be reluctant to switch if there is the possibility they may be charged more (due to risk rating), or not accepted at all, for supplementary insurance from an alternative insurer. Clearly high-risks will be burdened more by these costs than their low-risk counterparts. Insurers may also have incentives to use the sale of basic insurance as a tool for risk selection, which can create additional barriers to mobility for high-risk groups (Paolucci et al., 2007) (see Section 2.4.2.1). Duijmelinck, Mosca, and van de Ven (2015) find that overall this is the most significant switching costs according to their framework, cited by 16% of consumers overall and rising to 19.9% for unhealthy consumers. More detailed empirical analysis of the costs associated with the sale of supplementary insurance also suggest that these costs can create significant barriers to switching for high-risks (Roos and Schut, 2010; Duijmelinck and van de Ven, 2014; Dormont, Geoffard, and Lamiraud, 2009).

Provider-switching costs

Provider-switching costs are also specific to health insurance markets and relate to the cost of having to switch healthcare provider that may accompany switching health insurer (Duijmelinck, Mosca, and van de Ven, 2015). These costs are relevant in health insurance markets where differential contracting with healthcare providers is prominent (e.g. US, Israel) and consequently plans offered may differ significantly in terms of access to provider networks. In such instances, if a consumer's healthcare provider is not contracted with the new insurer, consumers may have to sever their existing provider relationship or face high out-of-pocket costs for access. Again, these costs can be hypothesised to be larger for those consumers who are more likely to utilise healthcare services (i.e. high-risks) and may have built up a relationship with their existing provider (Duijmelinck, Mosca, and van de Ven, 2015).

Managed care organisations that operate in the US are a notable example of organisations that restrict provider access (to varying degrees) to help control healthcare costs. Most managed care in the US is carried out by two types of organisational structures, HMOs and Preferred Provider Organisations (PPOs) (Fairfield et al., 1997). In HMOs (also known as traditional managed care) purchasers contract with (or own) selected providers to deliver an agreed upon set of services at a per-capita or per-service price (Sekhri, 2000). PPOs establish a network of providers who treat the insured population at a reduced cost. Enrolees do not have to use PPOs but are encouraged to do so by a system of incentives and disincentives (Fairfield et al., 1997). PPOs, as such, are less restrictive than HMOs. Given the popularity with managed care plans in the employer-based private insurance system, the 1980s and 1990s saw publicly-funded Medicare and Medicaid programmes offering managed care options also (Lagoe, Aspling, and Westert, 2005).

In this context, a sizeable amount of research has looked at the impact of introducing managed care options on health plan switching behaviour. While a review of evidence on selection bias suggests that it is low-risk individuals who are more likely to switch to managed care plans in Medicare and Medicaid populations, there is less evidence for selection bias in employer-based markets (Hellinger and Wong, 2000; Breyer, Bundorf, and Pauly, 2012). Schaefer and Reschovsky (2002) suggest that, for the privately insured market, factors other than health status may impact on HMO enrolment. Particularly they found that younger and poorer individuals were more likely to enrol in HMOs. These effects were offsetting in terms of health status and therefore may compromise HMOs' ability to attract healthier cohorts. Duijmelinck, Mosca, and van de Ven (2015) found no evidence of provider-switching costs in the Dutch health insurance system, however this may be related to the fact that little selective provider contracting has taken place to date (Heinemann, Leiber, and Gress, 2013). It should be noted that where evidence does exist that low-risks are more likely to switch to restricted provider plans (e.g. Medicare & Medicaid populations) it can be difficult to attribute such movement specifically to provider-switching costs. This relationship is complicated by incentives for risk selection faced by insurers. That is, intentionally restricting provider coverage in the hope of attracting low-risks. This idea is discussed further in Section 2.4.2.1.

Limits on rational behaviour and psychological costs

As noted at the beginning of Section 2.3, economic theory assumes rational behaviour; predicting that individuals will make decisions that maximise their own welfare. In terms of consumer choice, this principle dictates that individuals will weigh up the relevant costs and benefits when deciding whether to remain with their current insurer, or switch. Standard consumer theory is therefore normative in nature. That is, it describes what consumers should do, but not necessarily what they in fact will do and the assumption that consumers of healthcare (and consumers more generally) are rational beings, is quite a strong one. As such, it is generally now well accepted among economists that consumers deviate from the absolute rational behaviour propounded by the standard neoclassical normative economic framework. A first break away from this assumption was proposed by Herbert Simon in 1955 (Simon, 1955). While Simon did not reject the rational motivations of individuals and firms he wished to,

> 'replace the global rationality of economic man with a kind of rational behaviour that is compatible with access to information and the computational capacities that are possessed by...man (Simon, 1955, pg. 99).'

He termed this tailored notion of rationality, *bounded rationality.* In this context, there are many classes of problems where consumers are likely to deviate from normative predictions (Thaler, 1980). In many such instances the gap between normative and positive behaviour in decision theory has been bridged by Kahneman and Tversky in what became known as *Prospect Theory* (Kahneman and Tversky, 1979). A hybrid of economics and psychology, one of the key empirical findings of this theory was that gains are treated differently to comparatively sized losses. Specifically, individuals feel a greater loss in giving up a benefit than corresponding pleasure in gaining that same benefit. This is known as *loss aversion* and has provided the foundation for similar behavioural theories such as the *endowment effect* (people over-value what they already have) (Thaler, 1980), the *status-quo bias* (individuals prefer to leave things as they are, fearing a mistaken choice) (Samuelson and Zeckhauser, 1988; Hartman, Doane, and Woo, 1991) and the *loyalty effect* (Jacoby and Chestnut, 1978; Oliver, 1999). Many of these concepts have been discussed in the context of health insurance markets in an effort to explain consumer decision-making (Lako, Rosenau, and Daw, 2011). Duijmelinck, Mosca, and van de Ven (2015) argue that such psychological costs can manifest themselves in terms of sunk costs. Sunk costs relate to the 'time, money and effort' spent in establishing a relationship with an existing provider (Duijmelinck, Mosca, and van de Ven, 2015).

In line with the above discussion, recent research has shown consumer inertia to be responsible for decision-making in the US employer-based insurance market (Handel, 2013). The author found that, due to inertia, consumers did not adjust their health plan choices over time in response to changes in plan premiums and their own health states. Consequently, many consumers remained enrolled in sub-optimal plans. Status-quo bias has also been investigated in the context of health insurance choices and has been shown to also influence consumer behaviour. For example, Boonen, Donkers, and Schut (2011) examined the ability of insurers to 'channel' consumers to preferred providers. They conducted a discrete choice experiment and found that respondents preferred to remain with their current provider even if they had the option to switch to a better alternative. They interpreted this as evidence of status-quo bias. Consistent with this behaviour, longer tenures of enrolments have been shown to reduce the likelihood of switching between Swiss health insurers (Frank and Lamiraud, 2009). In a comparative context, Leukert-Becker and Zweifel (2014) conducted a discrete choice experiment to establish willingness to pay for health insurance attributes in both Germany and Netherlands and found evidence that consumers displayed considerable willingness to pay to retain their current policy. However, consumers in the Dutch system required only half as much compensation as consumers in the German system to switch contract. The authors suggest the 2006 health insurance form which mandated Dutch consumers to specifically choose a health insurance policy may have helped explain the lower levels of status-quo bias in this system. Moreover, there is also evidence that older and less healthy individuals exhibit higher status-quo biases (Leukert-Becker and Zweifel, 2014). Status-quo bias in health insurance decisions has also been observed in laboratory experiments conducted by Krieger and Felder (2013), although not in experiments conducted by Schram and Sonnemans (2011).

In many instances, however, care needs to be taken in deciphering rational from non-rational behaviour. For instance, unobserved preferences may mean that some individuals derive genuine utility from contracting with certain insurers (e.g. some individuals may have a preference for public insurance providers over private insurance providers) which may wrongly manifest itself as apparent non-rational behaviour. Similarly, loyalty effects manifest themselves in terms of psychological switching costs where there is no economically rational reason to remain with a current provider (Klemperer, 1987a). However, there may be occasions where remaining loyal to a current provider is rational. For instance, consumers may remain loyal in the hope that they can rectify any dissatisfaction in future periods. This is discussed in more detail in Section 2.3.3. Similarly, loyalty may also have rational foundations where, for example, providers offer discounts, or gifts, to loyal customers.

2.3.3 Exit, voice and loyalty

Aside from non-rational motivations, there may be other reasons why consumer do not switch even when the benefits of doing so outweigh the costs. Hirschman (1970) suggested that in such situations consumers may rather voice their dissatisfaction with their current insurer, rather than taking the terminal decision to switch to a competitor. In doing so, the consumer gives the insurer an opportunity, similar to the exit option, to address any complaints and 'engage in a search for the causes and possible cures of customers' and members' dissatisfaction' (Hirschman, 1970, pg. 4). Voice is also closely related to the idea of loyalty. As discussed above, loyal consumers may be less likely to switch to a competitor. Therefore a more agreeable option for loyal consumers may be to voice their concerns. As articulated by Hirschman (1970, pg. 78) 'loyalty holds exit at bay and activates voice'. The extent to which voice is a viable option is also closely tied to the governing market structure. That is, voice is more likely to be an option in markets with higher exit barriers. Health insurance markets tend to be quite concentrated (see Section 2.5) suggesting that exit options are more limited than in more perfectly competitive markets. As a consequence, theoretically at least, it is plausible that voice may be a legitimate alternative to exit in health insurance markets.

Evidence, however, would suggest that (as with the exit option) voice is not used to a large extent in health insurance markets (van de Bovenkamp et al., 2013). Van de Bovenkamp et al. (2013) suggest that the voice option might be tempered for similar reasons as the exit option. For example, time and energy considerations, lack of awareness of rights or high search and processing costs involved in complaining. Furthermore, certain groups might find it inherently difficult to complain (for example, those in care facilities might have trouble complaining, fearing retribution). In this context, Hendriks et al. (2010) examined the intention to switch health insurance and actual switching behaviour in the Netherlands. They found that only 31% of those who intended to switch insurer actually did so. This disparity may be partly explained to the extent that intention to switch is a manifestation of 'voice' for those who do not actually switch. However, while intention to switch was correlated with gender, age, education level, years of enrolment and self-reported health status, no difference existed between groups in terms of intention to switch and actual switching behaviour.

The idea of delegation has also been discussed as an addition to the exit, voice and loyalty framework (van de Bovenkamp et al., 2013). Delegation involves collectives exercising voice and exit options on behalf of individual consumers. In health insurance markets, voice and exit can be delegated to a variety of collectives. For example, in certain circumstances, enrolment decisions can be delegated to employers, while choice of provider can be delegated to health insurers. Delegation is advantageous in that it provides an alternative option for offering information on quality improvement if individual voice has failed. Moreover, to the extent that certain individuals may prefer to remain passive, it reduces inequalities between vocal and non-vocal consumers. However, delegation may also lead to inequalities both between collectives (for example if certain employer groups are better at negotiating group contracts than others) and also within collectives (if certain individuals can dictate the collective approach).

2.4 Regulatory environment

In contrast to many other market environments, healthcare and health insurance markets tend to be heavily regulated. As described by Tuohy and Glied (2011), there are a number of arguments as to why government involvement in such markets is justified. A first consideration is that healthcare can be considered a merit good and should be distributed based on some concept of equity. Unregulated (or lightly regulated) markets, while promoting efficient allocation of resources, do not consider equity in this process and therefore government intervention may be needed. In this context, many competitive health insurance markets place a strong emphasis on guaranteeing affordable access to high-risks. However, regulations designed to achieve this (e.g. community rating, open enrolment, lifetime cover) can create incentives for insurers to focus their attentions on insuring low-risks while avoiding high-risks, a phenomenon known as risk selection. The best way to temper these incentives, as discussed, is to design a payment system to insurers (e.g. risk equalisation) that subsidises premiums insurers receive based on the risk profile of their enrolees.

Furthermore, market failures in healthcare justify government intervention. Market failures relate to situations whereby buyers and sellers operating under a free market do not produce Pareto optimal (allocatively efficiency) outcomes (Hurley, 2000)[14]. As such, some alternative allocation of resources may be more efficient and market intervention is necessary to achieve this. A common market failure studied in health insurance markets arises from informational asymmetries that may exist between buyers and sellers of health insurance. As noted by Tuohy and

[14] That is, there exists an alternative outcome whereby an individual can be made better of without making someone else worse-off (Hurley, 2000).

Glied (2011), consumers of healthcare may face high informational costs in assessing the health implications of various goods and services and a 'long standing function of government' (Tuohy and Glied, 2011, pg. 59) in healthcare is to redress such informational gaps through regulation. Particularly in terms of health insurance markets, as discussed, consumers may face significant search costs which can create substantial barriers to otherwise beneficial switching behaviour. As such, regulators of many health insurance systems provide plan comparison information in an effort to aid consumer decision-making (see below).

The existence of private information about health risks can also lead to market failure through raising the possibility of adverse selection, whereby low-risk individuals may opt out of the risk pool, leading to a potential disintegration of markets for private health insurance (Rothschild and Stiglitz, 1976; Newhouse, 1996). Risk selection is also another form of market failure in that insurers are motivated to focus their resources on attracting certain risk types rather than engaging in welfare-enhancing competition. However, this has less to do with informational asymmetry and is more related to the fact that insurers are not allowed exploit their private information on policyholder risk profiles to charge premiums that reflect their expected costs[15] [16]. A final market failure relevant to health insurance may be the failure of competition given than health insurance markets tend to be heavily concentrated (Dranove, 2012) (this issue is discussed in more detail in Section 2.5).

In terms of the impact the regulatory environment may have on consumer mobility, the following sections discuss the impact of regulation as it applies to two main areas. First, Section 2.4.1 discusses the potential for consumer information to aid

[15] Another common form of market failure in healthcare markets, perhaps more so than health insurance markets, are externalities. As described by Mcpake and Normand (2007, pg. 59), an externality occurs where 'consumers and producers are either not affected or do not bear the full brunt of the effects of consumption or production.' Both positive (e.g. immunisations) and negative (e.g. second hand smoke) externalities arise in healthcare. The private market is unlikely to choose the right level of activity to control these externalities and consequently government involvement may be required to set Pigovian subsidies (for positive externalities) or taxes (for negative externalities) (Tuohy and Glied, 2011).

[16] Healthcare may also be seen as a public good and may require government intervention to make direct or indirect investments in health and healthcare infrastructure (Tuohy and Glied, 2011).

decision-making as it relates to health insurance plan choice. Second, Section 2.4.2 looks at the impact community rating regulations may have on consumer mobility.

2.4.1 Consumer information

An important assumption of the utility-maximisation framework underlying competitive markets is that consumers have sufficient information to make informed decisions (Weintraub, 2007). The provision of consumer information in health insurance markets may therefore be considered beneficial to the extent that it improves competitive functioning. However, this in turn assumes that consumers have the ability to find and process relevant information. In many instances, this is unlikely to be the case. It has been argued that at a fundamental level consumers often lack 'health literacy', that is 'the ability to understand basic health-related information to make informed decisions' (Ericson and Starc, 2012, pg. 330). As a result, health insurance consumers may often use heuristics in decision-making, such as 'choose the cheapest plan' that may overweight price and underweight other salient plan features, such as quality. Moreover, Kling et al. (2012), have discussed the idea of large 'comparison friction' in the US Medicare market. That is a large wedge between the availability of comparative plan information and consumers' use of it.

In this context, an important empirical question is whether the provision of consumer information actually aids decision-making. The vast majority of research in this area has focused on how consumers respond to information on plan quality. Particularly, much of this research stems from the US and examines the effect of report cards such as the Healthcare Effectiveness Data and Information Set (HEDIS) and Consumer Assessment of Healthcare Providers and Systems (CAHPS) survey, on health plan choice. This research spans a range of populations including the privately employed (Abraham et al., 2006; Beaulieu, 2002; Chernew et al., 2004; Scanlon et al., 2002), Medicare (Dafny and Dranove, 2008), federal employees (Jin and Sorensen, 2006; Wedig and Tai-Seale, 2002) and Medicaid (Farley et al., 2002b; Farley et al., 2002a). As described by Kolstad and Chernew (2009), the majority of this literature finds a positive and statistically significant consumer response to quality following the release of report card information. For example, Beaulieu (2002) found that individuals enrolled in plans with lower reported quality were more likely to switch plans than individuals in higher-quality plans. Moreover, a 1-point increase in quality (measured by HEDIS score) was associated with an increase likelihood of choosing a given plan by 10%. Similarly, Dafny and Dranove (2008) using a panel on Medicare HMO market shares between 1994 and 2002, found health plan choice was positively and statistically significantly associated with Medicare report card scores for consumer satisfaction, even after controlling for 'market-based learning' (e.g. private release of report cards, word of mouth etc.) that may have occurred over the period. The one exception to these results, however, may relate to the Medicaid population, as neither study found an effect of information on plan switching. One potential contributory factor in these findings is lack of consumer engagement with report cards in this population (Farley et al., 2002b; Farley et al., 2002a).

Research into the impact of quality information on health plan choice in other health systems has been lacking. One recent study, however, examined the impact of quality and consumer information search on health insurer switching in the Dutch system (Boonen, Laske-Aldershof, and Schut, 2015). The authors find that consumers who indicated they actively searched for health plan information were more likely to switch and that a one star higher than average quality rating for an insurer reduced the propensity to switch away from that insurer by 0.4% (relative to a base switching rate of 5.4%). Furthermore, switchers who searched for information were more sensitive to quality than switchers who did not search. However, this relationship was only observable for large differences in quality (exceeding five stars) suggesting that the publication of quality ratings may be of somewhat limited use in the Dutch system. Those who searched for information were much more sensitive to price differences.

As with price, it appears that different population cohorts may respond to information on health plan quality differently. Kolstad and Chernew (2009) suggest socio-economic and income differences may affect how different groups respond to information and may explain why Medicaid enrolees do not respond to report card information, in contrast to much of the other literature. As may be expected, education has been also shown to play a part. Abraham et al. (2006) found that more education had a positive and statistically significant effect on seeking quality information. Moreover, Boonen, Laske-Aldershof, and Schut (2015) report that higher educated individuals had a 1.7% higher propensity to switch insurer than those with less education. Older age groups have been shown to be more responsive to quality than their younger counterparts (Boonen, Laske-Aldershof, and Schut, 2015), while consumers with chronic disease have been reported to show greater awareness of health plan quality information (Abraham et al., 2006).

In addition to comparative plan/insurer information, it can also be hypothesised that regulatory information around switching rules, open enrolment periods etc. may also aid consumers in the decision-making process (Thomson et al., 2013; Laske-Aldershof et al., 2004). However, whether these factors actually do impact on decision-making is an empirical question that is yet to be addressed in the literature.

2.4.2 Providing affordable coverage to high-risks

Many health systems deem it unjust that individuals with higher expected healthcare costs should pay a higher premium for insurance than individuals with lower expected costs. Such systems design regulations that place limits on the amount insurers can differentiate premiums based on an individual's expected healthcare costs. The most severe form of premium restriction is known as community rating. Community rating is a regulation whereby consumers are required to pay the same premium for the same plan irrespective of the risk they represent to the insurer (Turner and Shinnick, 2013). Any restriction on premiums insurers can charge, and particularly community rating regulations, can introduce incentives for insurers to behave differently than they would do if such regulations did not exist. In the case of community rating, requiring insurers to charge a uniform premium leads to expected losses on high-risk consumers (as their expected healthcare costs will exceed the premium charged) and expected profits on low-risk individuals (as their expected healthcare costs will be less than the premium charged) (Breyer, Bundorf, and Pauly, 2012). In a competitive environment, this creates incentives for insurers to focus their attentions on attracting low-risk individuals while avoiding (or 'dumping') high-risk individuals. Such behaviour is known as risk selection *among health plans*[17] (Breyer, Bundorf, and Pauly, 2012) (from here on, referred to as risk selection).

2.4.2.1 Risk selection

As described by Van de Ven and Schut (2011), risk selection is considered a problem in health insurance markets for a number of reasons:

- *Poor quality service to high-risks* – Insurers have incentives not to provide high quality care to high-risk consumers. Insurers that do provide high quality care are likely to attract a disproportionate number of high-risks relative to other insurers, putting them at a competitive disadvantage.
- *Market segmentation* – To the extent that some insurers are more successful, or better able, to attract low-risks this introduces and perpetuates risk segmentation in the market. This is particularly a concern when new insurers enter the market and focus their pricing strategy on attracting low-risks. If new insurers can develop a favourable risk profile they can continue to attract low-risks through their ability to charge lower premiums (if, as discussed, low-risks tend to be more price-sensitive) than competitors. Such market segmentation creates a situation where high-risks pay a higher premium for coverage while low-risks pay a lower premium, undermining the principle of community rating.
- *Welfare loss* – Finally, risk selection can also generate welfare loss. If risk selection is deemed profitable, insurers will focus their resources on engaging in

[17] Risk selection *into coverage* can also take place, more commonly referred to as 'adverse selection'.

> risk selection activities rather than on price and quality competition. As risk selection extends no benefits to society, while price and quality competition do, risk selection can be deemed a welfare loss. Moreover, efficient insurers who do not engage in risk selection may lose market share to inefficient insurers who do, also creating welfare loss.

Community rating is often supported by a number of other regulations. Most commonly these relate to open enrolment, lifetime cover and minimum benefits. Open enrolment is a regulation whereby insurers must accept all applicants for insurance, regardless of their health status. In voluntary health insurance markets this may be subject to some waiting periods before cover is activated (Mossialos and Thomson, 2004). Lifetime cover relates to guaranteed renewability of insurance cover. Given that consumers may be unsure as to what cover they may need, health insurance regulations may also require all insurers to provide a minimum level of benefits that must be covered. These additional regulations help facilitate switching by reducing search costs in the market.

Direct risk selection

Open enrolment and lifetime cover regulations tend to prevent *direct* risk selection. That is, where insurers have the capability to explicitly influence who signs a contract. However, a form of selection that closely resembles direct risk selection can occur in markets where the sale of mandatory and supplementary health insurance is closely linked. In contrast to mandatory basic cover, supplementary insurance tends to be risk-rated and insurers are not required to accept all applicants. As such, insurers may use supplementary insurance as a tool for risk selecting in mandatory basic insurance. More specifically, an insurer who does not want to insure a high-risk individual for basic insurance can dissuade these individuals from doing so by rejecting them, or charging a high risk rated premium, for supplementary health insurance (Paolucci et al., 2007).

Indirect risk selection

The more common form of risk selection is *indirect* selection. This is where insurers design products to encourage consumers to self-select into different plans based on their risk status (Breyer, Bundorf, and Pauly, 2012). Minimum benefit regulations limit the ability to engage in indirect risk selection through benefit design. For example, if minimum benefit regulations were not in place insurers would have greater scope to provide plans with very little coverage which would be more attractive to low-risks. That said, however, there are many ways in which insurers can engage in indirect risk selection. Van de Ven and Ellis (2000), identify three main risk selection strategies:

- *Structure coverage so plan is unattractive to high-risks* - Although minimum benefit regulations mitigate against this form of risk selection to an extent, there may still be scope for insurers to risk select through plan design. This form of risk selection requires individuals to reveal their risk status and may occur where insurers cannot *ex-ante* identify high-risk individuals within the premium risk group and are unaware of relevant risk factors that make these individuals unprofitable. Examples include, exclusion of prescription drugs; contracting with certain low cost providers; or by grouping insurance with other services/goods attractive to healthy individuals (e.g. gym membership).

- *Selectively contracting with physicians* – This form of selection occurs where insurers cannot *ex-ante* identify high-risk individuals but are aware of relevant risk-factors. In such instances, insurers may not contract with physicians well-known for treating these risk factors (e.g. AIDS, chronic illness etc.)

- *Focused selection strategy* – Finally, this form of risk selection relates to situations where insurers are able to target specific individuals. Such strategies might include, providing poor-quality services to high-risks; selective advertising and mailing; or by incentivising high-risks to leave (e.g. providing a payment to cancer patient to contract with alternative insurer).

2.4.2.2 Risk selection in practice

Although much work has been done on the theoretical aspects of risk selection, it is much more difficult to identify such behaviour in practice. The fact that certain insurers or health plans are able to attract a low risk profile may not necessarily indicate active risk selection on their part. For example, as alluded to earlier (Section 2.3.2.2), there is strong evidence of favourable selection into HMO or other type of managed care plans versus other less restrictive forms of coverage, in the US Medicare market (Breyer, Bundorf, and Pauly, 2012). However, it can be quite difficult to separate out a risk selection effect (HMO-type plans explicitly targeting good risks) from a self-selection effect of consumers (low-risks may experience lower provider-switching costs). Similarly, if for some reason an insurer has an historically lower risk profile, or is a new entrant to the market, they are also likely to attract better risks. This may not indicate active selection strategies but may be a function of the fact that younger and healthier consumers are inherently more mobile, as they face lower switching costs and may be more responsive to price. That said, some efforts have been made, particularly in relation to the German health insurance system, to identify explicit risk selection effects, with mixed results.

For instance, Betriebskrankenkassen (BKK) funds in the German health system have historically attracted a low risk profile and following the introduction of free choice of funds in 1996, gained many new members. In this context, Nuscheler and Knaus (2005) tried to identify a risk selection effect by BKK funds over and above a self-selection effect, due to lower switching costs, associated with healthier consumers. They did this by comparing switching probabilities within non-BKK funds (which they assume, perhaps strongly, are entirely a product of switching costs) to switching probabilities from non-BKK funds to BKK funds. The authors found that those who switched between BKK and non-BKK funds *and* those who switched within non-BKK funds were both healthier than those who did not switch. However, there was no statistically significant difference identified between these two positive health effects and therefore the authors concluded that there was no evidence of selection by BKK funds.

Using a novel approach, Bauhoff (2012) also examined evidence of active risk selection on the part of insurers in the German health system. To identify such behaviour, the author implemented a double-blind audit study in which plans were contacted by fictitious applicants from different locations. The author found that plans were less likely to respond and follow-up with applicants from higher-cost regions, such as West Germany, suggesting presence of active selection on the part of insurers.

2.4.2.3 Risk equalisation

As a result of the difficulty in analysing actual risk selecting behaviour on the part of insurers an alternative strand of research has developed looking at the *incentives* for risk selection that exist in health insurance markets. Incentives for risk selection are primarily influenced by regulations that exist within the market. As discussed previously, open enrolment, lifetime cover and minimum benefit regulations all contribute to reducing opportunities for risk selection. However, the payment of risk-adjusted premium subsidies is considered the preferred strategy for the management of risk selection incentives (van de Ven, 2011; van de Ven and Ellis, 2000). Risk-adjusted subsidies are based on enrolees risk factors (e.g. age, health status) and are paid to insurers (not consumers). The payment of these subsidies to insurers aims to equalise the risk enrolees represent. In a competitive and transparent market, subject to community rating, insurers will be forced to use the subsidy to reduce the community rated premium that is charged (van de Ven, 2011). The way of organising and allocating these risk-adjusted payments is known as risk equalisation[18]. Research into the efficacy of risk equalisation performance can be quite technical in nature (e.g. see Ellis (2007) and van de Ven and Ellis

[18]In the literature, the terms ‘risk adjustment’ and ‘risk equalisation’ are sometimes used interchangeably. However, risk adjustment is a broader concept (e.g. it can also be applied to provider payments or outcomes measures). Following van de Ven (2011), I therefore denote risk equalisation to specifically refer to risk-adjusted compensation provided to insurers.

(2000)) and a thorough discussion of these issues is left until Section 4.4. The discussion provided below focuses more on the less technical and more conceptual aspects of risk equalisation.

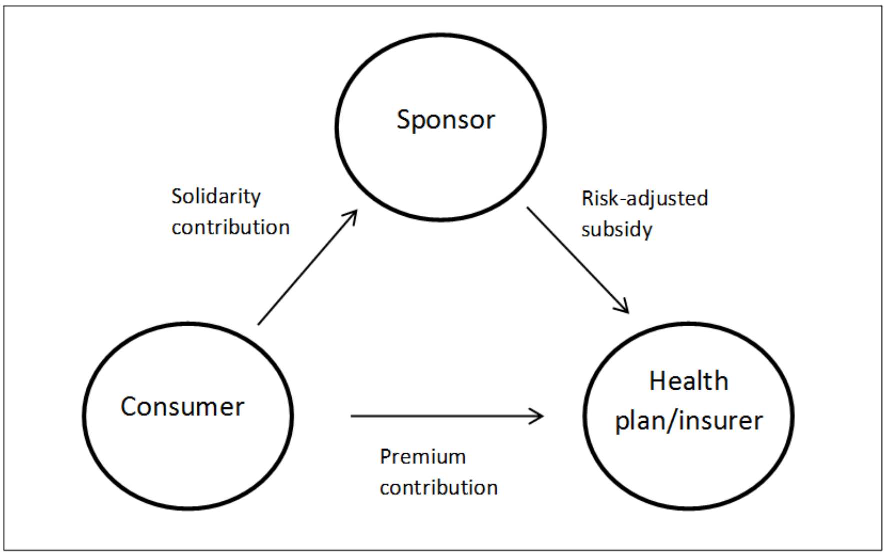
2.4.2.4 Risk equalisation design

Criteria for risk equalisation

A number of criteria have been proposed for designing risk equalisation schemes (van de Ven and Ellis, 2000). These are predicated on:

- *Appropriateness of incentives* – This relates to the ability of risk-adjusted payments to reduce incentives for insurers to engage in risk selecting behaviour, as discussed above.
- *Fairness* – This relates to the choice of factors used to calculate risk-adjusted payments. While a number of factors can be used to predict expected costs of health insurance consumers it may not be prudent to include all these factors in risk equalisation models as certain factors may not be considered valid on equity grounds (e.g. providing insurers with additional payments for insuring smokers) (Schokkaert and Van de Voorde, 2004; Schokkaert and Van de Voorde, 2006; van de Ven and Ellis, 2000). This idea is discussed in more detail in Section 4.4.4.
- *Feasibility* – One aspect of feasibility relates to administrative feasibility. Health expenditure data used to calculate risk-adjusted payments should not be overly expensive or difficult to collect, validate or process. A second dimension of feasibility concerns the acceptability of risk equalisation regulations by stakeholders. For example, providing payments to health insurers based on a consumer's death may be an actuarially effective way of reimbursing health plans, however, many stakeholders may not find it an acceptable factor to include in risk equalisation design.

FIGURE 2.1: Risk equalisation payments flow - Modality A.



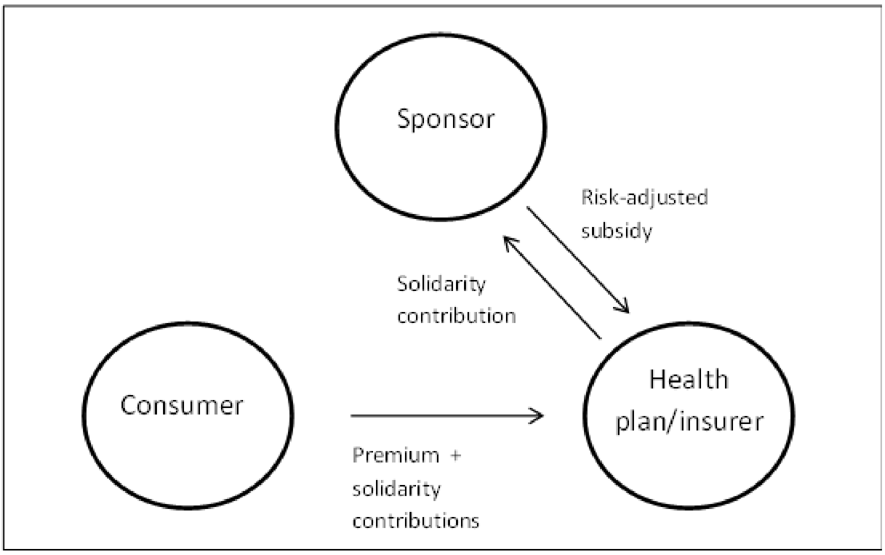
Source: Adapted from Van de Ven and Schut (2011).

Payment flows

Risk-adjusted payment flows are organised between the consumer, the sponsor and the health plan/insurer. The sponsor plays a crucial role in organising risk-adjusted premiums to insurers. It is the sponsor's job to collect revenues, either in the form of taxes or consumer premium contributions and to redistribute these revenues in the form of risk-adjusted premium subsidies (Breyer, Bundorf, and Pauly, 2012). The sponsor generally takes the form of an employer or government agency, or 'a distinct insurance entity empowered to use coercion to redistribute risk' (van de Ven and Ellis, 2000, pg. 760). Two main modalities of payment flows exist (see Figures 2.1 and 2.2). Within these modalities, consumers face two forms of payment. *Premium contributions* relate to the contribution paid to a health plan/insurer for his/her health insurance coverage. *Solidarity contributions* relate to payments designed to allow for redistribution of funds to reflect heterogeneous risk groups in health insurance markets. Van de Ven and Ellis (2000) distinguish between two main modalities of risk-adjusted payment flows, which differ based on the way the solidarity contribution is collected (see Figures 2.1 and 2.2).

In Modality A, consumers make a premium contribution to a health plan/insurer and separately, a solidarity contribution directly to a sponsor. In Modality B,

FIGURE 2.2: Risk equalisation payments flow - Modality B.



Source: Adapted from Van de Ven and Schut (2011).

consumers make a single contribution to the health plan/insurer (including premium and solidarity contributions) and the sponsor then collects the solidarity contribution from the insurer. Separate solidarity contributions under Modality A mean that universal access can be guaranteed by making contributions mandatory rather than based on the take-up of insurance (van de Ven, 2011). Income-related contributions can also be realised under Modality A, but not Modality B. Overall payment to insurers is higher under Modality B and consequently any cost savings made by insurers will have less of an effect on overall premium levels than under Modality A and this may dilute price competition. Furthermore, under Modality B the net payment to insurers, from the sponsor, will either be positive or negative depending on the balance between the solidarity contributions paid to the sponsor and the subsidies the fund is allocated. This results in a smaller transfer of funds across the system (as compared with Modality A), however, this may create more resistance from insurers as it may introduce a 'winner/loser' dynamic, based on whether this payment flow is positive or negative (van de Ven, 2011).

Modality A, for example, is applied in Belgium, Israel, the Netherlands (until 2006), Germany (since 2009) (Buchner, Goepffarth, and Wasem, 2013), and in

U.S Medicare. Modality B is used in Germany (until 2009), Ireland, Australia and Switzerland (van de Ven, 2011) (see Table 2.2)[19] [20].

TABLE 2.2: Risk equalisation systems by jurisdiction

System	**Premium restriction**	**Equalisation type**	**Risk Factors**	**Modality**	**Excess loss compensation**
Netherlands	Community rating[a]	Risk equalisation	Age, gender, region, source of income, socioeconomic status, 13 inpatient DCGs, 25 PCGs	A and B	Yes. Retrospective partial cost reimbursement and mandatory high-cost pool covering 90% of all costs >€ 20,000
Germany	Community rating[a]	Risk equalisation	Age, gender, disability status, 80 specific chronic disease	A	Yes. High-cost pool covers 60% of expenditures exceeding € 20,450/year
US Medicare	Community rating	Risk equalisation	70 diagnostic categories, 6 diagnostic interactions, five diagnostic interactions with entitlement/disability	A	No
Switzerland	Community rating[a]	Risk equalisation	Age, sex, healthcare utilisation indicator (<2 days inpatient hospital or nursing home stay)	B	No
Belgium	Community rating	Risk equalisation	Complex set of demographic and socioeconomic adjusters and health status (mortality) adjuster	A	Yes. Insurers pay 25% of any revenue-expenditure gap
Australia	Community rating	Claims equalisation	Age	B	Yes. High cost claims pool <$50,000/year
Israel	No direct premium paid by citizens to insurance fund	Risk equalisation	Age plus annual fixed payment for per person who is diagnosed with renal failure on dialysis, Thalasemia major, Gaucher, AIDS or Haemophilia	A	No

Source: Breyer, Bundorf, and Pauly (2012), Armstrong et al. (2010), van Veen et al. (2015), Van de Ven and Schut (2011), Connelly et al. (2010), and Shmueli et al. (2010).
[a] For basic insurance.

Risk-adjusted premium subsidies

In both modalities, the final aspect of these payment flows relate to the risk-adjusted subsidy allocated to health plans/insurers[21]. Risk-adjusted subsidies are

[19]Since 2006 the Dutch risk equalisation system has been a mixture of both modalities.

[20]There are also other modalities of payment flows. For example, the premium subsidy can go directly to the consumer and the consumer pays the premium partly with the subsidy and partly out-of-pocket (known as the 'voucher' model). However, this modality has not been applied in practice. Alternatively, the sponsor can collect both the premium and the solidarity contribution and then transfer the premium and the subsidies to the insurer. This modality is applied in some employer purchasing groups in the US (van de Ven, 2011).

[21]A more technical account of the calculation of risk-adjusted premium subsidies is provided in Chapter 3.

the *ex-ante* calculated payments (i.e. calculated before the insurers incur actual costs) allocated to insurers to equalise the expected costs enrolees represent. The most basic risk-adjusters used to risk equalise premiums are based on age and sex. They are easy to collect and monitor, however they are generally poor measures of expected healthcare costs (Chang et al., 2002; van de Ven and Ellis, 2000; Ellis, 2007). As a consequence, payments based on these factors tend to be poor at reducing incentives for risk selection. More sophisticated models tend to supplement demographic information with measures of health status as predictors. Health status-based risk equalisation can take the form of utilisation-based adjusters (e.g. hospital admissions, length of hospital stay) or can be based on clinical diagnoses or pharmacy data. From a policy perspective, basing health status measures on utilisation may reduce incentives for insurers to behave efficiently as reimbursement is tied more closely to actual service utilisation. Models incorporating health status measures tend to better account for variation in consumer risk and consequently lower incentives for selection (Ellis, 2007).

It is important to realise that regardless of the factors included, risk equalisation will likely never be perfect (i.e. it will never be able to fully predict costs). In fact, the fraction of claims variation explained by risk equalisation models tends to be relatively low (as shown in the next section)[22]. Risk equalisation models, however, need only be refined to the extent that the costs of investing in risk selection strategies (marketing to specific risks, reputational damage from engaging in selection activities etc.) outweigh any benefit (e.g. predictable profits) (van de Ven, 2011). However, in this context, the question still remains as to what is a sufficient level of risk equalisation (Van de Ven and Schut, 2011).

Excess loss compensation

While risk-adjusted payments, as noted, are calculated *ex-ante*, or prospectively, insurers can also be reimbursed *ex-post*, or retrospectively. Where payments to insurers are calculated retrospectively (i.e. based on actual costs incurred by the insurers) this is known as *claims equalisation* (Connelly et al., 2010). Moreover, where risk-adjusted subsidies are unlikely to adequately capture costs for extremely

[22]The reasons behind this are discussed in Section 4.4.4.

high-risk individuals, a form of claims-based equalisation known as *excess loss* compensation may be relevant. Excess loss compensation is where insurers are reimbursed, wholly or in part, by the sponsor for actual costs they incur above a pre-defined threshold (Van de Ven and Schut, 2011). While claims-based compensation reduces incentives for risk selection it also creates a trade-off in that insurers may also have less of an incentive to act efficiently (van de Ven, 2011). Where excess loss compensation exists, it has tended to be applied uniformly across insured populations (e.g. Netherlands, Germany) (van de Ven, 2011). However, given that a small group of high-risk individuals tend to be responsible for a substantial proportion of predictable losses (van de Ven, 2011), it may be more prudent to design an excess loss system that reimburses only for a pre-determined group of very high-risk individuals. Such a design would increase insurers' financial risk without increasing their incentives for risk selection and would therefore moderate the efficiency/selection trade-off (van Barneveld et al., 2001)[23].

2.4.2.5 International evidence on risk equalisation

Internationally, a number of countries have implemented risk equalisation (Breyer, Bundorf, and Pauly, 2012) and these have tended to relate to universally insured populations (e.g. Germany, Czech Republic, Netherlands, Switzerland) or US Medicare (see 2.2). Considerable research exists in these countries on the extent to which incentives for risk selection are reduced, or can be reduced, through risk equalisation (for example see, Breyer, Heineck, and Lorenz (2003), Behrend et al. (2007), Chalupka (2010), Beck (2000), McGuire, Newhouse, and Sinaiko (2011), Van Kleef, Van Vliet, and Van de Ven (2013), van Veen et al. (2015), Buchner, Goepffarth, and Wasem (2013), and van Kleef, van Vliet, and van Rooijen (2014)).

Internationally, the Dutch risk equalisation system is considered the most sophisticated. Since major healthcare reform in 2006, mandatory basic health insurance has been provided to the Dutch population under open enrolment, standardised

[23] Barros (2003) also proposed a novel approach to risk equalisation design that, under certain circumstances, mitigates against risk selection while preserving incentives for efficiency.

benefits and community rating regulations. Half of revenues for basic plans is financed through income-related deductions, which flow to the sponsor. The other half of revenues is financed through premium contributions levied by competing insurers to their customers. Moreover, about two-thirds of customers, below an income threshold, receive a premium subsidy from the government (Breyer, Bundorf, and Pauly, 2012). The Dutch insurers receive risk-adjusted subsidies based on age, gender, region, source of income, socioeconomic status, 13 inpatient DCGs (Diagnostic Cost Groups) and 25 PCGs (Pharmacy Cost Groups) plus an adjuster for multiple year high-costs. Despite the sophistication of this system, to further reduce incentives for risk selection, insurers also receive partial cost reimbursement and a mandatory high-cost pool covers 90% of all costs exceeding €20,000 (Breyer, Bundorf, and Pauly, 2012).

The current Dutch risk equalisation formulation has been shown to predict 28.5% of claims expenditure (van Veen et al., 2015). Moreover, it has been shown that expanding the number of inpatient DCGs to 15 suggests that the Dutch risk equalisation model could predict 31.4% of claims expenditure (van Kleef, van Vliet, and van Rooijen, 2014). Similarly, Behrend et al. (2007) find that DCG/HCC based model applied to German data predicted 11.7% of claims expenditure prospectively, using principal inpatient diagnoses (Behrend et al., 2007). More recently, the German risk equalisation design, based on 80 hierarchical diseases predicted approximately 20% of total claims expenditure (Buchner, Goepffarth, and Wasem, 2013).

While interest is growing in risk equalisation worldwide (Ellis and Fernandez, 2013), an important gap in the literature relates to how risk equalisation performs in competitive voluntary private health insurance markets (i.e. serving a complementary or substitutive role to publicly financed care) and a number of such health systems have been discussing its role (Armstrong, 2010)[24]. Risk equalisation in

[24]Australia operates a large (in terms of numbers covered) voluntary health insurance market akin to Ireland and some empirical risk equalisation research has taken place in the Australian context (see Duckett and Agius (2002) and Donato and Richardson (2006)). However, this research focused on populations of sick Australians rather than those privately insured.

the context of voluntary health insurance markets is discussed further in Section 2.6.3.

A final strand of literature has explicitly considered the impact of risk equalisation on consumer mobility. In terms of the Dutch system, van Vliet (2006) found that switchers are good risks in an absolute sense, however risk-adjusting payments based on health status largely eliminated any predictable profits for this group. As a consequence, risk equalisation in the Netherlands appears to compensate adequately for the heterogeneous movement of consumers across insurers (whether through self-selection or risk selection) and therefore helps 'level the playing field' (van Vliet, 2006). A similar conclusion was reached with regards risk equalisation in the German system, when the impact of DCG/HCC payments was simulated (Behrend et al., 2007). In the US, Nicholson et al. (2004) found favourable movement of consumers towards HMO plans. The authors argued that such favourable selection was likely to persist unless employers risk-adjust for factors related to preference for medical care or health status. In contrast, Barry et al. (2008), in a similar study, found that consumer-directed health plans (CDHP)[25], experienced favourable selection and that even after simulating relatively robust risk equalisation (based on age, sex, wage, job type, presence of chronic conditions and hierarchical condition categories), CHDP enrolees were still relatively less expensive.

2.5 Market structure

It may also be the case that the market structure under which insurers operate will have an influence on consumer mobility. The structure of a market tends to be understood in terms of the relative number of buyers and sellers in that market (Mcpake and Normand, 2007). Markets can range from perfectly competitive to situations where only one buyer (monopsony) or one seller (monopoly) exists in

[25]CDHPs establish tax-exempt savings accounts that consumers can use to pay out-of-pocket medical costs and are typically combined with a high-deductible health insurance plan (Barry et al., 2008).

a market. Analysis of insurance market structure tends to focus on the relative number of sellers of insurance (i.e. health insurers) given that the buyers (i.e. consumers, employers) are generally large in number (Zweifel, 2011). Combining information on the number of sellers with their proportionate market share yields a common measure of market competitiveness, the level of market concentration. Market concentration is discussed in detail in Section 2.5.1. Section 2.5.2 then describes the empirical evidence on competitiveness in health insurance markets. Finally, Section 2.5.3 discusses the relationship between market structure and consumer mobility.

Perfectly competitive markets tend to be defined by consumers who have perfect information and a large number of firms who have no control over market price and sell homogeneous products[26]. A relaxation of these assumptions moves us away from the perfectly competitive ideal to markets defined by imperfect competition. Imperfect competition can be understood either in terms of monopolistic competition or oligopolies.

Monopolistic competition relates to markets where there are a large number of sellers and the defining market feature is product differentiation. Products tend to be close substitutes so demand remains relatively elastic however firms have scope to raise prices without losing their entire market share (Samuelson and Marks, 2015). The ability to raise prices above perfectly competitive levels is termed market power. Advertising and marketing are important in this regard to reinforce real or perceived value associated with firms' products. Search and switching costs may also reinforce market power as some consumer will pay a higher price to their current seller rather than incurring search and switching costs associated with choosing other products or services (Mcpake and Normand, 2007). Along these lines, Satterthwaite (1979) suggests that under certain conditions, an increase in the number of sellers in a monopolistically competitive market may perversely reduce demand elasticities as search becomes more costly resulting in an increase in the equilibrium market price. Pauly and Satterthwaite (1981) find

[26] In reality, few, if any, markets conform to this ideal (Mcpake and Normand, 2007).

some evidence to support this theory in markets for primary care physician services in the United States.

In contrast, markets characterised by a small number of firms are generally referred to as oligopolies. The nature of oligopolies mean that there is a high degree of interdependency among firms and consequently strategic behaviour plays a prominent role in these markets. A number of alternative models have been proposed to explain behaviour in these markets as there is no single ideal model of competition within oligopoly (Samuelson and Marks, 2015).

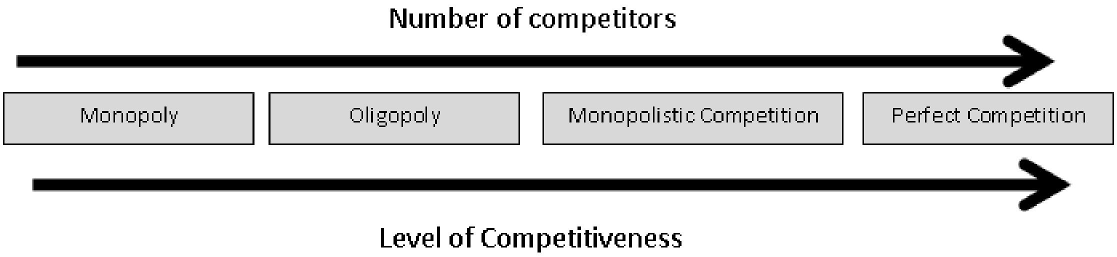
One popular model is the kinked demand curve model. This model predicts price rigidity and that competition will take non-price forms. Specifically, demand curves are kinked meaning the price and output relationship tends to be elastic above the currently prevailing price and inelastic below it (Mcpake and Normand, 2007). If a firm lowers their price it will likely be matched by competitors looking to hold onto market shares. However, if a firm raise their price others will not follow suit hoping to increase their markets shares. Price is set at this kink point and firms are reluctant to move away from it.

Stables prices represent one predicted outcome in oligopolistic markets. However, particularly where competing goods are close substitutes, price competition can be a key determinant of relative market shares and profits (Samuelson and Marks, 2015). A Bertrand Model represents a simple model of price competition in oligopoly. It assumes firms produce the same homogeneous products and make their decision at the same time (Pindyck and Rubinfeld, 2015). Since goods are homogeneous, there are strong incentives to cut price as the firm charging the lowest price will capture all of the market share. As a result all firms have incentives to price as low as is viably possible, where price equals marginal cost[27].

Another common theoretical insight in oligopolistic markets is that, where possible, firms may engage in cooperative (collusive) behaviour. That is, firms may

[27]One criticism levelled at the Bertrand model is that where firms produce homogeneous goods it is more natural to compete along a quantity rather than a price dimension (Pindyck and Rubinfeld, 2015). The Cournot Model and Stackelberg Model, respectively, are good examples of how output competition may take place in oligopolistic markets (see Pindyck and Rubinfeld (2015)).

FIGURE 2.3: Market structures



co-ordinate their pricing and output strategies in order to limit competition and consequently reap higher profits (Morris et al., 2012). In many instances, however, formal collusion in the form of cartels is illegal (Mcpake and Normand, 2007). Moreover, cartels can be unstable because of individual incentives to cut prices and cheat (Samuelson and Marks, 2015).

Another important aspect of market structure relates to the proportional market share captured by competing insurers (Morris et al., 2012). For example, a market with 20 competitors may be less competitive than perceived if only two firms control a large proportion of the market share. In this context, market concentration, which is a function of both the number of competitors in a market and their respective market shares is usually considered a useful measure of competition.

2.5.1 Market concentration

Market concentration is usually measured by means of the Herfindahl-Hirschman Index (HHI). It is calculated as,

$$H = \sum_{i=1}^{n} s_i^2 \tag{2.2}$$

where s_i is the market share of the i^{th} firm and n is the number of firms. A H of below 0.01 (or 100) indicates a highly competitive market, while a H above 0.25 (or 2,500) indicates high concentration (empirical estimates of concentration in health insurance markets are discussed in Section 2.5.2).

As noted by Dafny, Duggan, and Ramanarayanan (2012), it may be theoretically unclear as to the effect higher levels of concentration may have on health insurance premiums. On the one hand, standard theory would suggest that an increase in market concentration will allow insurers to raise their mark-up, leading to higher premiums. However, larger insurers may benefit from scale economies which lower unit cost and may result in lower premiums. In addition, to the extent that insurers can bargain with providers over cost of care, larger insurers may be able to negotiate better rates, also lowering unit costs.

Factors that affect market concentration include barriers to entry and exit and economies of scale and scope.

2.5.1.1 Entry and exit barriers

High barriers to entry will restrict the number of insurers in a market. High barriers to entry will exist where insurers face large sunk costs if entry fails. Health insurance markets are likely to be subject to large entry barriers given the resources required in terms of advertising and marketing to gain even a small market share (Zweifel, 2011)[28].

However, an alternative line of reasoning suggests that markets may not need a large number of insurers to act in a competitive fashion. Rather it is actually the contestability of, or threat of competition in, markets which is important (Baumol, 1982). Contestability will be higher the lower the entry and exit barriers in markets.

In contrast, high barriers to exit may serve to keep the number of insurers in the market higher than would otherwise be the case. Similar to barriers to entry, barriers to exit may also entail large sunk costs. Zweifel (2011) gives the example

[28] Farrell and Klemperer (2007) suggest that switching costs may impact on barriers to entry in potentially two alternative ways. On the one hand, high switching costs may create high barriers to entry for prospective firms as it will be difficult for them to attract customers away from the incumbent firms. In contrast, in the presence of high switching costs, incumbents with a large market share may be more concerned with extracting profits from their existing customers than focusing on new customers. In such situations, new entrants can enter the market and focus predominantly on attracting new customers.

of a sales force specialised in selling insurance not being as useful to a firm once it exits the market. Even with economies of scope these employees will have reduced value (e.g. in selling travel insurance).

2.5.1.2 Economies of scale and scope

Economies of scale relate to the ability of insurers to lower unit costs as the number of their enrolees increase. As described by Zweifel (2011), theoretically, the size of the risk pool might act as a scale economy in health insurance. A larger pool enables insurers to reduce its reserves per unit (without affecting insolvency), meaning premiums of large insurers may require a smaller loading.

Economies of scope prevail in insurance markets if the cost of providing an extra unit of coverage in one line of business decreases as a function of the volume written in another line (Zweifel, 2011). While insurers may gain some economies of scope from engaging in other business activities (e.g. travel insurance) a more likely way economies of scope impact insurance markets is through merging of insurers. This may occur where two insurers with similar, but differentiated, products save in terms of marketing and advertising expenses through merging rather than selling each product as individual entities.

Insurance markets defined by economies of scale and scope will therefore tend toward consolidation as unit costs fall with insurer size. Moreover, to the extent that insurers can bargain with providers over cost of care, larger insurers may be able to negotiate better rates, also lowering unit costs (Dafny, Duggan, and Ramanarayanan, 2012). One line of reasoning, therefore, would suggest that larger insurers will be able to capture ever increasing market shares due to their ability to charge lower premiums than their competitors[29].

Mergers between insurers may be viewed as anti-competitive and consequently, potential mergers may need to be submitted to anti-trust authorities. Zweifel,

[29]Taking such dynamics to their natural conclusion would suggest that market concentration, theoretically, may see insurance markets tend towards natural monopolies (Zweifel, 2011).

2011 notes that mergers that may substantially increase the level of market concentration are investigated by both the US Federal Trade Commission and the Commission of the European Union (EU). To date, few mergers between insurers have been blocked. However, following a similar line of reasoning to the 'contestability of markets' argument, the threat of anti-trust response may help keep concentration at a lower level than it would otherwise be.

2.5.2 Empirical evidence

While much health economics research has been devoted to issues of consumer behaviour (Gaynor and Town, 2012), relatively little empirical work has taken place on the competition structure of health insurance markets[30]. However, what evidence is available does suggest that insurance markets tend to be defined by a relatively small number of insurers and are quite concentrated. Moreover, market concentration appears to be increasing over time (Austin and Hungerford, 2009; Robinson, 2004; Dafny, Duggan, and Ramanarayanan, 2012; Gaynor, Ho, and Town, 2014).

In the US context, one of the first studies on market competitiveness is attributed to Dafny (2010). Using a sample of 776 large employers between 1998 to 2005, she found that health insurers, all else equal, charged higher premiums to more profitable firms. The implication of this is that health insurers, through their ability to price discriminate, hold some element of market power. Evidence was also found that the effect of employers' profits on premiums charged falls for markets with a larger number of competing firms, also consistent with theory. Using the same dataset (extended to 2006), Dafny, Duggan, and Ramanarayanan (2012) examined the extent to which consolidation in US health insurance markets has led to an increase in premiums. Firstly, high and increasing concentration was observed in US health insurance markets. For example, between the period 1998-2006, the mean HHI in their sample increased from 2,286 to 2,984. Moreover, the

[30]Gaynor and Town (2012) suggest this is a consequence of a scarcity of adequate data to calculate measures of price and market shares.

median four firm concentration ratio increased from 79 to 90% while the mean number of insurers per market fell from 18.9 to 9.6. Secondly, evidence was found that increased insurer concentration was positively associated with the premium charged. Specifically, their results implied that average market-level changes in HHI between 1998 and 2006 resulted in a premium increase of approximately 7% by 2007.

Outside the US, Gaynor, Ho, and Town (2014) found concentration levels increasing in the Dutch health insurance market. The Dutch market had a moderate HHI in 2005 of 1,346 but had increased to 2,011 by 2010. In Germany, although there are a relatively large number of sickness funds[31] the total number of sickness funds has decreased steadily over time, while ten largest sickness funds insure two-thirds of all statutory health insurance consumers (Busse and Blumel, 2014). In a comparative context, Laske-Aldershof et al. (2004) suggest that higher market concentration and barriers to entry contributed to low incentives for consumer mobility in social health insurance systems in Belgium, Israel and the Netherlands (as compared to Germany and Switzerland). Mossialos and Thomson (2004) also found many voluntary health insurance markets in the EU (e.g. Austria, Greece, Luxembourg, Portugal, Spain) exhibited increasing trends towards market concentration since the 1990s.

2.5.3 Consumer mobility and market structure

While the association between market structure and consumer mobility in health insurance markets has been referred to previously in the literature, it has not been examined in any great depth. For instance, it has been proposed that,

> ‘All other things equal consumer mobility is expected to be higher, the larger the number of sickness funds and the lower the level of market concentration (Laske-Aldershof et al., 2004, pg. 236).’

[31] 132 as of 1 January 2014 (Busse and Blumel, 2014).

However, a closer look at these relationships suggest that behaviour may be more difficult to predict. Using the perfect competitive ideal as a benchmark very little switching would be expected. All firms under this scenario would be price-takers, selling homogeneous products which would offer few incentives for consumer switching. However, evidence from Section 2.5.2 suggests that health insurance markets do not even loosely approximate such a structure. Health insurance markets, given their high and increasing levels of market concentration are best defined in terms of monopolistic or oligopolistic competition.

Under monopolistic competition, some material level of consumer switching will be expected. Product differentiation means insurers will compete for business through appealing to consumers' price and quality preferences. On the one hand, the more competitive the monopolistically competitive environment the more consumer switching that could be expected. However, as outlined above, this prediction may be mediated by the fact search costs can increase along with the number of insurers which may help tie consumers to existing insurance providers. Depending on incentives within a market, product differentiation and price competition may also be used as tools for risk selection (see Section 2.4.2), also impacting on consumer mobility.

However, as markets become increasingly concentrated and interdependency develops between firms, consumer mobility behaviour becomes harder to predict. The kinked demand curve model suggests that firms will be reluctant to lower price to improve market share as other firms may follow suit. Competition for business, in such situations, may take place along other dimensions than price. However, if collusion is easy and anti-trust policy is absent or ineffective, consumer mobility may be low as colluding insurers may be unlikely to differ their products along price or other plan dimensions (Laske-Aldershof et al., 2004). Distinct from monopolistic competition, incentives to engage in risk selection may be influenced by interdependencies that exist between firms in oligopolies. For instance, Wilson (1977) argues that if an insurance market is defined by only two insurers, risk selection would not make much sense. If insurer A manages to develop a favourable risk profile at a point in time, insurer B, noticing the increase in unfavourable risks will resort to risk selection in period 2. In period 3, insurer A will then notice a similar increase in unfavourable risks and so on, causing both to lose out by engaging in risk selection.

2.6 Voluntary health insurance

An important finding brought out in the literature review is the lack of attention that has been placed on understanding, conceptually, why consumer mobility in voluntary health insurance markets may differ from mandatory settings. As this thesis deals with understanding consumer mobility in a voluntary health insurance setting, it is important, at this point, to elaborate on some conceptual aspects of voluntary health insurance relevant to this discussion.

2.6.1 Forms of voluntary health insurance

Voluntary health insurance can take a number of forms. Private health insurance can act as the primary source of health cover in many instances. For example, in the US, voluntary private health insurance has been predominantly employer-based and provided without the benefit of publicly-funded care unless individuals earn below a certain income (Medicaid) or are above a certain age (Medicare)[32]. In Germany, individuals can be either excluded (public employees, the self-employed) or have the option of opting-out of public insurance (employees whose earning exceed an opt-out threshold)(Busse and Blumel, 2014). This form of primary health insurance in Germany is also referred to as substitutive. In competitive mandatory health insurance markets[33] voluntary health insurance can also be provided alongside basic cover in the form of additional supplementary or complementary cover. Voluntary health insurance can also duplicate cover provided by publicly

[32] This is changing, however, with the expansion of private health insurance and publicly-funded care under the Affordable Care Act 2010 (http://www.hhs.gov/healthcare/rights/).

[33] That is, health insurance systems in which insurers compete for enrolees and enrolment is required of all members of the population. Examples include Netherlands, Germany, Israel, Belgium and Switzerland.

funded systems. A taxonomy of these various forms of voluntary health insurance, along with a fuller description of their characteristics is provided in Table 2.3.

TABLE 2.3: Taxonomy of voluntary health insurance

Private Insurance Type	**Description**	**Examples**
Primary	Private insurance that represents the only available access to basic health cover because of no access to public insurance. This can be the result of a lack of, lack of eligibility for, or voluntary opt out of, public health insurance.	US employer-based health insurance; High-income individuals in Germany
Duplicate	Private insurance that offers cover for health services already included under public health insurance. Duplicate health insurance also offers access to different providers or levels of service, such as: i) access to private health facilities that are not accessible through public insurance when the full cost of the service is paid by private insurance; ii) access to fast/privileged cover by bypassing queues in public system; iii) access to care independent from referral and gatekeeper systems; iv) choice of doctor, hospital, or other health provider. It does not exempt individuals from contributing to public health insurance	UK, Italy, Australia, New Zealand, Ireland
Complementary	Private insurance that complements coverage of publicly insured services or services within principal/substitute health insurance, which is intended to pay only a proportion of qualifying care costs, by covering all or part of the residual costs not otherwise reimbursed (e.g., co-payments)	France
Supplementary	Private health insurance that provides cover for additional health services not covered by the public scheme. Depending on the country, it may include services that are uncovered by the public system such as luxury care, elective care, long-term care, dental care, pharmaceuticals, rehabilitation, alternative or complementary medicine, etc., or superior hotel and amenity hospital services (even when other portions of the service [i.e. medical component] are covered by the public system)	Netherlands, Belgium

Source: Adapted from (OECD, 2004).

Note: Private health insurance can fulfil several roles and there may be significant overlap within systems.

2.6.2 Consumer demand

In terms of consumer demand, it is important to consider the characteristics of, and choices faced by, individuals who purchase voluntary health insurance. Voluntary health insurance markets, in this context, may have particular, often contrasting, implications for consumer mobility when compared with mandatory health insurance markets.

For instance, individuals who purchase voluntary health insurance are likely to differ significantly in characteristics from those who do not. In this regard, while much theoretical work has been undertaken in terms of understanding the determinants of insurance purchase (for example, see Zweifel (2011)), predictions tend to be ambiguous. One branch of literature would suggest that those with a higher risk of falling ill are more likely to purchase insurance (and higher coverage) than those with a lower risk, a phenomenon known as adverse selection (Cutler and Zeckhauser, 2000). On the other hand, self-selection into insurance (or coverage level) may be correlated with factors that are negatively related to the risk of falling ill. Examples include risk preferences, financial means and cognitive ability (Kiil, 2012). This phenomenon is referred to as advantageous selection (Meza and Webb, 2001). Thus, understanding the characteristics of those who purchase health insurance is predominantly an empirical question.

Evidence, in this context, would largely contend that voluntary health insurance markets exhibit advantageous selection into insurance. Kiil (2012), reviewing the characteristics of individuals who purchase insurance in duplicative voluntary health insurance systems, found that they are in equal, or better health[34], than the rest of the population. Moreover, they tend to be wealthier and more educated (Kiil, 2012). Similarly, those who purchase substitutive, supplementary[35] and complementary health insurance all tend to belong to higher socio-economic groups. In addition, evidence from the predominantly employer-based US health insurance system would suggest that those without insurance are four times more likely to be both high-school dropouts and foreign-born non-citizens. Their incomes also tend to be substantially lower (O'Neill and O'Neill, 2009).

[34]Of course, this relationship is complicated slightly due to endogeneity. Having insurance could also improve health (Levy and Meltzer, 2008).

[35]Mossialos and Thomson (2004) definition of supplementary insurance overlaps to a degree with the categorisation of duplicative insurance defined above.

As a generalisation, therefore, individuals who purchase voluntary health insurance tend to be healthier, wealthier and more educated than those who don't. As described in Section 2.3, these characteristics are associated with greater ease of switching and may facilitate greater consumer mobility in voluntary health insurance markets.

However, consumers in voluntary health insurance markets also face a different choice set to consumers in mandatory health insurance systems. For instance, in response to dissatisfaction with a current insurer, consumer theory would dictate that individuals will consider switching to an alternative provider. However, those in voluntary systems also have the option of cancelling their insurance cover entirely. All else equal, this may reduce consumer mobility within voluntary markets as rather than switch insurer, some consumers might prefer to drop out of the market completely. Evidence would suggest that it is the low-risks who are more likely to exit voluntary markets in such circumstances (for example, see Butler (2002)).

Costs of switching may also differ between employer-based and individual health insurance markets. As noted by McGuire (2012), employer based health insurance markets tend to be subject to lower selling and administration costs. Employers tend to limit the choices of health insurance offered to employees by shopping on behalf of their workers for a set number of plans. Moreover, the importance of price as a switching benefit may also be reduced if employers subsidise the cost of employees' insurance premiums (McGuire, 2012).

2.6.3 Regulatory environment

Risk equalisation in voluntary private health insurance markets in the EU is rare (Mossialos and Thomson, 2004). However, the vast majority of voluntary private health insurance markets in the EU tend to risk rate premium contributions while open enrolment and lifetime cover regulations are uncommon (Mossialos and Thomson, 2004). Although risk rating factors differ across member states, they include age, sex, occupation, household size, medical history, family history of disease and extent of coverage (Mossialos and Thomson, 2004). Similarly, risk equalisation in US employer-based markets has traditionally not taken place however, as with EU markets, risk rating strategies (among others) have commonly been used to mitigate against biased selection (Ellis, 2001).

Some voluntary health insurance markets, however, do operate under the principles of community rating, open enrolment and lifetime cover regulations (e.g. Ireland, South Africa, and Australia). These markets are more akin to mandatory systems in the weight they attach to guaranteeing affordable access to insurance to high-risk individuals. However, while many mandatory systems have sophisticated risk equalisation in place to help address any risk selection incentives that may arise, risk equalisation is less developed in these voluntary insurance markets. For example, Australia's voluntary health insurance market provides premium adjustments to insurers based only on age and a high cost risk pool for very expensive enrolees (Connelly et al., 2010). And while South Africa's voluntary health insurance system has a relatively detailed risk equalisation system in place based on age, gender and a number of chronic health conditions, legislation is yet to approve actual transfers between insurers (McLeod and Grobler, 2010).

In terms of market structure, there is no *a priori* reason to believe that differences exist between competitive voluntary and mandatory health insurance markets. For instance, in European social health insurance systems, many mandatory health insurers also compete in the market for supplementary health insurance insurance (Thomson et al., 2013). Moreover, both mandatory and voluntary (US employer-based markets and voluntary EU insurance markets) have seen trends towards increasing concentration in recent times (see Section 2.5.2).

TABLE 2.4: Summary of theoretical and empirical literature

	Theoretical	**Empirical**
Consumer decision-making	Benefits and costs to switching affect decision-making	**-Price** - influences switching in a number of market settings (e.g. US [employee-based, individual, Medicare markets], Germany, Netherlands)
		-Quality - most detailed evidence comes from the US where quality has been shown to affect plan choice. Less robust, and mixed, evidence from other markets
		-Search costs - evidence of search costs in the US (Medicare Part C and D) and Switzerland
		-Transaction, learning, uncertainty costs - evidence mainly related to survey responses from Netherlands.
		-Benefit loss costs - little empirical evidence, although identified as most prominent cost in Netherlands
		-Provider-switching costs - little empirical evidence
	Prospect theory and its derivative theories suggest not all decision-making is rational	**-Non-rational costs** - Evidence of concepts such as status-quo bias and consumer inertia identified as features of health insurance markets (e.g. US, Netherlands, Germany)
	Benefits and costs to switching differ across risk-types, affecting switching propensities	-Overall, evidence suggests low-risk are more responsive to price and face lower search and switching costs
		-Overall, evidence suggests that low-risk consumers have higher switching propensities across a number of settings (e.g. US [Medicare, employee-based markets], Germany, Netherlands, Switzerland)
	Exit, voice and loyalty	-Not well researched. However, evidence from Netherlands suggests 'voice' is not used to a large extent.
Regulation	Consumer information influences decision-making	-Research mainly relates to impact of consumer quality info on choice in US markets (privately employed, federally employed, Medicare, Medicaid). Evidence suggests positive association (Medicaid- exception).
		-Although, evidence of 'comparison friction' found in US Medicare market
	Community-rated markets suffer from risk selection	-Difficult to empirically identify active risk selection. Mixed evidence from German system on the presence of risk selection.
	Risk equalisation reduces risk selection	-Risk equalisation research looks at reducing incentives for risk selection.
		-Choice of risk-adjusters, outlier-risk pooling and ex-post versus ex-ante payments all influence performance
Market structure	More concentrated markets lead to lower consumer mobility	-Lack of evidence to date. Although trend towards increased concentrations in health insurance markets, internationally.
Insurance market design	Difference in consumer characteristics, choice set and regulatory design may impact on consumer mobility	-Lack of evidence to date

2.7 Conceptual framework

There are a number of factors to consider when analysing what affects consumer switching behaviour. For this reason a literature review was conducted (see Section 2.2) which identified three broad potential drivers. These related to consumer decision theory (Section 2.3), the regulatory environment (Section 2.4) and market structure (Section 2.5). This section endeavours to present a synthesis of these theoretical and empirical findings in the form of a conceptual framework of consumer mobility. This framework will then be used to guide the research questions and hypotheses presented in the empirical analyses in Chapter 5, 6 and 7.

Sitting at the center of our understanding of consumer switching behaviour is consumer decision theory. Predicated on standard utility theory, it suggests that consumers will switch only if the benefits of doing so outweigh the costs. While consumer mobility in health insurance markets tends to be low, this is often explained in that satisfaction rates with insurers tend to be high, relative to the benefits of switching. However, for effective competition to take place, when individuals do switch it should be out of consideration for price and quality as this will motivate insurers to compete along these parameters. Empirically, evidence suggests that price (particularly) and quality do strongly influence consumer choice in a number of settings. Low switching rates in health insurance markets may also be a function of search and switching costs. The presence of some of these costs suggest departure from the rational behavioural model of consumer utility does occur. For example, evidence suggests that consumer decision-making worsens in the face of too much choice. Frank and Lamiraud (2009) found that as the number of plans increased, switching rates fell in the Swiss market. There is also ample evidence that barriers to switching include non-rational psychological costs to switching, including phenomena such as status-quo bias and consumer inertia. Theoretically, Hirschman (1970) also argued that the concept of ‘voice’ might keep switching rates lower than they otherwise would be, however, there is little evidence to suggest voice is used as a strategy by consumers in health insurance markets. Finally, search and switching costs may differ across individuals based on their socio-demographic and health related characteristics which conceptually helps explain why younger, healthier, wealthier and more educated individuals are observed to have higher switching propensities than other groups.

Consumer decision-making, however, may be strongly influenced by the regulatory environment, both directly and indirectly. Directly, the provision of consumer information (e.g. price and quality comparisons, information on switching rules) by a regulatory body may help consumer decision-making by lowering search and switching costs. Empirically, evidence from the US and Netherlands suggests that consumers may respond to the availability of quality information by choosing higher quality plans. Similarly, regulation might have a direct effect on the level of switching costs experienced. For example, consumers in markets where selective contracting with providers takes place may experience additional switching costs. In contrast, regulations specifying open enrolment and lifetime cover act to reduce switching costs.

Indirectly, the regulatory environment may influence consumer decision-making through the effect it has on insurer incentives for risk selection. Many health insurance markets are heavily regulated, and with equity considerations in mind, a common regulation is to community rate premiums. From an insurer perspective this categorises consumers into profitable (i.e. young and healthy) and unprofitable (i.e. old and less healthy) risks. While open enrolment and lifetime cover regulations help mitigate against direct risk selection, insurers can engage in indirect risk selection (e.g. marketing strategies, plan design) that may impact on consumer decision-making. Risk selection strategies employed by insurers (see Section 2.4.2.1) are essentially efforts made by insurers to distort the benefits and costs to switching faced by consumers. For example, insurers could endogenously lower search costs for low-risk groups through selective advertising or endogenously raise provider switching costs for high-risks through contracting with only certain providers.

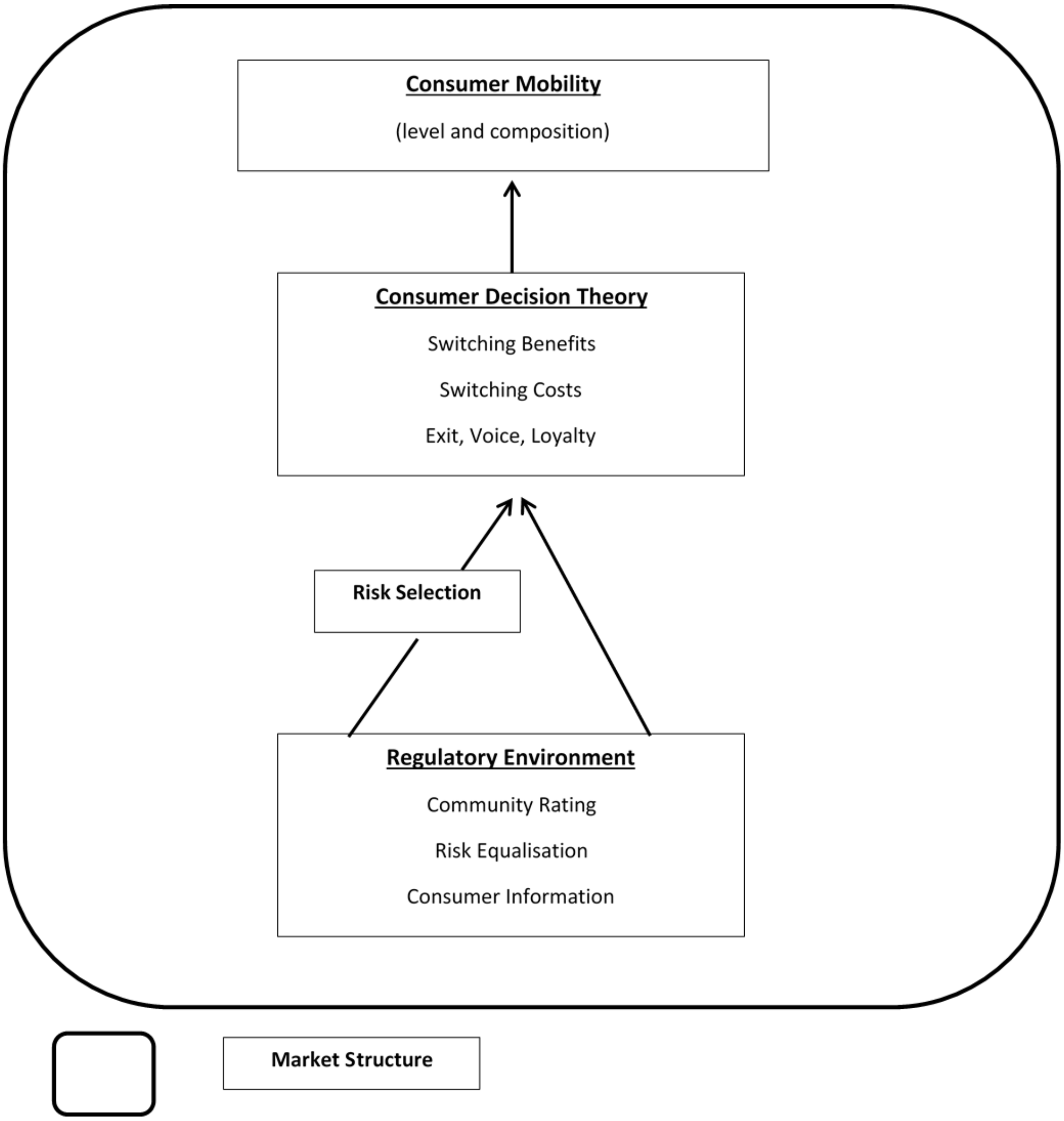
The best way to mitigate against incentives for risk selection is through providing risk-adjusted subsidies to insurers, generally organised through a risk equalisation scheme. As discussed, the quality of risk equalisation will depend on factors used to calculate risk-adjusted payments. While variables such as age and gender are easy to collect and monitor, they are poor at predicting healthcare expenditure and are not considered good risk- adjusters. More sophisticated risk equalisation designs tend to include payments based on some measure of health status, usually predicated on diagnostic information. Risk equalisation models that include health status as a risk-adjuster tend to perform much better than models that only include socio-demographic information. In an international context, the Netherlands is generally considered to have developed the most sophisticated risk equalisation design to date. It is important to realise that risk equalisation need not be perfect, but needs to be effective to the point that insurers see the benefits of investing in risk equalisation as not worthwhile.

The lack of risk equalisation, or poor risk equalisation, may indeed also impact on consumer decision-making directly. Specifically, lack of risk equalisation may allow for substantial price variation within the market if some insurers manage to capture a better risk profile than their competitors. This might result in higher levels of switching than would be the case in the presence of effective risk equalisation given the the flow of funds through such a system would act to limit this price variation. Some commentators have argued that the historic low price-sensitivity exhibited in the Dutch system, as compared to other systems, was a consequence of the ability of Dutch risk equalisation to limit price variation between insurers (Greß et al., 2002). As noted by Greß et al. (2002), a potential dilemma related to these dynamics is that a trade-off might exist between large differences in premiums, as a result of no (poor) risk equalisation, which may encourage switching between insurers and a low degree of price competition in systems with robust risk equalisation.

Additionally, consumer mobility needs to be understood in terms of the pervading market structure. Less competitive market environments are unlikely to be conducive towards consumer mobility. In this context, the number of insurers and their relative market share, that is the market concentration, constitute an important gauge of competitiveness. Less competitive environments will be associated with markets with high barriers to entry, while incentives for mergers will be related to the presence of economies of scale and scope. Moreover, market power (the ability to maintain prices above competitive levels) will be affected by the level of search and switching costs in the market. Empirically, evidence suggests that health insurance markets internationally are quite concentrated and that concentration has been increasing over time. This would suggest a trend towards worsening environments for consumer mobility and competitiveness.

Finally, given that this thesis explores consumer mobility in a voluntary health insurance market, consideration was given to whether consumer mobility may differ between voluntary and mandatory settings. This issue has not been addressed in the literature (and consequently not explicitly included the conceptual framework that was constructed), however, some speculations were made. For instance, search and switching costs may be lower in voluntary markets given that these markets are generally characterised by advantageous selection. On the other hand, consumers' choice set is larger as consumers, in addition to switching, can also choose to exit the market. This may have a negative effect on consumer mobility dynamics *within* the market. Finally, the regulatory environments in voluntary health insurance markets are quite heterogeneous. However, voluntary markets that require community rating have not been well supported by risk equalisation to date, suggesting strong incentives for risk selection may exist in these markets.

FIGURE 2.4: Conceptual framework of consumer mobility in health insurance markets.



2.8 Summary

This chapter set out to construct a conceptual framework of consumer mobility in health insurance markets. Grounded in a literature review, three explicit factors were identified as potentially explaining consumer switching dynamics. Sitting at the centre of understanding of consumer mobility is the decision-making process of the consumer. Allied to this, the regulatory environment and market structure may help to provide insight into the nature of consumer mobility. Cognisant that these factors do not operate in isolation, the conceptual framework attempted to structure and elaborate on the interactions that may exist.

The literature review also identified a number of important gaps in current knowledge. Of particular relevance is the lack of research that has taken place into aspects of consumer mobility in voluntary health insurance markets. Conceptually, little understanding exists on why switching behaviour may differ between mandatory and voluntary insurance settings. Furthermore, a distinct lack of empirical research was identified in terms of consumer mobility in duplicative voluntary health insurance markets. This relates both to explicit analysis of switching behaviour and, additionally, issues of risk selection and risk equalisation (where applicable).

In this context, Section 2.6 discussed some relevant conceptual characteristics of voluntary health insurance markets that may have implications for consumer mobility. Guided by the conceptual framework, Chapters 5, 6 and 7 then hope to add to existing empirical knowledge through examining aspects of consumer mobility in the context of the Irish voluntary private health insurance market. The next chapter provides a contextual background to the Irish market.

Chapter 3

Private health insurance in Ireland

3.1 Introduction

The purpose of this chapter is to provide an overview of important characteristics of the Irish private health insurance system, in order to provide context and justification for the empirical investigations undertaken in Chapters 5, 6 and 7.

As such, Section 3.2 provides an overview of the Irish health system in terms of financing and coverage. Healthcare in Ireland is primarily tax-funded, comprising a complex system of entitlements. Private health insurance only accounts for a small fraction of health expenditure, due to primarily covering hospital-based care. However, the promotion of private health insurance by the State along with access and quality concerns with the public system, mean that just under half the population currently hold private health insurance. These issues are discussed in detail in Section 3.3.

Private health insurance has been available in Ireland since 1957, and was the sole provision of the monopoly insurer, VHI. Following EU mandate, the market was liberalised in the mid 1990s and Section 3.4 discusses the development of the heavily regulated environment under which the competitive market now operates. The market is currently populated by four competing insurers, (VHI, Laya, Aviva and Glo), however, the belated introduction of risk equalisation regulations led to the development of an asymmetry in risk between the incumbent VHI and the newer insurers, a consequence, partly, of strong incentives for risk selection. This is discussed in detail in Section 3.5, along with an analysis of market competitiveness. Section 3.6 outlines current reforms taking place in the Irish health system along with special emphasis on reforms proposed, although very recently abandoned, to expand the role of competitive health insurance financing in the Irish system. Section 3.7 provides a summary of the issues discussed.

3.2 The Irish health system: financing and coverage

3.2.1 Financing

In 2013, Ireland spent €14.6bn on healthcare, equating to 8.9% GDP (WHO, 2015). This is slightly below the OECD average of 9.3% (WHO, 2015) and relates to €3,188 in per capita terms (see Table 3.1). The majority of total health expenditure is public in nature (67.7% in 2013) and is financed through general taxation. Since 2005, overall responsibility for the public health expenditure budget rests with the Health Service Executive (HSE)[36] [37]. Public health expenditure (and consequently total health expenditure) has varied significantly in recent times. As described by Nolan et al. (2014), levels of public health expenditure in Ireland rose rapidly in the early and mid 2000s, from a low base, and are now broadly in line with expenditure levels in other countries. However, since 2008 there have been significant cuts to public health expenditure as a result of the recent economic and financial crisis (see Nolan et al. (2014) and Keegan et al. (2013)). Between

[36]Prior to this provision of public health services was the responsibility of eight (then eleven) regional health boards.

[37]Overarching responsibility for the health system, however, lies with the Department of Health, under the direction of the Minister for Health.

2008 and 2014 the total public health expenditure budget fell from €15.4 billion to €13.2 billion (DPER, 2015)[38]. These reductions were mainly achieved through cuts to staff and their pay, along with efficiency savings (particularly in the early years of the economic crisis, where there was an abundance of 'fat' in the system) (Burke et al., 2014). In addition, there has been a policy of shifting the liability of healthcare costs back to the individual through increases in out-of-pocket payments over the course of the recession (see Section 3.2.2).

The effects of these cost-shifting policies are reflected somewhat in the increasing out-of-pocket expenditure per capita figures up to 2010 (Table 3.1). Out-of-pocket expenditure per capita stood at €537 in 2013, accounting for approximately 16.8% of total health spending (WHO, 2015). In an international context, this is not exceptional, with Ireland ranking 18 out of 34 OECD countries in terms of the proportion of total health expenditure attributable to out-of-pocket sources in 2013 (WHO, 2015).

Private health insurance expenditure accounts for the remainder of private spending. As can be seen from Table 3.1, private health insurance expenditure, in per capita terms, has risen dramatically in recent times. In 2013, private health insurance expenditure per capita stood at €426. Although the proportion of the population taking out private health insurance peaked in 2008 (see Figure 3.1), total premium income has continued to rise. Between 2003 and 2014 total premium income (not adjusted for inflation) has increased monotonically from €978.2m to €2,444.9m (HIA, 2014a). Recent drivers of premium inflation in the Irish private health insurance market have included increased charges for beds in public hospitals, rising volumes of treatments and increased quality of service and cover (Turner, 2013).

[38]The 2015 health budget is not directly comparable to previous years due to technical changes arising from the disestablishment of the HSE vote which is now met through a grant from the Minister for Health. However, based on revised estimates, it fell from €12.8bn to €12.7bn between 2014 and 2015 (DPER, 2015).

TABLE 3.1: Per capital health expenditure in Ireland, 2003-2013

Year	**Total health expenditure per capita**		**General government expenditure per capita**		**Private insurance per capita**		**Out of pocket expenditure per capita**	
	Current prices	**2005 prices**	**Current prices**	**2005 prices**	**Current prices**	**2005 prices**	**Current prices**	**2005 prices**
2003	2,592	2,717	1,987	2,083	170	179	397	416
2004	2,845	2,912	2,170	2,221	190	195	427	437
2005	3,005	3,005	2,283	2,283	220	220	482	482
2006	3,174	3,073	2,392	2,316	262	254	510	493
2007	3,437	3,270	2,602	2,475	279	265	509	485
2008	3,636	3,561	2,741	2,684	295	289	557	546
2009	3,572	3,637	2,592	2,640	361	368	576	586
2010	3,200	3,309	2,229	2,305	367	380	583	603
2011	3,100	3,186	2,103	2,162	385	396	547	562
2012	3,175	3,240	2,145	2,189	425	434	536	547
2013	3,188	3,240	2,157	2,192	426	433	537	546

Source: WHO (2015)

3.2.2 Coverage

As noted by Nolan et al. (2014), statutory entitlement to publicly financed healthcare in Ireland is complex (see Table 3.2). In terms of eligibility, those ordinarily resident in Ireland can be split into *Category I*, known as 'medical card holders', and *Category II*. In terms of scope and depth of coverage, Category I individuals are entitled to receive access, free at the point of use, to public inpatient and outpatient hospital services, GP services, along with some other entitlements (see Table 3.2). Category I individuals, historically, also received free access to pharmaceuticals. However, in response to dwindling government budgets for healthcare, a prescription charge of €0.50 for each item dispensed was introduced in 2010, which has since been increased to €2.50 (subject to a maximum of €25 per month per person or family).

Category I eligibility is decided mainly based on income, but differs based on age and family characteristics (Citizens Information, 2015b). However, in exceptional circumstances, full medical cards can be awarded on a discretionary basis, for individuals with ongoing medical conditions that may otherwise lead to undue hardship (see McDaid et al. (2009)). In 2009, the Government abolished automatic entitlement to medical cards for the over 70s, however, 'more than half a million more people had medical cards in 2013 than in 2008' (Nolan et al., 2014, p. 13), reflecting higher rates of unemployment and lower income levels during the crisis. As of the end of April 2015, over 1.7m individuals held a medical card (about 37.9% of the population) (DOH, 2015b).

The remainder of the population are characterised as Category II. Category II individuals are entitled to access to public inpatient and outpatient hospital services, subject to copayments (see Table 3.2), many of which have increased substantially since 2008 (see, Nolan et al. (2014)). The cost of pharmaceuticals is covered above a monthly deductible (currently set at €144/month) although all costs are covered for those with specific long-term illnesses (see Table 3.2). Similarly to hospital charges, recent budgets have seen cost-shifting back to the individual with increases in the monthly level at which pharmaceutical costs are covered (Nolan et al., 2014) [39].

Most Category II individuals pay the full market price for GP services, which can be as high as €80 a visit (McDaid et al., 2009). Although since 2005, means-tested[40] [41] GP visit cards entitle certain individuals to free GP services. In addition, since 1 July and 5 August 2015, all those aged under 6 and over 70, respectively, have been entitled to GP visit cards with the aim of eventually providing universal access to GP services to the entire population (DOH, 2015c)[42]. Latest

[39] Additionally, there were some other changes to dimensions of coverage as a result of the crisis including higher thresholds for over 70 medical card holders and cuts to dental, ophthalmic and aural entitlements for Category I and Category II populations (see Nolan et al. (2014) for more details).

[40] The rules for assessing eligibility for a GP visit card are the same as for medical cards, however, the income thresholds are higher (Citizens Information, 2015a).

[41] Similar to medical cards, discretionary GP visit cards can be awarded in exceptional circumstances (McDaid et al., 2009).

[42] The next step in this process is to expand to provision of GP visit cards to all those under 12 in 2016, subject to negotiation over rates (Citizens Information, 2015a).

official figures show that, as of April 2015, 162,240 individuals had GP visit cards, representing about 3.5% of the population (DOH, 2015b). However, the Department of Health notes that there has been strong take up of GP visit cards for newly eligible groups and that, to date, over nine in ten GPs have signed up to this new service (DOH, 2015a).

TABLE 3.2: Entitlement to publicly financed healthcare in Ireland, 2015

Type of care	**Category I**	**Category II**	**GP visit card**
GP services	Free	Pay full charge	Free
Pharmaceuticals	Pay €2.50 per prescription item up to a maximum of €25 per month per family	Pay full cost up to €144 per month per family (Drugs Payment Scheme); free for specified long term illnesses (Long Term Illness/High Technology Drug Schemes)	As for Category II
Public hospital in-patient care	Free	Pay €75 per night up to an annual maximum of €750 per person	As for Category II
Public hospital out-patient care	Free	Free emergency department attendance with GP referral or pay €100 per visit without GP referral; free access to all other outpatient services	As for Category II
Other	Various entitlements to community, personal and social services, dental, ophthalmic and aural care services; other benefits (e.g. maternity and infant care)	As for Category I	As for Category I

Source: Nolan et al. (2014)

Those who purchase private health insurance primarily belong to the Category II population, while a small proportion of Category I individuals also purchase private health insurance[43]. Since its inception, private health insurance has grown in

[43] As of 2010, it was estimated that 6% of the population had both a medical card and private health insurance cover, 23% had neither (CSO, 2011).

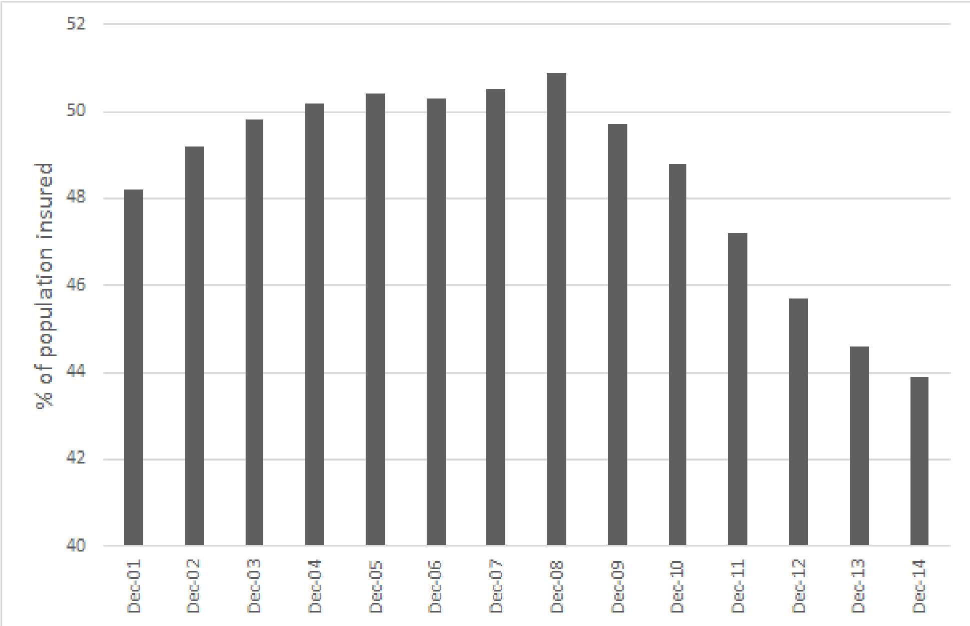
popularity, to the point where it now covers slightly less than half the population, primarily for the cost of hospital care. The following section discusses the role played by private health insurance in the health system in detail.

3.3 The role of private health insurance

Voluntary health insurance has been available in Ireland since 1957 following the establishment of VHI, operating as a not-for-profit, semi-state insurance body. The VHI was originally established to insure the hospital costs of the wealthiest 15% of the population, who, at the time, were not entitled to free access to public hospital care. While universal eligibility to public hospital accommodation and free treatment by public hospital consultants, were introduced in 1979 and 1991, respectively, the proportion of the population purchasing private health insurance cover increased dramatically. As noted by Columbo and Tapay (2004), private health insurance membership increased from 21.9% of the population in 1979 to 48% in 2002. As shown in Figure 3.1, coverage peaked at 50.9% of the population at the end of 2008, and since then, sharp increases in premiums along with declining household income (Nolan et al., 2014) have seen a fall in the proportion of the population covered. This figure stands at 43.9% of the population at the end of 2014[44].

[44]However, this does not account for the impact lifetime community rating regulations had on private health insurance take-up, see Section 3.4.1.

FIGURE 3.1: Percentage of population with private health insurance cover, Dec 2001-Dec 2014



Source: HIA (2014a).

Changes in eligibility criteria have also changed the role private health insurance plays. Originally, private health insurance fulfilled a substitutive role, for those wealthy individuals not entitled to free access to publicly funded hospital care. However, following extensions of eligibility to public hospital (and consultant) care to the entire population, private health insurance now fulfils primarily a duplicative role (see, OECD (2004)). That is, private insurance offers cover for health services already included under the public system. This duplicate cover provides faster access to hospital services along with a greater choice of providers and accommodation[45].

A notable feature of the Irish health system is that private care can take place in both public and private hospitals (this is discussed in more detail in Section 3.3.1). As such, private health insurance plans are generally categorised in terms

[45] Some authors refer to this role as supplementary, however I follow the categorisation outlined in OECD (2004) (see Table 2.3) so as to distinguish between the different interpretation of supplementary insurance in mandatory health insurance systems.

of the level of cover they provide. In this regard, the HIA distinguishes between five categories of coverage, based on whether cover relates to only semi-private[46] or private care in public hospitals or whether coverage extends to private and high-tech hospitals[47] (see Table 3.3). As would be expected, average price of cover increases with level of cover, with a significant jump in the prices of policies covering high-tech hospitals[48] [49] (see Table 3.3).

Historically, conditional on level of cover, insurers would cover all relevant hospitals. However, a significant market development in 2013 was that insurers started selling products that did not cover all public hospitals. These types of policies currently account for only a small (yet growing) fraction of the market, representing 1% and 4% of all policies in 2013 and 2014, respectively (HIA, 2013a; HIA, 2014a). However, the extent to which greater levels of selective contracting are feasible in the Irish market is debatable (Mikkers and Ryan, 2014). This issue is discussed in more detail in Section 8.4.3.

Private health insurance also includes elements of complementarity. That is, covering services not covered by the public system or co-payments for services not fully covered by the public system. Particularly, many insurance plans provide ancillary cover for cost of GP and physiotherapist services. However, insurers generally only provide partial reimbursement for these services (HIA, 2015a). Since 2001, insurers are allowed to sell ancillary health products on a standalone basis to hospital products (Armstrong, 2010).

[46] A semi-private room may contain up to five beds.

[47] High-tech hospitals specialise in the care of acute and complex conditions such as cardiac procedures. The Beacon Hospital, The Blackrock Clinic and the Mater Private are examples of such hospitals.

[48] Turner and Shinnick (2008) found that older people were more likely to select higher level cover plans suggesting part of this premium effect may also relate to adverse selection.

[49] Unfortunately, no publicly available data exists on the market shares within each category. Furthermore, private correspondence with the HIA revealed that they would not disclose such information.

Table 3.3: HIA level of cover classification

Level of cover	**Description (max cover level)**	**Average price of plan (€)**
Level 1	Semi-private or private room in a public hospital.	873.01
Level 2	Semi-private room in a private hospital.	1,245.54
Level 3	Private room in a private hospital.	1,930.04
Level 4	Semi-private room in a high-tech hospital.	4,192.59
Level 5	Private room in a high-tech hospital.	4,820.85

Source: (HIA, 2015b)

Group schemes are a wide-spread feature of the market. As noted by the Competition Authority (2007), most group schemes are work-based, with three in ten consumers of private health insurance belonging to a work-based group scheme (HIA, 2014e). 71% of consumers who had a work-based group scheme in 2013 had their policy premium deducted at source from their salary. However, choice of provider is often very limited with only 26% of consumers of work-based group schemes in 2013 offered choice of provider (HIA, 2014e). Employer payment, or subsidisation of work-based group schemes, is becoming increasingly rare. In 2013, only 32% of employers covered some or all of the cost of work-based group schemes, down from 57% in 2007 (HIA, 2014e). In addition to work-based group schemes, others can be vocational (e.g. teachers, nurses) or locally-based (e.g. credit unions) (Competition Authority, 2007). As is noted in Section 3.4, members of group schemes are entitled to a community rated premium discount.

3.3.1 State subsidisation

The Irish Government has historically placed a strong emphasis on the role private health insurance plays in the Irish system. As noted by Columbo and Tapay (2004, pg. 10), private health insurance,

> 'is considered a key part of overall efforts to maintain access to health services, and therefore is viewed as having an important social role'.

Moreover, policy-makers have regarded private health insurance as a means of increasing individual responsibility for healthcare, thereby alleviating pressure on the public system. The mixed public/private model of healthcare is also promoted under the assumption that it ensures the highest calibre of medical (and other staff) are attracted to the public system. Moreover, it promotes the efficient use of consultants' time by having public and private patients on the same site, and provides public hospitals with an additional income stream (DOHC, 1999).

As such, the State has traditionally pursued a policy of encouraging private health insurance take-up through public subsidisation. Traditionally, private health insurers were not charged the full economic cost of care in public hospitals while the State also subsidises private health insurance through the availability of tax relief on premiums. This tax relief is granted on private health insurance premiums at the standard rate of 20% (deducted at source by the insurers) (Smith and Normand, 2009). Subsidisation also takes place more indirectly through training of private medical staff by the public system (Nolan, 2006).

This State promotion of private health insurance has been a controversial topic in Irish policy circles (for example, see Nolan (2006)). A particular contentious aspect is that the duplicative role of private health insurance provision means that much of the care that the privately insured access is delivered in public hospitals. This has raised equity concerns over a 'two-tier' public hospital system whereby not only do private individuals receive quicker access to care in public hospitals, but the fact that public resources (e.g. hospitals, staff) are used to treat private patients raises issues over the 'crowding out' of public patients (Smith and Normand, 2009; Brick et al., 2010).

Strong incentives have also historically existed for private patients to be treated in public hospitals. For instance, as noted, charges for private care in public hospitals have not covered the full economic cost of that care (see, Smith and

Normand (2009) and Brick et al. (2010)). Moreover, the differential payment structures that have existed for treating public and private patients have raised concerns over the quality of care received by public patients. As consultants are paid fee-for-service for treating private patients and are salaried for their public work, it has been suggested that consultants have traditionally focused on treating their private patients while delegating care of their public patients to, less senior, non-consultant hospital doctors (NCHDs) (McDaid et al., 2009). Wren (2003) refers to this treatment of public patients as being 'consultant led' as opposed to 'consultant provided'[50].

In addition, revenues received by the State from private insurers have historically been sub-optimal due to charging insurers below full cost. Allied to this, subsidisation of private care by taxpayers means the net impact in terms of costs for the State is uncertain (Columbo and Tapay, 2004). In fact, it has been acknowledged that 'there is a sizeable deadweight element' to tax relief as many individuals would pay these premiums regardless (Commission on Taxation, 2009). Subsidisation of private care is also controversial in that it raises further equity concerns as taxpayers are cross-subsidising private care (largely in public hospitals) for those with insurance who are predominantly those from higher socio-economic groups (see Section 3.3.2).

In recent years, however, it is important to highlight that some relaxation of state support for private health insurance has taken place. Up to 2014, approximately 20% of beds in public hospitals were designated for private use. Prior to this only modest statutory charges (see Table 3.2) were sought for any private care that took place in public beds. However, since 2014 any private patient treated in a public hospital is liable for a private bed charge. Moreover, in recent times private bed charges in public hospitals have increased substantially and aim to better reflect

[50]Steps have been taken to address this problem with the negotiation of new consultant contracts in 2010. Three types of contracts were negotiated. Type A require consultants to care exclusively for public patients, although afford the highest salary out of all contracts. Type B allow for some private work (up to 20%), but must take place on public hospital campuses. There is also a limited number of Type C contracts which allow for off-site private hospital work. Existing consultants are not obliged to switch to these contracts, although they compare favourably to the former structure (McDaid et al., 2009).

the economic cost of care (Turner, 2015)[51]. Additionally, since 16 October 2013 the premium amount on which tax relief is applicable has been capped at €1,000 for each adult and €500 for each child and student.

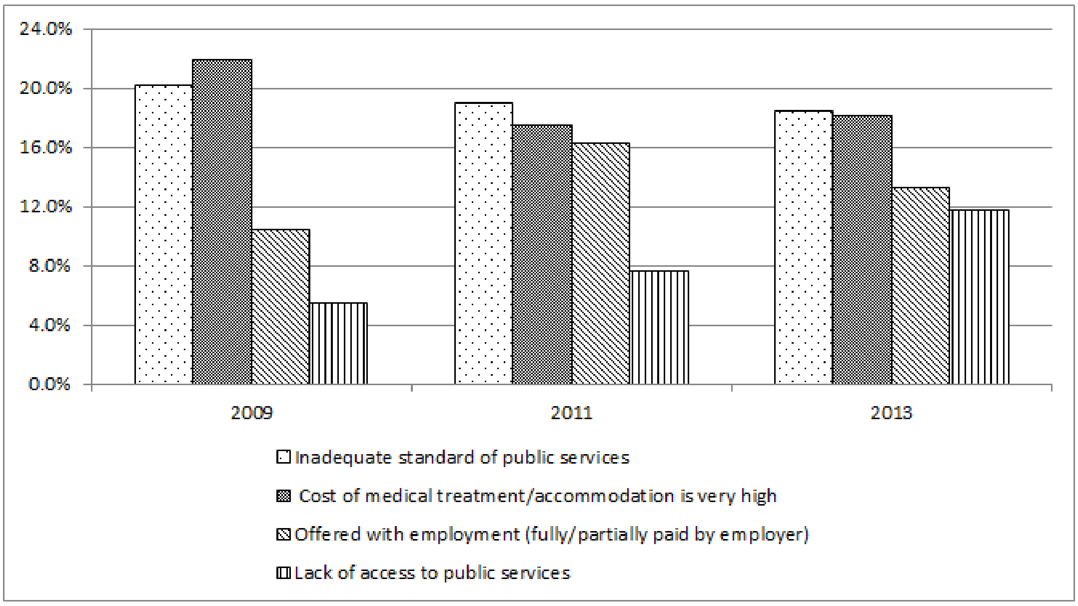
3.3.2 Consumer demand and characteristics

Complementing its promotion by Government, close to half the population purchase private health insurance, despite universal entitlement to public hospital services. It is also important to consider, therefore, consumer perceptions of the actual benefits of purchasing private health insurance. Consumer surveys conducted on behalf of the HIA provide some insight in this regard. Figure 3.2 provides the most common, main reasons for having health insurance [52].

[51] Currently, depending on hospital type, single-occupancy rooms charges per night are either €1,000 or €800; multi-occupancy rooms charges per night are €813 or €659; and daycase charges are €407 or €329 (Citizens Information, 2014).

[52] These responses compare quite similarly to those given by a sample of individuals (2,620 of which 43% had private health insurance) surveyed by the Economic and Social Research Institute (ESRI) in 1999. Of those insured, the three most important factors for having insurance were cited as 'fear of large hospital or medical bills' (cited by 88.5% as being very important), 'being sure of getting into hospital quickly' (cited by 86.4% as very important) and 'being sure of good treatment in hospital' (cited by 77.4% as being very important) (Harmon and Nolan, 2001).

FIGURE 3.2: Common (main) reasons for having private health insurance cover 2009, 2011 and 2013.



Source: HIA (2010c), HIA (2012), and HIA (2014e).

In terms of 2013 responses, the most frequently cited response related to inadequate standard of public services. Overall, however, evidence on whether private patients perceive higher quality care, is mixed (McDaid et al., 2009). On the one hand, the ESRI conducted a telephone survey in 2001 of 3,000 randomly selected individuals (61% response rate) on the 'Perception of the Quality of Health Services in Ireland' and found that 62% believed that quality of care was better in private hospitals[53], and this increased to 71% for those hospitalised as private patients (Watson and Williams, 2001). In contrast, a 2010 Irish Society for Quality and Safety in Healthcare (ISQSH) survey on 13,312 (44% response rate) inpatients who received care in Irish public hospitals found there was no statistically significant difference in satisfaction scores between public and private patients (ISQSH, 2010).

Secondly, the high cost of medical treatment/accommodation was a concern. Private health insurance therefore is seen as providing security against this high, often

[53]38% believed there was no difference between public and private care, while almost no respondents believed quality of care to be better in public settings.

unpredictable, cost of medical treatment and accommodation. These costs would be prohibitively expensive for most if required to pay out-of-pocket. For instance charges for a private hospital bed in a public hospital can currently cost up to €1,000 per night (Citizens Information, 2014). Health insurance being offered with employment is also an important reason for having cover. Health insurance being offered with employment (either partially or fully paid by the employer) was cited by 13.3% of respondents as the main reason for having it. As described earlier in this section, work-based group schemes are a wide-spread feature of the market and members of groups schemes are entitled to a community rated discount (see Section 3.4). However, choice of provider is often limited and employer subsidisation of work-based group schemes is becoming less popular (HIA, 2014e).

Finally, aside from quality of public care, another motivation for holding private health insurance related to lack of (timely) access to public health services. In this context, concern over long waiting times in the Irish public hospital system have been flagged as an important motivation for individuals to take out private health insurance (Nolan, 2006; McDaid et al., 2009). Efforts have been put in place to tackle waiting lists in the Irish public hospital system since 2002 with the establishment of the National Treatment Purchase Fund (NTPF)[54] and more recently, the Special Delivery Unit (SDU)[55]. Although tangible improvements in waiting list numbers have been seen with the implementation of these measures (McDaid et al., 2009; Burke et al., 2014), as noted by Burke et al. (2014, pg. 277), there remain 'persistent access problems in the Irish health system – very long waiting times in every aspect of hospital treatment'.

Moreover, the impact of the economic downturn, and subsequent austerity budgets, appear to have had a lagged impact on access to public hospital care. For example, between November 2012 and November 2013 waiting list figures for in-patient and daypatient care increased across all defined categories of measurement

[54]The purpose of the NTPF was to allow individuals who had been waiting more than three months for elective treatment to be treated in the private sector at the State's expense (McDaid et al., 2009). In 2011, the role of the NTPF was changed to support the newly established SDU (DOH, 2011).

[55]The SDU was established in June 2011. It has been tasked with putting systems in place to track, monitor and manage patient flows through the hospital system (DOH, 2011).

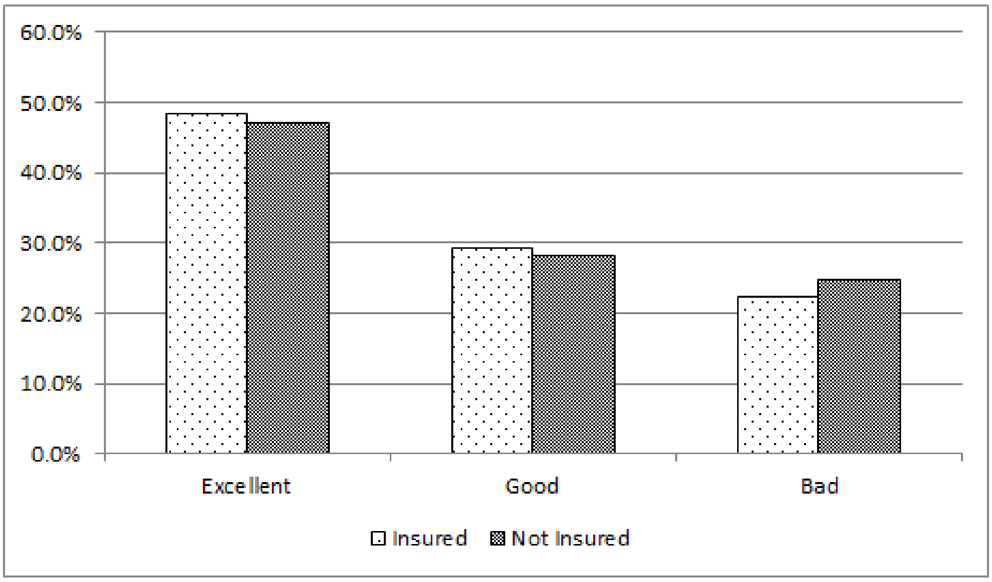
(0-3 months, 3-6 months, 6 -12 months) and trebled in respect of those waiting in excess of 12 months (from 214 in November 2012 to 797 in November 2013). Burke et al. (2014) explain this in terms of increased demand for public care and continued austerity budgets in previous years leading to declines in staffing, closed wards and fewer beds. These trends in waiting list numbers may partly explain the increased importance of 'lack of access to public services' in recent years as a reason for holding private health insurance.

Some research, in an Irish context, has also looked at the characteristics of those who purchase health insurance. Overall evidence suggests that, compared with the publicly covered only, those with health insurance tend to be younger, better educated, wealthier and healthier (Harmon and Nolan, 2001; Finn and Harmon, 2006; Bolhaar, Lindeboom, and van der Klaauw, 2012). These findings suggest that the Irish health insurance market has traditionally experienced advantageous selection which is a feature of many voluntary health insurance markets (see Section 2.6.2).

HIA Consumer Survey data, collected in 2013, also allow for a more recent comparison of characteristics of insured and non-insured individuals. Interestingly, and in contrast to earlier studies, the insured appear now to be proportionately older than the non-insured. In 2013, 20.6% of those insured were aged over 65 compared to only 13.0% of non-insureds (HIA, 2014e). A likely explanation for this fact is that the fall off in numbers insured in recent years associated with the recession, has mostly occured in younger age groups (McCarthy, 2013)[56], suggesting the market may have also been recently experiencing elements of adverse selection out of insurance.

[56]Consistent with earlier findings, evidence prior to recession from the 2003 (2005) HIA Consumer Survey(s) show 11% (13%) of insureds were aged over 65 versus 19% (16%) of uninsureds (HIA, 2003; HIA, 2005b).

FIGURE 3.3: Self-reported health status[a] of those with private health insurance, 2013.



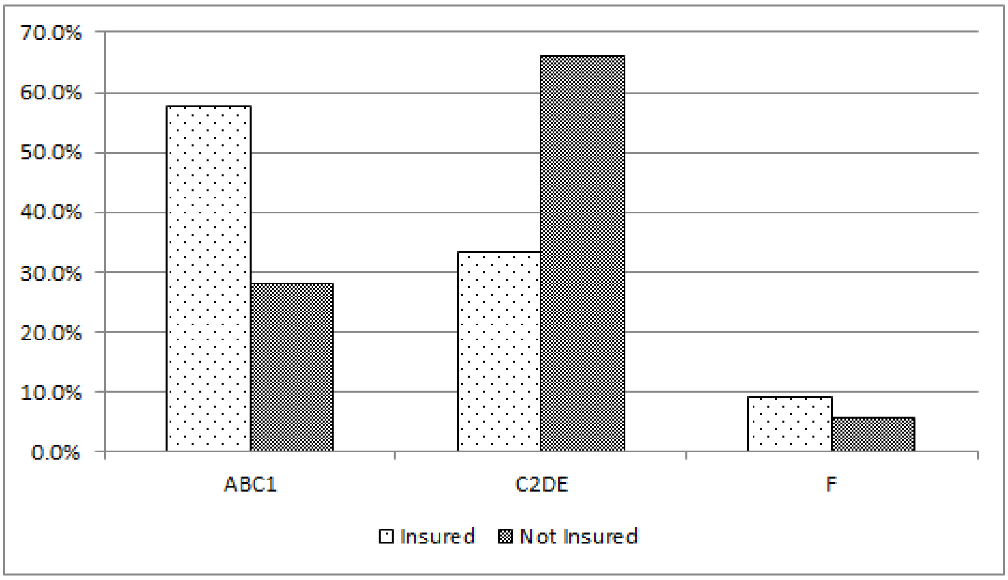
[a] Health status is classified based on respondents' self-assessed health. *Excellent*: "I am generally health and rarely make visits to the doctor". *Good*: "I am generally healthy but sometimes make visits to the doctor". *Bad*: "Some health problems and therefore regularly make visits to the doctor" or "Some health problems that sometimes require visits to the hospital".

Source: HIA (2014e).

HIA surveys, however, indicate that those with insurance appear to be in marginally better health than those not insured, consistent with earlier findings. Figure 3.3 shows that 48.4% of those insured rate their health as 'Excellent' compared with 47.0% of those uninsured. At the other end of the spectrum, 22.3% of those insured rate their health as 'Bad' compared with 24.8% of those uninsured. Figure 3.4 shows a much greater disparity between insured and uninsured in terms of social grade. 57.7% of those insured belong to category 'ABC1' ('Middle Class') as compared with 28.1% of those uninsured. Consistent with this, 30.0% of those with private health insurance are recorded as having a household income in excess of €50,000 compared with only 6.0% of those without insurance (graph not included) (HIA, 2014e)[57].

[57]Indeed, income appears to be a significant barrier for taking out private health insurance. For those without health insurance, by far the most prevalent main reason for not having private

FIGURE 3.4: Social grade[a] of those with private health insurance, 2013.



[a] Social grade relates to the occupation of the chief income earner for the household. More specifically, A is Upper Middle Class; B is Middle Class; C1 is Lower Middle Class; C2 is Skilled Working Class; D is Other Working Class; E is Casual Workers and those dependent on welfare. Farmers are classified as F1 and F2, F1 being farmers who farm more than 50 acres, F2 being those with smaller farms, i.e. 50 acres or less.

Source: HIA (2014e).

3.4 Regulatory environment

Private health insurance, as noted, has been available in Ireland since 1957. Its provision was established under the Voluntary Health Insurance Act 1957, which created VHI as a state-backed monopoly insurer. The only competition related to schemes sharing a common occupational or vocational arrangement (referred to as 'restricted membership schemes'). However, in 1992 the EU adopted the Third Non-Life Directive which states that any non-life insurance company which is authorised to transact in any EU member state is also allowed to transact in the same classes of business in any other member state (Competition Authority,

health insurance cover was cited as 'Too expensive/premiums too high/can't afford it' by 53%. The second most prevalent main reason cited was 'Have a medical card', recorded for 18% of those uninsured (HIA, 2014e).

2007). In response to this directive the Irish Government were forced to enact the Health Insurance Act 1994, and 1996 Health Insurance Regulations, which set out a legislative framework for establishing a competitive health insurance market. The first open-membership competitor, British United Provident Association (BUPA) Ireland (now trading as Laya Healthcare [Laya]), entered the market in 1997. VIVAS Health (now trading as Aviva Health [Aviva]) then entered in 2004, followed by Glo Health (Glo) in 2012, bringing the current number of insurers in the market to four.

The cornerstone of market regulations relate to principles of community rating, open enrolment, lifetime cover and minimum benefits[58]. In this context, the competitive Irish health insurance market was established under heavy regulation designed to promote affordability and access to individuals with high expected healthcare costs[59]. However, efforts to introduce risk equalisation payments to support community rating regulations were very slow to develop in the Irish market. Most notably, a successful legal challenge by the first market entrant, BUPA, blocked the commencement of actual payments. A system of additional age-related tax credits were introduced in 2009 and replaced by bona-fide risk equalisation in 2013. These issues are discussed in more detail in the following sections.

3.4.1 Community rating

Community rating is a regulation designed to allow access to affordable healthcare for high-risk individuals. Historically, community rating in Ireland has been achieved through prohibiting insurers from varying premiums between individuals on the same health insurance plan based on age, sex, or any other risk-factor - subject to some exemptions. Children (0-17 years) may be charged no less than 50% the adult premium while members of a group scheme can receive a 10% discount

[58] As noted by Turner and Shinnick (2013), as it was, these regulations had been operating on a *de facto* basis prior to liberalisation.

[59] While efficiency or cost control were not explicitly stated as policy objectives, these issues have received more attention in recent years (see McLoughlin (2013)). Thomson et al. (2013) also notes that even when efficiency is not a stated principle of a competitive health insurance market, policy-makers may tacitly expect insurer competition to result in efficiency gains.

on their insurance premium[60]. Those aged between 18-25 can also receive reduced premiums based on sliding scale[61] [62]. Moreover, pensioners who are members of restricted membership insurers may have their premiums reduced. Community rating, in this context, operates under the principle of 'intergenerational solidarity' (Competition Authority, 2007), whereby the young subsidise the healthcare costs of the old.

However, as community rating only applies within plans, across plans insurers are allowed to vary premiums. Under this form of community rating insurers have the ability to design products to attract certain types of risks (risk selection in the Irish market is discussed in detail in Section 3.5.1). For example, relatively low cover plans may be more attractive to younger and healthier individuals who are at a lower risk of requiring healthcare. A consequence of this is that low-risks may pay lower community rated premiums for their health insurance than high-risks. This undermines the principle of community rating and consequently raises concerns over solidarity principles espoused in the Irish market (Armstrong, 2010).

Lifetime community rating

As community rating reflects a cross-subsidisation of healthcare costs from younger, healthier (less costly) consumers to older, sicker (more costly) consumers, the voluntary nature of the market, therefore, has provided incentives for individuals not to take out community rated contracts when they are young and healthy (or to drop existing contracts that they do have, given the poor value they represent) and to enter the market when they are in more need of healthcare. Such behaviour results in community rating premiums rising to cover higher average claims cost in the market. Higher premiums may subsequently incentivise other potential low-risk consumers not to take out health insurance cover (or existing low-risk consumers to drop it) further increasing claims costs. This phenomenon is known as an adverse selection 'death spiral' (Cutler and Zeckhauser, 1997) and

[60] Children are also permitted to have their premium waived entirely.

[61] For example, those aged 18-20 can receive up to a 50% discount, while those aged 25 can receive up to a 9% discount.

[62] These discounts were introduced along with lifetime community rating regulations (see below) in May 2015. It replaced an exemption whereby dependent students (aged 18-23) in fulltime education could be charged no less than 50% the adult premium.

has been recognised as a potential threat in Irish policy circles at least as far back as 1999 (DOHC, 1999) where a form of *lifetime community rating* was proposed for introduction into the Irish health insurance market. Lifetime community rating is designed to encourage younger individuals to take out health insurance in a voluntary market. Under this system insurers are,

> 'allowed to charge an extra premium (in the form of a permitted maximum percentage loading on the standard community rate) to those who join private health insurance for the first time at a later age or re-join after a prolonged gap in coverage (DOHC, 1999, pg. 34).'

However, despite consultation on its adoption in 2002 (HIA, 2002a), lifetime community rating has only recently been introduced in the Irish private health insurance market. Prior to this, there was no penalty for not paying into the fund in younger years and entering the market later in life. Historically, the only protection against this type of behaviour was waiting periods for activation of coverage that differed based on age and health status (see Section 3.4.2).

Since 1 May 2015, lifetime community rating regulations have now been implemented in the market, meaning a loading of 2% of gross premium now applies for those aged 35 and over for every additional year they postpone purchase of inpatient private health insurance after 30 April 2015 (up to a maximum loading of 70%) (HIA, 2015c). However, there are a number of exemptions associated with these new regulations. Specifically, for those eligible for loadings,

- loadings will not be affected for breaks in cover of less than 13 weeks.
- for those who had health insurance previously, credit can be given for the time insured, increasing the notional age at entry for which loadings apply.
- loadings will not apply for those who have been resident outside Ireland provided health insurance is bought within nine months of moving (back) to Ireland.

- finally, if health insurance was stopped for reasons of recent unemployment (since 1 January 2008), up to three years of credits can be provided.

Initial reports suggest that lifetime community rating has been successful in its aim of encouraging take-up of private health insurance. The HIA report that the numbers insured increased by approximately 74,000[63] in April 2015, directly prior to the introduction of lifetime community rating, much higher than was initially expected[64](HIA, 2015d). While no information is available on age breakdown, it is believed there has been an even split between those buying cheap entry level cover and those purchasing more expensive, higher quality plans (Weston, 2015).

This large take-up in insurance in response to lifetime community regulations is consistent with evidence from the Australian private health insurance market where a similar policy was implemented in July 2000 to counteract adverse selection dynamics (Butler, 2002)[65]. This policy appears largely responsible for a jump in private heath insurance cover in Australia from 31% to 43% between the time of policy announcement (September 1999) and implementation. The influx of younger policyholders is reflected in the fact that the average market age fell from 39.4 years in December 1999 to 37.2 years by September 2000. Interestingly, however, coverage levels began to decline and average age began to increase soon afterwards suggesting lifetime community rating was not a durable response to the problem of adverse selection in the Australian market. Butler (2002) argues the most likely reason for the ephemeral nature of the policy was that the underlying adverse selection problem had not been corrected. Despite the introduction of a degree of risk discrimination based on age, residual cross-subsidisation from the young to the old remained a property of the market, incentivising younger individuals to exit the market again. It is yet to be seen whether a similar dynamic plays out in the Irish market.

[63]This is compared to a 6,000 person increase in March 2015 and a 3,000 person increase over the 12 months to the end of March 2015.

[64]The HIA expected that between 30,000 and 50,000 would take out health insurance as a result of the new regulations (Weston, 2015).

[65]The Australian policy introduced a 2% premium loading (subject to a maximum of 70%) for everyone over 30 years of age who did not have hospital cover by 15 July 2000.

3.4.2 Supporting regulations

Since the liberalisation of the Irish market in the mid-1990s, a number of additional regulations were put in place to support community rating. These relate to,

- *Open enrolment* – requires that insurers must insure all individuals seeking cover, regardless of their risk profile. Refusal of enrolment can only take place in exceptional circumstances, such as where an applicant lied to an insurer (Armstrong, 2010). This regulation also specifies a maximum waiting period that applicants must serve prior to coverage being activated. Historically, these waiting periods differed based on consumer age and when illness commenced (i.e. before or after taking out insurance). However, since the introduction of lifetime community rating on 1$^{\text{st}}$ May 2015, measures were put in place to standardise maximum waiting periods, irrespective of age (Turner, 2015).

- *Lifetime cover* – requires that once an individual is insured they can remain insured for the rest of their life, provided there is no break in cover greater than 13 weeks[66]. All insurance contracts are required to be one year in length (Armstrong, 2010).

- *Minimum benefits* – requires all insurers to provide at least the prescribed benefits and that the level of benefits provided by insurers are in excess of defined limits (Armstrong, 2010). These benefit limits relate to secondary care hospital services (inpatient, day patient and hospital outpatient benefits). They do not require insurers to provide benefits in particular hospitals with particular consultants or in particular hospital rooms (Armstrong, 2010).

Switching plan or insurer

As noted, health insurance contracts are one-year in length and at each renewal period consumers are entitled to renew their current contract, switch plan or insurer,

[66] Open enrolment waiting periods are applied to any applicants seeking insurance after a break in cover greater than 13 weeks.

or exit the market entirely. All four insurers allow a 14-day cooling off period from renewal dates whereby consumers may still cancel, get a full refund and switch to an alternative plan or insurer. All insurers impose penalties for switching after this point (HIA, 2015f). Individuals with existing health conditions may switch health plan or insurer without being subject to a break in cover (as long as waiting periods have been previously completed). However, if an individual switches to a new plan with higher cover there may be additional waiting periods in respect of the extra benefits associated with the higher cover (HIA, 2015f). As noted by the Competition Authority, switching plan or insurer in the Irish market is quite straightforward and 'can be accomplished easily in a matter of minutes, by means of two phone calls or online' (Competition Authority, 2007, pg. 72).

Consumer information provided by the HIA

One of the principal functions of the marker regulator, the HIA, provided for under law, is

> 'to take such action as it considers appropriate to increase the awareness of members of the public of their rights as consumers of health insurance and of health insurance services available to them' (HIA, 2016b)

In this regard, the HIA's website (www.hia.ie) provides consumers with information related to the switching rules and regulations in the market (as described in this section and Section 3.4.1). Moreover, the HIA website provides consumers with a plan comparison tool. This tool allows consumers to compare all plans on the market along dimensions such as price, inpatient cover, maternity cover, outpatient benefits, and whether hospital restrictions apply[67], [68].

[67] At present, no information is captured on dimensions of insurer or plan quality, such as consumer satisfaction ratings.

[68] Alternatively consumers can query market regulation, switching rules or plan comparison information through contacting HIA over the phone.

3.4.3 A history of risk equalisation in Ireland

In addition to the legislative regulations just discussed, the 1994 Act also made provision for the introduction of risk equalisation in the Irish private health insurance market, if the Government deemed it necessary (McDaid et al., 2009). As described in Section 2.4.2.3, risk equalisation is a means of organising the flow of risk-adjusted premium subsidies between health insurers in community rated markets so that payments to insurers better reflect the risk they hold. Risk equalisation is important both to reduce incentives for risk selection and also to ensure that all insurers can compete on a level playing field.

Following the introduction of BUPA into the market in 1997, early attempts to establish a risk equalisation system required both insurers to submit risk equalisation returns. However, after a period of consultation on the future of private health insurance, these regulations were revoked in 1999 with the result being that no actual payments between insurers took place (Turner and Shinnick, 2013).

The 2003 risk equalisation scheme

Efforts to introduce risk equalisation were then advanced in 2001 with the passing of the Health Insurance (Amendment) Act 2001 (2001 Act). This Act allowed for the establishment of a regulatory body, the HIA, whose function (among others) was to oversee the establishment and administration of a risk equalisation fund. Provision was also made in this Act for the introduction of the new risk equalisation scheme. Consultation with market stakeholders informed the design of the scheme (HIA, 2002b). Risk profile differentials were to be identified and equalised primarily based on age and sex. However, there was also the potential to activate a health status weight (HSW) as a basis for equalising risk profiles[69]. Risk equalisation was to be financed through contributions paid by the insurers into a risk equalisation fund. Risk equalisation was to be self-financing, so that

[69]The HSW was initially set at zero, however the weighting could be increased up to a value of 0.5. The HSW would be used to (partially) equalise the level of utilisation of hospital services (measured by treatment days). The idea behind capping the HSW at 0.5 was that differences in risk profiles, at a given age and sex may not just reflect differences in health status, but also the relative efficiency of the insurer (Armstrong, 2010). Power to initiate the HSW as a means of equalising risk profiles rested with the Minister for Health and Children, based upon recommendation from the HIA.

contributions entering the fund equaled contributions paid out by the fund. As required, an adjustment would therefore be made to payments to those insurers in receipt of transfers from the fund (HIA, 2008a). Payments were to be calculated on a retrospective basis.

Implementation of this risk equalisation scheme occurred on the 1 July 2003. As noted by Columbo and Tapay (2004); implementation, in this context, did not mean that actual payments took place but rather an assessment process was begun to determine the appropriateness of payments. Whether or not payments were to be initiated was based on the following decision rule: If the difference between insurers' risk profiles, the market equalisation percentage (MEP), was less than 2% payments would not be initiated. If the MEP was between 2% and 10%, the HIA would make a recommendation to the Minister for Health and Children on whether payments should take place. If the difference was greater than 10%, the Minister was to commence payments unless it was contrary to the best overall interests of health insurance consumers. This 'threshold' approach caused considerable controversy and was at odds with risk equalisation transfers in other jurisdictions which began regardless of their size relative to the market (Armstrong, 2010). By not initiating transfers until the MEP was greater than 2%, it hypothetically allowed for a smaller insurer to have a very favourable risk profile, without transfers commencing, thus encouraging risk selection (what the scheme was designed to prevent). Furthermore, there was a three-year exemption from risk equalisation payments in respect of new market entrants followed by an arrangement whereby payments for the first year of contribution were set at 50% (Armstrong, 2010).

Four separate analyses of returns were conducted prior to the Minister deciding that actual payments should take place, based on January to June 2005 returns[70].

[70] Analysis of returns showed MEPs of 3.7%, 3.5%, 4.7% and 4.2%, for the periods July to December 2003, January to June 2004, July to December 2004 and January to June 2005, respectively (HIA, 2005a). Based on the first two set of returns the HIA recommended that payments not be commenced. On the third occasion the HIA recommended payments be commenced, however this was rejected by the Minister. Finally, based on January to June 2005 returns, the HIA again made a recommendation that payments commence and in this instance the recommendation was accepted by the Minister.

During this period a third open market insurer entered the market in the form of VIVAS (in 2004).

BUPA objection to risk equalisation

Following recommendation by the Minister, actual payments were to commence on 1 January 2006. BUPA immediately challenged this decision in the Irish courts. The commencement of transfers would essentially see BUPA paying their main (and essentially only competitor prior to the entry of VIVAS) competitor compensation as a result of their (VHI's) substantially worse risk profile. In 2005 the size of BUPA's risk equalisation contribution (if payments had occurred) was estimated at €20,633,000 (HIA, 2006). As discussed in detail by Turner and Shinnick (2013), BUPA focused its objections to the 2003 risk equalisation scheme on the interpretation of community rating operating within the market. Risk equalisation payments were to be introduced under the definition of community rating in Section 12 of the 1994 Act (as amended), declaring 'the need for community rating across the market for health insurance' (Government of Ireland, 2001). However, Section 7 of the same Act provided a different wording of what was meant by community rating, referring to community rating only within plans (as opposed to across the market). BUPA argued that the valid definition was contained in Section 7, and consequently risk equalisation was introduced by the Minister on specious grounds. BUPA's arguments were originally rejected by the High Court in November 2006. However, on appeal, in July 2008, the Supreme Court concluded that risk equalisation, predicated on Section 12 of the 1994 Act, was done so on erroneous grounds, as community rating must be interpreted along the lines defined in Section 7 of the 1994 Act, (as amended). Consequently, the introduction of the Scheme was deemed beyond the powers of the Minister and set aside.

Following the original High Court ruling in November 2006, BUPA announced it was leaving the Irish market the following month, insisting that the introduction of risk equalisation transfers would make their business 'unviable' (RTE News, 2006). At the time of exit, BUPA accounted for approximately 21% of market share (HIA, 2014c). In January 2007 it was announced their business was to be taken over by Quinn. Controversially, the Government rushed through emergency legislation at this point, principally to ensure that Quinn, as a new entrant, would not be exempt from risk equalisation payments for three years (as was the case under existing legislation).

Age related tax credits and bona-fide risk equalisation.

The setting aside of the 2003 risk equalisation scheme presented significant problems for Irish health policy-makers in terms of correcting for the asymmetry in risk profiles between insurers that had developed in the market (see Section 3.5.1). The Minister for Health was particularly concerned that the absence of some form of risk equalisation was negatively impacting on incentives for insurers to treat older individuals. It was thought that, leaving the market as was could have had potentially resulted in 'massive increases in prices or reductions in benefits' for the elderly. The consequent 'collapse or erosion' of the principle of community rating would therefore result in the 'exclusion of older customers and customers who suffer ill health' (DOH, 2008). The solution was to introduce an interim scheme while a new, legally-valid, risk equalisation design was being developed. The Health Insurance (Miscellaneous Provisions) Act, 2009 provided for the administration of this interim arrangement based on a system of age-based tax credits. The Act provided for these measures to be in place for three years to allow time for a complete risk equalisation system to be developed. These measures were extended for a further year by the Health Insurance (Miscellaneous Provisions) Act 2011 before being replaced by a new robust risk equalisation system in 2013 (HIA, 2013b).

Interim scheme - age related tax credits

The new interim scheme was announced on the 19 November 2008 and came into effect on 1 January 2009. The scheme combined two measures designed to support the cost of health insurance for older people. First, an additional tax relief on health insurance premiums was introduced for people aged 50 and over and increasing for higher age groups (see, Table 3.4). This tax relief was deductible at source, meaning consumers only paid the net premium after the tax relief was applied to the gross premium set by the insurers. The value of the tax relief was then paid by the Revenue Commissioners to the insurers (DOH, 2008).

Secondly, in order to fund this additional tax relief, a new community rating stamp duty was introduced payable by insurers for each individual insured. Stamp duty for children was less than for adults reflecting the lower community rated premium they pay (Table 3.4). In contrast to the 2003 risk equalisation scheme, the interim scheme was prospective in nature. These measures were designed to be Exchequer neutral. That is, the income raised by the stamp duty and the tax relief payment to insurers were to be approximately equal. The increases in both the tax credits and the community rating stamp duty over time (see Table 3.4) reflected both the increased cost of benefits and changing composition of the insured.

TABLE 3.4: Interim system credits and community rating levy amounts for renewals, 2009-2013 (Q1)

Tax credits	**2009(€)**	**2010(€)**	**2011(€)**	**2012/2013 (Q1)(€)**
50-59	200	200	Nil	Nil
60-64	500	525	625	600
65-69	500	525	625	975
70-74	950	975	1,275	1,400
75-79	950	975	1,275	2,025
80-84	1,175	1,250	1,725	2,400
85+	1,175	1,250	1,725	2,700
Stamp duty	**2009(€)**	**2010(€)**	**2011(€)**	**2012/2013 (Q1)(€)**
Adult	160	185	205	285
Child	53	55	66	95

Source: HIA (2016a)

Armstrong (2010) pointed towards the ease of introduction of this form of risk equalisation as compared to the previous framework, and suggested it as a more straightforward alternative. It was also argued that this form of risk equalisation, introduced under the taxation system, was more difficult to challenge legally. Weighed against this, however, is that age alone is a poor predictor of health expenditure and therefore may be a less effective method of reducing risk selection incentives as compared with more traditional frameworks incorporating more robust adjusters for risk.

2013 risk equalisation scheme

On 27 May 2010, the Government announced plans to introduce a new robust risk equalisation scheme to support community rating in the Irish private health insurance market. As a first step, the HIA carried out a consultation process with stakeholders in the industry regarding implementation. The subsequent consultation paper, published in June 2010, highlighted the need for the introduction of an explicit health status adjuster in the new design. The HIA noted that,

> 'the full benefits for consumers of a community rated market will not be achieved in the absence of a robust risk equalisation system that sufficiently addresses health status differences as well as age and sex differences (HIA, 2010a, pg. 12).'

In terms of health status risk-adjusters the consultation paper focused on the potential inclusion of diagnostic related factors and/or resource usage factors (as a proxy for health status). With regard to diagnostic factors, mention was given to both specific medical diagnoses and diagnosis related groups (DRGs)[71]. Resource usage factors related to factors that were directly related to claims experience of insurers (e.g. hospital bed utilisation, pharmaceutical cost groups).

Insurers' responses to the consultation paper suggested a strong deviation in views between the incumbent insurer, VHI, and the newer market entrants. VHI claimed that activities in the market were focused on risk selection and segmentation. As a consequence, they highlighted the need for a robust risk equalisation mechanism for 'real and beneficial' competition to take place and to protect older members of society (VHI, 2010, pg. 10). Moreover, in terms of the introduction of a health status metric VHI saw a utilisation-based health status metric as implementable,

[71] DRGs group together cases which share common clinical attributes and similar patterns of resource use. Severity is measured through complication and co-morbidity (CC) weights given to all diagnoses (Government of Australia, 2008).

although they would favour one based on costs to account for treatment intensity and setting[72]. VHI also made the case for the introduction of a high-risk pool for seriously ill members through which their costs would be reimbursed separately, applicable for expenditures over €10,000/year.

In contrast, the newer entrants viewed the introduction of a risk equalisation scheme with more scepticism. Both Aviva (formerly VIVAS), and Quinn (now Laya) supported the existence of a community rated market. However, both insurers argued that the two-tier regulatory structure of the market (see Section 3.5.2) needed to be addressed before the introduction of a risk equalisation scheme (Aviva, 2010; Quinn Healthcare, 2010). Moreover, both insurers also raised concerns over the introduction of a health status metric if a risk equalisation design was to be introduced. Aviva argued that it was an 'unproven assertion' that within each age band VHI members were in poorer health (Aviva, 2010, pg. 3). Quinn, on the other hand, saw health status based adjusters, among other things, as potentially complicated and expensive to measure arguing it may not find market–wide acceptance. Quinn also promoted the idea that a shadow risk equalisation system, based on potential models, be trialled before implementation of a permanent risk equalisation system (Quinn Healthcare, 2010).

Following this consultation process, the new risk equalisation system was introduced on 1 January 2013. The new risk equalisation design differs from the interim system in a number of ways. First, risk equalisation credits are now payable from a fund operated by the HIA rather than in the form of tax credits. Second, although the fund is financed similarly to the interim scheme based on stamp duties that vary between children and adults, stamp duties also now vary between level of cover. Those with non-advanced contracts pay a lower stamp duty reflecting their lower expected claims costs. The stamp duty is payable by all open member insurers (through the Revenue Commissioner) to the risk equalisation fund. Finally, the risk equalisation fund reallocates out the proceeds of the stamp duty to

[72] It was acknowledged that the introduction of a diagnosis-based risk-adjuster (while advantageous), at the time, was complicated by a number of issues particularly scarcity of data, homogeneity of coding systems and complexity of calculation (VHI, 2010).

competing insurers in the form of risk equalisation credits. The payment flow design can be categorised along the lines of Modality B, as defined in Section 2.4.2.4 (see Figure 3.5). Moreover, any surpluses or deficits in the risk equalisation fund are carried forward and allowed for in setting future stamp duty rates. Risk equalisation credits differ based on age, sex, level of cover and on each night an insured person spends (privately) in hospital (HIA, 2013b).

- *Age* – Risk equalisation credits vary in five-year age bands from age 60 up to age 85 and for age 85 and above. Credit amounts increase along with age bands to reflect the higher average claims costs of older individuals (see Table 3.5). Within each age band, credits also differ by,
  - *Sex* - Credits differ by sex in order to reflect differences in average claims costs between males and females (at higher ages average claims costs for males significantly exceed those for females) (HIA, 2013b).
  - *Level of cover* - Credits also differ based on non-advanced/advanced cover level status. As described by HIA (2013b, pg. 12),

    > 'a contract is specified as providing for non-advanced cover if not more than 66% of the full cost for hospital charges in a private hospital or prescribed minimum benefits, if lower, is always provided.'

    All contracts that are not non-advanced are considered advanced contracts. Payments are higher for advanced level contracts to reflect the higher claims costs associated with higher benefit levels and/or accommodation cover.

- *Hospital bed utilisation credit* - Following the consultation process it was decided to adopt a utilisation-based health status metric. This took the form of a hospital bed utilisation credit which provides a fixed payment for each night *any* insured person spends in private hospital accommodation. This credit was justified on the grounds that responses to the consultation paper indicated a lack of support for the use of a complex diagnosis-based payment

(HIA, 2010b). Moreover, it was felt that there would be a large number of practical difficulties (e.g. large volume generation, data consistency issues, incentives relating to inpatient treatment) involved with the implementation of such a system. As a consequence, a more viable healthcare utilisation credit was adopted[73].

Insurers are required to submit returns to the HIA every six months providing data on the age, sex, healthcare claims and utilisation of insured persons, for a number of age/sex/level of cover cells (HIA, 2013b). These returns are analysed by the HIA and, if required, they can propose changes (through the Minister for Health) to the value of risk equalisation credits, which may be then changed in law (HIA, 2013b).

In order to claim risk equalisation payments, insurers submit claim forms to the HIA detailing total premium credit being claimed over the specified period. It is difficult to determine the scope insurers have for gaming this process. For instance, deliberately mis-classifying advanced/non-advanced cover status or deliberately over reporting on private hospital utilisation in an effort to claim higher returns. However, claim forms must be submitted by authorised signatories nominated by insurers. These individuals must confirm truthfulness and accuracy of the information submitted. Moreover, there is a requirement that detailed supporting information is retained and readily available for inspection in respect of claims (HIA, 2013b).

In an international context (see Table 2.2), the current risk equalisation scheme can be considered relatively basic as it does not reimburse insurers based on any diagnostic information. However, there has been renewed interest in the introduction of diagnostic-based payments in the Irish risk equalisation system. Since 2014, the DOH and HIA have commenced work in this area, looking at the development of a health status adjuster based on DRGs. It is suggested that such an adjuster

[73]The response to the Minister (HIA, 2010b) actually advised for the inclusion of a chronic disease flag as the health status-based risk-adjuster. However, concerns primarily over consistency of coding across insurers saw this replaced with the health utilisation credit (private correspondence with the HIA).

could be incorporated into the Irish risk equalisation design from 2016 onwards (DOH, 2014b). However, to date it is unclear exactly how these DRG payments will be formulated or how previous concerns over the feasibility and management of such a system will be allayed.

Figure 3.5: Irish risk equalisation payment flow.

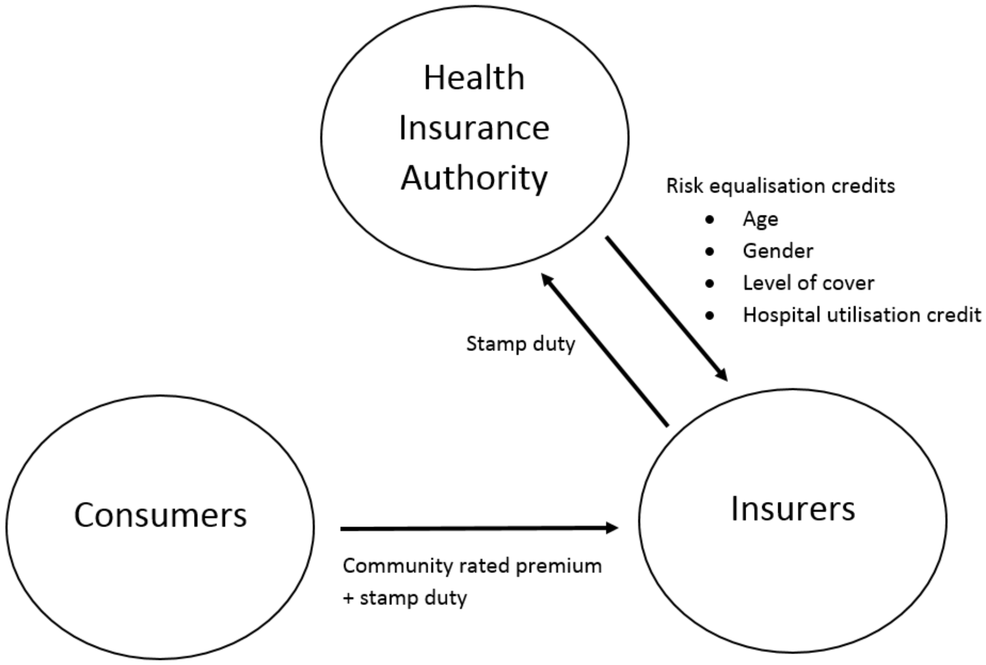


Table 3.5: Current risk equalisation credits and stamp duty

Age	**Non-Advanced (€)**[a]		**Advanced (€)**[a]	
	Male	Female	Male	Female
60-64	200	150	425	300
65-69	525	350	1,075	725
70-74	825	600	1,750	1,200
75-79	1,025	800	2,250	1,700
80-84	1,475	1,025	2,975	2,125
85+	1,750	1,125	3,725	2,475
Stamp duty	**Non-Advanced (€)**		**Advanced (€)**	
Under 18	80		135	
Over 18	240		399	

[a] A hospital bed utilisation payment of €90 is currently paid in respect of each night spent in private or semi-private accommodation by an insured person.

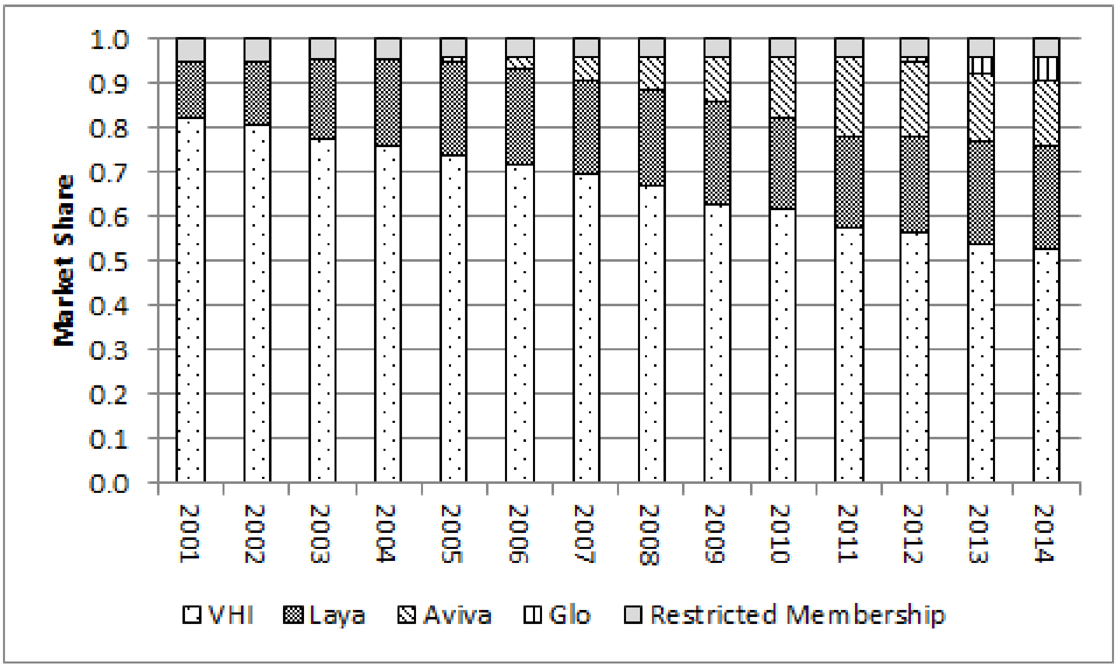
Source: Adapted from HIA (2016a).

3.5 Market structure

3.5.1 Market segmentation and risk selection

As noted, the Irish market currently consists of four competing insurers; VHI, Laya, Aviva and Glo. As seen in Figure 3.6, following liberalisation, VHI's market share has been consistently eroded, as would be expected, with increasing choice of insurer in the market. VHI is still the largest insurer in the market accounting for over half (52.8%) of market share, however this has fallen from approximately 82.2% in 2001. Laya is currently the next largest insurer (23.3%), followed by Aviva (14.7%) and Glo (5.0%), respectively.

FIGURE 3.6: Health insurance market shares, 2001-2014.



Source: Adapted from HIA (2014c).

A defining feature of the market is the high degree of risk segmentation that has developed. That is, not only did the introduction of liberalisation see a shift in consumers towards the newer insurers but this shift was not homogeneous in nature. Those contracting with the newer entrants tended to be younger than average, creating a situation whereby risk profiles between the incumbent and the newer entrants (firstly BUPA in 1997) began to diverge. The absence of risk equalisation, until recently, therefore meant that the newer entrants were in a position to charge lower community rated premiums, reflecting the relatively low-risk lives they insured (Turner and Shinnick, 2013). Dynamically, this created a situation whereby market segmentation was exacerbated as more mobile low-risk consumers continued to switch to, or contract with, the newer insurers who had the ability to, all else equal, offer lower community rated plan premiums. This resulted in competitive problems in the market as it created difficulties for VHI to compete on price. Furthermore, the principle of community rating was undermined as, although community rating was operating within plans, it was not operating across the market[74]. As the market evolved consumers contracted with the newer insurers were paying, on average, a lower community rated premium than those contracted with VHI (more likely to be higher than average risks).

Risk segmentation, in this context, is likely a function of a natural flow of younger and healthier consumers to the newer competitors due to the lower search and switching costs they face (as discussed in Section 2.3). However, the absence of risk equalisation can also create incentives for risk selection, which can exacerbate segmentation if some insurers are more successful in attracting low-risks (van de Ven, 2011).

Armstrong (2010) has outlined some ways in which insurers in the Irish market may have engaged in risk-selecting behaviour. Some insurers have targeted low-risks through advertising, marketing or designing products attractive to low-risks. In terms of the latter, possible risk selection can be identified through the strong growth in health insurance plans available in the market. As noted by Turner and Shinnick (2013), the number of health insurance products has increased from five in 1996 to eighteen in 2003, to over 100 in 2008. As of February 2015, this figure now stands a 378 plans (VHI=93, Laya=108, Aviva=133, Glo=44)[75]. Large price variations exist across plans given differences in level of hospital cover, benefits covered and inpatient/outpatient excesses. For example, as of February 2015, the lowest priced plan on the market for an adult was *Future Protect* (Laya) costing €495.00, while the most expensive was *Healthmanager Gold* (Laya) costing €6,320.42.

This increased product proliferation is used as a tool for risk segmentation. For instance, the HIA notes that all open membership insurers offer low cost products with reduced orthopaedic benefits in private hospitals, which few older consumers tend to purchase (HIA, 2014d). In addition, there has been a strong growth in products with high deductibles in recent years. Such products may be more

[74]As noted by Turner and Shinnick (2013), the only way in which community rating could operate across the market would be if each insurer has the same proportion of high-risks and low-risks as the market average.

[75]This information was extracted from the HIA plan comparison tool (http://www.hia.ie/ci/health-insurance-comparison) on 24 February 2015.

attractive to healthier individuals with a lower probability of claims expenditure. Armstrong (2010) argues that the most direct strategy used by insurers to attract better risks is by focusing on providing plans to employees of large multi-national corporations[76]. Employees tend to be relatively young and healthy, thus attractive to insurers. In addition, these plans are attractive to employees as insurers can offer discounts on these group schemes (see Section 3.4.1) and the cost of premiums is sometimes subsidised by the employer.

Moreover, newer insurers to the market may have had some advantages over VHI in pursuing low-risks. For example, newer insures tend not to have branch offices which may dissuade older individuals from contracting with them (Armstrong, 2010). In addition, VHI may find it comparatively difficult to compete on price, given its relatively worse risk profile. As a consequence, newer insurers have the ability to provide lower premium offerings than VHI in the expectation that this will encourage consumers to switch to their products. It is likely these switchers will be younger than average given their perceived higher price-sensitivity. Analysis of market price increases up to October 2006 has shown that when BUPA (now Laya) entered the market in 1997 it priced its products 10% lower than comparable VHI products. Subsequent price increases by BUPA were similar to VHI increases, thereby maintaining a 10% price differential (Competition Authority, 2007). Therefore, there is some evidence that rather than engaging in legitimate price competition, BUPA chose to follow a 'price-shadowing' strategy designed to attract low-risk individuals and to earn substantial profits. As noted by Turner and Shinnick (2013, pg. 218) (citing an internal HIA staff report),

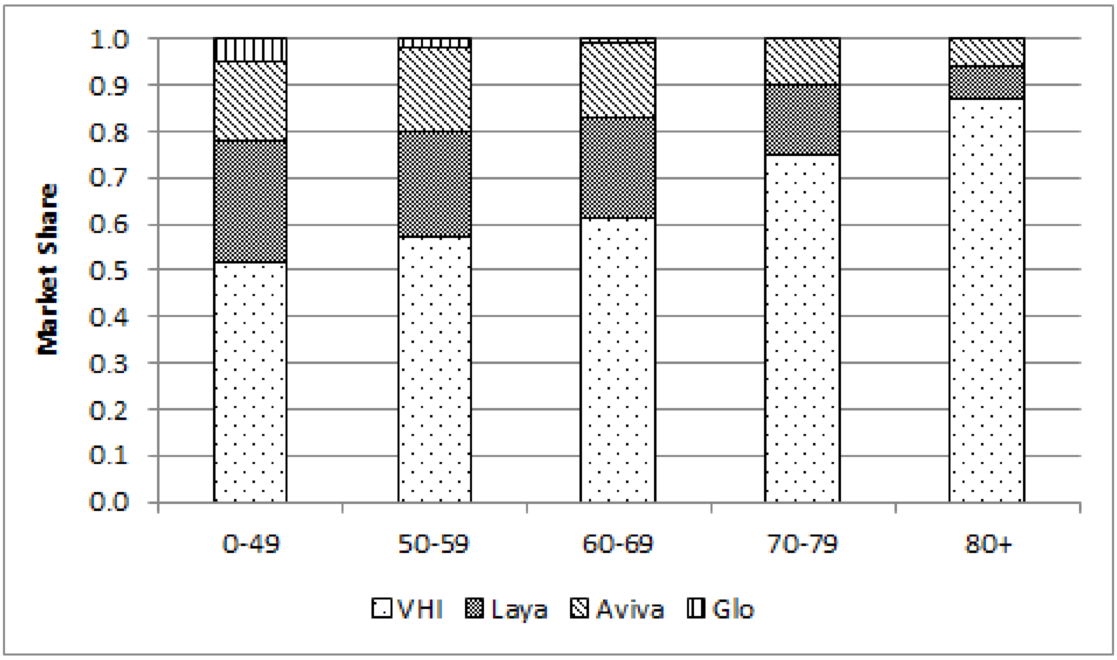
> 'BUPA Ireland appears content to follow the price increases of Vhi Healthcare and to continue making very large profits. This is at the ultimate expense of the Irish health insurance consumer'.

[76]Although, under open enrolment regulations, any individual is entitled to purchase these corporate plans.

Similar behaviour was also subsequently observed when VIVAS (now Aviva) entered the market in 2004, pricing its products below comparable VHI and BUPA products (Competition Authority, 2007).

Today strong risk segmentation is still observed between VHI and the newer market entrants. Looking at the age profile breakdown of the market by insurer, it can clearly be seen that the burden of insuring older individuals largely rests with VHI (Figure 3.7). For example, as of the end of 2013, 52% of those aged 0-49 were covered by VHI compared with 87% of those aged 80 and over. In this context, the introduction of age related tax-credits and subsequently risk equalisation were policy responses designed to balance the competitive landscape along with reducing incentives for risk selection. As would be expected given VHI's relatively worse risk profile, it is a net beneficiary of risk equalisation payment flows, while the other market insurers are net contributors (see Table 3.6). However, whether the current risk equalisation design is effective in terms of its ability to address market segmentation and/or risk selection is not something well understood to date. In an international context, the current design can be considered relatively basic given the lack of diagnostic information used to calculate payments. Moreover, as noted by HIA (2015e, pg. 4), 'In the last year, insurers have continued to adopt strategies to segment and select business with lower claims costs...' suggesting that adopting risk selection strategies is still a profitable pursuit. A similar observation was also made in 2014 (HIA, 2014d).

FIGURE 3.7: Health insurance market shares by age, 2013.



Source: Adapted from HIA (2014c).

TABLE 3.6: Financial impact of risk equalisation transfers for 12 months to end December 2013.

Insurer	**Risk equalisation impact, €m[a, b]**
Aviva	(31.0)
Laya	(47.1)
Glo	(9.2)
Quinn[c]	(3.9)
VHI	68.5

[a] Figures in parenthesis indicate net contributions to the Fund.

[b] Although the overall net financial impact is €22.7m, this does not indicate a surplus on the risk equalisation fund as the impact relates to both the interim scheme and the risk equalisation scheme.

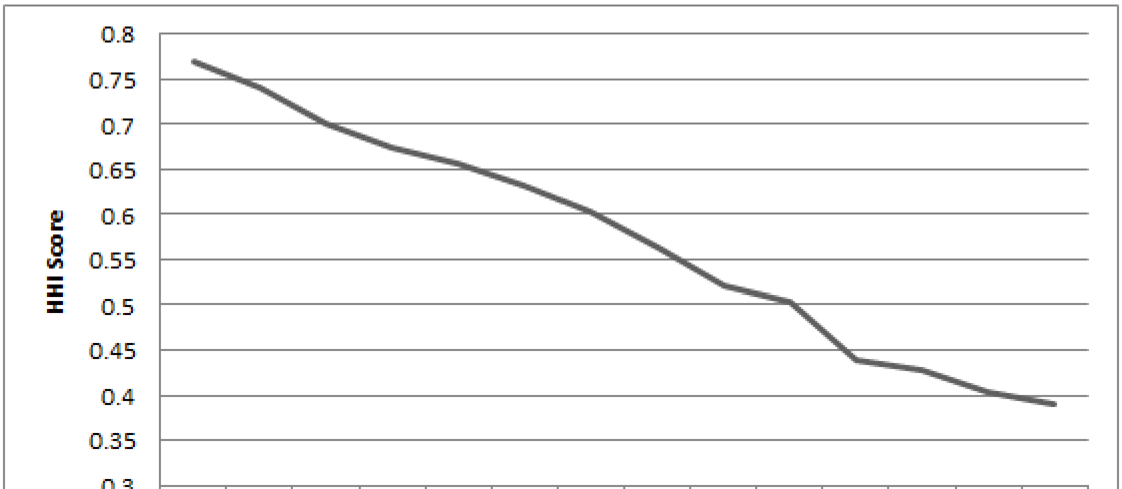
[c] Quinn ceased writing new business from 1 May 2012. At time of their renewal dates, customers were invited to renew contracts with Laya.

Source: HIA (2014d).

3.5.2 Market concentration

As described in Section 2.5, market concentration can be used to give an indication of market competitiveness. Given the staggered evolution of the Irish market from a monopolistic base and the slow erosion of VHI's dominant position identified above (Figure 3.6), liberalisation inherently resulted in an increased competitive environment. This is reflected in the Herfindahl-Hirschman Index (HHI) scores[77] calculated for the market over the last number of years, in Figure 3.8. Although still heavily concentrated, there has been a continual fall in the level of concentration within the market[78]. An important question, therefore, is whether scope exists for the Irish market to become more competitive. Important considerations in this regard are understanding barriers to market entry/exit and economies of scale and scope, that exist in the market.

FIGURE 3.8: Herfindahl-Hirschman Index, 2001-2014.



	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
HHI	0.77	0.74	0.7	0.67	0.66	0.63	0.6	0.56	0.52	0.5	0.44	0.43	0.4	0.39

Source: Adapted from HIA (2014c).

[77]The HHI is the most common of measure of market concentration. It is calculated as $H = \sum_{i=1}^{n} s_i^2$ where s_i is the market share of the i^{th} firm and n is the number of firms. A H of below 0.01 (or 100) indicates a highly competitive market, while a H above 0.25 or (2,500) indicates high concentration.

[78]This contrasts with evidence from Section 2.5.2 which suggested that health insurance markets internationally tend to be characterised by consolidation and concentration.

Barriers to entry

As described above, following liberalisation there has been a gradual increase in the number of competing insurers in the Irish market. An interesting question is therefore whether there is scope for more insurers to enter the market. While no benchmark exists for the ideal number of health insurers in a market (Mikkers and Ryan, 2014), understanding the barriers to entry that exist may provide some insights into the potential for additional insurer entry. Markets, all else equal, with lower barriers to entry will likely contain more competing insurers and consequently create a better environment for consumer mobility and competition. In this context, previous consultation with potential market entrants have identified two particular areas that have, historically, made entrance to the market unattractive (Competition Authority, 2007). These relate to market uncertainty and VHI's dominant market position.

In terms of the former, the Irish health insurance market has historically been characterised by strong uncertainty, which increases barriers to entry. Prior to its implementation in 2013, ambiguity had existed in terms of whether risk equalisation would be implemented at all, and if so, what form it would take. On the one hand, greater clarity and certainty around risk equalisation is beneficial for future market entrants as they can factor in the effect it may have on future expected profits when weighing up the costs and benefits of market entry. However, it is most likely the case that the commencement of risk equalisation payments will have reduced the attractiveness of market entry for many potential competitors. The fact that newer market entrants tend to attract a relatively low risk profile as compared to more established insurers suggests that upon market entry they will be net contributors to the system. Moreover, the new risk equalisation design does not offer any exemptions on contributions, nor phased introduction to contributions, as did the 2003 risk equalisation design (for which actual contributions never took place, see Section 3.4.3). This may further negatively impact on attractiveness of entry for potential insurers.

Additional uncertainty in the market has historically existed over the heterogeneity in regulatory requirements between the incumbent VHI and the newer entrants, and whether recommendations (e.g. by the Competition Authority (2007)) to bring all market competitors under the same regulatory umbrella would take place. Specifically, following market liberalisation VHI had been exempt from regulation by the Financial Regulator. This bestowed particular competitive advantages on VHI relative to its competitors. Particularly, this meant VHI did not need to divert capital into maintaining solvency rates. As noted by the Competition Authority (2007), this permitted VHI to run down reserve levels to minimise price increases, if so desired - an option not available to VHI's competitors[79]. A resolution to this issue was reached when the European Court of Justice ruled in November 2011 that VHI must seek what is known as 'authorisation' from the Central Bank to bring it under the same regulatory regime as the other market insurers. Although this was to be achieved by 31 December 2013 (VHI, 2012a), delays meant that authorisation was not sought until May 2014 (RTE News, 2014) with authorisation finally completed in July 2015 (DOH, 2015d). Clarity over this issue as well as homogeneous regulation of all insurers can be thought to have had a positive effect on attractiveness of market entry.

Similarly, until very recently, health financing reform plans, designed to expand the role of private health insurance, created uncertainties in the market as regards its future size (the details of these reforms are discussed in Section 3.6). First, original plans to begin a phased introduction of universal health insurance by 2016 (DOH, 2014a) were pushed back to 2019. There was then concern expressed by the Minister that original designs for universal health insurance, as outlined in the White Paper (DOH, 2014a), may not have been optimal. This raised the possibility of major reconsideration, both in terms of level of benefits covered and the competing insurer funding model proposed (Wall, 2015). Over this period, many potential entrants may have found it prudent to take a 'wait and see' approach to market entry, until such a time that these exact nature of reforms were defined.

In this regard, very recently, it appears that much of this uncertainty has been

[79] A solvency margin level of 40% is required by the Financial Regulator (Competition Authority, 2007).

resolved. As noted in Section 1.1, it now appears plans for universal health insurance reform, as proposed, have been rejected outright following the publication of recent costing reports (Wren, Connolly, and Cunningham, 2015; KPMG, 2015). However, it does appear that the Government is still keen on pursuing significant financing reform to abolish the current two-tier system of healthcare. Little as yet is known about the direction this will take. Therefore, although a competitive mandatory health insurance market is now unlikely, some residual uncertainty may still exist as to the impact future financing reforms may have on the private health insurance market.

In addition to a favourable regulatory regime, VHI has also traditionally benefited from a 'first mover advantage' which may have dissuaded potential entrants from joining the market (Competition Authority, 2007; YHEC, 2003). As noted by the Competition Authority (2007), VHI as a former state monopoly insurer has, in essence, had a forty-year head start on its competitors in developing a strong brand presence in the health insurance market. While costs of advertising and marketing are unavoidable sunk costs in entering a new market, potential new entrants to the Irish health insurance market may have traditionally faced the prospect of spending considerable sums in establishing their own brand identity in a market where the incumbent is synonymous with the provision of health insurance. Relatedly, health insurance can be viewed as an 'experience good', meaning that its characteristics as a product can only be assessed following purchase and upon use (Competition Authority, 2007; YHEC, 2003). If a trusted provider of health insurance already exists, then consumers may be less likely to risk switching to a competing brand. Such a dynamic may also have raised barriers to potential entry. Other potential barriers discussed in relation to VHI's 'first mover advantage' include VHI's salary deduction mechanism for paying PHI premiums and 1996 minimum benefit regulations being based on VHI product design (Competition Authority, 2007).

However, VHI's 'first mover advantage' is likely to have been eroded substantially since its previous emphasis by market commentators (Competition Authority, 2007). Although no evidence exists on consumers' understanding of brand identities within the market, competition has been in place for close to 20 years and in that space of time VHI's market share, although still substantial, has fallen significantly with the introduction of additional competitors. Both new and existing consumers of health insurance therefore appear ever more cognisant of alternative insurance brands and are willing to insure with them (weakening the 'experience good' argument). As a consequence, one can make a strong case that VHI's identity as an unrivalled provider of heath insurance has diminished, and with it a potential significant barrier to market entry.

Barriers to exit

Much less discussion has taken place on the impact of barriers to exit in the market, which may also impact on the number of market insurers. YHEC (2003) argue that the main determinant of exit costs relate to necessity for large investments in market-specific assets. This does not appear to be a substantial requirement in the Irish market. For example, internet and call centre operations could easily be extended by insurers operating in other jurisdictions, while similar facilities and relevantly-trained staff could be acquired from similar service sectors in Ireland. Furthermore, health insurance contracts in Ireland are one-year which permits insurers to exit the market with relatively little notice (YHEC, 2003). In this context, BUPA was able to exit the Irish market fairly seamlessly in 2007, handing over its consumer portfolio to Quinn.

Less tangible exit costs, however, may relate to the reputational damage done to a company from exiting the market. This might be particularly acute if a health insurer operates in other services sectors within the country. For example, the Aviva Group in Ireland provides car, home, health and travel insurance. Exiting the health insurance market may create negative reputational spillover effects into other product lines.

Economies of scale and scope

Little evidence exists of economies of scale or scope in the Irish market and suggestions of any have tended to be speculative. For example, while YHEC (2003) have previously considered the potential for VHI to benefit from some economies of scale in terms of administrative or overhead costs, it is unclear if such efficiencies exist. Moreover, it has also been suggested that given its size VHI may be able to negotiate favourable rates with private hospital providers. However, competitors have largely replicated the terms and conditions agreed by VHI with private medical providers (Competition Authority, 2007). Besides, as the market has matured VHI would have faced difficulty consolidating any buyer power given their declining market share.

Similarly, little analysis of the presence of economies of scope in the market has taken place. However, one could speculate again that efficiencies may exist for insurers who sell non-health insurance products in Ireland or who have health insurance businesses in other jurisdictions[80]. However, this has not been examined empirically.

3.6 Health system reforms and universal health insurance

Following election into Government in 2011, Fine Gael (in coalition with Labour) set about plans to radically reform the Irish health system along lines outlined in their pre-election manifesto (Reilly, 2009). These reforms proposed the introduction of a 'managed competition' framework, predicated on the Dutch model (Reilly, 2009; DOH, 2014a). The fundamental objective of these reforms was to end the current 'two-tier' public and private provision of health services and replace it with provision based on need, not ability to pay (DOH, 2014a).

These reforms were to be based on three major, overlapping stages. The first step involves the staggered removal of out-of-pocket payments for GP services, building towards a system of free GP services for all. As discussed in Section 3.2.2, progress is under way in this regard with the recent introduction of free primary care services for those aged under 6 and those aged over 70.

[80] For example, Aviva sells non-health and health insurance products in both Ireland and the UK.

Secondly, a purchaser/provider split is to be established. This step involves the abolition of the HSE and its replacement with separate purchaser and provider entities. In this context, the state purchasing of health services would be the responsibility of a newly formed Healthcare Commissioning Agency, while provision of care would fall on new primary and community care structures and independent hospital trusts (DOH, 2014a). Hospital 'groups' are currently being established in a transition towards independent hospital trusts (Higgins, 2013). Relatedly, there will be a move towards a system of activity-based financing ('money follows the patient'), predicated on DRGs. Some progress has also been made in this regard. For example, since January 2014, the National Casemix Programme and the Health Research and Information Division at the ESRI have been amalgamated into a new National Pricing Office[81].

The final, and most pervasive step was to be the introduction of universal health insurance (UHI), predicated on managed competition, between 2016 and 2019. As described in Section 3.5.2, it now appears that these plans have been abandoned. However, an overview of this proposed reform is presented below. Particularly, it provides background for a discussion on the appropriateness of expanding competitive health insurance in Ireland, provided in Section 8.4.

As proposed, UHI reform was to involve all individuals being required to purchase a health insurance policy for a standard package of health services from a choice of competing insurers. The current design of this benefit package was not finalised, however it was envisioned to encompass both primary and acute services (including acute mental health services). The inclusion of pharmaceuticals (subject to co-payments) as part of standard package, or through alternative separate eligibility (replacing the General Medical and Drug Payment Schemes) was also to be considered.

In contrast to current health insurance products which differ based on the setting in which care takes place (i.e. public or private), no such distinction was to be part of the UHI package. Individuals, would however, have the option of purchasing

[81]It is important to realise that universal GP and healthcare provider purchasing reform can happen independently of the need for universal health insurance.

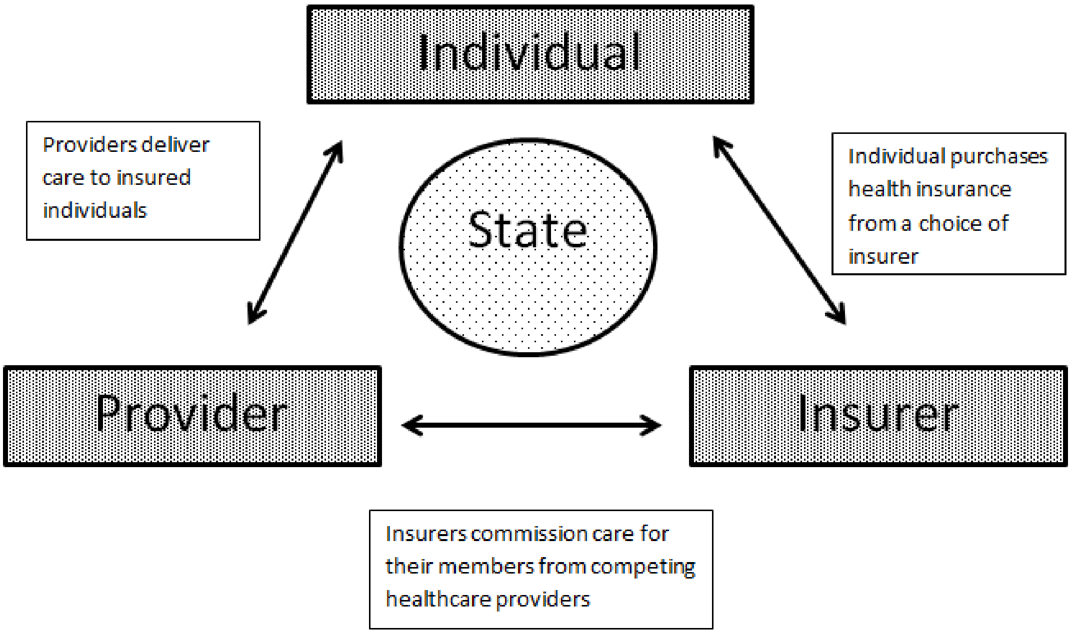
supplementary health insurance. This would cover healthcare services not included in the standard package (e.g. cosmetic surgery or alternative therapies) and non-health related services, such as a room with a satellite TV.

Regulation of the standard health insurance package was to be predicated on the regulatory pillars currently in place in the voluntary health insurance market; community rating, open enrolment and lifetime cover and risk equalisation. Supplementary health insurance, in contrast, would be risk rated yet still subject to open enrolment and lifetime cover regulations. Consumers would still have the option to switch insurer annually. Importantly, insurers would not be able to sell faster access to treatment as part of either standard or supplementary insurance.

Health insurance, under these arrangements, would be predominantly funded through individuals purchasing insurance from a choice of competing insurers. However, the government would subsidise premiums by providing financial supports towards the costs of premiums and by directly funding certain UHI services (e.g. emergency care). The State would also provide direct funds for other services not included under standard insurance (e.g. home help). Supplementary care would be entirely privately financed (DOH, 2014a). Health insurers would also, ultimately, be responsible for negotiating the purchase of health services, covered by the UHI package, from competing providers.

The dynamics of this system are presented graphically in Figure 3.9.

FIGURE 3.9: Overview of the Universal Health Insurance model.



Source: Adapted from DOH (2014a).

3.7 Summary

The private health insurance market plays an important yet contentious role in the Irish health system. Although accounting for a relatively small proportion of healthcare expenditure, slightly less than half the population purchase insurance. Among the main drivers for doing so relate to the high cost of private treatment combined with concerns over the quality and access to publicly funded hospital care. However, the unique 'two-tier' public/private provision of hospital services has raised a number of equity concerns. Those with insurance, generally the healthier and wealthier (due to advantageous selection), receive faster access to hospital services often at the expense of public patients. These inequalities are exacerbated by incentives to treat private patients in public hospitals ahead of those publicly funded. In addition, the State encourages the use of private healthcare through explicit and implicit subsidises. State subsidisation of private healthcare is justified, primarily, on grounds that it helps maintain access to health services and therefore plays an important social role, although subsidisation has been unwinding slightly in recent years.

Since its inception the health insurance market has been heavily regulated in terms of community rating (now lifetime community rating), open enrolment, lifetime cover and minimum benefits. The market was liberalised in the mid-1990s as a result of EU mandate and is currently populated by four competing insurers of which the incumbent VHI is still the largest with over half of market share. Ostensibly, the market has become somewhat more competitive as concentration levels have fallen along with increased insurer entry, although concentration ratios remain high. Although, an erosion of VHI's first mover advantage and, particularly recently, less market uncertainty perhaps pave the way for additional insurer entry.

Notably, the market evolved under community rating but, largely, in the absence of a system of risk-adjusted subsidy payments to insurers. This is considered to have distorted competitiveness and has raised concerns over market sustainability. Particularly, the flow of low-risk consumers to the newer market entrants resulted in strong market segmentation. This created problems as it made it difficult for VHI to compete on price and undermined community rating. While market segmentation may occur 'naturally', simply because low-risk groups experience lower search and switching costs, it is likely segmentation was exacerbated by risk selection. In this regard, an interim tax-credit scheme was belatedly introduced in 2009 and replaced by a bona-fide risk equalisation system in 2013 to address these issues.

Despite the prominent role market segmentation, risk selection, and risk equalisation have played in the evolution of the market to date, and the concerns these issues have raised over sustainability and competitiveness, there is still much that it is not known about consumer mobility dynamics. Important questions remain over the level and distribution of search and switching costs and relatedly, over the plan and consumer characteristics that are associated with actual switching behaviour. Furthermore, there is a lack of analysis on how well the recently introduced risk equalisation design has been able to address issues of market segmentation and risk selection. An understanding of these issues is particularly important and timely given the recent debate over the feasibility of expanding the role insurer competition plays in the Irish healthcare system.

In this context, the next chapter outlines the empirical strategies adopted to provide answers to these questions, which are addressed in Chapters 5, 6 and 7.

Chapter 4

Overview of data and methods

4.1 Introduction

The focus of this chapter is to provide a broad overview of the data sources and empirical strategies adopted in Chapters 5, 6 and 7 of this thesis. The nature of the empirical inquiries required access to a range of alternative quantitative data sources. The process of accessing these data and their characteristics are outlined in Section 4.2. Sections 4.3 and 4.4 provide an overview of, and arguments for, the main statistical methods employed in modelling switching behaviour (Chapters 5 and 6) and healthcare expenditure in the context of risk equalisation (Chapter 7). Section 4.5 summarises the content of the chapter. It is important to realise that this chapter is designed as an overview to familiarise the reader with the data and empirical methods employed later in this study. More detailed descriptions of data sources and statistical approaches are subsequently presented as part of their respective empirical analyses.

4.2 Data sources

In order to empirically investigate the research questions posed in this thesis, quantitative data needed to be collected from a number of sources, see Table 4.1.

Table 4.1: Empirical studies, data and methods overview.

Study	**Chap.**	**Description**	**Data**	**Main empirical methods**
1	5	Examines the factors that consumers see as encouraging and discouraging switching as well as whether differences exist between groups in terms of socio-economic and health characteristics	• 2010, 2012, 2014 HIA consumer surveys (N=4,037). See Section 4.2	Differences between groups assessed by logistic regression analysis. Average Marginal Effects (AME) reported. See Section 4.3.3
2	6	Models actual switching behaviour in terms of plan and consumer characteristics	• VHI consumer attrition data (N=320,830) • HIA quarterly market premium data • HIA data on tax, risk equalisation credits and levies See Section 4.2	Switching behaviour modelled through logistic regression analysis. AMEs reported. See Section 4.3.3
3	7	Assesses risk equalisation performance through ability to predict health expenditures	• VHI claims expenditure data (N=1,235,922). See Section 4.2	Risk equalisation performance modelled through Ordinary Least Squares (OLS). See Section 4.4

Three principal data sets were utilised, one for each empirical study conducted. Chapter 5 utilises raw data from three waves (2010 [N=1,002], 2012 [N=1,011] and 2014 [N=2,024]) of *Consumer Surveys* conducted on behalf of the HIA (HIA, 2010c; HIA, 2012; HIA, 2014e). Responses were collected from a sample of the adult national population, with quotas set around age, sex, social class and region. Data were also weighted to reflect the national population. These raw data are not publicly available and were provided exclusively to me, upon request, by the HIA.

Written requests were also sent to all commercial insurers in the market seeking access to their administrative data. However, all insurers, apart from VHI, declined this request citing reasons of commercial sensitivity. Access to VHI data was granted under strict conditions. Firstly, a VHI Code of Confidentiality form was required to be signed. Secondly, all statistical analysis was required to be performed in-house at VHI offices. A user account was created for me along with provision of a desk and computer. Finally, removal of aggregated results (which did not permit identification of individual members), via an external storage device, was permitted under strict supervision of IT security. Two alternative VHI administrative databases were provided to me, which were utilised, respectively, for empirical analysis conducted in Chapters 6 and 7. Both administrative datasets had been utilised in-house for separate research projects and had been cleaned and validated prior to access.

In Chapter 6, analysis is predicated on *VHI consumer attrition data.* This relates to 320,830 policy-level observations collected between July 2013 and June 2014 on policyholders who either, at the time of their renewal decision, renewed their contract with VHI or switched away from VHI to a competitor. Chapter 6 also utilises supplementary data provided by the HIA. This related to quarterly market premium data and numbers insured, which was obtained upon request from the HIA. Moreover, publicly available data on tax credits, risk equalisation credits and community rating levies were obtained from the HIA website.

In Chapter 7 analysis is based on *VHI claims expenditure data.* This data relates to claims expenditure data collected for all 1,235,922 VHI members insured between 2010 and 2012.

To avoid unnecessary overlap, a more detailed description of all data sources is provided as part of their respective empirical analyses.

4.2.1 Ethical approval

Ethical approval for secondary data analysis was requested in June 2014 and granted by the Centre for Health Policy and Management/Centre for Global Health Research Ethics Committee in August 2014.

4.2.2 Strengths and limitations

As noted in Chapter 1 much quantitative research on competition in the Irish health insurance market has been constrained due to lack of available data. Therefore the major benefit of the uniquely acquired data sources used as part of this thesis is that they allow for the specification and examination of a number of important and timely empirical questions, that to date, have not been possible. However, it is also worthwhile to consider the specific nature of data, both administrative (VHI) and survey-based (HIA), used in this thesis, as both forms have strengths and limitations for research (Jones, 2010; Kane and Radosevich, 2011).

Administrative data are beneficial in that they often contain very large numbers of observations on entire populations and are less affected by reporting bias (a type of measurement bias) than survey-based samples. However, as they are generally collected for purposes other than research they may not contain all variables of interest to the researcher (Jones, 2010). In this context, it is important to be cognisant that missing variables may introduce an alternative form of bias, omitted variable bias, in statistical estimation. This is discussed as a potential limitation (see Section 6.4.1) to the analysis conducted in Chapter 6.

An additional limitation of VHI administrative data is that they are not market-wide and consequently this raises questions over the generalisability of findings. This issue may be particularly pertinent in the context of this research as VHI does have a worse risk profile than the other insurers (Armstrong, 2010)[82]. However, that said, VHI insures over half the market and has access to arguably the richest set of data of all commercial insurers.

HIA survey data, on the other hand, are collected from a representative sample of the national population and, as a result, confidence can be placed in any generalisations made to the population level. This is important as it helps place the findings from Chapters 6 and 7 in broader perspective. While survey samples by their nature contain sampling error (i.e. the error caused by observing a sample

[82] For instance see Table 3.7.

rather than the population) this error is minimised as far as possible through the pooling of surveys in Chapter 5 (see Table 5.1). Survey data may also be prone to measurement error (that is, the difference between the measured value of a variable and its true value) which is another factor to be mindful of when interpreting results.

4.3 Modelling binary outcomes

A central aspect of the empirical research conducted in this thesis is modelling binary outcomes. In Chapter 5 emphasis is placed on predicting consumer responses (0=no, 1=yes) and switching behaviour (0=no switch, 1=switch) based on a set of socio-demographic and health characteristics (see Table 4.1). In Chapter 6 switching behaviour is modelled based on a number of plan and consumer characteristics. In this context, the purpose of this section is to review common statistical approaches to modelling binary outcomes and interpreting estimated effects. This is done with a view towards justifying the main statistical approaches adopted in Chapters 5 and 6.

4.3.1 Linear Probability Model

The expected value of a binary dependant variable y, conditional on a row vector of independent regressors, $\mathbf{x}(x_1, x_2, \ldots, x_k)$, can be specified as follows,

$$E(y|\mathbf{x}) = P(y = 1|\mathbf{x}) = g(\mathbf{x}) \tag{4.1}$$

The most straightforward option is to specify $g(\mathbf{x})$ as a standard linear function (i.e. the identity link), giving the linear probability model (LPM). This approach has advantages in that LPMs are easy to estimate and interpret (Wooldridge, 2009). However, they have a number of drawbacks. Firstly, LPMs violate the

Gauss-Markov[83] assumption of homoscedastic error variance (unless all slope parameters equal zero). Although this issue can be quite easily corrected through calculating heteroscedasticity robust standard errors (for example, see Wooldridge (2009)), a more serious problem is that the predicted probability values (i.e. expected values of the outcome variable) are unbounded. That is, they can take on values less than zero or greater than one, creating a problem of 'logical inconsistency' (Jones, 2000, pg. 275). Furthermore, the LPM does not allow for diminishing marginal effects, which would be expected when estimating probabilities (Wooldridge, 2009). For these reasons, the LPM is generally becoming less used 'except as a basis for comparison to some other more appropriate models' [pg. 666] (Greene, 2003).

4.3.2 Logistic regression

In the context of 'more appropriate models', non-linear specifications are normally considered. Non-linear specifications of $g(\mathbf{x})$ avoid issues such as unbounded and constant probabilities associated with LPMs. In this context, the most frequently applied model to analysing such binary outcomes is the logit model (Hosmer, Lemeshow, and Sturdivant, 2000)[84]. As such, the logit model is the main statistical approach employed for analysing binary outcomes in Chapters 5 and 6. Moreover, the binary logit model has also traditionally been a popular empirical approach in the analysis of consumer switching in health insurance markets (for example see, (Barry et al., 2008; Cutler, Lincoln, and Zeckhauser, 2010; de Jong, van den Brink-Muinen, and Groenewegen, 2008; Dormont, Geoffard, and Lamiraud, 2009; McDevitt et al., 2014; Mosca and Schut-Welkzijn, 2008; Naessens et al., 2008; Ng

[83]Gauss-Markov assumptions are a set of conditions required for OLS to be considered the best linear unbiased estimating process (BLUE) (Wooldridge, 2009).

[84] The probit link is sometimes used in preference to the logit link function. Both approaches are very similar. They differ only in terms of distributional assumptions. Probit models assume a standard normal cumulative distribution, rather than a standard logistic function. As a consequence, logit models have slightly heavier tails (Greene, 2003). It is difficult to justify choice of one distribution over the other on theoretical grounds and in most applications the choice between these two does not make a material difference (Greene, 2003).

et al., 2007; Reitsma-van Rooijen, de Jong, and Rijken, 2011; Schlesinger, Druss, and Thomas, 1999; Shmueli, Bendelac, and Achdut, 2007))[85].

In this context, the logit link function is used to formulate the relationship between the dichotomous response and its predictor variables. That is,

$$g(\mathbf{x}) = log(\frac{\pi(\mathbf{x})}{1-\pi(\mathbf{x})}) = \alpha + \boldsymbol{\beta}\mathbf{x} \tag{4.2}$$

Where α is a constant term and $\boldsymbol{\beta}$ is column vector of parameters. $\pi(\mathbf{x})$ is the conditional expectation of the outcome variable $E(y|\mathbf{x})$ (i.e. the probability of the event of interest occurring) and can be defined as the cumulative distribution function of the standard logistic random variable,

$$\pi(\mathbf{x}) = \frac{e^{g(\mathbf{x})}}{1+e^{g(\mathbf{x})}} \tag{4.3}$$

Unknown parameters $\boldsymbol{\beta}$ are estimated by means of maximum likelihood to yield their estimators $\widehat{\boldsymbol{\beta}}$.

4.3.3 Interpretation of effects

Logit specifications calculate coefficients in terms of logged odds ratios. They measure the logged-odds of the outcome occurring (holding all other effects constant) and therefore are not directly meaningful. As such, the two most common alternative approaches for reporting effects are in terms of odds ratios or marginal effects.

Odds ratios represent the exponentiated value of the logit coefficients and therefore represent a more meaningful interpretation of coefficient effects. Odds are defined

[85] It is important to note that statistical modelling of consumer choice in health insurance markets has alternatively been performed using McFadden's conditional logit model (McFadden, 1974). A benefit of this approach is that price-responses can be easily expressed as elasticities (for more information see Dowd and Feldman (2012)). Unfortunately, this approach generally requires information on alternative plan choices of different insurers and therefore was not a feasible modelling approach to apply.

as the probability of an event occurring divided by the probability of the event not occurring. That is,

$$Odds = \frac{\pi(\mathbf{x})}{1 - \pi(\mathbf{x})} \tag{4.4}$$

Odds ratios, in this context, measure the odds of an outcome occurring relative to not occurring for a one-unit change in an explanatory variable. As noted by Norton, Wang, and Ai (2004), despite being conceptually difficult to understand, arguments in favour of odds ratios generally relate to ease of calculation (as noted, they are simply the exponentiated value of the logit coefficient) and for small probabilities the odds ratio is a good approximation of more intuitive risk ratios[86].

In contrast effects can also be interpreted in terms of probabilities or marginal effects. Marginal effects in binary choice models represent the predicted change in probability associated with a change in the explanatory variable of interest. However, given the non-linear nature of logit models, marginal effects are not constant across observations. This can be seen by differentiating equation (4.3) showing that the marginal effect of x_j on $\pi(\mathbf{x})$ depends on all x through $g(\boldsymbol{\beta}\mathbf{x})$.

$$\frac{\partial \pi(\mathbf{x})}{\partial x_j} = g\prime(\boldsymbol{\beta}\mathbf{x})\beta_j \tag{4.5}$$

In order to understand these marginal effects at a regression level some kind of summary statistic needs to be calculated. One common approach, in this context, is to take the marginal effect for each observation and calculate the sample average effect, known as the average marginal effect (AME) (Greene, 2003)[87],

$$\frac{1}{n}\sum_{i=1}^{n} g\prime(\boldsymbol{\beta}\mathbf{x})\beta_j \tag{4.6}$$

[86] Risk ratios are defined as the ratio of two probabilities.

[87] An alternative approach is to evaluate the marginal effects at the sample means of the data, known as marginal effects at means (MEM). Current practice favours the AME approach, however, for large sample sizes, both algorithms will yield very similar results (Greene, 2003).

Logistic regression effects reported in this thesis are primarily calculated in terms of AMEs. For one reason, effects interpreted in terms of probabilities tend to be conceptually easier to understand that odds. However, perhaps more importantly, the odds ratio interpretation of logit coefficients cannot be used when estimating interaction effects between variables (Norton, Wang, and Ai, 2004)[88], which is an important part of the empirical analysis conducted in Chapter 6.

4.4 Risk equalisation modelling

The final empirical analysis of this thesis, conducted in Chapter 7, is concerned with estimating and analysing risk equalisation models. Risk equalisation is concerned with calculating payments for enrolees to reduce incentives for insurers to risk select profitable consumers. The conventional approach to risk equalisation focuses on calculation of expected costs, or weights, for pre-specified risk-adjusters that pay insurance providers as close as possible to the amount the consumer is expected to cost (Glazer and McGuire, 2012)[89]. In practice, these weights are generally calculated in terms of average costs per risk group by one of two methods.

As noted by Schokkaert and Van de Voorde (2004) many countries base payments for different risk-adjusters on simple cell means which are defined based on a set of discrete values such as age and sex. For more sophisticated risk equalisation designs, however, payments are calculated based on a claims expenditure function where coefficient estimates represent weighted average expenditures. The most common empirical approach is to estimate this claims expenditure function by means of Ordinary Least Squares (OLS) (van de Ven and Ellis, 2000). This approach is discussed in Section 4.4.1. However, distributional issues mean modelling claims expenditure may not be straightforward. These issues along with alternative approaches to modelling claims expenditure are discussed in Section 4.4.2.

[88]Problems also arise when interpreting interaction effects in non-linear models in terms of marginal effects, however, this can be remedied. This issue is discussed in detail in Section 6.2.

[89]Although other approaches, not based on expected-cost calculation, have also been discussed in the literature, see Section 4.4.5.

Section 4.4.3 then outlines arguments in favour of standard OLS estimation in the context of risk equalisation.

4.4.1 Standard OLS estimation

As noted above, the standard approach to empirically modelling risk equalisation is through OLS. This involves estimating healthcare expenditures y by means of an additive linear function $f(\mathbf{x})$, where,

$$E(y/\mathbf{x}) = f(\mathbf{x}) = \beta_0 + \beta_1 X_1 + ... + \beta_k X_k \tag{4.7}$$

and X represents a set of k predetermined risk-adjusters included in risk equalisation models. As described in Section 2.4.2.4, standard risk- adjusters include socio-economic variables such as age and sex. And while they are easy to collect and monitor, they tend to be poor predictors of claims expenditure variation. More sophisticated models incorporate risk-adjusters based on health status, normally represented in terms of diagnostic information.

The β are the coefficients associated with each defined risk group. OLS calculates these coefficient values through minimising the sum of squared deviations between observed and predicted values. That is,

$$min \sum_{i=1}^{n} (y_i - f(\mathbf{x}))^2 \tag{4.8}$$

These coefficient values can be interpreted as weights, or average costs per defined risk group, associated with each risk-adjuster. As such, regression analysis can be used to derive the actual risk-adjusted capitated payments allocated to insurers in risk equalisation systems (Glazer and McGuire, 2012) [90]. For example, if those aged 70-79 are calculated to be, on average, €900 more expensive than those aged

[90] This is known as the *conventional* approach to risk equalisation.

0-50, then risk equalisation will pay that much more for those aged 70-79, see Table 4.2.

TABLE 4.2: OLS beta coefficient per age group, hypothetical example

Variable		**Beta Coefficient (€)**
Age group	0-50 (reference group)	
	50-59	200
	60-69	450
	70-79	900
	80 +	1,200

In terms of performance, however, which is the primary concern of Chapter 7, risk equalisation models are primarily evaluated based on how much of the predictable proportion of health expenditures, $E(y/\mathbf{x})$, can be explained. The methods used to report on predictive efficacy are discussed in detail in Section 7.3.1.1. In absolute terms, however, the predictable proportion in risk equalisation models tends to be quite low. Reasons for this are discussed in detail in Section 4.4.4.

4.4.2 Alternative modelling approaches

Outside standard risk equalisation methodologies different approaches have been discussed as to the best way to model healthcare expenditures. It is important, therefore, to consider these alternative approaches that provide foundation for sensitivity analyses conducted in Appendix A.

In this context, standard linear regression approaches to modelling healthcare expenditure are often considered not suitable for a number of reasons. For instance, healthcare data tend not to be distributed symmetrically. These data often feature a spike at zero (where data relate to whole populations rather than just healthcare users) and display a heavy right-tail for positive costs. This non-symmetry arises from the fact that a small number of severely sick patients attract a disproportionate amount of healthcare costs (Jones, 2010). As such, measures of central tendency (mean, median and mode) may diverge substantially. Furthermore, error terms in statistical models of cost data may display heteroscedasticity (non-constant variance) while the relationship between cost and its covariates may in fact be non-linear (Jones, 2010). As a consequence, there has been much debate over the best approach to use to model healthcare cost data and a large volume of literature has considered various approaches (for example, Basu, Arondekar, and Rathouz (2006), Basu, Manning, and Mullahy (2004), Duan (1983), Dunn et al. (2003), Hill and Miller (2010), Jones (2010), Kilian et al. (2002), Manning, Basu, and Mullahy (2005), Mihaylova et al. (2011), Montez-Rath et al. (2006), Moran et al. (2007), and Powers et al. (2005)). The following sections provides a review of the main alternative estimation procedures.

4.4.2.1 OLS on transformed costs

A logical and straightforward approach to address skewness associated with distributions of costs and their errors is to transform the cost distribution into a more symmetric form (for example, see Duan (1983) and Manning and Mullahy (2001)). Most commonly a log-transformation has been employed (Jones, 2010; Mihaylova et al., 2011), however, square root transformations have also been considered (Veazie, Manning, and Kane, 2003). Transformations have generally been associated with early attempts at cost estimation and there are some statistical problems associated with this approach. The primary problem relates to re-transformation back to the raw scale. For non-linear transformations $g(\mathbf{x})$, $g[E(y|\mathbf{x})]$ will not equal $E[g(y|\mathbf{x})]$ and transformation back to the original scale will be dictated by the nature of the error term on the transformed scale (Mihaylova et al., 2011). Where the error term is homoscedastic, retransformation is governed by Duan's smearing method (Duan, 1983). However, in situations where the error term is heteroscedastic alternative approaches are required (Ai and Norton, 2000; Manning, 1998). An additional problem with log-transformations is that they cannot accommodate 'zero' costs and consequently additional arbitrary transformation of zero costs must occur.

4.4.2.2 Two-part models

Health expenditure data, where they represent a whole population rather than just healthcare users, can be considered limited to the extent that such data generally contain a large fraction of zero cost observations and the normality of error assumption is not satisfied (Mihaylova et al., 2011). One approach to dealing with this problem is to use two-part models.

In this context, the first part of a two-part model represents a binary indicator used to model the probability of any costs incurred. While the second part then models the expected cost, conditional on positive costs.

$$E(y|\mathbf{x}) = Pr(y > 0|\mathbf{x}) * E(y|y > 0, \mathbf{x}) \tag{4.9}$$

The probability of incurring any cost is generally modelled by means of a logit or probit specification (see Section 4.3). While given the issues already outlined with modelling cost distributions, the second part of the model has in practice taken on a range of functional forms. Early approaches were to perform OLS on log-transformed costs (Duan, 1983). And while a two-part modelling approach allows modelling of zero-costs under a log-transformation, the issue of re-transformation back to the original scale still remains (Mullahy, 1998). Consequently, other specifications used to predict positive claims expenditure have been frequently used, including untransformed OLS and GLM specifications (Mihaylova et al., 2011; Jones, 2000; Buntin and Zaslavsky, 2004).

4.4.2.3 Generalised linear models

GLMs have become quite popular in the literature on health expenditure modelling (for example, Manning, Basu, and Mullahy (2005), Blough, Madden, and Hornbrook (1999), Moran et al. (2007), and Manning and Mullahy (2001)). GLMs directly model the relationship between a linear predictor and the mean and also between the mean and variance.

In this context, a link function $g(\mathbf{x})$ specifies the relationship between conditional mean and the covariates. That is,

$$g[E(y|\mathbf{x})] = (\mathbf{x}\boldsymbol{\beta}) \tag{4.10}$$

$$E(y|\mathbf{x}) = g^{-1}(\mathbf{x}\boldsymbol{\beta}) \tag{4.11}$$

The second component is a distribution function, used to specify the relationship between the mean and variance,

$$Var(y|\mathbf{x}) = v(u) \tag{4.12}$$

The major advantage of GLM models over transforming raw costs is that the mean and variance functions are directly specified. As such, the predictions are made on the raw cost scale, $E(y|\mathbf{x})$ and no retransformation is required. Furthermore, heteroscedasticity is directly modelled through choice of distribution. However, the modelling of variance is restricted to a specific function of the mean from the linear exponential family of distributions (normal, Poisson, gamma, binomial, inverse Gaussian). Common link functions include identity, logarithmic, square root, logistic and power. The most widely used link-distribution pair for modelling healthcare expenditure is a log-link with gamma error distribution (Jones, 2010; Moran et al., 2007; Manning and Mullahy, 2001; Manning, 2012).

GLMs parameters are generally estimated based on maximum likelihood or iteratively re-weighted least squares (Moran et al., 2007). An additional, although less popular approach (Mihaylova et al., 2011), is to specify the GLM model from the actual data. This approach is known as the Extended Estimating Equations (EEE) approach (Basu and Rathouz, 2005).

Numerous other approaches to modelling cost data have been discussed and applied in the literature (for comprehensive overview see Jones (2010) and Mihaylova et al. (2011)). Such methods include Tobit models (for high zero-observation cost data), survival analysis (for right-censored data), non-parametric approaches, data-components modelling, and Markov-chain methods, among others. However, these approaches are less common modelling methods particularly in a risk equalisation context.

4.4.3 Arguments in favour of OLS estimation

Considering the discussion above, a number of arguments can be made for favouring OLS estimation in risk equalisation modelling:

- Although transformations help normalise the distribution of costs, the issue of re-transformation back to the raw scale can result in biased estimates unless corrections are made, which will depend on the distribution of the error term and the presence of heteroscedascticity (Ai and Norton, 2000). Furthermore, standard log transformations of zero cost data require the addition of an arbitrary constant to all observations (e.g. $log(y + 1)$) which have been noted to have very poor statistical properties (van de Ven and Ellis, 2000).

- The problem of healthcare costs having non-symmetric distributions (i.e. a thick upper right tail) is not an issue for prediction in extremely large samples. It is the norm in empirical risk equalisation research to have very large samples (i.e. observations in the hundreds of thousands/millions) at the researcher's disposal. Numerous studies have shown that in such situations OLS generally provides the same predictive efficacy as more complicated functional forms (e.g. two-part models or GLMs) (Dunn et al., 2003; Jones, 2010; Mihaylova et al., 2011; Powers et al., 2005; Van Vliet and van de Ven, 1993).

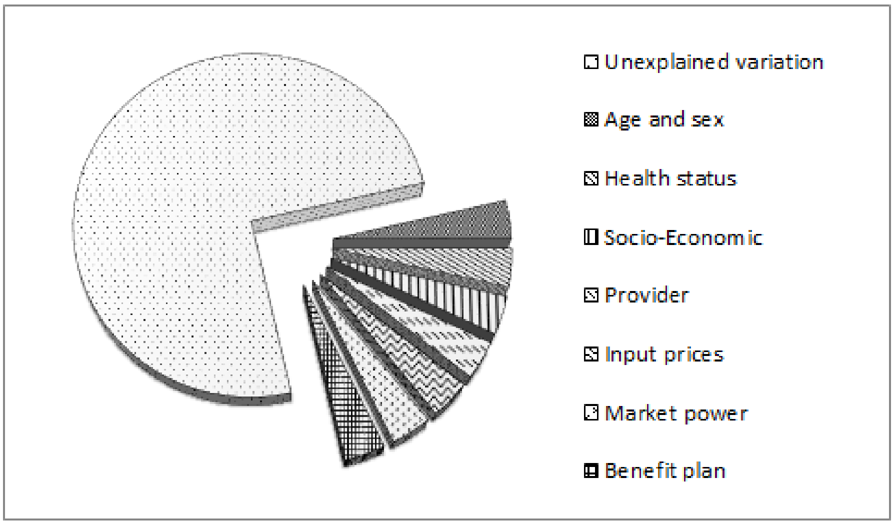
- Relatedly, and sometimes not clearly articulated in the risk equalisation literature, is that non-constant error variance is not an issue if the focus on research is simply estimating predicted costs as heteroscedasticity does not bias estimation. Although heteroscedasticity may lead to inefficient coefficients, this can be remedied through application of robust standard errors (White, 1980).

- Finally, standard linear models are easier to use and interpret than other more complicated specifications (e.g. log transformations, two-part models, GLMs), particularly from the perspective of regulators and policy-makers (van Veen et al., 2015). Standard linear models replicate the cell-based approach (that is, the calculation of average expenditures per risk group) commonly used by regulators (including in the Irish system) to calculate subsidised premium payments (van de Ven and Ellis, 2000). Ellis (2007) also notes that when dealing with large sample sizes, requiring the estimation of a large number of parameters, non-linear estimation can sometimes be difficult (and time-consuming) using conventional statistical packages.

4.4.4 Variable selection

A large proportion of variation in healthcare expenditure can be considered random and, as such, is not predictable. That is, the random error associated with equation (4.7), $(y_i - f(\mathbf{x}))$, can account for a substantial proportion of variance in risk equalisation models (van de Ven and Ellis, 2000). Van de Ven and Ellis (2000) identify seven classes of factors that explain variation in healthcare expenditure yet only make up a relatively small portion of overall expenditure (see Figure 4.1). The first three groups relate to individual (e.g. age, sex and health status) and socio-demographic characteristics (e.g. lifestyle, tastes, income, religion and ethnicity). Provider characteristics (practice style, mode of reimbursement, demand/supply of providers) and input prices may also influence health expenditures. The final two categories relate to characteristics of the health plan. Market power describes an insurer's ability to negotiate prices. Benefit features relate to demand-side factors such as deductibles and co-payments in addition to supply-side factors that may look to limit expenditures (i.e. utilisation reviews and health management strategies).

FIGURE 4.1: Factors explaining variation in healthcare spending



Source: Adapted from van de Ven and Ellis (2000)

However, there are legitimate reasons why not all of these factors should be included to set capitation rates. To understand this, risk-adjusters can be categorised as either S-type (solidarity) or N-type (solidarity not desired) variables. S-type variables can be considered 'legitimate' risk-adjusters for which subsidisation is acceptable. Alternatively, N-type risk-adjusters can be considered 'illegitimate' and as such, should not be used as a grounds for reimbursement[91] (Lamers, van Vliet, and van de Ven, 2003; van de Ven and Ellis, 2000). Schokkaert and Van de Voorde (2004, pg. 1241) describe these N-type variables as those that are 'directly linked to the behaviour of insurers and/or individual members i.e. variables which are under their control'.

However, existing literature does not provide a ready guide as to what can be deemed legitimate or illegitimate. What is deemed as an appropriate variable as a means for compensation will differ based on a country's social and political values and on a society's disposition towards solidarity (van de Ven and Ellis, 2000; Schokkaert and Van de Voorde, 2004; Schokkaert and Van de Voorde, 2006).

[91] Legitimate and illegitimate risk-adjusters have alternatively been referred to as C-type (compensation) and R-type (responsibility) variables in the health economics literature (Schokkaert, Dhaene, and van de Voorde, 1998; Schokkaert and Van de Voorde, 2004; Schokkaert and Van de Voorde, 2006).

Omitted variable bias

Excluding certain N-type variables from risk equalisation models can lead to problems if those variables, in addition to predicting expenditure, are correlated with S-type variables in the risk equalisation specification. This can bias the weights calculated for S-type variables, a consequence known as 'omitted variable bias'. Previous research has shown that excluding N-type explanatory variables in risk equalisation models can lead to significantly biased coefficient estimates on S-type risk-adjusters (Schokkaert and Van de Voorde, 2004; Schokkaert and Van de Voorde, 2006). These findings are not inconsequential; for example, correlation between an illegitimate explanatory variable and a legitimate risk-adjuster, say age, will affect the capitated payment assigned to age and may make it profitable for an insurer to engage in risk selection based on age, something risk equalisation is designed to prevent (see Schokkaert and Van de Voorde (2006) for a detailed example).

A proposed solution to this problem is to include all available and potentially explanatory variables in risk equalisation models so that coefficient estimates on S-type variables are no longer biased (Schokkaert, Dhaene, and van de Voorde, 1998; Schokkaert and Van de Voorde, 2004; Schokkaert and Van de Voorde, 2006). This has been referred to as the *explicit* approach to risk equalisation in contrast to the current *conventional* approach that only considers S-type explanatory variables. The biggest hurdle to implementing the explicit approach would appear to be the cost (and potentially privacy implications) involved in collecting data on a wider range of individual level variables for risk equalisation.

4.4.5 Optimal risk equalisation

Calculating risk equalisation payments based on expected costs is not the only approach discussed in the literature. An alternative strand of research considers the notion of optimal risk equalisation (also referred to as optimal risk adjustment) (for good overviews of this topic, see Ellis (2007) and Glazer and McGuire (2012)). Optimal risk equalisation views risk equalisation as a set of incentives aimed to induce insurers to behave in a particular way. The behaviour (most commonly efficiency) is usually explicitly stated (Glazer and McGuire, 2012). In this context, optimal risk equalisation weights may differ significantly from those calculated based on a least-squares algorithm. This approach to risk equalisation was first articulated by Glazer and McGuire (2000). In their paper they show the conventional approach to risk equalisation may not be optimal due to the often weak correlation between risk- adjusters (e.g. age) and healthcare costs. In this context, a better approach may be to over-pay for high-risks (and under-pay for low-risks) so as to encourage health insurers to compete for high-risks. While additional research into optimal risk adjustment has taken place (Shen and Ellis, 2002; Jack, 2006; Glazer and McGuire, 2002; Kifmann and Lorenz, 2011), research has been mainly theoretically-based with no risk equalisation system to date deviating from the conventional approaches to calculating capitated payments.

4.5 Summary

This chapter provided an introduction to the data sources and empirical methods utilised in this thesis. In terms of data sources, this thesis uses a mix of uniquely acquired survey (HIA) and administrative (VHI) data, which allow for the specification and analysis of the research questions posed in Chapter 1. Both types of data have strengths and limitations for research and these were discussed in Section 4.2.2.

In terms of empirical method, Section 4.3 made arguments in favour of using logistic regression analysis as the main approach to modelling binary outcomes in Chapters 5 and 6. Estimating a linear relationship to explain binary outcomes (i.e. LPM approach) may not be optimal as it calculates constant and potentially unbounded probability estimates (see Section 4.3.1). In contrast, logistic regression is a more popular approach to modelling binary outcomes as it allows for the specification of non-linear marginal (probability) effects. In terms of interpreting effects, the AME algorithm was preferred to the odds ratio specification as probability interpretations of effects are considered more intuitive than odds. Moreover, odds ratio interpretations of interaction effects do not have much meaning and the specification and interpretation of interaction effects is an important aim of Chapter 6.

Chapter 7 looks to assess risk equalisation performance. In this context, the standard empirical strategy adopted is to determine the degree of health expenditure variation that a set of chosen risk equalisation models are capable of predicting. Risk equalisation models are generally estimated through standard OLS regression (see Section 4.4.1) and this is the statistical approach adopted in Chapter 7. The arguments in favour of this approach were outlined in Section 4.4.3. However, distributional characteristics of health expenditures led to a number of alternative statistical approaches being considered. The main approaches are discussed in Section 4.4.2 and provide a basis for specifying sensitivity analyses around functional form in Appendix A.

It is also important to realise that risk equalisation models tend to predict relatively small amounts of expenditure variation. While much variation can be considered random, certain variables with potential predictive power may also be overlooked (either intentionally or due to data constraints) in risk equalisation design. This may also create concerns over biased coefficient estimates. These issues were discussed in Section 4.4.4. Finally, rather than calculating risk equalisation payments based on average costs, an alternative methodological approach, known as optimal risk equalisation has also been considered in the literature, however, it is yet to be implemented in practice.

Chapter 5

Switching benefits, switching costs and consumer awareness in the Irish private health insurance market – an analysis of consumer surveys

5.1 Introduction

As described in the conceptual framework outlined in Chapter 2, consumer decision theory would suggest that an insight into switching behaviour can be gained through understanding the benefits and costs to switching, and their distribution within an insured population. In this context, the purpose of this chapter, primarily, is to investigate the motivations for (not) switching, the socio-economic and health characteristics associated with search and switching costs, and actual switching behaviour. In this regard, Section 5.2 describes the consumer survey data used as part of this investigation. Section 5.3 describes the statistical approaches adopted, while Section 5.4 presents the results. Section 5.5 discusses the results, including implication and recommendations arising from the analysis. Section 5.6 concludes.

Duijmelinck, Mosca, and van de Ven (2015) outline a range of switching benefits and costs that are applicable to health insurance markets and these were discussed in detail in Chapter 2. The benefits to switching primarily relate to price and quality considerations. As described in Section 2.3.1.1, price seems to be the predominant motivating force for switching insurer and this seems to apply across most insurance system designs. Quality, however, can be considered an altogether more complex concept than price (Kolstad and Chernew, 2009). One aspect of quality relates to service quality (speed of payment, coverage decisions, customer care etc.). While another aspect of quality relates to quality of care. This relates to quality of contracted healthcare providers, the freedom to choose a provider or drug or the organisation of healthcare provision. It is important to note that differences in quality of care mainly arise in health insurance systems where it is possible for insurers to selectively contract (e.g. US, Netherlands). Similarly, supplementary insurance for better accommodation or additional coverage to that of a basic benefit package may act as an additional switching benefit in insurance systems where it is available. Importantly, this benefit will only encourage switching if consumers are either legally obliged to take out basic and supplementary insurance with the same insurer (for example, in Belgium) or if there are close ties between the sale of basic and supplementary insurance (for example, in the Netherlands and Switzerland). Free gifts to new applicants may also act as a potential switching benefit.

The benefits of switching must, however, be weighted against the costs. Costs can take the form of either search or switching costs. Search costs represent 'the total costs spent by a consumer in identifying and interpreting a firm's product and price offering, regardless of whether the consumer buys the product from the firm of not' (Wilson, 2007, pg. 3). Regardless of switching behaviour, search costs can be incurred multiple times. Although freedom of choice is often advanced as an important benefit of competitive insurance markets, search costs tend to increase along with greater choice. As described by (Satterthwaite, 1979) more firms in a market will reduce consumers' knowledge of each, lowering demand elasticities.

Switching costs, on the other hand, are one-time costs incurred when switching takes place. Switching costs relate to 'the total costs incurred by a fully informed consumer through deciding to change suppliers that would not have been incurred by remaining with the current supplier' (Wilson, 2007, pg. 3). Some switching costs may be common to all insurance markets. For example, the transaction, learning and uncertainty costs involved in switching insurer. Other switching costs may be more specific to the regulatory environment under which insurers operate. For example, where basic and supplementary insurance are tied together (e.g. Netherlands, Switzerland) consumers may face additional costs (as discussed in Section 2.3.2) in switching to an alternative provider if insurers are permitted to risk rate supplementary insurance or have the right to refuse applicants. Similarly, in markets where provider networks are common (e.g. US, Israel), individuals may be reluctant to switch insurer if it means loss of access to their existing provider (or paying high out-of-pocket costs for access). Moreover, in conflict with standard neoclassical economic assumptions, not all costs experienced may be rational. Individuals, for example, may prefer to leave things as they are or may over-estimate the value of their current health insurer (Lako, Rosenau, and Daw, 2011).

Search and switching costs tend not to be evenly distributed across insured populations. Evidence from Chapter 2 suggests that younger, healthier and more educated individuals face lower switching costs, which is often used to explain why these groups are empirically observed to be more likely to switch insurer. Theoretically, these groups may be able to better navigate the market and compare alternative product offerings. Low-risk individuals may also be less concerned about issues around continuity of care. The finding of differential barriers to switching may raise concerns over inequities if they contribute to differences in actual switching behaviours. For example, if high-risk individuals face greater restrictions in switching insurer it may make insurers less responsive to the needs and preferences of this group[92].

The provision of consumer information is often advanced as a means of reducing search costs in health insurance markets. Similarly, the provision of regulatory information around switching rules, open enrolment periods etc. may also aid consumers in the decision-making process and reduce potential uncertainty or learning costs. Underlying these ideas is that more information helps consumers make better choices as regards their health insurance coverage. However some concerns exist over whether the provision of consumer information actually makes a difference. For one, doubt has been raised over the ability of consumers to seek out and interpret health-related information, while others have argued that the provision of easily accessible and costless information on plan switching does not necessarily mean that consumers will make use of it. This phenomenon has been described as 'comparison friction' and relates to the large separation that may exist between the availability of health insurance-related information and consumers' use of it (Kling et al., 2012).

Despite these concerns, a strong emphasis has been placed on the provision of health insurance comparison and switching information in many markets. Particularly in the US, consumers are provided with a wealth of information (in both employer-based and publicly-funded markets) on price and comparative plan performance information (e.g. HEDIS and CAHPS) in an effort to aid consumer decision-making and competition. In the Netherlands, the performance of health plans is assessed annually through a standardised Consumer Quality Index (CQI) instrument which measures consumers' experience of quality of healthcare (Reitsma-van Rooijen, de Jong, and Rijken, 2011). *A priori*, it is difficult to predict what groups of individuals will likely seek out consumer information. Different groups, however, may be interested in different aspects of their policies and as such may seek out information for different reasons. low-risk individuals may be more concerned about price while their high-risk counterparts may be more concerned

[92]This is, of course, not taking into account any incentives for risk selection faced by insurers, an issue which is explored in more detail in Chapters 6 and 7.

about quality. However, where information is largely disseminated online, it could be argued that it is younger and more educated cohorts that may be likely to access such information. Lave et al. (2011) suggest that educated individuals may indeed be more willing to examine the benefits and costs of choosing a health plan. Furthermore, it is low-risk groups who generally have a higher propensity to switch and therefore maybe more likely to access information on switching rules and price comparison for this reason.

The Irish context

Consumers of health insurance in Ireland will not be subject to the same range of switching costs and benefits identified in the conceptual framework presented in Chapter 2. For instance, 'benefit-loss' costs (most associated with the linking of basic and supplementary insurance in mandatory European health insurance systems) may not be directly applicable to the Irish insurance system[93]. Furthermore, and as noted in Section 3.3, while selective contracting is permitted in the Irish market it has only recently commenced and is applicable to only a very small proportion of plans. Therefore it is unlikely that selective contracting is being used to a great extent as a tool for differentiating quality of care between insurers, nor does it suggest that provider-switching costs (see Section 2.3.2.2) represent a substantial switching barrier in the Irish market.

Previously a report into competition in the Irish private health insurance market considered the benefits and costs of switching faced by consumers (Competition Authority, 2007). It was found that cost savings were cited as the most important factor considered when switching insurer (Competition Authority, 2007). As noted in Chapter 2, motivation to switch in response to price considerations is an important requirement of competitive health insurance markets. In contrast, the most important reason for not switching was consumer satisfaction with their current insurer. However, switching costs also appeared to play a role in influencing consumer mobility. Three main types of switching costs were identified in the Irish

[93] As noted by Duijmelinck, Mosca, and van de Ven (2015), however, one exception to this may relate to the practice pursued by VHI of linking its health and travel insurance. If consumers switch away from VHI they may lose their travel insurance or face a price increase for their travel insurance.

market. These related to search, transaction and psychological costs of switching (Competition Authority, 2007)[94].

Consumer attitudes towards (not) switching, however, deserve further attention. Firstly, little analytical investigation has taken place in this regard since the publication of the Competition Authority report in 2007 (Competition Authority, 2007). Particularly, the impact of the recent economic and financial crisis in Ireland (Burke et al., 2014) may have impacted on consumers' motivations for switching insurer. More importantly, perhaps, there is currently no empirical understanding of whether the distribution of attitudes towards (not) switching differs among the insured population. Particularly, it is unknown whether certain groups differ in their motivations for (not) switching and if certain groups are more likely to face greater barriers to switching insurers than other groups. As noted, it is likely that high-risk individuals (for example, older and sicker) may face greater search and switching costs than other groups. While policies such as open enrolment and community rating are designed with access and ease of switching in mind for high-risk groups, if these high-risks face greater barriers to switching which, in turn, translates into actual switching behaviour it may raise concerns over inequities in switching capabilities in the Irish system. In a wider context, there is a lack of evidence on switching costs and benefits as they relate to duplicate voluntary health insurance markets in general. As noted in Section 2.6.2, the fact that duplicate voluntary markets contain different risk distributions and choice sets than other health insurance systems, means that they merit separate investigation.

In the context of aiding consumer decision-making with regard choice of health insurance, an important function of the market regulator, the HIA, is to help 'increase awareness of members of the public of their rights as consumers of health insurance and health insurance services available to them'[95]. The importance of

[94] Empirical results from this study are drawn from a 2005 Consumer Survey carried out on behalf of the HIA.

[95] http://www.hia.ie/about-us

the provision of such information as a policy tool for improving consumer decision-making and competition was highlighted by the Competition Authority (Competition Authority, 2007). As such, the HIA website provides information for consumers on their rights and information regarding market regulations, as well as access to a health insurance comparison tool. Moreover, the HIA can also be contacted directly for consumer rights and switching advice. However, little emphasis has been placed on the extent to which consumers in the market are aware of the HIA and the functions it provides in this regard. Moreover, it is not understood whether certain groups in the insured population are more likely to be aware of the HIA and its functions than others.

In the context of the above discussion, four specific research questions will hoped to be answered in this chapter:

1. In terms of switchers, what are the main reasons for switching insurer? Do individuals switch out of concern for price and/or quality?
2. In terms of non-switchers, what are the main reasons for not switching insurer? Are there differences in switching costs evident between groups based on socio-economic and health characteristics of consumers?
3. To what extent are consumers aware of the HIA and its functions? Are there differences evident between groups based on socio-economic and health characteristics of consumers?
4. Taking into account the above questions, are there differences in actual switching behaviour based on socio-economic and health characteristics of consumers?

In terms of differences between groups, and guided by the conceptual framework constructed in Chapter 2, it is hypothesised that,

- price and (certain) quality concerns will motivate switching.

- high-risk individuals will perceive a greater level of switching costs than their low-risk counterparts.
- high-risk individuals will be less likely to switch than their low-risk counterparts.

5.2 Data

This study is based on market-wide data obtained from the HIA. This related to raw data collected as part of the HIA's biennial consumer survey publications. Access was granted to the raw data for 2010 (N=1,002), 2012 (N=1,011) and 2014 (N=2,024) consumer surveys (HIA, 2010c; HIA, 2012; HIA, 2014e)[96]. Collection of data for each survey was tendered to market research companies. Data for the 2010 survey was collected (between 9 November and 6 December 2009) by RedC Research and Marketing Ltd. Data for the 2012 survey (collected between 2 - 27 November 2011) and the 2014 survey (collected between 11 November and 6 December 2013) were collected by MillwardBrown. Data for all years were collected by means of face-to-face interviews. Surveys included data on socio-demographic profiles, self-assessed health[97], prior healthcare utilisation, history of insurer switching, questions related to motivations for (not) switching and questions related to understanding of rules and regulations governing the market. Checks took place for missing observations for all variables of interest, however as this raw data had already been used in the compilation of published consumer surveys it had been cleaned and verified prior to acquisition. No missing observation for variables of interest were found.

In order to ensure a representative sample of the adult population in the Republic of Ireland (aged 18+) quotas were set around sex, social class and region. The raw data were weighted to reflect the national population. A large number of identical

[96]Consumer surveys have also been published in 2003, 2005 and 2008. The information collected in these surveys differed appreciably from later surveys and consequently were not considered in this analysis.

[97]Self-assessed health has been shown to be consistent with objective measures of health status in general populations (Wu et al., 2013).

questions were asked of respondents covering the three surveys which enabled them to be pooled. The major benefit of pooling is that it increases the sample size and consequently reduces the sampling error around variables of interest. Only respondents with private health insurance cover at the time surveyed were considered in this analysis. This left a total sample for analysis of 1,703 privately insured individuals, with a sampling error of 2.4% (see Table 5.1).

TABLE 5.1: Estimated maximum sampling error per sample size[a] (95% confidence)

	All respondents				**Health insurance only**			
	2010	2012	2014	All	2010	2012	2014	All
N	1,002	1,011	2,024	4,037	480	424	799	1,703
Sampling Error(%)	3.10	3.08	2.18	1.54	4.47	4.76	3.47	2.37

[a] Maximum margin of error is calculated as $(0.98)\sqrt{\frac{1}{n}}$

5.3 Methods

In order to understand the motivations for switching and not switching in the market, focus was placed on two specific questions asked to those with private health insurance. These related to:

1. 'Reasons for switching private health insurance provider?'

2. 'Reasons for not switching private health insurance provider?'

For each question, respondents were given a range of answers to choose from and responses were not mutually exclusive, meaning a respondent could give more than one answer per question. The first question was asked to all those who had switched insurer in the last four years[98]. While the survey only asked respondents on incident of ever switching, information did exist on the actual number of years a respondent was with their current insurer (0-4 years, 5-10 years, 11-20 years, 21+ years). Therefore, by identifying switchers who had been with their current

[98] 28.5% switched more than once in this period.

insurer 0-4 years it was possible to derive a variable capturing switching in the last four years. Unfortunately, it cannot be ruled out that this variable also captures individuals who previously held private health insurance, switched during that period, dropped their cover and then had re-activated their cover by the time of the survey. Although given the sample size and the switching rate it is likely that very few, if any, respondents fulfil these conditions.

First, in order to determine more dominant benefits and costs, responses to both questions were ranked in terms of frequency, based on weighted percentages. In terms of 'reasons for not switching', it was possible to match a number of responses to actual switching costs identified in Section 2.3.2 (see Table 5.2).

TABLE 5.2: Reasons for not switching insurer and associated switching cost

Reason for not switching insurer	**Associated switching cost**
'Too much hassle/paperwork'	Transaction cost
'Couldn't be bothered'	Psychological cost
'Feel loyal to my current provider'	Psychological cost
'Been with my existing provider a long time'	Psychological cost
'Too difficult to compare plans'	Search cost
'Concerned that coverage would not be the same'	Uncertainty cost

Second, logistic regression analysis was then performed to determine if certain groups, based on socio-economic and health characteristics, were more likely to experience these switching costs. The dependent variable was binary in nature indicating whether the respondent gave a positive (1) or negative (0) response to the question asked, see Equation (5.1)[99]

Given the multi-response nature of this data, it is of interest to know whether these responses can be considered 'marginally independent'. That is, whether or

[99]This is similar in approach to a study conducted by Reitsma-van Rooijen, de Jong, and Rijken (2011).

not there is correlation between responses based on the socio-economic and health characteristics used in the logistic regression analysis. Rao-Scott adjusted chi-square statistics are used to test this association, as standard Pearson chi-squared statistics are not appropriate for this type of data (Thomas and Decady, 2004). Results are presented in Table A.1, Appendix A. As the number of switchers was low, it was not possible to perform reliable regression analysis to see if responses related to reasons *for* switching differed between groups.

Third, it was assessed whether certain groups were more likely to display awareness of the HIA and its functions. This was assessed by means of logistic regression analysis, dependent variable coded as (0) for not aware and (1) for aware (see below for more detail on variable construction), see Equation (5.2).

Finally, another logistic regression model was estimated in order to understand the characteristics of switchers. A binary variable was created based on whether respondents had switched at least once in the last four years (1) or not (0)[100], see Equation (5.3).

For all logistic regression analyses, categorical dummy variables were included to account for any survey-specific effects. Effects were presented in terms of AME (see Section 4.3.3 for details). Independent variables of interest in all models were based on age, sex, social grade and self-reported health status. Categorisations of social grade, self-reported health status and consumer awareness are presented below:

- **Social Grade** – In the absence of information on the education level of respondents, social grade is used as a proxy. Social grade relates to the occupation of the chief income earner for the household. More specifically, A is Upper Middle Class; B is Middle Class; C1 is Lower Middle Class; C2 is Skilled Working Class; D is Other Working Class; E is Casual Workers and those dependent on welfare. Farmers are classified as F1 and F2, F1 being farmers who farm more than 50 acres, F2 being those with smaller farms,

[100]As noted, this was the most recent breakdown afforded by the data.

i.e. 50 acres or less. Respondents are grouped as 'ABC1' (Middle Class), 'C2DE' (Working Class) and 'F1F2' (Farmer).

- **Health Status** – Health status is classified based on respondents' self-assessed health. *Excellent*: "I am generally health and rarely make visits to the doctor". *Good*: "I am generally healthy but sometimes make visits to the doctor". *Bad*: "Some health problems and therefore regularly make visits to the doctor" or "Some health problems that sometimes require visits to the hospital".

- **Consumer Awareness** – This variable looks to capture respondents' understanding of the availability of information on price comparison tools and around market switching rules and regulations. This variable was constructed based on individuals' responses to their 'Awareness of Ireland's Health Insurance Authority'. *Aware*: 'Fully aware of the Health Insurance Authority' or 'Have some awareness of the Health Insurance Authority and its functions'. *Unaware*: 'Have heard of the Health Insurance Authority but not sure what they do' or 'Have never heard of the Health Insurance Authority'.

$$Pr(Response_i = 1) = \frac{exp(\beta_0 + \sum_{k=1}^{4} \beta_k X_{ki} + \beta_5 Z_i)}{1 + exp(\beta_0 + \sum_{k=1}^{4} \beta_k X_{ki} + \beta_5 Zi)} \tag{5.1}$$

i=1...1,301

$$Pr(Aware_i = 1) = \frac{exp(\beta_0 + \sum_{k=1}^{4} \beta_k X_{ki} + \beta_5 Z_i)}{1 + exp(\beta_0 + \sum_{k=1}^{4} \beta_k X_{ki} + \beta_5 Z_i)} \tag{5.2}$$

i=1...1,703

$$Pr(Switch_i = 1) = \frac{exp(\beta_0 + \sum_{k=1}^{4} \beta_k X_{ki} + \beta_5 Z_i)}{1 + exp(\beta_0 + \sum_{k=1}^{4} \beta_k X_{ki} + \beta_5 Z_i)} \tag{5.3}$$

$$i = 1....1{,}703$$

where,

X_k, is a set of four predictor variables (age, sex, social status, self-reported health status), and

Z, is a categorical variable capturing year of survey.

5.4 Results

Table 5.3 reports a descriptive summary of the survey respondents characteristics disaggregated by year of survey and in terms of weighted and unweighted percentages. For the remainder of the chapter, weighted percentages are exclusively reported. In this context, 19.1% of the overall sample were aged 65+, and there was an even split between male and female respondents. Furthermore, the majority of respondents belonged to 'ABC1' (57.4%) social grade, indicating that it is those from higher socio-economic classes that generally purchase health insurance. The proportion of respondents considering themselves in 'Excellent' health fell over time, with just over half overall (51%) reporting themselves in this category. A high proportion of consumers appear to be unaware of the role the HIA performs (58.3%). Worryingly, this lack of awareness has increased over time. In total, just under 12% of respondents switched in the last four years.

5.4.1 Reasons for switching insurer

Table 5.4 presents the five most frequent reasons cited for switching insurer. As expected, cost savings was by far the most influential reason for switching, cited by 70.7% overall. Quality, as proxied by 'level of cover' was the next most frequent

Table 5.3: Percentage (unweighted percentage) breakdown of respondent characteristics by year of survey.

		2010 (N=480)	**2012 (N=424)**	**2014 (N=799)**	**ALL (N=1,703)**
Age	18-44	49.7 (51.3)	45.2 (44.6)	43.7 (42.2)	45.7 (45.3)
	45-64	35.4 (34.8)	33.9 (37.5)	35.8 (41.6)	35.2 (38.6)
	65+	14.9 (14)	20.9 (17.9)	20.6 (16.3)	19.1 (16)
Sex	Male	49.4 (49.2)	51 (48.8)	49.8 (47.8)	50 (48.4)
	Female	50.6 (50.8)	49 (51.2)	50.2 (52.2)	50 (51.6)
Social Grade	ABC1	55.3 (54)	59.3 (65.8)	57.7 (63.1)	57.4 (61.2)
	C2DE	34.6 (37.1)	32.4 (28.8)	33.4 (29.8)	33.5 (31.6)
	F	10.1 (9)	8.3 (5.4)	8.9 (7.1)	9.1 (7.2)
Health Status	Excellent	56.6 (56.5)	49.7 (49.1)	48.4 (48.3)	51 (50.8)
	Good	27.8 (27.5)	30.3 (30.9)	29.3 (29.9)	29.2 (29.5)
	Bad	15.5 (16)	19.9 (20)	22.3 (21.8)	19.8 (19.7)
Consumer Awareness	Unaware	53.8 (53.3)	58.4 (56.1)	61 (60.3)	58.3 (57.3)
	Aware	46.2 (46.7)	41.6 (43.9)	39 (39.7)	41.7 (42.7)
Switched within the last 4 years	Yes	7.3 (7.3)	14.9 (15.6)	12.9 (13.4)	11.8 (12.2)

response, cited by 20.7% overall. It is interesting to note that concern with level of cover appears to have increased in recent years as a motivation for switching insurer, cited by 10.3%, 20.2% and 24.5% in 2010, 2012 and 2014 surveys, respectively. Another proxy for quality 'newer insurer had a better product/service range' was cited by 11.8%, overall. 'Group scheme switched' (7.0%) and 'recommendation from family member' (4.9%) made up the remainder of responses, however their importance appears to be waning over time.

TABLE 5.4: Top 5 reasons for switching insurer (switched in last 4 years)[a]

	2010 (N=35)	**2012 (N=66)**	**2014 (N=107)**	**Total (N=208)**
New insurer was cheaper/Cost savings	74.8%	69.7%	69.8%	70.7%
Level of cover was better	10.3%	20.2%	24.5%	20.7%
New insurer had a better product/service range	16.8%	9.4%	11.6%	11.8%
Group scheme switched	8.1%	7.9%	6.0%	7.0%
Recommendation from family member	14.2%	5.8%	1.2%	4.9%

[a] Weighted percentages reported.

5.4.2 Reasons for not switching insurer

Table 5.5 reports on consumer reasons for not switching insurer. Chiefly, respondents did not switch because they were 'satisfied with their current provider', cited by 40.6%, overall. However, certain individuals were discouraged from switching due to perceived lack of product and service differentiation between insurers. 14.5% cited 'level of cover no better' and 10.0% cited 'range of products/services no better' as reasons for not switching insurer.

Certain switching costs could also be identified as popular reasons for not switching. Particularly, 'too much hassle/ paperwork' (14.5%) and 'couldn't be bothered' (11.2%) were the third and fourth most common reason for not switching insurer in the sample. As outlined in Table 5.2, these relate to transaction and psychological costs, respectively. Other psychological costs of switching were also identified.

'Feel loyal to my current provider' and 'been with existing provider for a long time' were cited by 8.3% of respondents. Explicit search costs seem to play slightly less of a role. 'Too difficult to compare plans' was cited by 7.2% of respondents. Finally, uncertainty costs, manifested in terms of 'concerned that coverage would not be the same' were only cited by 5.7% of non-switchers as a reason for not switching.

Table 5.6 presents results for the logistic regression analysis modelling the search and switching costs identified in Table 5.2 in terms of consumer characteristics to see if responses differ between groups. The hypothesis that high-risk individuals will perceive higher switching costs than low-risk individuals is partly confirmed. For instance, high-risk respondents were more likely to experience psychological switching costs. Those aged 65 and over were more likely to 'feel loyal to my current provider' (AME = 0.065, $p < 0.01$), as compared to those aged 18-44. That is, compared to a base response rate of 11.8%, those aged 65 and over were 6.5 percentage points more likely to cite loyalty as a reason for not switching compared to those aged 18-44. Compared to those aged 18-44 older age groups were also more likely to cite 'been with my existing provider for a long time' as a reason for not switching (45-64, AME = 0.052, $p < 0.01$; 65+, AME = 0.059, $p < 0.05$). In contrast, apathy towards the switching process ('couldn't be bothered) was more likely to be cited by those with worse self-reported health statuses (AME = 0.047, $p < 0.05$). In addition, those with the worst self-reported health status were also more likely to cite 'too difficult to compare plans' (AME = 0.043, $p < 0.05$) as a reason for not switching.

Less obvious relationships were observable in terms of transaction and uncertainty costs of switching. In terms of transaction costs ('too much hassle/paperwork'), those aged 45-64 were more likely to see them as barriers to switching. In contrast, uncertainty costs ('concerned coverage would not be the same') did not differ based on consumer characteristics, however, this could be related to lack of power given the small proportion of positive responses. Finally, Table A.1, Appendix A reports that all multi-responses are marginally independent across predictor variables.

Table 5.5: Reasons for not switching insurer[a] [b]

	2010 (N= 379)	**2012 (N=318)**	**2014 (N=604)**	**Total (N=1,301)**
Satisfied with current provider	41.6%	44.0%	38.3%	40.6%
Level of cover no better	14.9%	13.2%	14.9%	14.5%
Too much hassle/paperwork	12.6%	10.2%	17.8%	14.5%
Couldn't be bothered	12.5%	8.1%	11.9%	11.2%
Range of products/services no better	10.4%	9.1%	10.2%	10.0%
Not my decision	12.0%	5.7%	9.1%	9.1%
Feel loyal to my current provider	9.1%	4.1%	10.1%	8.3%
Been with existing provider for a long time	13.0%	3.8%	7.8%	8.3%
Work/employer looks after it	10.0%	7.7%	6.6%	7.9%
Don't know	4.4%	5.9%	10.7%	7.7%
Too difficult to compare plans	7.4%	3.8%	8.9%	7.2%
Concerned that coverage would not be the same	6.4%	3.3%	6.6%	5.7%

[a] Weighted percentages reported. Truncated at response rates greater than 5% (overall).

[b] Asked to all those who never switched insurer.

Table 5.6: Logistic regression predicting reasons for not switching[a] [b]

Variables		**1. Too much hassle/paperwork**	**2. Couldn't be bothered**	**3. Feel loyal to my current provider**	**4. Been with my existing provider a long time**	**5. Too difficult to compare plans**	**6. Concerned coverage would not be the same**
		dy/dx[c] (S.E.)	**dy/dx (S.E.)**	**dy/dx (S.E.)**	**dy/dx (S.E.)**	**dy/dx (S.E.)**	**dy/dx (S.E.)**
Age *(Ref = 18-44)*	45-64	0.053** (0.022)	-0.017 (0.02)	0.017 (0.016)	0.052*** (0.017)	0.009 (0.016)	0.002 (0.015)
	65+	0.023 (0.026)	-0.006 (0.024)	0.065*** (0.024)	0.059** (0.023)	0.026 (0.021)	-0.002 (0.018)
Sex *(Ref = Male)*	Female	0.031 (0.019)	-0.004 (0.017)	0.002 (0.015)	0.007 (0.015)	0.03** (0.014)	0.001 (0.013)
Social Grade *(Ref = ABC1)*	C2DE	0.004 (0.021)	0.005 (0.019)	-0.013 (0.016)	-0.004 (0.016)	-0.003 (0.015)	0.01 (0.014)
	F	-0.026 (0.032)	0.007 (0.031)	0.046 (0.031)	0.036 (0.03)	0.024 (0.028)	0.019 (0.025)
Health Status *(Ref = Excellent)*	Good	0.033 (0.023)	0.047** (0.021)	0.007 (0.018)	0.006 (0.018)	0.001 (0.016)	0.021 (0.016)
	Bad	0.037 (0.026)	0.047** (0.025)	0.012 (0.021)	0.008 (0.02)	0.043** (0.022)	0.005 (0.017)
Year of Survey *(Ref = 2010)*	2011	-0.028 (0.024)	-0.047** (0.023)	-0.052*** (0.019)	-0.096*** (0.021)	-0.037** (0.018)	-0.031* (0.016)
	2014	0.047** (0.023)	-0.009 (0.022)	0.005 (0.019)	-0.056*** (0.021)	0.011 (0.018)	0.021 (-2.73)

[a] Asked to all those who never switched insurer.
[b] *p <0.1, **p <0.05, ***p <0.01.
[c] Effects presented in terms of AME.

5.4.3 Consumer awareness

Table 5.7 reports the result of the logistic regression analysis modelling consumer awareness of the HIA. Interestingly, consumer characteristics, overall, did not appear to influence consumers' self-reported awareness of the HIA. However, those classified as having 'good' self-reported health status were more likely to have knowledge of the HIA than those in 'excellent' health (AME = 0.053, $p < 0.1$). While those from social grade F (farmers) were less likely to have knowledge of the HIA than those considered middle class (ABC1) (AME = -0.141, $p < 0.01$). Compared to the 2010 survey there appeared to be an overall fall in the consumer awareness of the HIA in the 2014 survey (AME =-0.077***, $p < 0.01$). This last observation reflects descriptive findings in Table 5.3.

TABLE 5.7: Logistic regression analysis modelling consumer awareness of HIA[a] [b]

Variables		**dy/dx[c] (S.E.)**
Age *(Ref = 18-44)*	45-64	0.034 (0.027)
	65+	-0.01 (0.034)
Sex *(Ref = Male)*	Female	-0.032 (0.024)
Social Grade *(Ref = ABC1)*	C2DE	-0.038 (0.026)
	F	-0.141*** (0.04)
Health Status *(Ref = Excellent)*	Good	0.053* (0.028)
	Bad	0.042 (0.032)
Year of Survey *(Ref = 2010)*	2012	-0.52 (0.033)
	2014	-0.077*** (0.028)
N		1,703
Log-Likelihood		-1162.00

[a] Asked to all those with private health insurance.

[b] *p <0.1, **p <0.05, ***p <0.01.

[c] Effects presented in terms of AME.

5.4.4 Switching behaviour

Table 5.8 reports the results for the logistic regression analysis of switching behaviour. As hypothesised, there is evidence that high-risk individuals were less likely to switch. Compared to those aged 18-44, those aged 65+ were less likely to switch (AME= -0.048, p <0.05). Independent of age, those who described their health as 'bad' (AME =-0.043, p <0.05) were also less likely to switch insurer (compared to those who described their health status as 'excellent'). There was no evidence that sex or social grade had an impact on switching behaviour[101].

TABLE 5.8: Logistic regression analysis modelling switching behaviour[a b]

Variables		**dy/dx[c] (S.E)**
Age *(Ref = 18-44)*	45-64	0.006 (0.018)
	65+	-0.048** (0.02)
Sex *(Ref = Male)*	Female	0.023 (0.016)
Social Grade *(Ref = ABC1)*	C2DE	0.014 (0.017)
	F	0.007 (0.029)
Health Status *(Ref = Excellent)*	Good	-0.011 (0.018)
	Bad	-0.043** (0.019)
Year of Survey *(Ref = 2010)*	2012	0.08*** (0.021)
	2014	0.059*** (0.017)
Log-Likelihood		-610.94

[a] Asked to all those with private health insurance.

[b] *p <0.1, **p <0.05, ***p <0.01.

[c] Effects presented in terms of AME.

[101] Consumer awareness was not included in this regression due to potential simultaneity bias.

5.5 Discussion

Switching benefits

An important requirement of competitive health insurance markets is that price and quality considerations guide consumer demand. Therefore, a salient finding is that consumers in the Irish market do appear to be strongly motivated by price considerations. Cost-savings were by far the most important reason cited for switching insurer. Quality, both in terms of level of cover and also product and service range, motivated switching to a much lesser degree than price. As a consequence, there may be less reason for insurers to compete along these quality parameters. The relative importance consumers place on price might reflect the fact that consumers derive greater genuine utility from better price as compared to better quality. However, as noted in Section 2.4.1, it could also point towards the fact that consumers face difficulty interpreting other salient plan features (other than price) and consequently may revert to heuristic behaviour such as 'choose the cheapest plan'. That said, however, it is important to recognise that level of cover has been increasing as a switching benefit in recent years. This may partly reflect the worsening risk profile of consumers in the market (see Table 5.3).

In terms of the Dutch system, price concerns also play a prominent role. Duijmelinck, Mosca, and van de Ven (2015) found that 64% of switchers in the Dutch system switched out of price considerations, a similar proportion to that reported in this study (see Table 5.4), while quality concerns were deemed less important. Reitsma-van Rooijen, de Jong, and Rijken (2011) also report that premium appears to be a more important reason for switching than factors such as coverage or service. It is difficult to compare these findings across other health insurance systems given the lack of similar research on consumer survey responses in this area.

Switching costs

While a large proportion of consumers appear satisfied with their insurance offering and may not switch for that reason, it is important to understand the role switching costs play due to their potential distorting impact on competition. In this context, it was possible to link many of the reasons given for not switching to conceptual switching costs identified in Section 2.3.2.

Transaction costs ('too much hassle/paperwork') of switching were the most frequently cited switching cost for non-switchers. Transaction costs are also found in the Dutch system, although they appear less frequently. Duijmelinck, Mosca, and van de Ven (2015) find that 4.3% of non-switchers cite transaction costs as a reason for not-switching[102]. Similarly, Reitsma-van Rooijen, de Jong, and Rijken (2011) find that around 5% of non-switchers cite 'I fear getting into (administrative) problems if I change to another health insurance company'. In this context, it could be that transactions costs cited in the Irish market are more perceived than actual, as the switching process is actually fairly straightforward (see Section 3.4.2). This point has been raised previously by the Competition Authority (Competition Authority, 2007).

Evidence also suggests the presence of psychological costs to switching in the Irish market. As noted in Chapter 2 a number of behavioural biases have been identified in the literature that can affect decision-making (for example see, Samuelson and Zeckhauser (1988), Hartman, Doane, and Woo (1991), Jacoby and Chestnut (1978), and Oliver (1999). In this regard, and to varying degrees, evidence was found that apathy ('couldn't be bothered'), consumer inertia/status-quo bias ('been with my existing provider a long time') and loyalty effects ('feel loyal to my current provider') are features of the Irish market. In a comparative context, where studied, psychological switching costs have also been identified in other health insurance market settings. For instance, Duijmelinck, Mosca, and van de Ven (2015) find that 15.6% of non-switchers cite 'sunk costs' (psychological costs) as a reason for not switching in the Dutch system. Again, in the Dutch market, Reitsma-van Rooijen, de Jong, and Rijken (2011) find between 15-19% of non-switchers do not switch as a result of 'not being bothered to look for another, better or cheaper healthcare insurer'. This is slightly higher than the rates reported in this study

[102]However, the authors' definition of transaction costs relates to 'the time and effort it takes to make a decision and to actually switch insurer', which may also incorporate aspects of search costs, more so than actual administrative difficulties at the time of switching.

(see Table 5.5)[103]. In a broader context, status-quo bias and consumer inertia have also been identified as features of a number of health insurance markets, leading to sub-optimal decision-making (Handel, 2013; Boonen, Donkers, and Schut, 2011; Frank and Lamiraud, 2009; Leukert-Becker and Zweifel, 2014). The finding of psychological switching costs also conflicts with the standard neoclassical assumption of rational consumer behaviour, the implications of this are discussed in Section 5.5.1.

Ostensibly, search costs are less frequently cited than transaction or psychological costs as reasons for not switching. This could be considered slightly surprising given the number of plans currently available for purchase in the Irish market (see Section 3.5.1). However, as noted by the Competition Authority, it could be the sense of apathy some consumers display towards the switching process is indicative of high latent search costs (Competition Authority, 2007). Consumers may be less likely to see a point in considering switching if they feel overwhelmed by the number of products on offer and lack confidence in their ability to navigate successfully through the market.

Differences between groups

From a competitive perspective it is also important to consider if reasons non-switchers don't switch, differ between groups. The finding that high-risk individuals are more likely to experience barriers to switching agrees with the conceptual framework constructed in Chapter 2 and available empirical evidence from other health insurance systems.

Particularly, the finding that high-risk individuals are more likely to cite psychological costs of switching has also been observed in the Dutch system (Duijmelinck, Mosca, and van de Ven, 2015; Reitsma-van Rooijen, de Jong, and Rijken, 2011). In an Irish context, however, it appears older individuals are more prone to psychological costs such as loyalty and status-quo effects, while sicker individuals may be more prone to apathy. In terms of loyalty, little investigation has taken place into

[103] One could speculate that this differential may be related to the voluntary nature of the market, with individuals who voluntary purchase insurance (given advantageous selection) less prone to such non-rational behaviour.

its distribution across insured populations[104]. More broadly, however, evidence based on medium to high contact consumer services suggests that older individuals are more prone to service loyalty than their younger counterparts (Patterson, 2007). Evidence from this chapter suggests that these findings may be extended to health insurance markets also. It is possible to speculate a number of reasons as to why older individuals may be more prone to loyalty effects (Patterson, 2007). For instance, it may be the case as individuals age their values change and they may be more likely to exhibit 'loyal' behaviour. Over time it could also be the case that individuals build up a relationship or bond with their insurer, making it more difficult to switch. Alternatively, older individuals are perhaps simply more conservative and, consequently, may be less willing to switch insurer.

Some of these explanations could also reflect consumer inertia or status-quo bias on the part of older individuals in the market. It is therefore not surprising that older individuals were also more likely to cite 'been with my existing provider a long time' as a reason for not switching. In this context, Leukert-Becker and Zweifel (2014) found, through discrete choice experiments in the Dutch and German health insurance systems, that older (and also less healthy) consumers displayed higher willingness to pay to retain their current policy and this was interpreted as evidence of higher status-quo bias for this group[105].

In contrast, evidence suggests that less healthy individuals were more apathetic to the switching decision. In this regard, it may the case that those in worse health (rather than simply older individuals) are more concerned about quality of care and consequently need to consider a wider range of factors (than say, simply price) when searching for insurance plans. Apathy with the switching process may therefore be a reflection of the greater cognitive effort necessary for less healthy

[104] Although low switching rates of older individuals in the French system have been explained in terms of a 'loyalty' effect (Lako, Rosenau, and Daw, 2011).

[105] Unfortunately, lack of longitudinal data means age effects have to be interpreted with care. For instance it cannot be ruled out that loyalty may be more a function of a cohort effect (the older generation now have always displayed loyalty, the younger generation are less loyal and may continue to be as they age). Similarly, an age effect, *per se*, may not be responsible for older individuals' higher likelihood of citing 'been with my existing provider a long time' as a reason for not switching. Rather, it may stem from the fact that younger individuals have not been insured long enough to consider this response as a barrier to switching.

individuals to switch insurer. Supporting this view, those in worse health were also found to experience greater search costs, finding it more difficult to compare plans[106].

Consumer information and awareness

An important principle underlying rational behaviour is that consumers will make use of available information in the decision-making process. One source of such information may be recommendations from family members. However, there appears to have been a noticeable drop in consumers switching on the recommendation of a family member since 2009 (see Table 5.4), implying less reliance on informal advice. However, in this context, it does not appear that consumers have become more reliant on formal information sources. As outlined in Section 3.4.2, one important function of the HIA is the provision of information to aid the search and switching processes. In fact, consumer awareness of the functions of the market regulator, the HIA, has also been falling since 2009 and overall three out of five consumers were unaware of the functions of the HIA. In this context, there seems to be strong evidence of 'comparison friction' in the market, whereby there is a divide between the availability of switching information and consumers' use of it[107]. However, as noted, there was no meaningful difference observed between groups in terms of their consumer awareness of formal switching information.

Switcher characteristics

The findings that older and less healthy individuals experience greater search and switching costs is reflected in actual switching behaviour in the market. Older individuals and those with worse self-reported health status were less likely to switch. Similar findings are common among many other health insurance systems and are generally explained in terms of these individuals facing higher costs to switching (Duijmelinck, Mosca, and van de Ven, 2015; Lako, Rosenau, and Daw, 2011).

[106] It is interesting to note that previous evidence from the US and the Netherlands suggests that older individuals are prone to higher search costs (Besedes et al., 2012; Hanoch et al., 2009; Damman et al., 2012). Similar findings were not observed in this study.

[107] A similar friction has previously been identified in the US Medicare market (Kling et al., 2012).

5.5.1 Policy implications

A standard policy response to address search and switching costs is the provision of information around switching rules and plan comparison. While this information does exist, the 'comparison friction' identified means some non-switchers see transaction costs, particularly, and search costs, as reasons for not switching. This suggests that a broad information campaign across various media (e.g. television, radio, print) highlighting the existence of the HIA as a source of information on the switching process and plan comparison information, may prove worthwhile. For instance, transaction costs were identified as the most prominent switching cost in the market. However, as described previously, switching insurer is actually a straightforward process that in reality entails minimum transaction costs. If consumers were more aware of this fact, more consumers may be encouraged to switch. Moreover, while consumer awareness did not differ based on socio-demographic characteristics or health status, the fact that older and sicker individuals were found to experience higher search costs suggests a focused campaign by the regulator informing these groups of the availability of comparative plan information, may also be a policy worth pursuing in terms of addressing switching inequities in the market (Duijmelinck and van de Ven, 2015).

Another finding of this study was that consumer decision-making at present also seems to be largely orientated towards price considerations. In this context, the collection and distribution of consumer satisfaction information, such as that provided through CAHPS in the US and CQI in the Netherlands, may help improve quality competition in the market by allowing consumers differentiate between plans and insurers on dimensions other than price.

Any intervention to improve availability of comparative information or improve the awareness of such information should be cognisant that, for such policies to be successful, information would need to be presented in a straightforward and comprehensible way. Evidence suggests that presentation can influence consumers' interpretation and use of such information (Damman et al., 2012).

Although not empirically investigated, it could be that the number and complexity of plans in the Irish market are contributing to search costs. While more research is required to tease out this relationship, commentators have previously suggested the introduction of a standardised basic community rated plan for health insurance to address this (Turner and Shinnick, 2013). Additional risk rated supplementary cover could then be purchased by those requiring it. In fact, this was the structure being considered as part of universal health insurance reform (DOH, 2014a). However, as discussed in Section 2.3.2.2, the joint sale of basic and supplementary insurance can create additional switching costs and policy-makers would need to be cognisant of this. The burden of such costs would also be more likely to fall on high-risk individuals[108]. Relatedly, another potential issue with this plan structure is that some insurers might use their risk rating flexibility related to supplementary insurance as a tool for risk selection in standard insurance (Paolucci et al., 2007).

As noted by McGuire (2012), a disadvantage of the individual health insurance purchasing market is the higher individual selling and administration costs involved. In this context, an alternative option would be to expand the role employer-based health insurance plays in the Irish market. Employers, through shopping for health insurance products on behalf of their employees, limit the choice set available and consequently reduce employees' search costs (McGuire, 2012). Currently three in ten health insurance consumers in the Irish market have access to work group schemes, with one in four offering choice of provider (HIA, 2014e). An argument against this, of course, is that limiting consumer choice is not welfare-maximising. However, the higher administrative costs in individual purchasing markets may partially offset any consumer benefits from expanded choice (McGuire, 2012). Moreover, greater consumer choice is predicated on the assumption that consumers will be at least as well off in the presence of more choice yet evidence would suggest that too much choice often makes consumer decision-making more difficult (Frank and Lamiraud, 2009; Nadash and Day, 2014; Tanius,

[108] As a solution to this, Duijmelinck and van de Ven (2015) outlines a 'basic-plus-insurance' plan than might help address this problem.

Wood, and Hanoch, 2009; Bundorf and Szrek, 2010; Cummings, Rice, and Hanoch, 2009; Hanoch et al., 2009).

Policy interventions of this nature, however, have to be understood in the context of the finding of substantial psychological switching costs in the market. The presence of non-rational behaviour raises serious questions over the ability of a competitive market to allocate resources effectively, not least given the fact that policies attempting to improve the competitive environment may not be amenable to such non-rational behaviour. For example, it may be difficult to encourage switching for (more likely older) individuals who are loyal to their current insurer and refuse to switch.

Finally, an aspect of consumer mobility that this study did not address was the impact insurer incentives for risk selection may have on consumer decision-making. This is an important part of the conceptual framework to consider, and the extent to which incentives for risk selection exist in the Irish market is explored in Chapters 6 and 7.

5.6 Conclusion

The primary focus of this chapter was to explore the benefits and costs associated with switching insurer as faced by the consumers of private health insurance in Ireland. In terms of benefits, consumers were mainly motivated to switch in response to cost savings but less so in response to dimensions of quality. In contrast, individuals mainly did not switch due to satisfaction with their current insurance provider, however a number of barriers to switching were also identified. Transaction, search and psychological costs are all identified as potential barriers to switching among consumers, while the burden of these costs, overall, appeared to be felt more heavily by high-risk individuals. The distribution of these switching costs was reflected in actual switching behaviour whereby high-risk individuals were also less likely to switch, raising concerns over inequalities in switching capabilities in the Irish system.

Some proposals were identified to address these issues. For instance, given that three in five consumers are currently unaware of the functions of the HIA, both broad and targeted media campaigns to highlight the availability of plan comparison and switching information may help reduce the level of, and inequalities in, search and switching costs. More radically, the introduction of a standardised basic insurance package and/or a greater emphasis on employer-provided health insurance may help limit certain barriers to switching in the market. Policy-makers, however, need to be cognisant of the fact that non-rational psychological costs seem to play an important role in consumer decision-making. This both undermines the standard theoretical foundations of consumer choice and could mean some consumers may be unresponsive to policy intervention.

Chapter 6

Switching behaviour in the Irish health insurance market

6.1 Introduction

As discussed in Chapter 2, arguments in favour of competition within health insurance markets focus on its welfare enhancing effects. Particularly, requiring insurers to bear financial risk in addition to the 'threat of exit' are designed to promote both productive and allocative efficiency, providing consumers with the products they desire at optimal prices (Thomson et al., 2013). However, underlying the market mechanism are certain assumptions concerning consumer behaviour. Particularly, consumers are assumed to be utility-maximising beings who will rationally weigh up the benefits and costs when considering the decision to switch insurer. Moreover, the distribution of these costs and benefits is assumed not to be homogeneous across consumer groups and this is often given as an explanation for different observed switching propensities between high and low-risk groups in a number of competitive health insurance systems (see Section 2.3).

In this regard, the focus of the previous chapter was to gain a deeper insight into the consumer-reported benefits and costs to switching in the Irish market and whether the distribution of these costs differed between groups. The focus of this chapter is now to build on this analysis to consider *actual* switching behaviour in more detail. In terms of the layout of this chapter, the remainder of this section provides an introduction to this study, including specific research questions and hypotheses. Section 6.2 describes the data and methods utilised as part of this empirical analysis. This includes a description of a number of sensitivity tests conducted around variable specification and functional form. Section 6.3 presents the results of the analyses. Section 6.4 discusses the implications of the results along with highlighting certain limitations of the analysis. Section 6.5 concludes.

To review, Chapter 5 identified a number of important features of consumer switching behaviour in the Irish market. Overall it was found that,

- The most important reason for not switching was consumer satisfaction with their current insurer
- When individuals did switch they claimed to do so predominantly due to opportunities for cost savings.
- Quality was a less important reason, potentially due to restricted quality competition in the market.
- Barriers to switching identified included transaction, search, and psychological (i.e. apathy, loyalty and status-quo bias) costs.
- Costs of switching also differed based on consumer characteristics,
  - Older individuals were more likely to cite consumer loyalty and status-quo as reasons for not switching.
  - Less healthy individuals were more likely to cite apathy and search costs as reasons for not switching.

As noted, an important condition for a functioning competitive market is that consumers take price into account when switching as it motivates insurers to compete along that dimension. The fact that findings from Chapter 5 suggest consumers value cost-savings is not surprising given that premiums, for the majority of policyholders, are entirely paid out-of-pocket. In contrast to other health systems, out-of-pocket premiums in Ireland are not directly offset through income-based contributions, nor are premiums generally subsidised by employers (see Section 3.3)[109]. As such, it is expected that premium price will have a strong effect on actual switching behaviour also. However, something that was not possible to explore in Chapter 5 was whether consumer price-responsiveness differs between groups. For instance, higher search and switching costs on the part of high-risk individuals may make any benefits, in terms of lower premiums, less likely to motivate switching when compared with low-risk. Alternatively, those at higher risk of healthcare utilisation may be more concerned about other non-price aspects of their insurance (e.g. level of benefits) which may discount premium savings as a benefit. In both cases it could be expected that high-risk individuals may display lower price-responsiveness. Moreover, empirical evidence from other insurance markets has found lower price-responsiveness on the part of high-risks (see Section 2.3.1.1).

It is also important to consider in more detail whether the unequal distribution of costs of switching identified in the previous chapter leads to differences in actual switching behaviour. In this regard, high-risks can be expected to display lower switching propensities given that they appear to face higher search and switching costs than their low-risk counterparts. If high-risk groups therefore turn out to be less likely to switch it may encourage insurers to be less responsive to their preferences. However, as described by the conceptual framework underlying this thesis, it is important to examine the role risk selection may play in this process. If risk selection is a profitable competitive pursuit it may reinforce, or exacerbate, switching differentials between low and high-risks. As described in Section 3.5.1, risk selection strategies thought to have been employed in the Irish market included plan design (e.g. reduced orthopaedic benefit attractive to low-risks), marketing at low-risks, targeting multi-national companies and the pursuit of a

[109]However, as mentioned in Section 3.3.1, tax-relief is granted on all private health insurance premiums (at source) at a standard rate of 20% (up to a maximum premium of €1,000 per adult or €500 per child).

'price-shadowing' strategy to exploit the perceived higher price-sensitivity of low-risks.

In this context, robust risk equalisation is necessary to reduce incentives for risk selection that may exist in the market. Although, regardless of whether consumer mobility is influenced by risk selection or simply self selection (i.e. consumers naturally experiencing differential switching costs) it should be the case that robust risk equalisation is in place to equalise any cost differentials that may arise between switchers and stayers to ensure a 'level the playing field' on which genuine competition can take place (van Vliet, 2006). This is particularly important in an Irish context given the large risk asymmetry that has evolved between VHI and the newer market entrants (see Section 3.5.1).

As described in Section 3.4.3 while a bona-fide risk equalisation scheme was introduced in the Irish market in 2013 (following an interim system since 2009), little evidence exits as to the efficacy of this scheme in terms of its ability to equalise cost differentials between switchers and stayers. However, in an international context, the Irish risk equalisation design can be considered somewhat basic compared to more sophisticated designs in other health insurance systems (see Table 2.2). In this regard, a strand of literature has explicitly considered the association between risk equalisation and consumer mobility in more advanced risk equalisation systems. In terms of the Dutch system, van Vliet (2006) finds that switchers are good risks in an absolute sense, however, providing risk-adjusted premium subsidies based on health status eliminated predictable profits for this group. A similar conclusion was reached in Germany where more sophisticated risk equalisation, based on measures of health status, removed incentives for selection (Behrend et al., 2007).

In the context of the above discussion, this chapter therefore hopes to address two important research questions:

1. What are the plan and consumer characteristics than determine switching behaviour in the Irish health insurance market?

2. How well have Irish risk equalisation payments been able to address any cost differentials that exist between switchers and stayers?

It is hypothesised that,

- Due to lower search and switching costs (and potentially risk selection), low-risk individuals will be more likely to switch.
- Higher premiums, relative to the market, will have a positive effect on switching.
- Due to lower search and switching costs (and potentially risk selection), low-risk individuals will be more price-sensitive.
- The relatively basic design of the Irish risk equalisation scheme may not fully equalise cost differentials that arise between switchers and stayers.

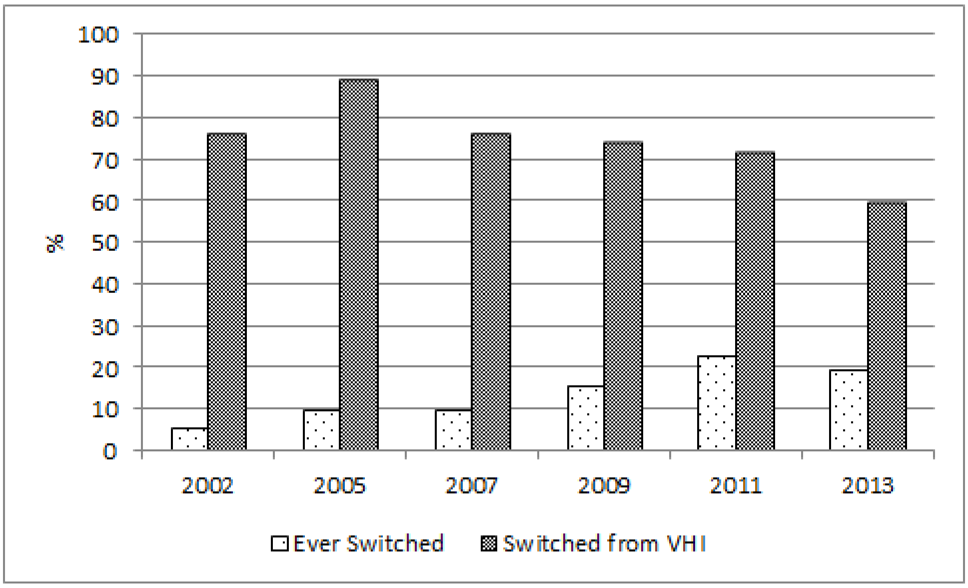
6.1.1 Consumer mobility in the Irish market

As described in Section 3.4.2, health insurance contracts in Ireland are generally of one-year duration and, as such, consumers in the market are entitled to switch plan or insurer annually. Switching insurer is generally not a tedious process and can be completed quickly and straightforwardly over the phone or online.

While a review of current evidence of the motivations for switching and not switching were discussed in the previous chapter, less is known empirically about actual switching behaviour in the market. The main source of information on switching behaviour relates to (approximately) biennial consumer surveys commissioned by the HIA. These surveys reveal that switching in the Irish market has historically been quite low. Although no information exists on annual switching rates, information is collected on those who have ever switched insurer. As reported in Figure 6.1, the percentage of private health insurance consumers stating that they have ever switched was estimated at 6% in 2002, rising to a peak of 23% in 2011 and falling back slightly to 20% in 2013. In 2013, of those who switched, three in ten had done so more than once (HIA, 2014e).

As would be expected the vast majority of switching has been away from VHI. Again, not surprisingly, this was particularly so in the nascent years of competition. For example in 2005, 89% of all switching was away from VHI. This has since fallen to an estimated 60% in 2013 (see Figure 6.1).

FIGURE 6.1: Percentage ever switched insurer and switchers away from VHI 2002-2013.



Source: HIA (2003), HIA (2005b), HIA (2008b), HIA (2010c), HIA (2012), and HIA (2014e)

Little evidence exists on the characteristics of switchers apart from their age breakdown relative to non-switchers, reported in 2005 (HIA, 2005b). As can be seen from Table 6.1 it was generally younger individuals who switch, with 74% of switchers aged between 18-44 compared to 54% of non-switchers.

Table 6.1: Age breakdown of switchers and non-switchers , 2005

Age cohort	**Switchers % (n=80)**	**Non-switchers % (n=481)**
18-24	9	13
25-34	34	19
35-44	31	22
45-54	15	18
55-64	10	15
65+	1	14

Source: Adapted from Table 4, the Competition Authority (2007, pg. 49); based on HIA (2005b) analysis.

6.2 Data and methods

The main source of data for this study was provided by VHI, the largest insurer in the market. The database provided policy-level information on 450,862 policies. Over the period July 2013 to June 2014 all policies were flagged at the time of renewal[110]. At the time of the renewal decision, policyholders were then classified as switchers or stayers, with the following definitions:

Switchers - Policyholders, who, at the time of renewal decided to cancel their existing policy and switch to a competitor. Whether a switch to a rival insurer occurred is known based on information provided by the departing policyholder[111].
Stayers - Stayers are defined as those who, at time of their renewal decision, renewed their subscription with the insurer. This includes those who switched plans *within* VHI.

Socio-demographic, healthcare utilisation and policy-specific information for each policyholder was collected for the prior 12 months. All policies were 12 month

[110]The highest proportion of policy renewal decisions took place in January 2014 (34.7%).
[111]As this is a voluntary market, the other option faced by policyholders was to exit the market. These individuals were excluded from this study.

contracts. Information on employer-based group health insurance policies was not included in the dataset. To facilitate analysis, the dataset was refined in a number of ways. Specifically, all policies that had changes in cover, added individuals to the policy, or had multiple coversets, during the previous 12 months prior to the renew/switch decision were excluded. Discontinued and unpaid policies or policies where the subscriber died during the period of cover, were excluded. Furthermore, not all policy renewals/switches relating to July 2013 were captured on the dataset and on the advice of the VHI data analytics team it was agreed to drop these observations from the analysis. This related to only 0.25% (1,118/450,862) of total policy observations. This left a final total of 320,830 policies for analysis (see Table 6.2). Although this data had been cleaned and verified in-house by VHI data analytics department, 1,781 missing values were found related to policyholder age (0.6% of observations). These cases were listwise excluded from the regression analyses.

Table 6.2: Data cleaning–VHI policyholder data

Total Policies on File	**450,862**
Remove deceased, discontinued, unpaid and other policies	382,367
Exclude policy changes	381,405
Exclude multiple coversets	330,009
Exclude changes to number on policy	321,948
Exclude July 2013	**320,830**

In order to gain an understanding of the determinants of consumer switching, differences in plan and consumer characteristics between switchers and stayers for the 12 months leading up to the switch/renew decision were assessed by means of a binary logistic regression model (this is a popular approach to modelling consumer mobility, see Section 4.3.2 for an overview of this approach).

As data are captured at the policy level and not the individual level, regressions are presented in terms of single-person, multiple-person, and total policies. In order to be confident of robust inference, cluster robust errors are specified to account for any correlation between errors that occur within policies (see White (1980)). The logistic regression models are specified as follows, Model 1

$$Pr(Switch_i = 1) = \frac{exp(\beta_0 + \sum_{k=1}^{4} \beta_k X_{ki} + \sum_{k=1}^{7} \gamma_k Z_{ki})}{1 + exp(\beta_0 + \sum_{k=1}^{4} \beta_k X_{ki} + \sum_{k=1}^{7} \gamma_k Z_{ki})} \tag{6.1}$$

Model 2

$$Pr(Switch_i = 1) = \frac{exp(\beta_0 + \sum_{k=1}^{4} \beta_k X_{ki} + \sum_{k=1}^{7} \gamma_k Z_{ki} + \delta Price_i^* Age_i)}{1 + exp(\beta_0 + \sum_{k=1}^{4} \beta_k X_{ki} + \sum_{k=1}^{7} \gamma_k Z_{ki} + \delta Price_i^* Age_i)} \tag{6.2}$$

Model 3

$$Pr(Switch_i = 1) = \frac{exp(\beta_0 + \sum_{k=1}^{4} \beta_k X_{ki} + \sum_{k=1}^{7} \gamma_k Z_{ki} + \delta Price_i^* LOS_i)}{1 + exp(\beta_0 + \sum_{k=1}^{4} \beta_k X_{ki} + \sum_{k=1}^{7} \gamma_k Z_{ki} + \delta Price_i^* LOS_i)} \tag{6.3}$$

i=1...320,830

Where,

X_k, is a set of consumer characteristics (policyholder age, sex, marital status, region of residence) Z_k, is a set of plan characteristics (children on policy, students on policy, duration of cover, level of cover, length of hospital stay [LOS], relative premium change, month of renewal). In addition, Model 2 examines interactions between relative premium price ($Price_i$) and policyholder age (Age_i), while Model 3 examines interactions between relative premium price and LOS (LOS_i). β, γ, δ represent associated parameters to be estimated. Coefficients (estimated parameters) in non-linear models represent log-odds and are not directly meaningful. As such results are presented in terms of average marginal effects (AME) (see Section 4.3.3).

While the estimation of interaction effects δ, is straight forward in linear models, much care needs to be taken when calculating interaction effects in non-linear specifications. As described by Ai and Norton (2003), the magnitude of an interaction effect in non-linear models does not equal the marginal effect of the interaction term. The correct interaction effect is the cross derivative, rather than simply the marginal effect on the interaction term. Moreover, for correct statistical inference, alternative standard errors need to be also calculated. Use is made of the Stata program *inteff* to calculate correct interaction effects and their standard errors (Norton, Wang, and Ai, 2004)[112]. Figures A.1 - A.6 present graphically the distribution of these interaction effects and their associated z-values for single-person, multiple-person and total policies, respectively.

Given that probabilities capture non-linear effects it is also prudent to examine these associations of interest over a range of possible values. In this context, interaction effects are further investigated by calculating predicted probabilities from Equation (6.1) and assessing them for various levels of relative price changes and age, and LOS, respectively.

Relative price effects are determined through a premium variable which captures the difference in the percentage change of a policyholders premium at the time of the switch/renew decision and the percentage change in the market average. Average market premiums were calculated based on quarterly premium data provided by the HIA.

In order to reduce bias the maximum level of cover of a particular policy is controlled for in the regression analyses. Both the theories of adverse selection and moral hazard would predict that ex post expenditures and utilisation will be influenced by the amount of cover (Breyer, Bundorf, and Pauly, 2012). Moreover, in the Irish context, private care can be provided in public as well as private hospitals and therefore, without controlling for level of cover, differences in expenditure/utilisation may not accurately reflect differences in health status. Level of cover is categorised based on HIA definitions (see Table 6.4).

As noted, a number of other control variables are also included in the regression equations. These relate to sex, marital status, single/multiple-person policy

[112]Unfortunately, the *inteff* program does not allow for the calculation of more than one interaction effect per model, necessitating the need for separate models.

dummy (where applicable), student dummy, children dummy (where applicable), duration of cover with VHI and month of policy renewal. Regressions also control for the impact region of residence may have on switching propensities. Region of residence is categorised into Dublin, the rest of Leinster, Munster, Ulster[113], Connacht and Other (residing outside these areas). Leinster is considered the most populous province (with over half residing in Dublin), followed by Ulster (as a whole), Munster and Connacht (CSO, 2016).

Model fit is examined through log-likelihood and (pseudo) R-squared (R^2) statistics[114]. Log-likelihood represents the value that maximises the log-likelihood equation used to estimate parameters in non-linear regression analysis, such as logistic regression (Hosmer, Lemeshow, and Sturdivant, 2000). Log-likelihood does not represent an absolute measure of fit but allows for comparison of fit across models with the same dependent variable and sample size. As it is the value that maximises a function, higher (less negative) values indicate better fit. A (psuedo) R^2 statistic based on comparison of the likelihood values from the null (intercept only) model and the fitted model (see McFadden (1974)) is also presented. Similar to standard R^2, values range from 0 to 1 with higher values indicating better fit (although values are presented as percentages in this chapter).

Finally, the impact of Ireland's tax credit and subsequent risk equalisation scheme is examined in terms of their ability to equalise any cost differentials that exist between stayers and switchers. Differences in average costs between switchers and stayers are calculated based on recorded claims expenditure for the 12 months prior to switching/renewing. Adjustments for tax/risk equalisation credits and levies are made based on publicly available data (over the period of analysis) provided by the HIA. The credit values used over the period of analysis are presented in Table 6.3. Adjustments to average claims expenditures for switchers and stayers are made as follows,

[113]Relates only to those Ulster counties that are part of the Republic of Ireland (i.e. Donegal, Monaghan and Cavan).

[114]As maximum likelihood, not least-squares, is used as the estimation technique standard R^2 is not applicable.

$$\overline{Cost_i} = \overline{Exp_i} + \overline{Lev_i} - \overline{Credit_i} \tag{6.4}$$

i=Stayer, Switcher

Where,

$\overline{Cost_i}$ represents average (risk-adjusted) cost

$\overline{Exp_i}$ represents average claims expenditure

$\overline{Lev_i}$ represents average levy contribution

$\overline{Credit_i}$ represents average risk equalisation credit received.

Table 6.3: Tax/risk equalisation credits to insurers and community rating levies 2012-2014

Age	**2012/2013 Q1**	**01/03/2013 – 28/02/2014 (since 01/03/2014)[a]**			
		Non-Advanced Contract		Advanced Contract	
		Men €	Women €	Men €	Women €
60-64	600	375 (250)	250 (200)	425 (450)	275 (325)
65-69	975	900 (575)	650 (400)	1,050 (1,150)	775 (775)
70-74	1,400	1,450 (925)	975 (625)	1,700 (1,850)	1,150 (1,200)
75-79	2,025	2,050 (1,200)	1,550 (950)	2,425 (2,500)	1,800 (1,925)
80-84	2,400	2,850 (1,575)	1,925 (1,150)	3,375 (3,200)	2,275 (2,250)
85+	2,700	2,850 (1,975)	1,925 (1,325)	3,375 (4,000)	2,275 (2,725)
Community Rating Levy					
Adult	285	290 (290)	290 (290)	350 (399)	350 (399)
Child	95	100 (100)	100 (100)	120 (135)	120 (135)

[a] Between 01/03/2013 – 28/02/2014 a hospital bed utilisation charge of €75 was paid in respect of each overnight stay in hospital. Since 01/03/2014 (to 28/02/2015) this had fallen to €60.

Source: Adapted from HIA (2013c)

6.2.1 Sensitivity analyses

In order to examine the robustness of results, a number of sensitivity analyses are reported in Appendix A. Firstly, the robustness of price effects is explored through examining four alternative specifications of the premium variable. These are presented in Table A.2. First, consideration is given to whether the premium relative to the market average at time of switching influences behaviour. The second price variable looks at the percentage change in premium, regardless of market premium dynamics. Price variables three and four look at absolute (i.e. in euro) premium change effects, which might influence behaviour differently to percentage changes in premium. The four alternative premium specifications are,

1. Ratio of premium charged at time of the renew/switch decision to market average premium.
2. Percentage change in policy premium over the 12 months to the renew/switch decision.
3. Change (in euro) in policy premium over the 12 months to the renew/switch decision.
4. Difference between the change (in euro) in policy premium over the 12 months to the renew/switch decision and the change in the market average premium (in euro).

Secondly, to examine the sensitivity of results to functional form, switching propensities are also estimated by means of an alternative LPM (see Section 4.3.1) in Table A.3.

6.3 Results

Descriptive statistics

Descriptive statistics are presented in Table 6.4. The largest proportion of policyholders were aged 60-69 (20.6%), while those in the 18-29 year age group contained the least number of policyholders (4.0%). There were a higher proportion of male (51.2%) and non-married (59.4%) policyholders, respectively. The largest proportion of policyholders resided in Dublin (34.6%). The majority of policies were single-person policies (54.3%), while children (students) were recorded on 16.3% (3.8%) of total policies. The vast majority of policies provided cover up to a semi-private room in a private hospital (76.1%). VHI premiums increased, on average, by 9.2% more than market average increases[115]. Average LOS was slightly less than a day while on average, length of cover with VHI was just over 18 years. Finally, the highest proportion of policy renewals took place in January 2014 (see Figure 6.2).

In the bivariate analysis, statistically significant differences existed between switchers and stayers for most variables. A greater proportion of switchers tended to be from the youngest age groups (18-29 [$p < 0.01$], 30-39 [$p < 0.01$], 40-49 [$p = 0.06$]) and a lower proportion from the oldest age groups (70-79 [$p < 0.01$], 80+ [$p < 0.01$]). Switchers were more likely to be male ($p < 0.01$) and married ($p < 0.01$), respectively. Switchers were less likely to reside in Dublin ($p < 0.01$) and more likely to reside in the rest of Leinster ($p = 0.02$), Munster ($p < 0.01$) and Connacht ($p < 0.01$). Switchers were more likely to belong to a multiple-person ($p < 0.01$) policy and more likely to have children on their policy ($p < 0.01$). In terms of policy cover, 84.9% of switchers had cover up to a semi-private room in a private hospital versus 75.8% of stayers ($p < 0.01$).

In terms of continuous variables, average length of hospital stay over the prior 12 months was 0.71 days for switchers and 0.96 days for stayers ($p < 0.01$). Relative VHI premium increases were, on average, 9.41% for switchers versus 9.2% for stayers ($p < 0.01$). Average length of cover prior to the switch/renew decision was statistically significantly ($p < 0.01$) longer for stayers (18.3 years) than for switchers (13.7 years).

[115]While strong premium inflation was experienced over this period of analysis in the Irish market ((Turner, 2013)), VHI's particularly strong premium increases most likely reflect a worsening relative risk profile compared to the other market insurers.

Table 6.4: Descriptive statistics for policyholders and policies

Variables		**Total %** (N=320,830)[a]	**Stay %** (N=307,007)	**Switch %** (N=12,042)	**P-value**
Policyholder age	18-29	4.02	3.32	7.62	p<0.01
	30-39	13.75	13.5	22.23	p<0.01
	40-49	17.83	17.91	18.58	p=0.06
	50-59	19.22	19.34	19.03	p=0.40
	60-69	20.57	20.7	20.5	p=0.60
	70-79	16.06	16.4	9.8	p<0.01
	80+	8.54	8.84	2.23	p<0.01
Policyholder sex	Male	51.19	51.12	53.1	p<0.01
	Female	48.81	48.88	46.9	
Policyholder marital status	Married	40.65	40.38	47.51	p<0.01
	Not married	59.35	59.62	52.49	
Policyholder region of residence	Dublin	34.63	34.77	31.01	p<0.01
	Leinster	22.65	22.61	23.55	p=0.02
	Ulster	3.35	3.35	3.21	p=0.40
	Munster	28.87	28.8	30.48	p<0.01
	Connacht	10.35	10.3	11.61	p<0.01
	Other	0.16	0.16	0.14	p=0.59
Multiple-person policy	Yes	45.68	45.32	54.85	p<0.01
	No	54.32	54.68	45.15	
Children on policy	Yes	16.33	16.06	23.26	p<0.01
	No	83.67	83.94	76.74	
Students on policy	Yes	3.73	3.72	3.93	p=0.23
	No	96.27	96.28	96.07	
Maximum policy cover[b]	1	8.37	8.47	5.89	p<0.01
	2	76.12	75.78	84.89	p<0.01
	3	15.5	15.75	9.21	p<0.01
		Mean (S.D)			
LOS per policy (days)[c]		0.95 (4.10)	0.96 (4.15)	0.71 (2.63)	p<0.01
VHI relative premium increase (%)		9.21 (8.23)	9.20 (8.25)	9.41 (7.7)	p<0.01
Length of VHI cover (years)		18.10 (12.35)	18.27 (12.35)	13.74 (11.45)	p<0.01

[a] 1,781 missing observations on policyholder age.

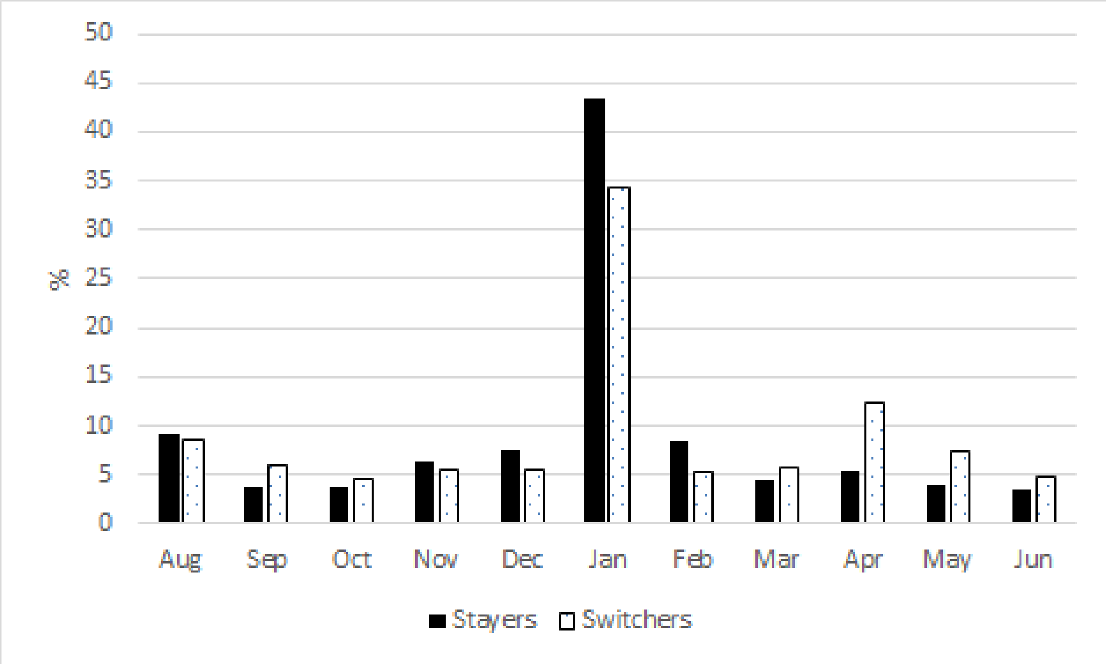
[b] 1= semi-private/private room in a public hospital; 2= semi-private room in private hospital; 3= private room in a private hospital or a semi-private or private room in a high-tech hospital.

[c] LOS captures both day and inpatient hospital stays.

Total policies

Table 6.5 reports the results of the logistic regression analysis for total policies. All results are reported in terms of AME relative to a base switching rate of 3.8%. In terms of consumer characteristics, each additional year of age was estimated

Figure 6.2: Month of contract renewal decision broken down by stayers and switchers, August 2013 to June 2014



Note: Significant differences between switchers and stayers (at p <0.05) exist for all months apart from August 2013.

to reduce the probability of switching by 0.1 percentage points in Model 1 and 3, and 0.11 percentage points in Model 2. Being male increased the probability of switching by 0.36 percentage points (0.37 percentage points in Model 2) while, independently, being married (compared to not married) increased the probability of switching by a relatively large 0.94 percentage points. Compared to those residing in Dublin, those residing in Munster (AME = 0.53, $p < 0.01$), Connacht (AME = 0.83, $p < 0.01$), and other parts of Leinster (AME = 0.31, $p < 0.05$) were all more likely to switch.

In terms of policy characteristics, single/multiple-person policy type had a large effect on switching propensities. Multiple-person policyholders were estimated to be 1.2 percentage points more likely to switch than those on single-person policies. However, controlling for other factors, there is no evidence that having either children or students on a policy impacted on the decision to switch. Each additional year of cover with VHI reduced the probability of switching by 0.10 percentage points, on average, while level of cover did not impact on switching probabilities. For each additional day of hospital stay recorded in the prior 12 months, the probability of switching fell by 0.08 percentage points (0.05 percentage points in Model 3), suggesting those in worse health were less likely to switch. In contrast, for each additional percentage point increase in VHI's premium relative to the market average, the probability of switching increased by 0.18 percentage points (this effect was not significant in Model 2). Given the low base switching rate (i.e. 3.8%) and specification of the premium variable, this effect size can be considered quite large. The model suggests that, holding all other factors constant, if VHI's premiums were to increase by 10% relative to the market average, it would result in approximately an additional 5,743 switchers out of VHI (319,049*0.018). In terms of interaction effects, there was statistically significant evidence that as individuals became older (AME = -0.004, $p < 0.01$), and (separately) as hospital utilisation increased (AME = -0.006, $p < 0.01$) they became less price-sensitive.

Results for the LPM regressions, presented in Table A.3, were consistent in terms of the direction and statistical significance of associations described above. The only noticeable inconsistency was that, while the interaction effect between price and age was also negative, it was not statistically significant.

Single and multiple-person policies

Table 6.6 reports the results of the logistic regression analysis broken down by single and multiple-person policies. For a number of variables of interest, disaggregating the analysis in these terms provides similar associations to those presented in Table 6.5. Age, for instance, was negatively associated with the switching decision for both single (AME = -0.09, $p < 0.01$, Model 1 and 3; AME = -0.08, $p < 0.01$, Model 2) and multiple-person policies (AME = -0.12, $p < 0.01$, Model 1 and 3; AME = -0.14, $p < 0.01$, Model 2). Each additional year of cover reduced the probability of switching by 0.84 percentage points (0.85 percentage points, Model 2) for single-person policies and by 0.12 percentage points for multiple-person policies. Similarly, each additional recorded day of LOS over the prior 12 months reduced the probability of switching by 0.07 percentage points for single-person policies (Model 1 and 2) and by 0.08 percentage points for multiple-person policies (0.09 percentage points, Model 2). Statistically significant positive price effects were

Table 6.5: Regression model of switching behaviour for total policies

Variables[a,b]	**Total**		
	Model 1	**Model 2**	**Model 3**
	dy/dx[c] **(S.E)**	**dy/dx**[c] **(S.E)**	**dy/dx**[c] **(S.E)**
Age	-0.103*** (0.01)	-0.11*** (0.013)	-0.103*** (0.01)
Male *(ref =female)*	0.364*** (0.124)	0.366*** (0.121)	0.364*** (0.124)
Married *(ref = not married)*	0.936*** (0.137)	0.935*** (0.136)	0.936*** (0.137)
Region of residence *(ref=Dublin)*			
Leinster	0.312*** (0.151)	0.312** (0.15)	0.312** (0.151)
Ulster	0.289 (0.3)	0.291 (0.298)	0.289 (0.3)
Munster	0.529*** (0.184)	0.527*** (0.187)	0.529*** (0.184)
Connacht	0.829*** (0.191)	0.829*** (0.19)	0.829*** (0.191)
Other	0.442 (1.085)	0.447 (1.087)	0.443 (1.085)
Single/multiple dummy	1.23*** (0.239)	1.236*** (0.232)	1.23*** (0.239)
Children dummy	-0.068 (0.408)	-0.068 (0.41)	-0.067 (0.408)
Students dummy	-0.139 (0.363)	-0.108 (0.334)	-0.139 (0.363)
Duration (years) with VHI	-0.099*** (0.015)	-0.098*** (0.015)	-0.099*** (0.015)
Maximum Cover Level			
Cover level 1	-0.342 (0.74)	-0.369 (0.777)	-0.339 (0.773)
Cover level 3	-1.085 (0.727)	-1.24 (0.897)	-1.208 (0.908)
Average LOS	-0.081*** (0.018)	-0.082*** (0.017)	-0.048* (0.026)
Relative price change (%)	0.179*** (0.047)	0.149 (0.094)	0.18*** (0.048)
Relative price (%)* Age[d]		-0.004*** (0.002)	
Relative price (%)* LOS[d]			-0.006*** (0.003)
R^2 (%)	5.56	5.59	5.58
Log-likelihood	-48359.84	-48355.75	-48357.18
Switch (%)	3.8		

[a] Not included in table are month-of-renewal/switch specific and region of residence specific intercepts.
[b] Variables relate to description of main policyholder, where applicable.
[c] AME multiplied by 100.
[d] Interaction effects calculated using Stata *inteff* program.
*p<0.1, **p<0.05, ***p<0.01, cluster robust standard errors in parenthesis.

also observed for both single (AME = 0.15, Model 1 and 3; AME = 0.18, Model 2) and multiple-person policies (AME = 0.23, Model 1 and 3), with effect sizes larger for multiple-person policies.

Observed positive associations between switching probabilities and sex, marital status and region of residence[116], respectively, were statistically significant only for multiple-person policy breakdowns. In contrast, only students who were single-person policyholders were more likely to switch. Finally, price-sensitivities fell with age (AME =-0.004, $p < 0.01$) and prior hospital utilisation (AME = -0.006, $p < 0.01$) for single-person policies, but associations were not statistically significant for multiple-person policies.

As noted, sensitivity analyses were conducted to examine the robustness of price effects across different specifications of the premium variable. These are presented in Table A.2 of Appendix A. Firstly, the positive and statistically significant price effects identified above appear to be robust to alternative specifications of the premium variable. This holds for single-person, multiple-person and total policies. Interaction effects in these models also suggest that price sensitivity falls with age and prior hospital utilisation, respectively, although not all relationships were statistically significant.

Finally, it is worth commenting on the goodness of fit of these models. Overall, goodness of fit statistics did not vary substantially across alternative model specifications (i.e. Model 1/2/3). However, pseudo R^2 statistics indicated a slightly better fit for models based on single-person policies (5.7%) compared to multiple-person policies (4.9%). Although the pseudo R^2 statistics reported for all models were low, this is not unusual in logistic regression analysis (Hosmer, Lemeshow, and Sturdivant, 2000).

Predicted probabilities

Figures 6.3, 6.4 and 6.5 examine price effect interactions from the perspective of predicted probabilities. The first point to observe is that, consistent with the

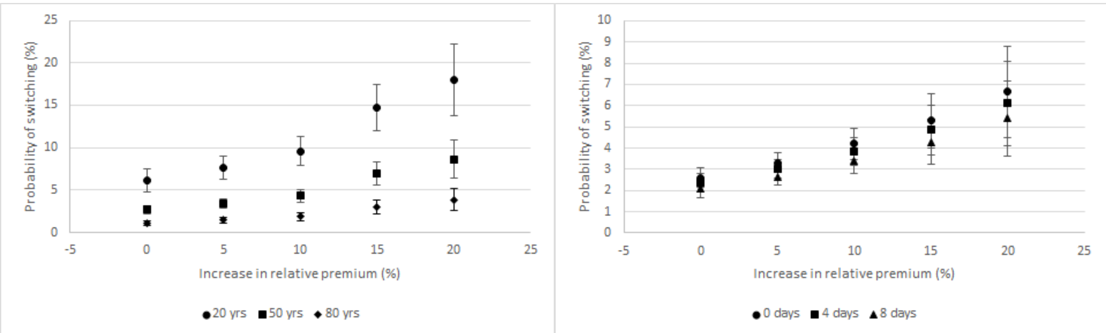
[116] Apart from some evidence of weakly statistically significant effects for those living in Connacht (versus Dublin) for single-person policies (AME = 0.32, $p < 0.1$).

TABLE 6.6: Regression model of switching behaviour for single and multiple-person policies

Variables[a,b]	Single			Multiple		
	Model 1	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
	dy/dx[c] (S.E)	**dy/dx[c] (S.E)**	**dy/dx[c] (S.E)**	**dy/dx[c] (S.E)**	**dy/dx[c] (S.E)**	**dy/dx[c] (S.E)**
Age	-0.087*** (0.009)	-0.08*** (0.011)	-0.087*** (0.009)	-0.119*** (0.016)	-0.144*** (0.029)	-0.119*** (0.016)
Male (*ref =female*)	0.136 (0.118)	0.13 (0.114)	0.136 (0.118)	0.57*** (0.213)	0.58*** (0.209)	0.57*** (0.213)
Married (*ref = not married*)	0.501 (0.324)	0.503 (0.321)	0.501 (0.325)	1.167*** (0.206)	1.165*** (0.207)	1.167*** (0.206)
Region of residence (*Ref=Dublin*)						
Leinster	0.735 (0.059)	0.059 (0.177)	0.06 (0.177)	0.672*** (0.205)	0.673*** (0.205)	0.672*** (0.205)
Ulster	-0.136 (0.297)	-0.137 (0.297)	-0.137 (0.297)	0.844** (0.466)	0.846** (0.466)	0.844** (0.466)
Munster	0.172 (0.142)	0.176 (0.143)	0.173 (0.142)	1.02*** (0.279)	1.012*** (0.284)	1.02*** (0.279)
Connacht	0.319* (0.177)	0.319* (0.177)	0.319* (0.178)	1.5*** (0.285)	1.5*** (0.282)	1.5*** (0.285)
Other	0.791 (0.844)	0.789 (0.844)	0.793 (0.844)	-2.125 (2.523)	-2.092 (2.527)	-2.125 (2.523)
Children dummy				0.171 (0.49)	0.133 (0.487)	0.171 (0.49)
Students dummy	2.81*** (0.813)	2.754*** (0.784)	2.816*** (0.815)	-0.411 (0.466)	-0.302 (0.378)	-0.411 (0.466)
Duration (years) with VHI	-0.084*** (0.014)	-0.085*** (0.014)	-0.084*** (0.014)	-0.117*** (0.02)	-0.117*** (0.02)	-0.117*** (0.02)
Maximum Cover Level						
Cover level 1	0.097 (0.571)	0.139 (0.589)	0.104 (0.571)	-1.234 (1.349)	-1.243 (1.309)	-1.234 (1.35)
Cover level 3	-1.093 (0.708)	-1.054 (0.673)	-1.088 (0.706)	-1.313 (1.203)	-1.408 (1.214)	-1.313 (1.201)
Average LOS	-0.073*** (0.02)	-0.072*** (0.02)	-0.032 (0.022)	-0.081*** (0.028)	-0.086*** (0.026)	-0.082* (0.072)
Relative price change (%)	0.146** (0.04)	0.177** (0.07)	0.147*** (0.04)	0.225*** (0.063)	0.108 (0.16)	0.225*** (0.063)
Relative price (%)* Age[d]		-0.004*** (0.002)			-0.003 (0.004)	
Relative price (%)* LOS[d]			-0.006*** (0.002)			-0.004 (0.005)
R^2 (%)	5.73	5.74	5.73	4.92	4.95	4.92
Log-likelihood	-22747.19	-22745.35	-22746.33	-25549.33	-25542.03	-25549.33
Switch (%)	3.1			4.5		

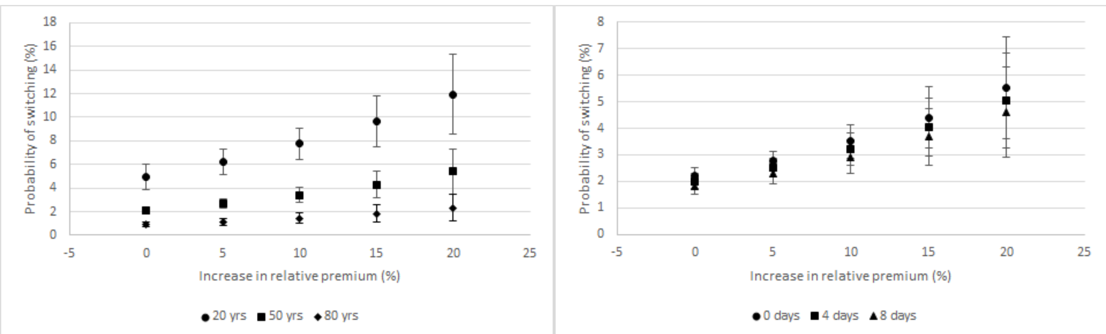
[a] Not included in table are month-of-renewal/switch specific and region of residence specific intercepts.
[b] Variables relate to description of main policyholder, where applicable.
[c] AME multiplied by 100.
[d] Interaction effects calculated using Stata *inteff* program.
*p<0.1, **p<0.05, ***p<0.01, cluster robust standard errors in parenthesis.

regression analyses presented above, higher relative premium change was positively associated with switching probabilities in all graphs. Similarly, higher levels of switching were recorded for younger policyholders in Figures 6.3a, 6.4a and 6.5a and for those with lower recorded hospital utilisation in Figures 6.3b, 6.4b and 6.5b. Consistent with the logistic regression analysis, price-sensitivity also appeared to fall with age. For total policies, for those aged 20 years the predicted probability of switching for a zero percent increase in relative premium was 6.1% however this rose to 18.0% for a 20% increase in relative premium. In contrast, for those aged 80 years the predicted probability of switching for a zero percent increase in relative premium was 1.1%, however this was only predicted to rise to 3.9% for a 20% increase in relative premium. Similar effects were observed for single and multiple-person policies, respectively. In contrast, Figures 6.3b, 6.4b and 6.5b suggest that interaction effects broken down by prior utilisation were less substantial, with large overlaps between confidence intervals.



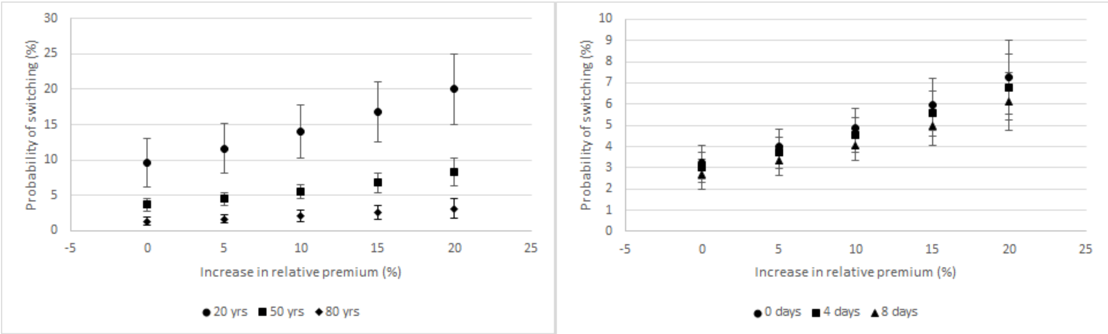
(A) Relative premium and age (B) Relative premium and LOS

FIGURE 6.3: Predicted probabilities of switching for total policies



(A) Relative premium and age (B) Relative premium and LOS

FIGURE 6.4: Predicted probabilities of switching for single-person policies



(A) Relative premium and age (B) Relative premium and LOS

FIGURE 6.5: Predicted probabilities of switching for multiple-person policies

Risk equalisation

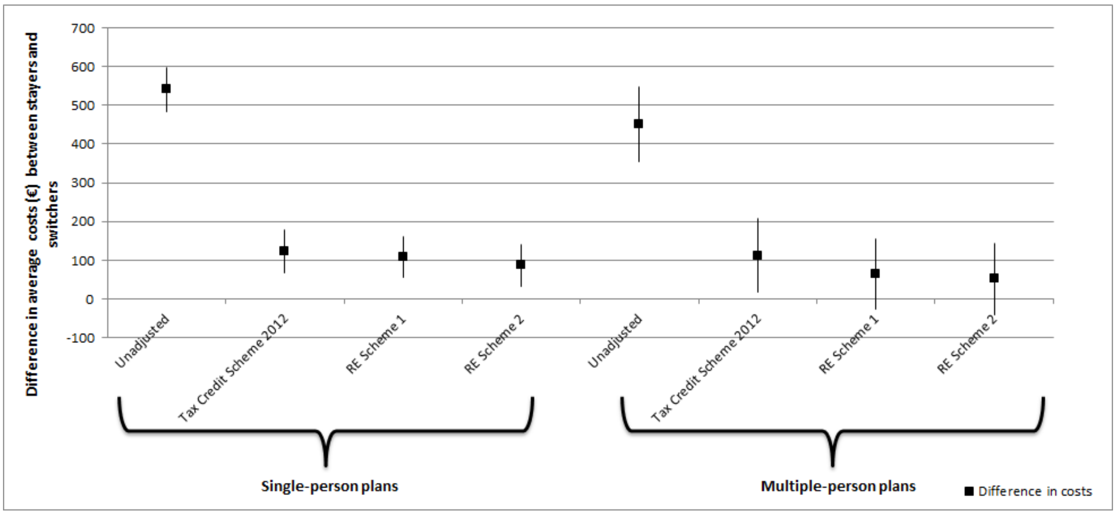
Finally, Figure 6.6 graphs the difference in average costs for the 12 months prior to the switch/renew decision between stayers and switchers for successive iterations of risk-adjusted subsidies. In absolute terms, the difference in average costs between stayers and switchers was quite large for both single-person (difference in average costs= €540.64; CI =€484.37 - €596.90) and multiple-person (difference in average costs= €450.74; CI = €355.33 - €546.15) policies, reflecting the fact that it was low-risks (younger, healthier) who tended to switch. However, successive iterations of risk equalisation appear to have substantially reduced the profitability of switchers, although some residual incentives for risk selection may have remained. Particularly, single-person switchers remained profitable following application of risk equalisation credits (difference in average costs= €88.12; CI = €34.04 - €142.20).

6.4 Discussion

Switching rates in health insurance markets are generally low. For example, following reform in 2006 annual switching rates in the Netherlands have settled between approximately 3-6% (Boonen, Laske-Aldershof, and Schut, 2015; Reitsma-van Rooijen, de Jong, and Rijken, 2011)[117]. Switching rates in Germany have been

[117]Following the introduction of the 2006 Health Insurance Act in the Netherlands, the percentage of switchers was recorded at 26%. Boonen, Laske-Aldershof, and Schut (2015) note that this was most likely due to the fact that the reform urged consumers to reconsider their health plan

FIGURE 6.6: Unadjusted and risk-adjusted differentials in average costs (95% CI) between switchers and stayers for single-person and multiple-person policies.[a,b]



[a] Age data were only available for policyholder and spouse (if applicable), therefore it was not possible to include plans with >=2 adults that were not married (approx. 3.1% of policies).
[b] RE Scheme 1 relates to credits and levies applicable between 01/03/2013 – 28/02/2014. RE Scheme 2 relates to credits and levies applicable since 01/03/2014.

reported at 5% in 2000 (Laske-Aldershof et al., 2004) and around 3% in Switzerland (Frank and Lamiraud, 2009). Lower rates, typically 1%, have been reported in Belgium (Schokkaert and van de Voorde, 2003) and Israel (Shmueli, Bendelac, and Achdut, 2007). In the employer-based market in the US, rates of between 3-6% have been reported for University of California employees (Buchmueller and Feldstein, 1996).

Similar to the rates reported above, this study estimated an annual switching rate in the Irish market of 3.8%, overall[118]. Evidence from Chapter 5 suggests that, in an Irish context, low switching rates may primarily be a function of consumer satisfaction with their current insurer, although a number of barriers to switching

choice given the substantial change in health insurance products brought about by the reform. However, individuals were not forced to make an active choice and where no choice was made, consumers were assigned a default health plan offered by their existing insurer.

[118]This however, requires qualification. It relates only to those switching out of VHI and is calculated at the policy-level, not the individual-level.

were also identified. However, a central argument of this thesis is that when considering the competitive implications of consumer mobility, it is not the switching rate, *per se*, that should be focused on but rather who switchers, who does not switch and their motivations for doing so.

In this context, a major objective of this study was to gain an understanding into important policy and consumer characteristics that determined switching behaviour. In terms of consumer characteristics, evidence suggests it is predominantly low-risk policyholders, as expected, who switch. Both younger policyholders and those with lower hospital utilisation were more likely to switch. As described in Chapter 2, this is in line with empirical findings from many other health insurance markets.

In terms of the policy characteristics, further evidence is provided to support the idea of non-rational 'sunk costs' being a feature of the Irish market. Independent of age effects, those with longer length of cover with VHI are less likely to switch than those who have been with the insurer for a shorter duration. This suggest possible inertia or status-quo bias, evidence of which was also found in Chapter 5.

However, in terms of policy effects, how price influences switching behaviour was perhaps the most important empirical investigation of this study. In theory, premium price should have a considerable influence on switching behaviour as it will represent an important benefit for utility-maximising consumers. And as reviewed in detail in Chapter 2, price-sensitivity of consumers appears to be a common feature of most, if not all, health insurance markets where its presence has been investigated. In an Irish context, particularly, we would, *a priori*, expect that price would motivate switching behaviour given that the majority of consumers are responsible for the direct payment of their premiums. Empirically, this appears to be the case. Price was a statistically significant predictor of switching across single-person, multiple-person and total policies. The magnitude of these price effects could also be considered large. For example, for total policies, as noted, a one percent increase in relative premium increased the probability of switching by approximately 0.2 percentage points, relative to a base switching rate of 3.8%.

As stressed, such behaviour is important in the context of competitive market functioning in order to motivate insurers to focus on efficiency in order to attract business. If price effects did not exist, it would raise serious concerns over the fundamental assumptions underlying the competitive market model. Furthermore, price sensitivity was also hypothesised to be greater for low-risk policyholders, and this appears, overall, to be confirmed. The balance of evidence suggests that price sensitivity decreases with age and hospital utilisation.

Differential price sensitivities and higher switching propensities for low-risks are commonly explained in that low-risk groups face lower barriers to switching than their high-risk counterparts. Evidence from Chapter 5 supports this interpretation as it was found that the burden of switching costs is generally higher for high-risk policyholders. However, in community rated markets, it may also be the case that risk selection strategies influence the flow of consumers between insurers. In the presence of poor (or absence) or risk equalisation, insurers will have incentives to focus resources on attracting profitable risks (e.g. young, healthy) rather than engaging in welfare-enhancing price and quality competition. The extent to which risk selection may have taken place in the Irish system in the past was discussed in detail in Section 3.5.1. As noted, newer entrants to the market may have enjoyed relative advantages in terms of risk selection which may have contributed to current risk segmentation in the market. Particularly relevant to this discussion is the idea that 'price-shadowing'[119] may have been an important risk selection tool used in this regard. The fact that this study identifies differing price sensitivities between low and high risks provides empirical foundations that such a strategy may have aided newer entrants capture better risks.

Robust risk equalisation is therefore vital in an Irish context not only to address risk selection incentives but also market segmentation that evolved through the absence of risk-adjusted subsidies (regardless of whether this segmentation is a result of risk selection or self-selection). Van Vliet (2006, pg. 771) describes this function of risk equalisation as 'levelling the playing field'. In this context, this

[119] That is, newer entrants setting their prices marginally below competing plans offered by VHI.

chapter assessed the quality of risk equalisation from the perspective of the ability of various iterations of risk-adjusted subsidies to equalise costs between switchers and stayers. As expected, and consistent with earlier findings, switchers were on average much less expensive than stayers. However, the fact that switchers are more profitable than stayers is not important as long as risk-adjusted subsidies are able to address risk differentials so that insurers cannot profit from the non-random selective behaviour of the switching process. In this context, successive iterations of tax credits and risk equalisation subsidies have appeared to appreciably equalise cost differentials between switchers and stayers. This analysis would therefore suggest that risk equalisation has performed relatively well. However, residual incentives for selection may remain, most notably for single-person policies[120]. Moreover, this analysis is rudimentary in nature, only considering differences in average costs between switchers and stayers for various iterations of risk equalisation and although it does give certain insights into the impact of risk equalisation, it also requires tentative interpretation. A more detailed analysis of risk equalisation performance takes place in Chapter 7.

6.4.1 Limitations

In the context of the above discussion it is important to highlight some limitations of this analysis. Particularly, the greatest challenge to understanding consumer mobility dynamics in the Irish market is concerns over the generalisability of this study. Although VHI is by far the largest insurer in the market (both in terms of market share and claims payout) generalising any results must be done with caution as VHI has a worse risk profile, and higher attrition rates, than the overall market (HIA, 2014b).

A second limitation relates to the administrative nature of the database. Particularly, it does not include all data that may be relevant to this inquiry. For example,

[120]However, cost differences between switchers and stayers need not be zero to discourage risk selection as there will be some positive cost associated with investing in risk selection strategies.

this study was not able to account for potentially important socio-economic variables such as education or income, which could be hypothesised to impact on the switching decision. To the extent that omitted variables from this analysis are correlated both with independent variables included in the regression equations and with the dependent variable itself, concerns may be raised over potential endogeneity. For example, one could plausibly make the case that income and price-sensitivity may be correlated and that income also impacts on the decision to switch. In such circumstances, concerns would exist over whether the price effect observed in this study could be considered exogenous. In this context, however, it is important to note that evidence from Chapter 5 suggests that social grade of consumers was not associated with the consumer switching decision, which is likely to be strongly correlated with income and education.

Similarly, it was not possible to test for the effect of quality on switching behaviour. However, it is important to note quality effects in the Irish context may be quite limited. Quality of care, largely, does not differ between insurers as only very limited selective contracting takes place. Quality competition therefore mainly takes place based on factors such as level of cover, product range and service. Evidence from Chapter 5 suggests that these quality parameters were far less important as reasons cited for switching relative to cost savings. Moreover, there is no rating system in place to compare insurer performance (for example, CAHPS in the US or the CQI in the Netherlands), suggesting that it may be difficult for consumers to use quality as a basis for switching.

A further data limitation was that it was possible only to examine switchers out of VHI as comparatively less information was available on joiners. Particularly, it was not possible to distinguish between those who joined the market for the first time and those who switched from a competing insurer. Finally, whether a policy was flagged as switching to a competitor was based on voluntary information provided by the departing policyholder; consequently, there may be some under-representation of switchers in this analysis.

6.5 Conclusions

The focus on the empirical analysis carried out in this chapter was to build on work carried out in Chapter 5 which identified benefits and costs of switching cited by consumers in the Irish private health market. Specifically, this chapter, for the first time, statistically modelled actual switching behaviour in the Irish market. A significant finding was that consumers were found to be price-sensitive, which is an important requirement of a well-functioning market as, all else equal, it will motivate insurers to pursue efficiency. In terms of consumer characteristics, the young and the healthy were both found to be more likely to switch and to be more price-responsive than their older and less healthy counterparts, respectively. From a demand-side perspective these associations may be related to low-risks facing lower switching costs. On the other hand, incentives for risk selection can also play a part. Not surprisingly, switchers were found to be much less costly than stayers in absolute terms. However, successive iterations of risk equalisation markedly reduced this disparity, helping to level the competitive playing field. Although, costs were not completely equalised suggesting it may be beneficial to look at ways of improving risk equalisation design. This is the focus of Chapter 7, the final empirical chapter.

Chapter 7

Risk equalisation in the Irish health insurance market

7.1 Introduction

This chapter presents the final empirical investigation of this thesis. In contrast to Chapters 5 and 6, which focused more explicitly on consumer switching behaviour, this chapter addresses how the regulatory environment underwhich health insurance competition operates can strongly impact on insurers' competitive incentives which may in turn impact on the ease of switching faced by different groups of consumers. The remainder of this section sets out the context for the study, including research questions and hypotheses. Section 7.2 presents the data while Section 7.3 discusses the statistical methods employed including a description of sensitivity analyses presented in Appendix A. The main results of the analysis are presented in Section 7.4. Discussion of results, along with some limitations of the analysis, takes place in Section 7.5. Section 7.6 concludes.

Community rating, which limits the extent to which insurers can vary premiums based on consumers' risk profiles, is a key feature of many health insurance markets. While promoting equity, this regulation has the effect of transforming consumers, from an insurer perspective, into unprofitable (high-risk) and profitable (low-risk) consumers. As such, in a competitive environment, insurers will be expected to focus their attention on attracting low-risk consumers, while avoiding high-risk consumers, a phenomenon known as risk selection. As discussed in Chapter 2, risk selection can have a number of adverse competitive implications in health insurance markets; potentially resulting in (or contributing to) market segmentation, poor quality service to high-risks, and/or a welfare loss as investment is focussed on attracting low-risks rather than price and quality competition (van de Ven, 2011; van de Ven and Ellis, 2000). The best strategy for reducing risk selection incentives has been identified as good risk equalisation (van de Ven and Ellis, 2000). A common form of risk equalisation is to allocate risk-adjust premia subsidies, based on consumers' risk profiles, to insurers (not consumers) thereby equalising the risks different consumers represent.

As described in Chapter 3, a defining characteristic of the Irish market is that it has evolved largely in the absence of the allocation of risk-adjusted premium subsidies to reflect the heterogeneity of risks in the market. As a consequence, the shift in new and existing, predominantly low-risk, consumers to the newer insurers following liberalisation resulted in significant market segmentation. While low-risks are naturally more mobile, market segmentation was most likely exacerbated by insurer risk selection.

While policy-makers were cognisant of these issues, prior efforts to implement a system of risk equalisation were never realised. Most notably, the introduction of risk equalisation in 2003 was blocked due to a successful legal challenge by VHI's main competitor at the time, BUPA. In 2009 an interim system was introduced whereby insurers received staggered additional age-based tax credits for each consumer they enrolled aged 50 and over[121]. This system was replaced by bona-fide risk equalisation in 2013, whereby insurers were required to pay a stamp duty (also known as a community rating levy) to a centralised risk equalisation fund for every individual they insured. These stamp duties vary between children and

[121] This was changed to 60 and over in 2011.

adults and advanced/non advanced policy status[122] (see Table 3.5). Resources from this fund are then re-allocated to insurers based on age-bands into which their consumers fall (60-64, 65-69, 70-74, 75-59, 80+). Payments within these age bands vary based on sex and advanced/non advanced policy status. In addition insurers receive a payment for each night an insured person (regardless of age) spends in hospital as a private inpatient (see Table 3.5). Any surpluses or deficits in the fund are carried forward and are considered in setting future stamp duty rates (HIA, 2013b).

In an international context, socio-demographic variables such as age and sex are considered rather basic criteria for risk equalisation as they generally do not capture a large variation in costs; although they are easy to collect and monitor. Payments incorporating measures of health status tend to better capture variation in claims expenditure across individuals, and consequently, are better able to reduce incentives for risk selection. Measures of health status can relate to utilisation-based indicators (e.g. hospital utilisation), clinical indicators (e.g. HCCs, DCGs) or pharmaceutical data (e.g. PCGs). Separate to, or in conjunction with, prospective risk adjustment, insurers can also be reimbursed based on actual claims expenditures that have arisen. This retrospective form of reimbursement (sometimes referred to as claims-based adjustment) will better reduce risk selection incentives as insurers will be reimbursed on actual costs, however in doing so it removes insurer incentives to act efficiently[123]. A common form of claims-based adjustment is to reimburse insurers, wholly or in part, for actual costs above a certain threshold where prospective reimbursement is unlikely to be effective. This is often referred to as excess-loss compensation or outlier risk sharing.

Currently the most sophisticated risk equalisation system internationally operates as part of the Dutch health insurance system and incorporates elements of socio-demographic, health-based and outlier risk-sharing. Specifically, the Dutch system

[122]Specifically, a product is designated 'non-advanced' if 'not more than 66% of the full cost of hospital charges in a private hospital or prescribed minimum benefits, if lower, is always provided' (HIA, 2013b).

[123]This tradeoff between risk selection and efficiency is a well-known phenomenon in the health economics literature (Newhouse, 1996).

reimburses insurers based on age, sex, region, source of income, socioeconomic status, 13 inpatient DCGs and 25 PCGs plus an adjuster for multiple year high-costs. In addition, insurers receive partial cost reimbursement and a mandatory high-cost pool covers 90% of all costs exceeding €20,000[124].

It must be kept in mind that risk equalisation models will never predict all, or even a large proportion of, claims expenditure for a number of reasons. Firstly, prospective prediction by which risk equalisation model efficacy is usually measured tends to be more difficult than concurrent prediction. Moreover, a large proportion of healthcare expenditure can be considered random and therefore not predictable. While the predictable proportion of healthcare expenditure could be improved through including additional categories of variables (see Figure 4.1) health insurers and/or regulators may not capture such information. Moreover, these variables may be excluded from risk equalisation designs intentionally. For example, it may be undesirable for society to reimburse for certain socio-demographic criteria (e.g. smoking, poor eating habits) while compensating for other variables may introduce unwanted incentives into the market (e.g. method of provider remuneration) (see Section 4.4.4 for more details).

However, risk equalisation models need not predict high levels of claims expenditure to be effective. As described by van de Ven (2011), risk equalisation needs to be refined to the extent that the costs of investing in risk selection (e.g. marketing, plan design, reputational damage) outweigh any benefits. To date, however, no guidelines exist in terms of what this level may be. As such, the efficacy of risk equalisation models must be interpreted in a relative context.

In terms of the above discussion, this chapter hopes to answer two related research questions:

1. How well does the current Irish risk equalisation design perform in terms of reducing incentives for risk selection?

[124]Please refer to Figure 2.2 for a description of the design of risk equalisation in other health systems.

2. How can the Irish risk equalisation design be improved, with particular attention paid to the effect of introducing diagnosis-based payments?

It is hypothesised that,

- The current risk equalisation design will perform relatively poorly in terms of reducing incentives for risk selection given the basic nature of adjusters used to calculate expected costs.
- The introduction of an outlier risk pool will improve the efficacy of risk equalisation as very high cost claims will be removed from the calculation of expected costs.
- Risk equalisation will perform worse for high-risk groups as it will be more difficult to match expected and observed costs.
- Risk equalisation design that explicitly takes into account high-cost diagnoses will perform better for high-risk groups.

Importantly, implications of this analysis may have broader relevance beyond the Irish market. Specifically, the Irish health insurance system is the first duplicate private insurance system to implement a system of risk equalisation payments between insurers. As noted by Armstrong et al. (2010), although the Australian voluntary private health system does facilitate transfers between insurers, this is claims-based rather than risk-based; while the South African system does have a risk equalisation system in place, legislation is yet to approve actual transfers. As such, this empirical investigation may have implications for similarly designed health insurance markets looking to introduce risk equalisation payments to insurers.

7.2 Data

Data for this study were provided by VHI and related to individual-level claims expenditure data for 1,235,922 insured VHI members, covering the years 2010-2012.

Available socio-economic data related to age and sex. Policy level characteristics consisted of policy type and number of coverage days per year[125]. Claims data related to the number of daypatient and outpatient admissions and the number and length of inpatient admissions, along with associated costs. Clinical data were provided in the form of 35 diagnosis cost categories that were compiled with the aid of clinicians in order to predict high-cost diagnoses for internal VHI analysis. These cost categories were predicated on primary International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) codes. Table 7.1 provides a list of these diagnosis groups, while a more detailed breakdown by individual primary ICD-9-CM codes is provided in Appendix B, Table B.1. These categories were defined in-house by the insurer based on clinical judgement. In addition, a variable flagging whether an individual suffered from a chronic condition (based on ICD-9-CM coding) was also included in the database. The chronic illness flag was calculated in-house by the insurer and based on Iezzoni et al. ICD-9-CM chronic conditions (Iezzoni et al., 1994).

As noted, this dataset had been utilised in-house for separate VHI research projects and had been cleaned and validated prior to access. However, data were still checked for missing and illogical values (e.g. LOS greater than 365 a year), and for variables of interest. None were found.

[125]For example, if someone was covered by VHI for the entire year, their coverage days would be 365.

Table 7.1: ICD-9-CM diagnostic categories, clinical breakdowns

ICD-9-CM diagnostic category			
1	Alcoholism	19	Haemophilia
2	Chronic Kidney Disease	20	Hyperlipidemia
3	Chronic Pulmonary Disease	21	Hypertension
4	Central Nervous System (CNS) Disorder (Multiple Sclerosis)	22	Infectious Disease (Hepatitis A-E, HIV)
5	CNS Disorder (Cerebral Palsy)	23	Infectious Liver Disease
6	CNS Disorder (Parkinson)	24	Malignant Cancer, Leukemia
7	CNS Disorders	25	Maternity
8	Congestive Heart Failure	26	Mental disorder
9	Coronary Artery Disease	27	Mental disorder (Schizophrenia)
10	Cerebral Vascular Accident (CVA) - Stroke	28	Metabolism Disorders (Cystic Fibrosis)
11	Dementia	29	Musculoskeletal/ connective tissue disorder
12	Depression	30	Polycystic Ovary Syndrome
13	Diabetes	31	Peripherial Vascular Disease
14	Disorder of the adrenal glands	32	Renal Failure
15	Drug Abuse	33	Severe Chronic Liver Disease
16	Epilepsy	34	Systemic Lupus Erythematosus
17	Gastroentestinal Disease (Crohns)	35	All other diagnoses
18	Gastroentestinal Disease (Ulcerative Colitis)		

7.3 Methods

7.3.1 Risk equalisation models

Following arguments presented in Section 4.4.3, risk equalisation models in this chapter are estimated by means of OLS.

Risk equalisation models are specified as follows,

$$Y_{it} = \mathbf{X}_{it}\boldsymbol{\beta}_i + u_i \text{ (Concurrent)} \tag{7.1}$$

where t= 2012, i = 1,235,922

$$Y_{it} = \mathbf{X}_{it-1}\boldsymbol{\beta}_i + u_i \text{ (Prospective)} \tag{7.2}$$

where t= 2012, i = 1,166,425

The outcome variable of interest in this analysis, Y, is individual-level yearly claims expenditure payable by the insurer. This relates to inpatient, daycase and outpatient claims expenditure. This claims expenditure is predicted by alternative vectors of independent variables X, and their associated coefficients, β, calculated by OLS. Errors between observed and predicted values are captured by the disturbance term u. In all, five risk equalisation models are examined. The risk-adjusters (i.e. independent variables) included in these models are outlined below and models are summarised in Table 7.2.

As is standard, these models are analysed both concurrently and prospectively. This involved dividing the dataset into concurrent and prospective sub-populations. For the concurrent analyses, all persons with any cover in 2012 were included, i.e., a population of 1,235,922 individuals. For the prospective analysis, anybody with cover in 2011 and cover in 2012 was retained, leaving a prospective population of 1,166,425 individuals (see Table 7.3). The concurrent analysis used risk-adjusters from 2012 to model claims expenditure in 2012. The prospective model used risk-adjusters in 2011 to model claims expenditure in 2012[126].

The form of the independent variables (i.e. risk-adjusters) in the models are specified to reflect current or plausible categories of risk equalisation payments in the Irish system (see Table 7.2). For instance, it is generally preferable not to categorise continuous variables, such as age, due to the loss of information inherent in this process. However, in order to mimic the staggered levels of risk equalisation payments, dummy variables are specified for each age/sex/level of cover risk group. Similarly, more complex specifications of independent variables that could plausibly improve model fit (e.g. squared terms or distinct interaction effects) were not included as it is unlikely actual payments will be based on such formulations.

Age, Sex, Level of Cover

The most basic risk-adjusters used to risk-equalise premiums are based on age and sex. They are easy to collect and monitor, however, they are poor predictors of claim expenditure (van de Ven and Ellis, 2000; Ellis, 2007). As noted, risk equalisation credits in Ireland are provided to insurers based on the age of enrollees, varying in five-year age bands from age 60 up to 85 and for those 85 and older (see Table 7.2). These credits also vary based on sex and across two levels of cover - advanced and non/advanced. Level of cover is a unique risk-adjuster in an international context. However, its inclusion in the Irish risk equalisation model is justified based on the unique public/private mix of hospital care in the Irish system (see Section 3.3). That is, differences in expenditures between individuals, rather than being a reflection of health status, could represent differences in accommodation (for example, whether a patient was treated in a semi-private ward in a public hospital or private room in a private hospital). As a consequence, insurance products which offer low levels of cover (non-advanced) receive lower risk equalisation credits than more comprehensive (advanced) products. Model 1 includes age, sex and level of cover as risk-adjusters.

[126]The use of 2010 data relate only to the definition of the chronic illness flag, see below, which captures diagnosis of a chronic condition within the last two years of interest (i.e. 2011 and 2010 for the prospective analysis).

Inpatient hospital nights

Models incorporating data on utilisation (or prior expenditures) tend to show significant predictive improvements over models based solely on demographic information (van de Ven and Ellis, 2000). However, the main argument against using utilisation data in risk equalisation models is that it creates inappropriate incentives on the part of health insurers as payment of risk-adjusted subsidies is tied directly to quantity of healthcare utilisation. Insurers therefore face negative incentives for cost control.

In the absence of information on other measures of health status, the HIA has included a payment for each overnight hospital stay recorded by an insured individual as part of the current risk equalisation design. In this context, Model 2 includes age, sex, level of cover and an adjuster for frequency of inpatient hospital stays. This is the set of adjusters included in the current risk equalisation scheme.

Daycase admissions

Model 3 supplements Model 2 by including a flag for daycase admissions. Current risk equalisation utilisation payments are based exclusively on inpatient hospital nights. However, in recent years there has been a strong shift towards treatment in daycase settings (Thomas et al., 2013)[127].

In this model, a daycase admission is considered equivalent to spending one night in hospital. It is important to note that only reimbursing for inpatient nights may create perverse incentives for the health insurers. To the extent that insurers have some control over treatment settings, some disincentives may be created for treatment in more efficient daycase settings. In addition, daycase admissions may relate to unique cohorts of patients (e.g. chemotherapy patients) and reimbursing on inpatient nights alone may create incentives for insurers to avoid contracting with these individuals.

[127]This statement relates to treatment in public hospitals as data on private hospital activity is not publicly available. However, additional data from VHI shows that daycase and sideroom treatment increased from 53% of claims in 2002 to 77% of claims in 2013 (VHI, 2012b; VHI, 2013).

Diagnostic information

Using diagnostic information as a measure of health status may help reduce the inefficiency problems associated with reimbursement based on utilisation information (van de Ven and Ellis, 2000). However, inefficiency incentives may not be completely removed as diagnoses are generally tied to some form of hospitalisation. Measures of diagnostic severity may improve the predictive efficacy of risk equalisation models as they may better capture variation in cost above that of generic measures of utilisation. However, basing payments on severity of illness may introduce incentives for insurers (where possible) to influence treatment and diagnoses and 'upcode' patient severity (Ellis, 2007). That said, Ellis (2007) notes that diagnoses from insurance claims have become the most widely used set of information beyond demographic variables. Most health insurance systems with advanced risk equalisation schemes tend to use measures of diagnoses as risk-adjusters (see Table 2.2).

A primary objective of this study, therefore, is to assess whether the current risk equalisation specification can be improved through the use of diagnostic-based information. This is assessed through the application of two alternative sets of diagnostic information. In addition to the risk-adjusters specified in Model 2, Model 4 includes a binary flag representing whether or not a policyholder received an ICD-9-CM diagnosis of a chronic condition within the last two years of interest. Diagnosis of a chronic illness has previously been considered for inclusion in the Irish risk equalisation scheme (HIA, 2010b).

Including more detailed diagnostic coding was also considered by the HIA, however there was little support for its inclusion[128]. Disadvantages related to practical difficulties including 'the large volume of data generated, the lack of a credible volume of data in each cell... and issues with consistency of data and whether it would promote a bias towards in-patient treatment (HIA, 2010b, pg. 17)'. However, as noted, there is renewed interest in the applicability of diagnosis-based risk equalisation in the Irish market. In this context, Model 5 includes information on 35 high cost diagnosis groups based on ICD-9-CM classification, see Table 7.1.

[128] This related to proposed diagnostic payments based on diagnosis-related groups.

Partial year weighting and validation approach

As noted by van de Ven and Ellis (2000) it is important to explicitly account for partial year enrolments in the prediction process. Simply excluding partial year enrolments is not wise if the goal is unbiased prediction, as these groups tend to have systematically different expenditures from average (as evidenced in Chapter 6). Furthermore, simply including these groups without recognising their partial year enrolment can lead to under prediction.

As such, partial year enrolees' expenditure was adjusted through the following procedure. First, partial year expenditures were annualised by dividing by the fraction of the year each enrolee was covered. Secondly, in the calculation of unconditional and conditional means, each observation was weighted by the same fraction. To avoid inflated predictive accuracy as a result of over-fitting, a 10-fold cross-validation approach was employed. This process involves randomly splitting the data into k approximately equal parts. For the k^{th} part, models are estimated using the remaining $k-1$ parts and validated on the k^{th} part[129]. This process is repeated for each of the k parts. This analysis sets $k = 10$. Previous analyses suggest this number of iterations to be sufficient (Behrend et al., 2007; Mookim and Ellis, 2008). Model evaluation metrics of interest (see Section 7.3.1.1) returned from this process are then averaged and reported.

[129] An alternative, split-sample approach is sometimes used in cost prediction studies. The split-sample approach involves randomly splitting the data into an estimation and validation sample. However, this approach can be considered much less efficient than the k-fold approach as only a portion of the data is used for estimation (Jones, 2010).

TABLE 7.2: Risk equalisation models estimated

Model		**Description**
Model 1	Demographic model	This model consists of 24 (6*2*2) age, sex, non-advanced/advanced cover dummy categories. Where applicable this will be referred to as the demographic model.
Model 2	Risk equalisation model	Model 1 plus a variable capturing the count of inpatient hospital days per insuree for that year. This model is analogous to the current risk equalisation scheme as it includes all the same risk-adjusters. Where applicable, this model will be referred to as the risk equalisation model.
Model 3	Risk equalisation model incl. day cases	Model 2 plus a count of daycase admissions.
Model 4	Risk equalisation model incl. a chronic illness flag	Model 2 plus a binary flag representing whether or not a policyholder received a principal ICD-9-CM diagnosis of a chronic condition within the last two years of interest.
Model 5	Demographic model plus ICD diagnostic groups	Model 1 plus 35 count variables representing each aggregated ICD-9-CM diagnostic cost category.

7.3.1.1 Predictive metrics

Predictive performance of all models was assessed both from an individual and group-level perspective. Individual prediction was measured in terms of two commonly used predictive statistics. That is the individual adjusted r-squared statistic (R^2) and mean absolute prediction error (MAPE) in addition to a third less commonly used statistic, Cumming's prediction measure (CPM) (Cumming et al., 2002).

Individual R^2 is the standard metric for evaluating risk equalisation models (Ellis, 2007). A general form of the R^2 statistic is computed by comparing the sum of squared differences between the observed (y_i) and predicted values ($\hat{y}_i$) (i.e. the residual sum of squares) with the sum of squared difference between observed values and the sample average ($\bar{y}$) (i.e. the sum of squares total).

$$R^2 = 1 - \frac{\sum_{i=1}^{n}(y_i - \hat{y}_i)^2}{\sum_{i=1}^{n}(y_i - \bar{y})^2} \tag{7.3}$$

In this context, the R^2 statistic can be interpreted as the proportion of variation explained by a model, with values ranging from 0 (no variation explained) to 1 (all variation explained). However, in models containing a large number of parameters it is more prudent to employ the adjusted R^2 statistic. As R^2 can never fall when an additional parameter is added to the model, the adjusted R^2 is a modified version of the standard R^2 statistic which has been adjusted for the number of parameters in the model,

$$AdjustedR^2 = 1 - \frac{(1 - R^2)(N - 1)}{(N - k - 1)} \tag{7.4}$$

Where, N refers to the total sample size and k the number of parameters in the model.

One concern levelled at the R^2 metrics is that, as it squares prediction errors, it can be overly sensitive to a small number of cases that may have large prediction errors (Cumming et al., 2002). MAPE, on the other hand, is calculated as the average of absolute differences between observed and predicted values.

$$MAPE = \frac{\sum_{i=1}^{n}|y_i - \hat{y}_i|}{N} \tag{7.5}$$

As MAPE considers absolute values, in contrast to R^2 statistics, it places the same weight on large and small errors. However, MAPE is not a standardised statistic, it is reported in units of the dependent variable (e.g. claims expenditure in euro), and therefore makes model comparison across different units of a dependent variable more difficult.

CPM is a measure of predictive accuracy developed by Cumming et al. (2002) and combines the attractive features of both R^2 and MAPE statistics. That is, it is reported on a standardised scale with values closer to 1 indicating better fit with fit measured in terms of absolute (not squared) deviations. As MAPE and CPM both consider absolute deviations they will always provide the same relative ranking of model performance.

$$CPM = 1 - \frac{\sum_{i=1}^{n} |y_i - \hat{y}_i|}{\sum_{i=1}^{n} |y_i - \bar{y}|} \tag{7.6}$$

Measures of predictive accuracy can also be applied at the group level. In this context, predictive ratios (PR) can be used to determine if specific risk equalisation models under or overestimate costs for specific subpopulations of consumers. Predictive ratios are calculated as the total predicted costs for a specific group divided by the total observed costs for a specific group. That is for each subgroup of interest, i

$$Predictive\ ratio_i = \frac{Total\ predicted\ costs_i}{Total\ actual\ costs_i} \tag{7.7}$$

PRs close to one indicate strong fit as observed costs equal predictive costs. PRs greater (less) than one indicate a model is over (under) estimating costs for that group.

7.3.2 Truncation of claims expenditure

In order to reduce the influence of outliers on model performance and to simulate the impact of introducing outlier risk-sharing, observed claims expenditures were truncated at €25,000. Although this threshold is arbitrarily chosen, it corresponds approximately with similar thresholds in other jurisdictions[130].

7.3.3 Sensitivity analyses

Sensitivity analyses conducted as part of this study are presented in Appendix A. Firstly, given distributional concerns raised when modelling health expenditures (see Section 4.4) it was prudent to test risk equalisation models using alternative functional forms. In this context, a two-part model (probit; OLS) (Table A.4) and a GLM (link-log; family-Gaussian) (Table A.5) were also estimated and presented in the Appendix.

Furthermore, simulation analyses truncating expenditure alternatively at €10,000 and €50,000 are also presented in Table A.6.

7.4 Results

7.4.1 Descriptive statistics

Descriptive statistics are presented in Table 7.3 & 7.4.

Just over half of the concurrently (prospectively) insured were female. A total of 77% (77.6%) of insurees were aged less than 60 while 1.4% (1.2%) were aged 85 and over. The vast majority of individuals held advanced-level cover, accounting for 96.1% (96.4%) of concurrent (prospective) population. In total, 14.6% (15%) of the concurrent (prospective) population were admitted once, while 4.4% (4.6%) were admitted three or more times. In addition, 75.9% (75.5%) of the concurrently (prospectively) insured made no claim. Average claims expenditure for the concurrently (prospective) insured was €819.65 (€834.40).

[130] For example, Netherlands (€20,000) (Breyer, Bundorf, and Pauly, 2012), Germany (€20,450) (Breyer, Bundorf, and Pauly, 2012), and Australia ($50,000 AUS) (Connelly et al., 2010).

There were 555,205 (549,695) principal diagnoses recorded for the concurrent (prospective) population. Of these 81.6% (82.6%) were grouped into 'all other diagnoses'. The most frequent category of diagnosis after this was 'Malignant cancer, Leukemia', accounting for 11.2% (9.9%) of concurrent (prospective) diagnoses.

TABLE 7.3: Descriptive statistics for concurrent and prospective data

Variables		**Concurrently insured (%) (N=1,235,922)**	**Prospectively insured (%) (N=1,166,425)**
Gender	Male	47.9	47.8
	Female	52.1	52.2
Age	0-59	77.0	77.6
	60-64	6.3	6.4
	65-69	5.7	5.5
	70-74	4.3	4.2
	75-79	3.3	3.1
	80-84	2.1	1.9
	85+	1.4	1.2
Level of cover	Advanced	96.1	96.4
	Non-advanced	3.9	3.6
Number of admissions	0	75.9	75.2
	1	14.6	15.0
	2	5.1	5.3
	3 +	4.4	4.6
Positive claims expenditure 2012	No	75.9	75.5
	Yes	24.1	24.5
Average claims expenditure (S.D) 2012		€819.65 (€4,326.81)	€834.40 (€4,357.09)

Table 7.4: Top 5 ICD-9-CM diagnostic categories by percentage of total diagnoses for concurrent and prospective breakdowns

ICD-9-CM category	**% Concurrent (N=555,205)**	**% Prospective (N=549,695)**
All other diagnoses	81.6	82.6
Malignant Cancer, Leukemia	11.2	9.9
Maternity	1.8	2.1
Coronary Artery Disease	1.6	1.6
Musculoskeletal / Connective Tissue Disorder	0.7	0.7

7.4.2 Model performance

Table 7.5 presents individual-level predictive performance for both concurrent and prospective models. In terms of all predictive metrics assessed, concurrent models performed noticeably better than prospective models. In terms of the model sensitivity analyses, both the two-part model and the GLM provide similar interpretations to the OLS results presented below. In terms of prediction, the two-part model performed similarly well to the standard OLS model, while the GLM performed slightly worse. See Tables A.4 and A.5, respectively.

7.4.2.1 Individual prediction

In terms of the concurrent analysis, the demographic model performed worse (R^2=3.0%). The current risk equalisation model performed significantly better (R^2=45.2%), while including daycase admissions (Model 3) further increased predictive ability (R^2=50.9%). Substituting a chronic illness indicator for the daycase admissions flag (Model 4) lowered the R^2 slightly (R^2 = 47.4%). Model 5 (based on ICD-9-CM groupings) explained 36.8% of expenditure variation. The demographic model had the highest (lowest) MAPE (CPM) of €1,275.42 (5.3%). The risk equalisation model performed noticeably better with a MAPE (CPM) of €871.20 (35.4%). As with the R^2 metric, based on MAPE and CPM, Model 3 (MAPE=€722.96; CPM=46.4%) was the best performing model.

In terms of the prospective models, the demographic model again predicted the least variation in claims expenditure (R^2=3.0%). Models 2, 3, 4, and 5 all represented successive improvements in R^2 (5.8%, 6.8%, 7.0% and 16.6%, respectively). MAPE and CPM provided the same model rankings as given by R^2.

7.4.2.2 Group prediction

Figure 7.1 displays predictive ratios for concurrent and prospective models, broken down by quintile of expenditure. For all concurrent models predictive ratios fell moving from the lowest quintile (Q1) of expenditure to the highest (Q5). All models over predicted expenditure for Q1 and Q2 and under predicted expenditure for Q5. As expected, Model 1 performed worst in terms of group-level prediction for Q5 (PR=0.12) while Model 3 performed best (PR= 0.59). Relative to the other models, Model 5 noticeably over predicted expenditure for those in Q1 and Q2. Similar to the concurrent models, all prospective models over predicted expenditure for Q1 and Q2 (particularly Model 5) and under predicted expenditure for Q5. Under prediction for Q5 was worse for all models (except Model 1 with the same PR) compared with the concurrent analysis. For Q5, Model 1 under predicted spending more than all other models (PR=0.12), while Model 5 under predicted spending the least (PR=0.32).

Figure 7.2 displays predictive ratios for concurrent and prospective models, broken down by number of diagnoses. For concurrent models, in general the group predictive ability of models fell as number of diagnoses increased. The demographic model performed worst with lower predictive ratios across all categories relative to the other models. Relative to other models, as number of diagnoses increased, Model 5 became increasingly the best predictor of expenditure. For those with five or more diagnoses, Model 5 had a PR of 0.94. For the prospective application, similar trends were observed. Predictive ability of all models fell along with increasing numbers of recorded diagnoses. Within all categories of morbidity, Model 5 was by far the best predictor of observed expenditure (PR=0.52).

7.4.2.3 Truncation at €25,000

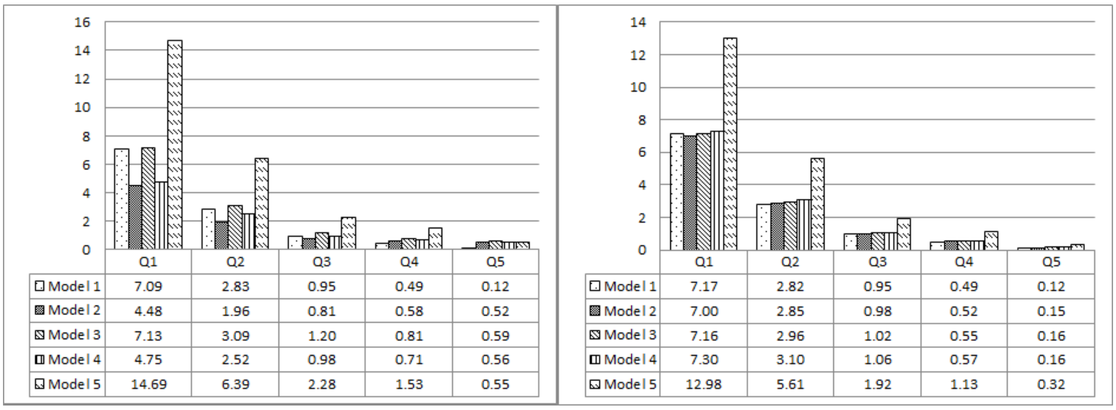
Overall, truncation had the effect of improving model fit in the prospective analysis. Results were more ambiguous for the concurrent analysis with only Model 1 and Model 5 reporting higher R^2 and CPM with truncated expenditure. All truncated concurrent models, apart from Model 3, reported lower MAPE (see Table 7.5).

Similar trends were observed truncating expenditure at €10,000 and €50,000 (Table A.6). For the prospective analysis, truncating at €10,000 provided an unambiguously better fit than truncating at €25,000, which in turn provided better fit than truncating at €50,000.

TABLE 7.5: Individual prediction metrics for concurrent and prospective models (raw and truncated expenditure)

	Adj.R^2 *100	**MAPE €**	**CPM *100**
Concurrent -– Raw Expenditure			
Demographic model (Model 1)	3.0	1275.42	5.3
Risk equalisation model (Model 2)	45.2	871.2	35.4
Risk equalisation incl. day cases (Model 3)	50.9	722.96	46.4
RE model incl. a chronic illness flag (Model 4)	47.4	828.28	38.6
Demographic model incl. 35 ICD-9-CM diagnostic groupings (Model 5)	36.8	744.05	44.6
Prospective — Raw Expenditure			
Demographic model (Model 1)	3.0	1280.17	5.2
Risk equalisation model (Model 2)	5.8	1250.21	7.3
Risk equalisation model incl. day cases (Model 3)	6.8	1231.91	8.5
Risk equalisation model incl. a chronic illness flag (Model 4)	7.0	1229.15	8.7
Demographic model incl. 35 ICD-9-CM diagnostic groupings (Model 5)	16.6	989.69	25.7
Concurrent — Truncated Expenditure (€25,000)			
Demographic model (Model 1)	5.1	1080.57	5.7
Risk equalisation model (Model 2)	38.2	842.26	26.5
Risk equalisation model incl. day cases (Model 3)	44.3	745.9	34.8
Risk equalisation model incl. a chronic illness flag (Model 4)	42.7	793.99	30.6
Demographic model incl. 35 ICD-9-CM diagnostic groupings (Model 5)	44.6	607.28	46.7
Prospective — Truncated Expenditure (€25,000)			
Demographic model (Model 1)	5.0	1086.97	5.5
Risk equalisation model (Model 2)	7.5	1066.98	7.2
Risk equalisation model incl. day cases (Model 3)	8.5	1054.25	8.2
Risk equalisation model incl. a chronic illness flag (Model 4)	9.3	1048.17	8.7
Demographic model incl. 35 ICD-9-CM diagnostic groupings (Model 5)	23.4	814.08	28.1

Figure 7.1: Predictive ratios by quintile of expenditure



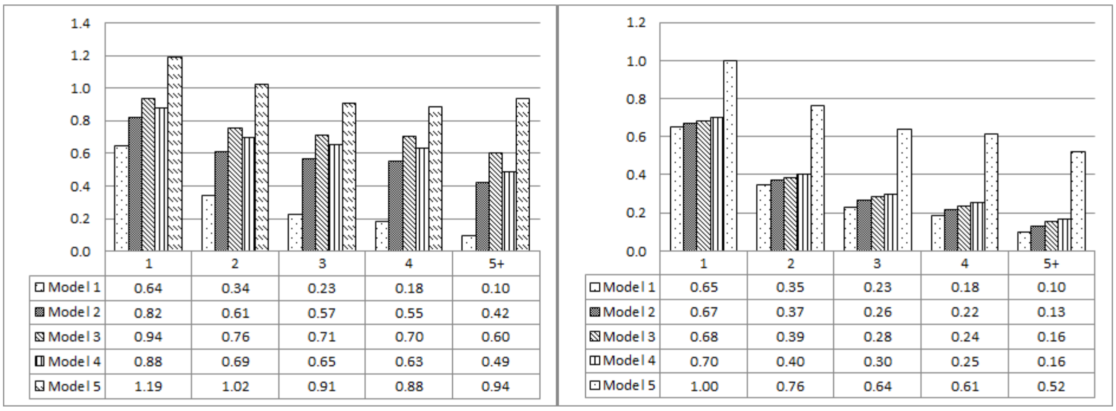
	Q1	Q2	Q3	Q4	Q5
Model 1	7.09	2.83	0.95	0.49	0.12
Model 2	4.48	1.96	0.81	0.58	0.52
Model 3	7.13	3.09	1.20	0.81	0.59
Model 4	4.75	2.52	0.98	0.71	0.56
Model 5	14.69	6.39	2.28	1.53	0.55

(A) Concurrent

	Q1	Q2	Q3	Q4	Q5
Model 1	7.17	2.82	0.95	0.49	0.12
Model 2	7.00	2.85	0.98	0.52	0.15
Model 3	7.16	2.96	1.02	0.55	0.16
Model 4	7.30	3.10	1.06	0.57	0.16
Model 5	12.98	5.61	1.92	1.13	0.32

(B) Prospective

Figure 7.2: Predictive ratios by number of diagnoses



	1	2	3	4	5+
Model 1	0.64	0.34	0.23	0.18	0.10
Model 2	0.82	0.61	0.57	0.55	0.42
Model 3	0.94	0.76	0.71	0.70	0.60
Model 4	0.88	0.69	0.65	0.63	0.49
Model 5	1.19	1.02	0.91	0.88	0.94

(A) Concurrent

	1	2	3	4	5+
Model 1	0.65	0.35	0.23	0.18	0.10
Model 2	0.67	0.37	0.26	0.22	0.13
Model 3	0.68	0.39	0.28	0.24	0.16
Model 4	0.70	0.40	0.30	0.25	0.16
Model 5	1.00	0.76	0.64	0.61	0.52

(B) Prospective

7.5 Discussion

As described by the conceptual framework presented in Chapter 2, one important way in which consumer mobility in heavily regulated competitive health insurance markets can be influenced, is through risk selection. The best way to prevent incentives for risk selection is through providing insurers with risk-adjusted premium subsidies to equalise the costs these risks represent. In this context, the objectives of this chapter were to empirically evaluate the performance of Ireland's risk equalisation scheme (belatedly introduced in 2013) and to see if improvements could be made to its specification. Particular interest was placed in determining the scope for introducing diagnosis-based risk-adjusters.

7.5.1 Concurrent and prospective specifications

Firstly, for both concurrent and prospective models, age, sex and level of cover alone performed poorly in explaining claims expenditure. Similar results have been reported in mandatorily insured systems, with risk equalisation models based primarily on age and sex, generally accounting for between 1-4% of claims expenditure (Behrend et al., 2007; Breyer, Heineck, and Lorenz, 2003; Chalupka, 2010; Chang, Lee, and Weiner, 2010; Chang et al., 2002; van de Ven, van Vliet, and Lamers, 2004). As such, it is unlikely the tax-credit system in place in Ireland prior to risk equalisation adequately reimbursed insurers for the risk they held.

For all other models, as expected, concurrent models perform better than prospective models and similar findings have been reported elsewhere (Behrend et al., 2007; Chalupka, 2010; van de Ven and Ellis, 2000). Particularly, utilisation-based models (i.e. Model 2 and 3) appear to perform comparatively well in a concurrent context and this could be related to the fact insurers are paid set per diem rates for private care in public hospitals (Citizens Information, 2014). Figures suggest that for those with private health insurance, just over 60% of their inpatient stays take place in public hospitals (CSO, 2011).

However, a concurrent approach may not be desirable in practice. Providing payments to insurers based on information collected in the same period, while reducing risk selection incentives to a greater degree, reduces insurers' motivation to act efficiently as reimbursement is based on actual claims accrued (van de Ven and Ellis, 2000). Moreover, retrospective payments can create uncertainties around payment allocations leading to difficulties for insurers in calculating premiums. This is a particular problem in voluntary markets where consumers use premium signals not only as a basis for insurer choice but also in deciding whether to take out insurance at all (Armstrong et al., 2010).

Prospective payments may be less accurate, however, they better preserve incentives for efficient behaviour and allow insurers to ex-ante factor in the impact of credits in determining plan premiums. In addition, the Irish risk equalisation scheme is prospective in nature and therefore assessment of the prospective modelling is more pertinent. In this context, the prospective risk equalisation model explained approximately 5.8% of expenditure variation. While the inclusion of daycase admissions or a chronic illness flag marginally improved performance, evidence suggests that overall selection incentives on the part of insurers could be substantially reduced through the replacement of the inpatient LOS adjuster with one based on high cost diagnostic categorisation (Model 5; R^2= 16.6%). Moreover, replacing the current utilisation-based health status adjuster with one based on diagnoses would improve incentives for efficient behaviour as reimbursement would not be tied directly to frequency of utilisation (i.e. number of nights spent in acute care).

7.5.2 Outlier risk pooling

This chapter also examined the potential effect of introducing an outlier risk pool. Outlier risk pools are part of many risk equalisation designs internationally, however, at present it is not part of the Irish risk equalisation design. While results were mixed for concurrent models there is strong evidence that outlier risk pooling would help improve predictability of claims expenditures in prospective models for those outside the risk pool and thus reduce incentives for selection. However, policy-makers and regulators would need to be cognisant that reimbursing actual expenditure above a certain threshold may also reduce insurer incentives to behave efficiently.

7.5.3 Predictive ratios

When considering efficacy of risk equalisation models it is also important to understand how they perform in terms of predicting expenditures for high-risk groups.

In this context, predictive ratios for high-risks, assessed in terms of quintile of expenditure and number of diagnoses, were closer to one for concurrent models relative to prospective models. More importantly, however, it appears that the current risk equalisation specification (across both concurrent and prospective applications) is a poor predictor of claims expenditure for high-risk groups. Overall, and particularly for prospective models, risk equalisation predicated on high cost diagnoses performed significantly better for high-risk groups than all other specifications. One caveat however, is that this model did also substantially over pay for those in the lower quintiles of expenditure, relative to other models, which itself might distort incentives.

7.5.4 International context

Although comparison of performance with risk equalisation in other health systems is complicated given differences in breadth and depth of coverage, such comparisons do provide a useful point of reference. Table 2.2 outlines the various risk equalisation designs in place across a number of health systems. A first point to note is that, apart from the Swiss system, utilisation of health services is not employed as a measure of health status internationally. For models that do incorporate health status measures, they tend to be based on diagnostic information. For example, the 2012 Dutch risk equalisation scheme was based on age, sex, region, source of income, socioeconomic status, 13 inpatient DCGs (Diagnostic Cost Groups) and 25 PCGs (Pharmacy Cost Groups) plus an adjuster for multiple year high-costs. The updated German risk equalisation design, introduced in 2009, bases payments on age, sex, disability status and 80 specific chronic diseases. In addition to age, the Israeli system includes fixed annual payments for those diagnosed with a restrictive list of certain illnesses. In the US, Medicare predicates payments on 70 diagnostic categories.

Internationally, the Dutch risk equalisation can be considered the most sophisticated and predicts approximately 28.5% of claims expenditure (van Veen et al., 2015). However, it has been reported that expanding the number of inpatient

DCGs to 15 would predict 31.4% of claims expenditure (van Kleef, van Vliet, and van Rooijen, 2014). In contrast, recent research has also taken place on the predictive efficacy of the German risk equalisation design, which suggested it could predict approximately 20% of total claims expenditure (Buchner, Goepffarth, and Wasem, 2013)[131].

7.5.5 Additional considerations

Overall, evidence from this chapter appears to suggest that the current risk equalisation design in Ireland could be improved. In an international context, it appears to perform poorly. Moreover, from both an individual and group perspective, it would appear that basing risk equalisation on high-cost diagnoses would significantly improve predictive ability thereby reducing incentives for risk selection. However, a number of factors need to be taken into account before considering possible changes to the current system.

A first consideration relates to the actual form diagnosis-based payments would take. As described in Section 3.4.3, during the consultation process prior to the introduction of the current risk equalisation design, interest was expressed by the Government in the introduction of diagnosis-based risk equalisation, predicated on DRGs. Renewed interest has recently been expressed in this idea (HIA, 2014a), however considerable uncertainty still exists over the structure and configuration this would take. While this study provided some evidence on the ability of a relatively small number of high-cost diagnoses to improve risk equalisation design, a more focused statistical analysis will be required once potential diagnostic groups for inclusion are identified.

[131] Research is sparse on the efficacy of risk equalisation in voluntary private health insurance markets. Some research exists on this topic as it applies to the Australian system, looking at the applicability of DCG-based models. For instance, Duckett and Agius (2002) found that a DCG-based model predicted 18% of the log of monthly healthcare expenditure. While, more recently, DCG model predicted 5.2% of prospective inpatient expenditure for a large Australian hospital dataset (Donato and Richardson, 2006). However, these simulations are likely to be unhelpful in a comparative context as they deal with populations of sick Australians rather than the privately insured, specifically.

An important criterion to consider when designing risk equalisation schemes is feasibility (see Section 2.4.2.4). For instance, the introduction of diagnosis-based risk equalisation would likely place a much greater administrative burden on both insurers and the regulator in the Irish system. The introduction of diagnosis-based risk equalisation would require that each insurer in the market be able to accurately capture and code relevant diagnostic information. In this regard, little is known about the quality of respective IT systems used by insurers. The increased informational burden would also make the submission of risk equalisation returns by insurers to the HIA more burdensome. From a regulator perspective, more care would need to be taken in terms of auditing submitted risk equalisation returns and insuring consistency across insurers. Moreover, the rudimentary cell-based statistical techniques used by the HIA to calculate risk equalisation credits would likely have to be substituted for more sophisticated methods (e.g. linear regression analysis). Finally, predicating payments on diagnoses may introduce incentives for insurers to influence the reporting of diagnoses such that they receive higher payments. Processes would need to be put in place to monitor such activity.

Another aspect of feasibility of risk equalisation design concerns its acceptability by stakeholders. In this context, risk equalisation has historically been a contentious issue in the Irish health system. As described in Section 3.4.3, efforts to introduce risk equalisation payments in 2003 were impeded due to successful legal action taken by VHI's main competitor at the time, BUPA. More recently, consultation prior to the introduction of the current risk equalisation design revealed that a strong divergence in views existed between VHI and its competitors over the need for a risk equalisation system. Among other concerns, the newer insurers were particularly apprehensive about the introduction of a health status adjuster into the risk equalisation design. Given the asymmetry of risk in the market it was felt that a system of risk equalisation payments would essentially amount to a transfer of funds from the newer insurers to VHI[132]. It could be argued that a more refined health status measure, based on diagnoses, would exacerbate this transfer of funds to VHI, and would therefore be strongly objected to by the other market insurers.

[132] Actual risk equalisation payments reflect these concerns, see Table 3.6.

Another issue is the impact recently introduced lifetime community rating regulations may have on the market (see Section 3.4.1). For instance, as a form of risk-rating, lifetime community rating may complement risk equalisation subsidies in reducing selection incentives. However, if lifetime community rating encourages younger cohorts to take out insurance (as it is designed to) and if, for instance, newer entrants are better able to capture these risks, this could contribute to further market segmentation. Low-risk consumers, in this context, might be attracted to low cost policies (as a cheap way of avoiding loadings) something the newer insurers given their already better risk profiles (due to lack of robust risk equalisation) may be better able to provide.

Finally, results from this analysis would appear to caution against expanding the role competitive health insurance plays in the Irish market. As described in Section 3.6, until recently the introduction of a competing insurer model of universal health insurance was being strongly considered. However, this analysis indicates that an important precondition of effective competition, namely, robust risk equalisation appears not to be met at present. This issue is discussed in more detail in Section 8.4.3.

7.5.6 Limitations

Access to individual level private health insurance data in Ireland is very restricted. In this context, the dataset provided by VHI allowed, for the first time, an empirical analysis of risk equalisation in the Irish system. However, this analysis is predicated on data from only one (albeit the largest) insurer in the market with a worse than average risk profile. This may have implications for generalisability of findings. Moreover, data restrictions meant it was only possible to test a narrow range of risk equalisation models. Ideally, access to ICD-level diagnostic coding would have allowed examination of standard and validated diagnostic categorisations used in other jurisdictions (such as DCGs and HCCs (Duncan, 2011)) and DRGs which are currently beginning to be considered for use in the Irish system.

7.6 Conclusion

The regulatory environment under which health insurance markets operate has been identified as potentially having a strong effect on consumer mobility through its influence on risk selection incentives. In that context, this chapter analysed the efficacy of the current design of Ireland's risk equalisation scheme and if improvements could be made. Evidence indicates that the current risk equalisation model, in a prospective context, performs quite poorly both in terms of individual level and group level prediction. The introduction of an outlier risk pool may also help reduce selection incentives but its advantages in this regard would need to be weighed against its negative effects on cost control for high cost individuals. Findings also suggest that the current specification could be substantially improved through the replacement of current inpatient hospital utilisation payments by those based on diagnostic information. Questions, however, remain over the feasibility of introducing diagnosis-based payments into the Irish risk equalisation design. More broadly, little research exists on the efficacy of risk equalisation models in voluntary private health insurance markets and this analysis may have implications for such markets considering designing and/or implementing risk-adjusted subsidy payments to health insurers.

Chapter 8

Discussion of findings, implications and conclusions

8.1 Introduction

The purpose of this chapter is to discuss the findings of this thesis. The conceptual framework constructed in Chapter 2 offered a number of predictions regarding consumer mobility in health insurance markets. In this regard, Section 8.2 discusses the empirical findings of this thesis in terms of this framework. Section 8.3 then highlights the contributions to knowledge identified in this research. It is argued that contributions are multifaceted and can be identified from both theoretical and applied (national and international) perspectives. Section 8.4 discusses the implications and recommendations arising from this thesis, including policy options to improve competition within the market and whether the expansion of the competitive health insurance market, as has been proposed, is advisable. Finally, Section 8.5 outlines potential directions of future research and Section 8.6 concludes.

8.2 Overview of findings

8.2.1 Switching rate

Low switching rates tend to be a defining characteristic of health insurance markets across a number of settings. As noted in Chapter 6, low switching rates have been observed in a number of mandatory European health insurance systems and in US employer based health insurance markets. This thesis also observes similar switching propensities in the Irish health insurance market. According to HIA consumer surveys, only one-in-five consumers had ever switched insurer, while the estimate from Chapter 6 puts the annual switching rate at 3.8% overall.

Consumer decision theory provides us with some explanations as to why this may be the case. First, consumers should only switch when the benefits of doing so outweigh the costs. However, this requirement may not be fulfilled in a number of instances. First, as reported in Chapter 5, a large majority of consumers appear satisfied with their health insurance coverage and may not switch for this reason. In addition, health insurance markets tend to be subject to a number of switching costs which were identified in the conceptual framework and may also impact on consumer mobility. As discussed in Chapter 5, the regulatory nature of the Irish market means it is less affected by some potential switching costs that manifest themselves in other systems. However, evidence of a number of costs of switching were identified in the Irish market (see Chapter 5). Perhaps of most concern in terms of its effect on consumer mobility was that just over one in seven non-switchers in the market cited transaction costs of switching as a reason for not switching (the implications of this are discussed in more detail in Section 8.4.1).

The conceptual framework also acknowledges that standard economic assumptions may not be able to fully account for consumer decision-making behaviour and allows for deviations from the standard model. Particularly, prospect theory and its derivative theories (see Section 2.3.2.2) acknowledge that consumers may be prone to a number of biases that limit rational behaviour. Conceptually these can be thought to manifest themselves in terms of non-rational (psychological) switching costs. In this regard, Chapter 5 also found that some non-switchers in the Irish market cited apathy (11.2%), inertia (8.3%) and loyalty (8.3%) as reasons for not switching insurer. Evidence of non-rational switching costs has also been identified in other health insurance markets internationally. It is important to realise that the presence of non-rational costs to switching present unique concerns of their own and question the ability of competitive markets to allocate resources effectively. This issue is addressed in more detail in Section 8.4.

Relatively few non-switchers (7.2%) cited search costs as a reason for not-switching. This findings is slightly contrary to what would be expected, given the large number of plans available on the market. However, as argued, it may be the case that the apathy displayed towards the switching process is a latent manifestation, to some degree, of high search costs in the market.

Finally, Hirschman (1970) would argue that low switching rates may also be a function of dissatisfied consumers preferring to voice their concerns with their current insurer, rather that switch, in the hope that they can initiate improved insurer performance. Internationally, this phenomenon has not been well research. However, evidence that does exist from the Dutch health insurance market suggests voice is not used to a large extent (See Section 2.3.3). While an empirical investigation into the role 'voice' may play in the Irish market was outside the scope of this thesis, it may, however, represent a area of possible future research (see Section 8.5)

8.2.2 Characteristics and motivations

As noted in Chapter 6, low switching rates may not necessarily point towards a lack of competitiveness. Indeed too much switching may be undesirable as it can result in high administrative costs (Duijmelinck, Mosca, and van de Ven, 2015). What is just as important is an understanding of the consumer and plan characteristics that motivate switching.

In terms of consumer characteristics, the conceptual framework predicts that low-risk individuals face lower search and switching costs. This idea is often used to explain the higher observed switching rates of low-risk individuals in health insurance markets internationally (see Section 2.3). However, what is less well studied are whether search and switching costs in health insurance markets do indeed differ between risk-types. This was investigated in Chapter 5 of this thesis. Largely, the hypothesis that low-risks experience lower search and switching costs was confirmed. As reported in Chapter 5, although transaction and uncertainty costs did not meaningfully differ between individuals; psychological and search costs of switching did. A particularly interesting finding was that older individuals were more likely to experience inertia and loyalty towards their current insurer, while those in worse health were more likely to experience search costs and apathy towards the switching process. The conceptual framework, in this context, did not offer much guidance as to why this may be the case. However, it was speculated that certain characteristics of older individuals may make them more prone to exhibiting 'loyal' behaviour. In contrast, less healthy individuals may need to exert greater cognitive effort if switching given that consideration may need to be given to a wider range of factors than simply price. It was argued that this may offer a plausible explanation as to why less healthy individuals are more apathetic towards the switching process and experience higher search costs. These findings were reflected in the actual modelling of switching behaviour in Chapters 5 and 6 where younger and healthier individuals, respectively, were found to have higher switching propensities than their older, less healthy, counterparts. Differential switching costs between low and high-risks may also be a function of risk selection (if it exits); this is discussed in Section 8.2.3.

Understanding the plan characteristics that motivate switching behaviour, particularly price and quality, was also an important empirical inquiry of this thesis. In terms of standard neoclassical thinking, a central prediction is that utility-maximising consumers will be motivated to switch in response to lower priced plans. In a competitive market environment, if this holds, insurers will be forced to behave efficiently in order to provide plans that match consumers' price preferences. Empirically, findings from other health insurance market environments suggest that price is an important predictor of switching behaviour (see Section 2.3.1.1).

This motivation should be particularly strong in the Irish market given that the premium cost falls, predominantly, directly on the consumer[133]. Evidence from Chapters 5 and 6 seem to confirm this hypothesis. Infact, perhaps the strongest empirical evidence arising from this thesis is that price effects matter for switching behaviour. Over 70% of switchers (see Chapter 5) cited cost-savings as a reason for switching insurer while relative premium increases were a statistically significant motivation for switching when modelled in Chapter 6. The magnitude of these price effects could also be considered large. For example, for total policies, a 1% increase in relative premium resulted in a 0.2 percentage point increase in the switching rate (relative to a base switching rate of 3.8%). It was also found that this price-responsiveness differed across risk-type. Older policyholders and those in worse health (as proxied by higher recorded hospital utilisation) were less responsive to relative premium increases and this was likely related to these policyholders experiencing, all else equal, a greater burden of switching costs.

Conceptually, for similar reasons to price, it is also to be expected that quality will influence switching behaviour. Again, under competitive pressures, if consumers are quality conscious it will motivate insurers to design products that match consumers' quality preferences. Overall, empirical evidence, largely from the US, would agree with the prediction that quality influences consumer choice. Evidence, from other markets, however, is slightly less robust (see Sections 2.3.1.2 and 2.4.1). Partly, this may relate to the fact that quality is a more complex concept than price. It is multi-dimensional, incorporating elements of service quality and quality of care. As such, consumers may lack the ability to understand it fully as a benefit.

[133]Although as noted in Chapter 3, there is some subsidisation of premium costs by the Government while some employers may also contribute towards employees' premiums.

In the Irish market, quality of care most likely does not differ significantly between insurers given that selective contracting, largely, does not take place. Quality, therefore, may be better understood in terms of level of cover and product/service range. In this context, results from Chapter 5 indicated that only 20.7% of consumers switched due to a better level of cover and even fewer (11.8%) switched because their new insurer had a better product or service range. This implies that quality is considered a much less important reason for switching than price. Unfortunately, lack of available data meant that it was not possible to model quality effects in Chapter 6. Therefore, it remains unclear as to the extent that dimensions of quality impact on actual switching behaviour in the Irish market.

8.2.3 Regulatory environment

The conceptual framework also highlights the need to consider the regulatory environment in which health insurance markets operate when understanding consumer mobility dynamics. For a number of reasons, regulation in health insurance markets tends to be quite strong. First, as described in Chapter 2, healthcare and health insurance markets tend to be prone to a number of market failures. In terms of this discussion, informational asymmetries mean that consumers often face high costs in finding and processing healthcare and health insurance-related information (Tuohy and Glied, 2011). As such, many health insurance markets aim to reduce search and switching costs through the provision of switching and comparative plan information (Laske-Aldershof et al., 2004). However, provision of such information may often not have the required effect; evidence from the US Medicare market suggests the presence of 'comparison friction'. That is, the wedge between the availability and use of consumer health insurance information. Evidence of a similar friction was observed in the Irish health insurance market. While the HIA provide information on the switching process and comparative plan information the majority of consumers were unaware of the functions of the HIA. As noted in Section 2.3, neoclassical economic theory dictates that consumers will act on available information when making decisions. Similar to the presence of psychological costs of switching in the market, the finding of poor consumer awareness questions the assumptions underlying market competition. Strategies to potentially reduce this friction are discussed in Section 8.4.1.

Healthcare is also considered a merit good and therefore should be distributed along some concept of equity. In this context, regulations such as open enrolment, lifetime cover and community rating are features of many health insurance markets as they promote access and affordability of health insurance to high-risk individuals. However, these regulations also promote risk selecting behaviour which can have a number of negative competitive effects including poor service to high-risks, welfare loss and market segmentation (see Section 2.4.2.1). The best way to temper these incentives is to design a payment system to insurers, for example through risk equalisation, that subsidies premiums insurers receive based on the risk profile of their enrolees.

Understanding the impact risk equalisation has had on the Irish market is particularly important. As discussed in Chapter 3, following liberalisation in the mid-1990s, the community rated market evolved, largely, in the absence of risk equalisation payments which resulted in strong incentives for risk selection and contributed to acute market segmentation between VHI and the newer entrants. Most notably, efforts to commence risk equalisation transfers in 2003 were abandoned due to a successful legal challenge by BUPA. However, in 2009 a system of additional age-related tax credits were introduced followed by bona-fide risk equalisation in 2013.

Evidence on the efficacy of risk equalisation presented in this thesis was, perhaps, slightly conflicting. Analysis in Chapter 6 suggested that the current risk equalisation design, largely, although not completely, equalised cost differentials between switchers and stayers. In contrast, a more detailed statistical analysis of risk equalisation in Chapter 7 based on standard international methodology suggested the current risk equalisation design performs quite poorly. In a prospective context, the current risk equalisation design predicted only 5.8% of claims expenditure.

More sophisticated risk equalisation designs in other systems tend to predict substantially more claims expenditure (see Section 7.5.4). In addition, this current Irish model also performed relatively poorly in terms of its ability to predict the claims expenditure of the sickest groups in the population.

On the balance of evidence, and reflection, it is felt that there is likely scope for improvements still to be made to the current risk equalisation design. This view is further supported by comments from the HIA, both in 2014 and 2015, that cite risk selection as still a feature of the market despite the implementation of risk equalisation (HIA, 2014d; HIA, 2015e) (Section 3.5.1). In this context, evidence from Chapter 7 suggests the current risk equalisation design could be significantly improved through the replacement of the current hospital utilisation adjuster with one based on high-cost diagnosis categories. To the extent that insurers are able to influence length of care, providing a single payment per diagnosis may also improve efficiency as payment would not be linked directly to quantity of utilisation as is the case with the current hospital utilisation adjuster. Evidence also indicates that the introduction of an outlier risk pool may also help reduce incentives for risk selection. However, policy-makers would need to be cognisant of the selection/efficiency tradeoff that is associated with the introduction of an outlier pool. Improving risk equalisation design may also have implications for price competition and market structure. Moreover, question marks still exist over the feasibility of implementing diagnosis-based payments in the Irish market. These issues are reviewed in detail in Section 8.4.2.

Finally, Table 8.1 provides a summary of the main findings of this thesis, just discussed, as they relate specifically to the research questions identified in Chapter 1.

Table 8.1: Summary of empirical findings

Research question	**Findings**
What factors do consumers see as encouraging and discouraging switching in the Irish private health insurance market? What barriers to switching do consumers face and how are they distributed across the insured population?	• Cost savings, more so than aspects of quality, were identified as the most important reason for switching insurer • Consumers mainly did not switch due to satisfaction with their insurer • Barriers to switching identified included transaction costs, search costs and non-rational (psychological) costs - Older individuals were more likely to experience loyalty and inertia towards their current insurer - Less healthy individuals were more likely to experience search costs and apathy towards switching • High-risk individuals were also less likely to switch insurer • Evidence was also found for the presence of comparison friction in the market, although this, overall, did not differ based on risk.
What are the determinants of actual switching behaviour in the Irish private health insurance market?	• Higher relative premium increases were associated with increased switching propensities • Price sensitivity declined with age, and prior healthcare utilisation, respectively • Older individuals and those with higher prior healthcare utilisation were less likely to switch, respectively • Risk equalisation largely, although not completely, eliminated cost differentials between switchers and stayers
How well has the recently introduced risk equalisation scheme addressed incentives for risk selection in the market? Can the design of risk equalisation be improved?	• Concurrent risk equalisation models outperformed prospective • Prospectively, the current risk equalisation design performed poorly, both at the individual level and for high-cost groups • Basing risk equalisation on 35 high costs diagnostic groups substantially improved performance • Outlier risk pooling also improved risk equalisation performance

8.2.4 Limitations

In the context of the findings discussed above, it is important to be cognisant of the limitations inherent in these analyses, which have been flagged, where relevant, throughout this thesis. For instance, while the main datasets utilised in this thesis provided the opportunity to specify and examine heretofore unexplored research questions, the nature of the data did carry with it some limitations, as outlined in Chapter 4. Particularly, the administrative nature of VHI datasets, on which analysis was predicated, restricted the number of variables which could be analysed. For instance, it was not possible to model the effect of dimensions of quality on switching behaviour in Chapter 6 nor the impact of alternative diagnostic groupings (e.g. DRGs, DCGs, HCCs) on risk equalisation performance in Chapter 7. Relatedly, the issue of potential omitted variable bias in these studies, and its consequences, was also considered (see Sections 6.4.1 and 4.4.4). Concerns over generalisability also needed to be highlighted as VHI does have a worse risk profile than the other market insurers. However, consumer survey data, utilised in Chapter 5, were representative of the entire health insurance market and reinforced many of the findings in Chapter 6. For example, analysis of both administrative and survey data suggests that cost is an important switching consideration and that low-risk individuals have higher switching propensities.

One aspect of the conceptual framework that remained relatively unexplored empirically was the impact of market structure on consumer mobility. An important observation that emerged from the literature review process was that while some authors cited market structure as an important conceptual element in understanding consumer choice in health insurance markets (Thomson et al., 2013; Laske-Aldershof et al., 2004), the relationship remained underdeveloped (although efforts were made to better understand the link between the two in this thesis). As noted in Chapter 2, internationally, adequate data on health insurance market shares and prices have only become available in recent years. As a consequence, research into health insurance market structure and competitiveness has only recently taken place in earnest (Gaynor and Town, 2012). As such, there is a distinct lack of empirical research on the association between consumer mobility and market structure, most likely a result of data limitations.

In this context, although a large portion of Chapter 3 was devoted to providing an understanding of the market structure of the Irish health insurance system, it was difficult to explicitly analyse an association between consumer mobility and market structure. Primarily, such a study would likely require access to detailed longitudinal data on consumer mobility and market structure which currently do not exist. Certainly, in terms of providing a holistic understanding of health insurance market competitiveness this is an area that requires future attention (see Section 8.5).

8.3 Contributions

8.3.1 Theoretical contributions

The major theoretical contribution of this thesis is the development of a conceptual framework of consumer mobility in health insurance markets. A literature review, conducted in Chapter 2 highlighted not only the manifold factors that need to be considered in understanding consumer switching behaviour but also the current lack of a coherent and interconnected holistic framework for this purpose. As such, a conceptual framework of consumer mobility was constructed in Section 2.7 that offers a number of insights into consumer mobility behaviour that, perhaps, have been poorly understood, or even unrecognised, to date.

In this context, consumer switching behaviour is predicated on standard neoclassical assumptions about how choices are made. Underlying this framework is the idea that rational consumers will only switch insurer if the benefits of doing so outweigh the costs. However, until very recently this was based on a generalised understanding of neoclassical economic behaviour applicable to all markets (for example see Klemperer (1987a) and Klemperer (1995)). Only recently have efforts been made to develop a framework of switching costs and benefits applicable specifically to health insurance markets (see, Duijmelinck, Mosca, and van de Ven (2015)). Conceptually, this is important to highlight as health insurance markets may contain idiosyncratic considerations that need to be accounted for in terms of consumer decision-making. For instance, provider-switching costs are specific to health insurance markets and relate to the costs of having to switch health-care provider that may accompany switching health insurer. Moreover, consumers may harbour a number of behavioural biases that undermine the standard rational model of consumer decision-making.

Other factors also need to be recognised and accounted for in a holistic conceptual treatment of consumer mobility and this understanding is often lacking. The conceptual framework identified the regulatory environment and the market structure, particularly, as important factors to consider. In terms of the former, the regulatory environment can influence consumer mobility both directly and indirectly through its effect on consumer decision-making (see Figure 2.4). For example, consumer information, selective contracting, supplementary insurance, open enrolment and lifetime cover regulations may all directly influence switching costs and benefits. Indirectly, consumer decision-making can be influenced through incentives created in community rated markets for insurer risk selection. While open enrolment and lifetime cover regulations help mitigate against direct risk selection, insurers can engage in indirect risk selection (e.g. marketing strategies, plan design) that may impact on consumer decision-making. Risk selection strategies employed by insurers (see Section 2.4.2.1) are essentially efforts made to distort the benefits and costs of switching faced by consumers (see Section 2.7).

Moreover, much of the theoretical and empirical literature on risk selection and risk equalisation is undertaken as a distinct branch of research and not considered from the perspective of consumer mobility. In instances where these topics have been considered in tandem (e.g. Laske-Aldershof et al. (2004) and Thomson et al. (2013)) it has been done at a high-level with a lack of in-depth investigation into the interaction between the two. Therefore, this framework advances current understanding by considering in tandem issues of risk selection and consumer mobility in greater detail and presenting a distinct perspective in terms of understanding the relationship between them.

In addition to the regulatory environment operating within the market, it was also argued that the market structure can play an important role in consumer mobility. However, theoretical and empirical work has been slow to develop in this area (see Section 8.2.4), meaning it was more difficult to fully conceptualise associations. Standard thinking to date would argue that as the number of insurers in a market fall and concentration levels increase, consumer mobility will be lower (Laske-Aldershof et al., 2004). However, as markets become very concentrated and interdependencies develop, competitive insurer behaviour and consequently consumer mobility, becomes harder to predict. Market concentration will be influenced by barriers to entry and exit and economies of scale and scope. Moreover, market power (the ability to maintain prices above competitive levels) will be affected by the level of search and switching costs in the market.

Furthermore, little theoretical work has taken place to date as to whether consumer mobility may differ across health insurance market designs. Given that the empirical analysis in this thesis dealt with an individual voluntary health insurance market, consideration was given to this issue (see Section 2.6). For instance, it was argued that in comparison to mandatory health insurance markets, voluntary markets tend to experience advantageous selection into insurance and consequently the characteristics of consumers may mean these markets face lower overall barriers to mobility. In contrast, however, the choice set faced by consumers in voluntary health insurance markets is larger as consumers can also exit the market if dissatisfied. This may have negative implications for consumer mobility *within* the market if this option is taken instead of switching. In addition, the number of plans faced by consumers of health insurance in employer-based settings tend to be restricted which may lower costs to switching in such markets.

Regulatory environments also tend to differ across insurance settings. In contrast to mandatory health insurance markets, most voluntary health insurance markets in the EU tend to be risk rated. However, where voluntary markets are community rated, risk equalisation regulations tend to be underdeveloped. Risk equalisation is also extremely uncommon in US employer-based insurance markets.

Finally, it is important to stress that from a theoretical perspective a higher level of switching does not necessarily equate with a more competitive market environment. It is also important to consider the motivations and characteristics of those who switch.

In summary, the conceptual framework constructed in this thesis offers a number of contributions that may better help understand consumer mobility in health insurance markets:

- Consideration needs to be given to the fact that health insurance markets face unique sets of costs and benefits, not common to other markets.
- However, understanding consumer mobility in health insurance markets is more complex than narrowly focusing on switching costs and benefits.
- It is important to realise that the prevailing regulatory environment may directly and indirectly impact on switching benefits and costs.
- It is important to understand that the prevailing market structure may also impact on consumer mobility, however association may be more ambiguous.
- It can be speculated that consumer mobility may also differ between health insurance market designs.
- It is not just level of consumer mobility that defines the competitiveness of health insurance markets. The characteristics and motivations of those switching also need to be taken into account.

8.3.2 Contributions at a national level

As noted in Chapter 1, much previous research into consumer mobility and broader aspects of competition in the Irish health insurance market have been quite qualitative in nature, while access to usable and relevant quantitative data has been quite limited. However, the data used as part of this thesis allowed for the formulation of important research questions that previously could not be explored. As a consequence, all three empirical studies conducted as part of this thesis contributed to empirical understandings of aspects of consumer mobility and competition in the Irish private health insurance market that did not previously exist.

While grey literature (i.e. the Competition Authority (2007)) has previously examined issues of search and switching costs in the Irish market, analysis in Chapter 5 of this thesis improved our understanding of these issues in a number of ways. First, motivations for switching and not switching, faced by consumers, were examined in more detail than has previously taken place. Particularly, it was not known that switching costs in the market were more likely to be experienced by high-risk individuals. Understanding this unequal distribution of costs also provided an empirical basis for understanding actual switching behaviour in the market. Finally, this study also highlighted the lack of consumer awareness of the HIA. This is important as the HIA provides information on switching rules and health plan comparison information which may help in reducing barriers to mobility in the market.

Chapter 6 represented a first ever attempt to empirically model switching behaviour in the Irish market. Apart from presenting evidence on different switching propensities among high and low-risk groups, this study provided a detailed account of the effect price had on switching behaviour. As noted in Section 8.2.2, it was possible for the first time to estimate the magnitude of price effects and whether these price effects differed based on risk-type.

As discussed in Chapter 3, risk equalisation and its absence, has received much attention in an Irish context. However, since the introduction of bona-fide risk equalisation in 2013 no independent empirical analysis had taken place to measure its performance. Understanding risk equalisation performance is particularly important in an Irish context given the need to correct for large risk asymmetries, and selection incentives, that have developed in the market. In this regard, analysis from this thesis makes two important empirical contributions. First, evidence, overall, suggests that the current risk equalisation design may require improvements if market asymmetry and selection incentives are to be appropriately addressed. Second, evidence is presented that the replacement of the current utilisation-based risk adjuster with one predicated on diagnostic information may be a way to achieve this.

In summary, therefore, some specific contributions this thesis makes to understanding consumer mobility and competitiveness in the Irish market include,

- A more detailed analysis of search and switching costs than has heretofore taken place in the Irish market,
  - particularly testing and identifying differences in search and switching costs between high and low-risk groups.
- Identifying a lack of consumer awareness of the HIA in the market and finding it did not meaningfully differ by risk-type.
- A first analysis of actual switching behaviour in the Irish market, that,
  - tested and identified price effects in the market
  - tested and identified interactions between price and risk-types
  - tested and identified differences in switching propensities across risk-types
- A first analysis of the performance of risk equalisation in the Irish market and finding that the current specification most likely requires improvement in design, which could be achieved through the integration of diagnostic information.

8.3.3 Contributions at an international level

Contributions at an international level are somewhat broader, although nonetheless valuable, in terms of understanding competitiveness in multi-payer health insurance markets.

First, as described in Chapter 2, consumer mobility has been well researched in mandatory health insurance systems in Europe and in a variety of settings in the US (employer-based, individual, Medicare, and Medicaid markets). However, what had been missing to date was an empirical analysis of consumer mobility in duplicate voluntary health insurance markets underpinned by a public healthcare system. As reinforced in Section 8.3.1, the particular characteristics of these markets justify the need for independent empirical investigation. As such, this thesis contributes to international understanding of consumer mobility using the Irish voluntary market as a platform.

Although a detailed comparison of consumer mobility in the Irish market versus other settings was outside the scope of this thesis, some general observations can be made. Most notably, findings from this study seem to reinforce the idea that certain consumer switching behaviours appear consistent across settings. For instance, as discussed, consumer switching rates in health insurance markets tend to be low and findings from this thesis suggest the Irish market is no different in this regard. Similarly, when switching does occur in most systems price seems to be the major motivating factor while low-risk consumers tend to have higher switching propensities. These behaviours were also observable features of the Irish market.

As argued in Section 8.3.1, however, what is less well studied are the drivers of consumer decision-making. Greater emphasis needs to be placed on consumer reported motivations for switching and not switching if interventions are to be identified to improve the competitive market environment. Outside perhaps the Netherlands, little empirical evidence exists in this regard. As such, findings from this thesis also contribute to improved understanding of the motivations that drive consumer decision-making with regard switching insurer.

As described in Chapter 5, and in common with the Dutch system, consumer satisfaction with health insurance providers in the Irish market tends to be quite high and may offer an important insight into why consumer switching rates tend to be low. In addition, non-rational switching costs are features of both markets, which likely contributes to low switching propensities. In other contexts, phenomena such as status quo bias and consumer inertia have been shown to be features of many health insurance systems (see Section 2.3.2). Evidence from this thesis therefore reinforces the notion that non-rational barriers to switching may play an important role in consumer decision-making in health insurance markets. Relatedly, the finding that switching costs tend to be experienced more by high-risk individuals in the Irish market is also an empirical feature of the Dutch system.

However, other observations serve to highlight the fact that certain barriers to switching will be unique to individual markets. For instance, the potential benefits lost with switching insurer has been reported as the largest barrier to mobility in the Dutch system (Duijmelinck, Mosca, and van de Ven, 2015); primarily a function of the sale of both basic and supplementary insurance in that market. Such costs are less of a concern in the Irish market. Additionally, transaction costs of switching appear to play a larger role in the Irish market as compared to the Dutch system. However, switching insurer in the Irish market is straightforward and can be accomplished quite quickly. This suggests that transaction costs of switching may be more perceived than actual and, as such, may relate to consumers lack of understanding of the switching process. Supporting this view, evidence from Chapter 5 suggested that a large gap exists between the availability of market switching information and consumers' use or awareness of it. In fact, despite its potential relevance this notion of 'comparison friction' has not been well studied to date in health insurance markets outside of the US Medicare market. From this perspective, this thesis also provides a relevant empirical contribution.

In an international context, much empirical research has taken place into the best way to design risk equalisation systems (see Chapter 2.4.2). Findings from this thesis, that diagnosis-based models outperform utilisation-based models, therefore may not offer much in the way of additional insights into risk equalisation performance. However, this thesis does present the first empirical evidence of risk equalisation performance, and potential for improvements, in the context of a regulated competitive voluntary private health insurance market. Importantly, risk equalisation systems have been slow to develop in such markets and recently interest has been growing in the role risk equalisation may play in these systems (e.g. South Africa, Australia).

In summary, therefore, some relevant empirical findings from this thesis in terms of international contributions to research on competitive health insurance markets, include,

- Consumers in voluntary private health insurance markets, underpinned by a public system, display many of the same switching behaviours as in other types of health insurance markets:
  - switching rates are low
  - price motivates switching behaviour
  - low-risks are more likely to switch than high-risks
- Switching behaviours may be understood through examining consumer reported motivations for switching and not switching,
  - particularly, differences in consumer responses across groups of individuals may help explain actual switching behaviour
  - evidence is found that reinforces the idea that non-rational decision-making may be an immutable characteristic of competitive health insurance markets
  - Some evidence is found of 'comparison friction', a concept not examined empirically in many health insurance markets

- Although risk equalisation has been well researched internationally, this thesis presents the first empirical findings of risk equalisation performance in the context of a voluntary private health insurance market.

8.4 Implications and recommendations

There are a number of implications arising from this thesis that may be valuable to policy-makers both in terms of improving the competitive environment of the voluntary Irish health insurance market and informing debate over recent health system financing reform proposals.

8.4.1 Switching costs and benefits

A first implication relates to the finding of search and switching costs in the market and the fact that the burden of these costs tends to fall disproportionately on high-risk consumers which was also reflected in the lower propensity of high-risk individuals to switch. While more switching is not necessarily better, an important principle of health insurance market competition is that consumers should have free choice of insurer without facing significant search and switching costs (Bevan and van de Ven, 2010). Greater barriers to mobility reduce insurers' incentives to match consumers' preferences around price and quality as the 'threat of exit' is diminished. Particularly, given that high-risk individuals appear to face greater barriers to mobility, insurers may have even fewer incentives to respond to the preferences of these groups, exacerbating inequities within the market.

As discussed in Chapter 5, a number of potential policy interventions were suggested to help address these issues. Foremost, strategies need to be identified to reduce the 'comparison friction' in the market. While a responsibility of the HIA is to provide consumer switching and plan comparison information, evidence would suggest that many consumers remain unaware of the availability of this information. Consequently, efforts to improve consumer awareness may help improve decision-making.

For instance, the most frequently cited switching cost in the market relates to the transaction cost of switching. However, as transaction costs may represent a perceived rather than actual barrier to switching an educational campaign highlighting the straightforward nature of switching insurer may be beneficial. Additionally, given that high-risks appear to face higher search costs, a focused campaign by the HIA highlighting the availability of plan comparison information may help reduce some of the inequities in the market. Perhaps less realistic, given the potential costs involved, although worthy of consideration would be the collection and distribution of consumer satisfaction ratings (such as that provided through CAHPS in the US and CQI in the Netherlands). This may help improve quality competition in the market given decision-making at present seems to be largely orientated towards price considerations. It is crucial, however, that in laying the foundations for such interventions to be successful that information made available by the HIA is easily accessible and presented in a comprehensible way.

Although not empirically investigated directly as part of this thesis, it may be that the large number of plans available for purchase in the market (see Section 3.5.1) are contributing to search costs. In this regard, one approach to limit the number of plans on the market would be to introduce a standardised community rated plan for all individuals with the option to purchase risk rated supplementary cover if required. This was also the option considered under UHI reforms. An alternative option would be to reduce the plan choice set faced by consumers by expanding the role of the employer-based health insurance market. Employer-based markets suffer from less search costs than individual insurance markets as employers generally offer a limited number of plans.

While standard economic theory would suggest that limiting the number of plans in such ways would reduce choice and consequently consumer welfare, empirical evidence actually suggests that consumer decision-making deteriorates along with too much choice. On the other hand, it is not clear whether such proposals are yet justified. More research is required into the link between the number of plans and search costs in the Irish market. Moreover, introducing a standard benefit package or expanding the role of employer-based insurance would come at a cost of significant regulatory change and the relatively low level of consumer-reported search costs identified in this thesis may not merit such change. Relatedly, as discussed (see Section 5.5), other switching costs can arise as well as incentives for risk selection where community rated standard cover is combined with risk rated supplementary cover and regulators and policy-makers would need to be cognisant of this[134].

As suggested by the conceptual framework, consumer decision-making may be influenced by the presence of profitable and unprofitable risks in the market. It is argued that risk selection strategies are essentially efforts to distort the benefits and costs to switching faced by consumers. For instance, insurers selectively targeting low-risks for advertising campaigns may reduce search costs for this group. Risk selection can also manifest itself in terms of price competition. This is important in terms of the strong evidence of price effects that were empirically observed in this thesis. Ostensibly, the strong consumer price responsiveness observed should be welfare enhancing in that it motivates insurers to provide efficiently priced products. However, where profitable and unprofitable risks exist in a market there is a worry that price competition may be driven by risk selection rather than the pursuit of efficiency. Before the introduction of risk adjusted subsidies this behaviour was identified in the Irish market. Particularly, newer entrants had advantages in pursuing ‘price shadowing’ strategies which helped them risk select consumers away from the incumbent VHI. The higher price responsiveness of low-risks helped them capture profitable consumers, contributing to acute market segmentation in the process.

[134] Any policy interventions designed to improve consumer-decision making and improve ease of mobility face difficulties raised by the presence of non-rational costs in the market. For example, it may be difficult to encourage switching for (more likely older) individuals who are loyal to their current insurer and refuse to switch.

Robust risk equalisation should temper insurer incentives for risk selection and correct for any risk segmentation between insurers. However, an important finding of this thesis is that the current risk equalisation design may face difficulties in achieving these objectives. Although the introduction of risk equalisation will have reduced incentives for risk selection (and somewhat addressed market asymmetry), differential barriers to switching between high and low-risks empirically identified in this thesis may remain a function, partly, of risk selecting behaviour. In this context, improving risk equalisation is discussed in the following section.

8.4.2 Improving risk equalisation

Findings from this thesis illustrated that incentives for risk selection could be reduced through the introduction of prospective diagnostic payments. Due to data limitations, this thesis only examined the applicability of 35 pre-defined high costs conditions on which to predicate risk adjusted payments. However, it provides a basis for further examination of the merits of diagnosis-based payments in the Irish setting as an approach to improving risk equalisation. Diagnosis-based payments are a feature of more advanced risk equalisation designs, internationally (e.g. Netherlands, Germany, US Medicare).

Risk equalisation performance could be further improved through the introduction of an outlier risk pool whereby claims above a certain threshold are retrospectively reimbursed. This is a feature of many health insurance systems internationally (see Figure 2.2) and evidence from this thesis shows that outlier risk-pooling would improve risk equalisation performance. Given an historic strong emphasis on social solidarity within the Irish market it is perhaps surprising that such a mechanism is not part of the current design. However, policy-makers would need to be cognisant that such a system might limit insurers' motivations for efficiency in terms of very high-cost individuals.

Finally, if selection incentives and segmentation are policy-makers' sole concern, then completely removing insurers' financial liability through claims-based (concurrent) equalisation would be optimal. This would involve calculating risk equalisation credits retrospectively and reimbursing insurers (after the fact) for actual claims incurred. However, internationally, this is very uncommon given the lack of incentives it creates for efficient behaviour.

As alluded to, improving risk equalisation design may also have consequences for price competition. While consumers in the Irish market appear to be strongly motivated to switch in response to cost savings, better risk equalisation would reduce the level of price variation that may still exist between the VHI and the newer entrants. This may have knock on effects for mobility within the market as consumers will have less of an incentive to switch if the benefits of doing so, in terms of price, are lower. However, as stressed through this thesis, it is not just the level of switching that defines competitiveness; as long as consumers are still willing to switch in response to cost savings, this should motivate insurers to compete along this dimension. Crucially, however, in the presence of robust risk equalisation, price competition will be a product of efficient insurer behaviour rather than risk selection.

Another corollary of the introduction and improvement of risk equalisation is its potential impact on market structure. As discussed, risk equalisation may disincentivise entry for potential insurers who, given VHI's adverse risk profile, would end up as net contributors to the risk equalisation system. Relatedly, risk equalisation, through reallocating funds in the market away from the newer entrants and towards VHI may help improve VHI's market power. Prior to risk equalisation, and in the presence of poor risk equalisation, VHI's competitors had what are considered unfair advantages in attracting consumers, particularly low-risks, away from the incumbent which is likely to have contributed to the significant fall in VHI's market share. Improvements in risk equalisation will likely result in improvement in VHI's competitive strength.

In this context, it is likely that there may be some degree of resistance from other market insurers to improvements in risk equalisation design. As discussed, efforts to introduce risk equalisation, historically, were impeded through legal action taken by BUPA. More recently, consultation prior to the introduction of the current risk equalisation design revealed a strong divergence in views between VHI and its competitors over the need for a risk equalisation system. Newer entrants were particularly apprehensive about the introduction of a health status adjuster into the risk equalisation design. Given risk equalisation incorporates a health status adjuster, further efforts to improve it may result in renewed objections from certain insurers. The introduction of diagnosis-based payments, as discussed in Chapter 5, may face other obstacles that would also need to be addressed. Among them, include specifying the form of diagnosis-based payments to introduce (e.g. specific high-cost diagnoses, DRGs, DCGs, HCCs) and managing the increased administrative burden that would be placed on both insurers and regulators.

8.4.3 Expanding competitive health insurance

The research carried out as part of this thesis was undertaken at a time when a large amount of debate was being generated, and government reports were being published (e.g. DOH (2013) and DOH (2014a)) on plans to predicate Irish health system financing on a model of competing insurers. Reforms would essentially see mandatory purchase of a standardised community rated basic benefit package with the option to purchase risk rated supplementary insurance. The market for basic insurance would be regulated similar to the current voluntary market (lifetime cover, open enrolment, community rating and risk equalisation)[135]. Very recently, as noted, it appears these plans have been abandoned following costing studies that deem such a system too expensive (Wren, Connolly, and Cunningham, 2015; KPMG, 2015). Results from this thesis, however, may provide additional insights into the appropriateness of expanding competitive health insurance financing in the

[135]For a detailed account of these reforms, see Section 3.6.

Irish health system. In this regard, as noted in Section 1.1, if a mandatory multi-payer health insurance market is to be introduced it is crucial that fundamental pre-conditions of ease of switching and robust risk equalisation are in place.

In terms of the former, a number of barriers to switching have been identified in this thesis. Of particular concern is the high levels of (perceived) transaction costs and presence of non-rational costs. Non-rational costs, particularly, raise questions over the ability of a competitive market model to effectively allocate resources. Moreover, the burden of search and switching costs, overall, tend to fall on high-risk individuals. All else equal, this may motivate insurers not to respond to the preferences of these consumers as their 'threat of exit' is weakened.

Perhaps even more worrying is the fact that the current risk equalisation design may not be effective at tempering incentives for risk selection and correcting for market asymmetry. In an expanded market, the competitive implications of poor risk equalisation would be accentuated. This includes poor service to high-risks, market segmentation and welfare loss as resources are devoted to risk selection strategies rather than price and quality competition.

Aside from a cost argument, therefore, this thesis provides additional reasons as to why expanding the competitive health insurance market in Ireland may, currently, not be an attractive approach to financing reform.

Other factors, not addressed in this thesis, may also limit the effectiveness of a managed competition model in the Irish market. As described in Chapter 1, while this thesis only explored competition in terms of consumers and insurers, a crucial aspect of the managed competition framework is developing the market between insurers and providers (i.e. the healthcare purchasing market) (van Ginneken and Swartz, 2012; van Ginneken, Swartz, and Van der Wees, 2013). In fact, van Ginneken and Swartz (2012) argue that competitive health insurance markets will not contain costs without reforms to the healthcare purchasing market. In other words, an underdevelopment of this market may severely limit the ability of insurers to engage in price competition. For managed competition to be effective, health insurers should have the ability to negotiate with providers on price and quality of care and to selectively contract. The current private health insurance market does not provide a suitable environment for such competition to take place.

Scope for insurer negotiation over prices is limited as insurers are forced to accept set payment rates from Government, which do not reflect variation in treatment costs, for care that takes place in public hospitals (Citizens Information, 2014). Some negotiation, however, does occur between insurers and private hospitals over costs (Turner, 2013), although details around it are unclear as published information is limited. While steps were in place as part of universal health insurance plans to move toward a system of provider payments that reflect activity, rather than average cost (DOH, 2014a), progress had been limited.

The ability of insurers to selectively contract with providers in a managed competition setting is also of concern. While, as noted, some selective contracting does occur in the Irish market, with insurers providing some plans based on restricted hospital lists, it is certainly not a defining feature. Moreover, it is unclear whether widespread selective contracting would be feasible. Compared to the Dutch system, hospital concentration is much lower (owing to much lower population density) and consequently this limits the ability of insurers to credibly negotiate with providers (Mikkers and Ryan, 2014). In addition, Mikkers and Ryan (2014) note that the closure of hospitals in Ireland is a contentious political issue and plans to conduct selective contracting may encounter resistance. In this context, it is questionable whether a major precondition to managed competition is in fact feasible in the Irish context[136].

A final recommendation of this thesis, therefore, is that while financing reform does need to take place, predicating such reform on a single-payer model would be better suited to the Irish setting. A single-payer system would still be conducive

[136] In total Bevan and van de Ven (2010) identifies eight preconditions to effective managed competition. That is 1) risk equalisation 2) market regulation 3) transparency 4) consumer information 5) freedom to contract 6) consumer choice of insurer 7) financial incentives for efficiency and 8) sufficient providers and insurers. While many of these conditions are interdependent, a full analysis is outside the scope of this thesis. However, Mikkers and Ryan (2014) provide a discussion of these conditions in the context of the Irish health insurance market.

to the main goal of reform, that is the abolition of the current two-tier public/private system and access to services based on need and not ability to pay. Under such a system, one organisation (e.g. a social health insurance fund or the Government) collects and pools revenues and purchases health services for the population (Hussey and Anderson, 2003). The major benefit of a single-payer system, in this context, is that it avoids the issue of risk selection (Hussey and Anderson, 2003) and market segmentation, and with it the need to design, implement and manage, a complicated (and potentially costly) risk equalisation system. In light of the discussion on risk equalisation taken place in this thesis, it is perhaps difficult to over-emphasise how much this would simplify the regulatory burden in the market.

Of course, proponents of a managed competition model would argue that the introduction of a single-payer system would remove the benefits of insurer competition in terms of cost and quality (Breyer, Bundorf, and Pauly, 2012). However, it is in fact still empirically unclear whether multi-payer frameworks deliver on these benefits (Mikkers and Ryan, 2014). Another argument is that single-payer systems may also limit choice available to consumers and while this may be true, as discussed above and in Section 2.3.2.1, evidence suggest that many consumers make poor purchasing decisions in terms of health insurance, which limits the argument that more choice is always better.

8.5 Future research

Under the assumption that private health insurance will play some part in Irish health system financing in the future, the most pressing research, perhaps, relates to improving the design of risk equalisation. Evidence presented in this thesis suggests that diagnosis-based risk equalisation is a promising area for further research in this regard. Particularly beneficial would be access to market-wide, individual-level claims data, however, at present these data do not exist.

TABLE 8.2: Summary of recommendations

• Strategies should be put in place to reduce search and switching costs in the market. For example, - broad and focused (for high-risks) media advertising relating to the functions of the HIA as a source of information on switching and health plan comparisons - introduction of health insurer quality ratings - ensure easily accessible and comprehensible information
• Improvements in risk equalisation design are required to better address market segmentation and incentives for risk selection - consideration should be given to the use of diagnostic payments - consideration should be given to the introduction of an outlier risk pool - regard needs to be given to the feasibility of changes in risk equalisation design - regard needs to be given to the acceptability of stakeholders to any changes in risk equalisation design
• Aside from cost concerns, findings from this thesis strengthen the argument that a mandatory multi-payer insurance market may not be the most suitable model for the Irish health system.

In addition, there were areas identified as part of the conceptual framework that were not tested empirically as part of this work. For example, it might be pertinent to research the impact that 'voice' might play in the context of consumer decision-making. To date, little empirical work has taken place in this area. As noted, an important factor in understanding consumer mobility may be the market structure under which a competitive health insurance market operates. As yet, the relationship between the two has also remained largely unexplored. Research in this area could prove worthwhile given the trend internationally for increased concentration within health insurance markets.

Finally, research on issues of consumer switching and risk equalisation tend to be heavily quantitatively focused and the empirical analysis conducted in this thesis was no different. However, additional insights, not possible to capture through quantitative analysis, could be gleaned from qualitative research design. For example, risk equalisation in an Irish context has historically been a highly contentious issue. Semi-structured interviews of market stakeholders may help discern the various conflicting attitudes towards risk equalisation and its improvement in the Irish market. Such insights may provide evidence for policy development in this area that is more acceptable to all stakeholders and therefore more likely to succeed in the long term.

8.6 Concluding remarks

This thesis was motivated by a distinct lack of knowledge that existed on the forces influencing competition in the Irish voluntary health insurance market. Particularly a focus was placed on understanding aspects of consumer mobility dynamics, which offered a practical and coherent platform on which to base investigations. Guided by the construction of a conceptual framework of consumer mobility a number of important, timely, and heretofore unexplored, research questions were addressed.

Similar to other health insurance markets, when individuals switch insurers it is often in response to strong preferences for cost-savings, which promotes price competition on the part of insurers. Overall, however, consumer switching rates are low. As an explanation, many consumers appear satisfied with their current insurer and do not switch for that reason. Barriers to switching were also identified which may also be contributing to low switching rates. From a competitive perspective it is perhaps particularly worrying that some switching costs are non-rational in nature and that many consumers may lack the awareness needed to make informed decisions. Moreover, high-risk individuals are more prone to these switching costs which is a likely explanation for higher observed switching propensities of low-risk consumers.

In addition, poor risk equalisation may not be adequately addressing risk selection incentives in the market and, as such, may also be contributing to differential switching propensities between low and high-risks. Diagnosis-based risk equalisation, in this context, may offer a means of improving risk equalisation performance.

Overall, findings from this thesis improve understanding of the competitive environment in which the Irish voluntary health insurance market currently operates.

As such, the evidence and recommendations presented may be particularly relevant for policy-makers interested in improving the market's competitive design. For the most part, however, this body of work represents an early exploration into issues of consumer mobility and competition in the Irish voluntary health insurance market. As such, much scope still exists for additional, more refined, research in this area. It is hoped, therefore, that this thesis, and the findings contained within, provides justification and motivation for future analysis of these important issues.

Appendix A

Additional empirical results

Table A.1: Corrected Rao-Scott chi-squared statistics

	Pearson chi-squared	**Corrected Rao-Scott chi-squared**[a,b]
Age	15.2	16.75
Gender	3.44	3.79
Social Grade	8.91	9.82
Health Status	3.57	3.93

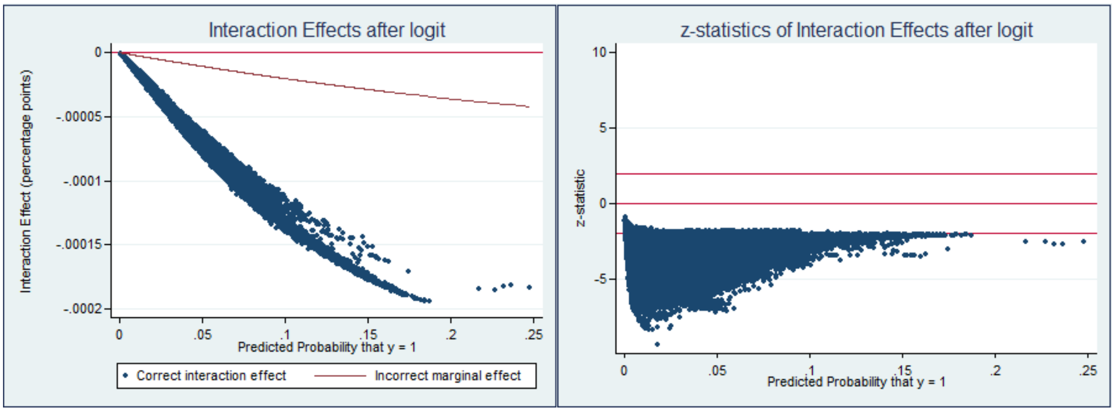
[a] Corrected Rao-Scott chi-squared statistic calculated as $\frac{\chi^2}{\sigma}$ where,
σ = 1 - total count of multiple responses/(total number of subjects x number of multiple response variables)

[b] At 5% significance, I failed to reject the null hypothesis of marginal independence, for all associations.

TABLE A.2: Estimated AMEs for price effects using different specifications of the premium variable

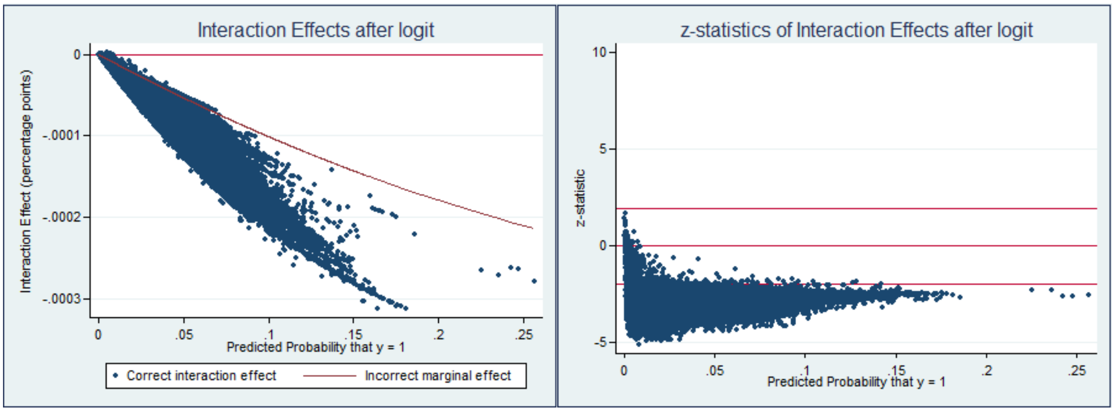
Variables	**Single**			**Multiple**			**Total**		
	Model 1	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
	dy/dx (SE)	**dy/dx (SE)**	**dy/dx (SE)**	**dy/dx (SE)**	**dy/dx (SE)**	**dy/dx (SE)**	**dy/dx (SE)**	**dy/dx (SE)**	**dy/dx (SE)**
Price1	0.085* (0.046)	0.187** (0.083)	0.086* (0.046)	0.033** (0.015)	0.103** (0.046)	0.034** (0.015)	0.032** (0.014)	0.073** (0.035)	0.033** (0.014)
Price1*Age		-0.004** (0.002)			-0.002*** (0.001)			-0.001** (0.001)	
Price1*LOS			-0.004* (0.003)			-0.003** (0.002)			-0.001* (0.001)
Price2	0.466** (0.182)	0.162** (0.072)	0.147*** (0.04)	0.225*** (0.063)	0.048 (0.175)	0.225*** (0.063)	0.179*** (0.047)	0.116 (0.097)	0.18*** (0.048)
Price2*Age		-0.004*** (0.002)			-0.009 (0.005)			-0.009** (0.004)	
Price2*LOS			-0.007*** (0.003)			-0.004 (0.005)			-0.006*** (0.003)
Price3	0.466** (0.182)	0.91** (0.358)	0.471** (0.184)	0.214** (0.083)	0.466* (0.251)	0.22*** (0.084)	0.209*** (0.072)	0.451** (0.212)	0.212*** (0.074)
Price3*Age		-0.021*** (0.008)			-0.009** (0.005)			-0.009*** (0.004)	
Price3*LOS			-0.02** (0.012)			-0.016** (0.008)			-0.01** (0.005)
Price4	0.466*** (0.182)	0.915** (0.359)	0.47** (0.184)	0.214*** (0.083)	0.464* (0.248)	0.22*** (0.084)	0.209*** (0.072)	0.452** (0.213)	0.212*** (0.074)
Price4*Age		-0.021*** (0.008)			-0.009** (0.005)			-0.009*** (0.004)	
Price4*LOS			-0.019 (0.209)			-0.016 (0.099)			-0.001 (0.083)

Price1 = Ratio of premium charged at time of the renew/switch decision to market average premium
Price2 = Difference in the percentage change in policy premium over the 12 months to the renew/switch decision and the percentage change in the market average premium
Price3 = Change (in euro) in policy premium over the 12 months to the renew/switch decision. Variable is scaled in hundreds of euro.
Price4 = Difference in the change (in euro) in policy premium over the 12 months to the renew/switch decision and the change in the market average premium (in euro). Variable is scaled in hundreds of euro.



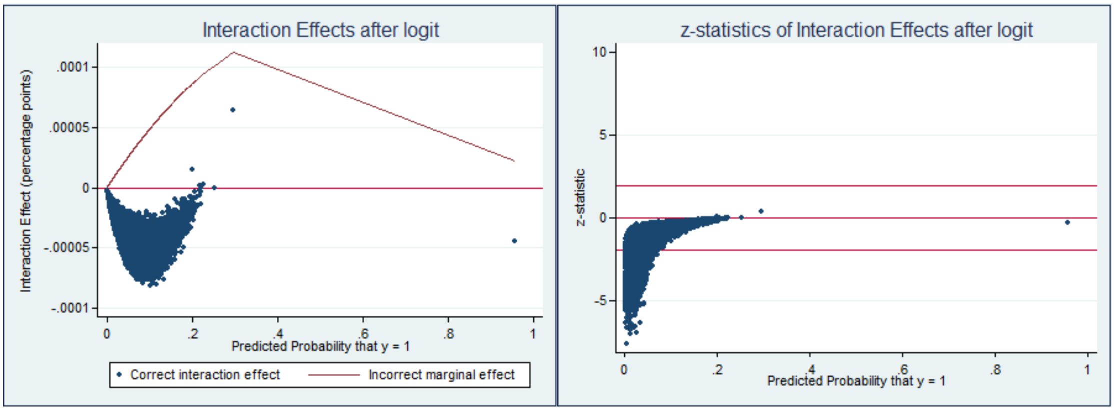
(A) Interaction effects (B) Z-values

FIGURE A.1: Distribution of price*age interaction effects and associated z-values for logistic regression models - single-person policies



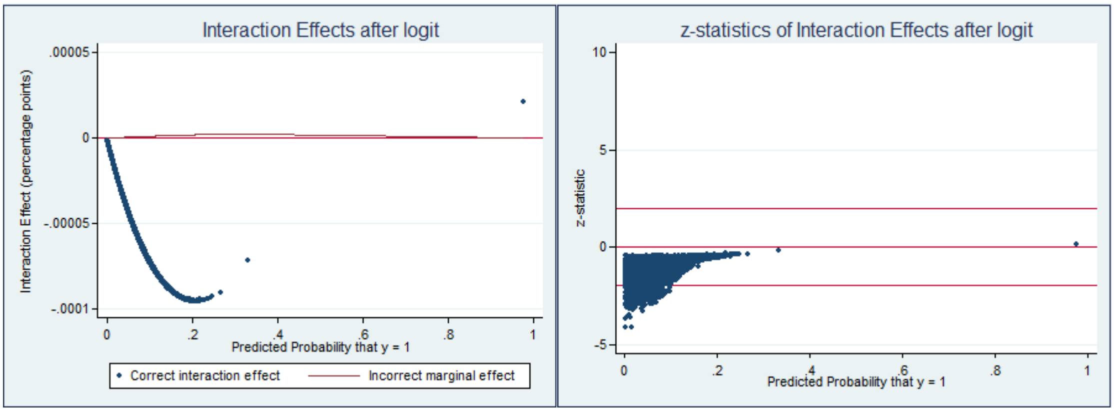
(A) Interaction effects (B) Z-values

FIGURE A.2: Distribution of price*LOS interaction effects and associated z-values for logistic regression models - single-person policies



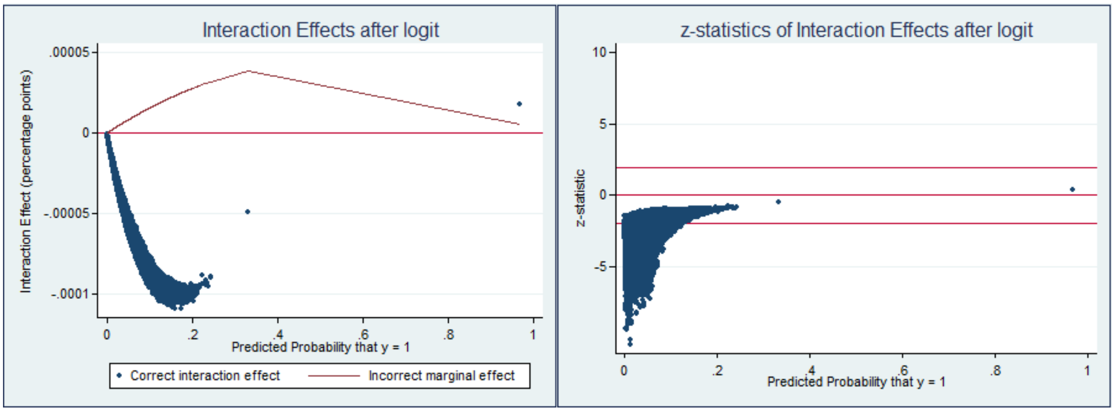
(A) Interaction effects (B) Z-values

FIGURE A.3: Distribution of price*age interaction effects and associated z-values for logistic regression models - multiple-person policies



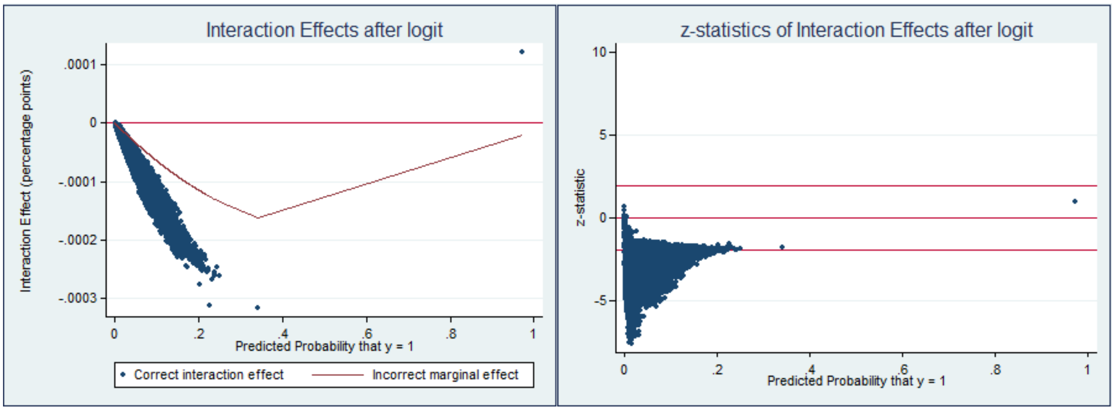
(A) Interaction effects (B) Z-values

FIGURE A.4: Distribution of price*LOS interaction effects and associated z-values for logistic regression models - multiple-person policies



(A) Interaction effects (B) Z-values

FIGURE A.5: Distribution of price*age interaction effects and associated z-values for logistic regression models - total policies



(A) Interaction effects (B) Z-values

FIGURE A.6: Distribution of price*LOS interaction effects and associated z-values for logistic regression models - total policies

Note: Interaction effects will always follow a curved pattern when graphed against predicted probability (Ai and Norton, 2003).

TABLE A.3: LPM results determining switching behaviour for total policies

Variables[a,b]	**Total**		
	Model 1	**Model 2**	**Model 3**
	Coeff[c]**(SE)**	**Coeff (SE)**	**Coeff (SE)**
Age	-0.091*** (0.007)	-0.078*** (0.011)	-0.091*** (0.007)
Male (ref =female)	0.224* (0.123)	0.216* (0.12)	0.224* (0.123)
Married (ref = not married)	0.966*** (0.17)	0.97*** (0.167)	0.965*** (0.17)
Leinster	0.101* (0.237)	0.237* (0.143)	0.239* (0.144)
Ulster	0.232 (0.28)	0.226 (0.278)	0.23 (0.28)
Munster	0.463*** (0.166)	0.468*** (0.164)	0.463*** (0.166)
Connacht	0.795*** (0.187)	0.793*** (0.185)	0.795*** (0.188)
Other	0.509 (0.991)	0.49 (0.996)	0.51 (0.991)
Single/multiple dummy	0.868*** (0.3)	0.848*** (0.293)	0.868*** (0.3)
Child(ren) dummy	0.289 (0.572)	0.328 (0.558)	0.293 (0.571)
Student(s) dummy	-0.409 (0.446)	-0.457 (0.424)	-0.408 (0.446)
Duration (years) with VHI	-0.084*** (0.013)	-0.085*** (0.013)	-0.084*** (0.013)
Cover level 1	-0.252 (0.597)	-0.207 (0.619)	-0.247 (0.597)
Cover level 3	-0.845 (0.674)	-0.791 (0.641)	-0.842 (0.673)
Average LOS	-0.033*** (0.009)	-0.032*** (0.009)	-0.003 (0.01)
Relative price change (%)	0.165*** (0.047)	0.243** (0.099)	0.166*** (0.047)
Relative price (%)* Age		-0.001 (0.001)	
Relative price (%)* LOS			-0.002*** (0.001)
Constant	9.421*** (0.609)	8.793*** (0.666)	9.407*** (0.607)
R^2 (%)	1.52	1.55	1.52
Switch (%)	3.8		

[a] Not included in table are month-of-renewal/switch specific intercepts.
[b] Variables relate to description of main policyholder, where applicable.
[c] Coefficient values multiplied by 100.
*p<0.1, **p<0.05, ***p<0.01, cluster robust standard errors in parenthesis.

TABLE A.4: Individual prediction metrics for concurrent and prospective models; two-part model (probit; OLS)

Models	**Adj. R^2 *100**	**MAPE €**	**CPM *100**
Concurrent Models			
Demographic model (Model 1)	3.0	1286.17	5.3
RE model (Model 2)	49.3	767.00	43.5
RE model incl. day cases (Model 3)	52.9	587.26	56.8
RE model incl. a chronic illness flag (Model 4)	50.1	747.21	45.1
Demographic model incl. 35 ICD-9-CM diagnostic groupings (Model 6)	37.6	695.96	48.8
Prospective Models			
Demographic model (Model 1)	2.9	1290.64	5.1
RE model (Model 2)	2.9	1290.64	5.1
RE model incl. day cases (Model 3)	5.9	1242.48	8.6
RE model incl. a chronic illness flag (Model 4)	6.4	1242.73	8.6
Demographic model incl. 35 ICD diagnostic groupings (Model 6)	17.4	954.30	29.5

Table A.5: Individual prediction metrics for concurrent and prospective models; GLM (link-log; family-Gaussian)

Models	**Adj. R^2 *100**	**MAPE €**	**CPM *100**
Concurrent Models			
Demographic model (Model 1)	3.0	1286.17	5.3
RE model (Model 2)	31.5	1056.80	22.2
RE model incl. day cases (Model 3)	23.9	907.08	33.5
RE model incl. a chronic illness flag (Model 4)	31.1	1015.56	25.3
Demographic model incl. 35 ICD-9-CM diagnostic groupings (Model 6)	20.2	865.23	40.0
Prospective Models			
Demographic model (Model 1)	2.9	1290.64	5.1
RE model (Model 2)	4.3	1291.91	5.1
RE model incl. day cases (Model 3)	5.0	1284.05	5.6
RE model incl. a chronic illness flag (Model 4)	5.6	1276.71	6.2
Demographic model incl. 35 ICD diagnostic groupings (Model 6)	10.2	1176.17	26.2

Note: Efforts were also made to estimate a GLM with a log link function and a Gamma distribution. However, due to unstable goodness of fit estimates and (in some cases) lack of convergence, this was not possible. In a risk equalisation context, similar estimation issues with GLMs have been previously reported by Veazie, Manning, and Kane (2003) and Ellis and McGuire (2007).

Table A.6: Individual prediction metrics for concurrent and prospective models, truncated expenditure

Models	**Adj. R^2*100**	**MAPE €**	**CPM *100**
Concurrent - Truncated €10,000			
Demographic model (Model 1)	6.1	842.79	5.9
RE model (Model 2)	28.5	720.06	19.6
RE model incl. day cases (Model 3)	34.3	662.23	26.1
RE model incl. a chronic illness flag (Model 4)	34.3	676.33	24.5
Demographic model incl. 35 ICD-9-CM diagnostic groupings (Model 6)	49.5	449.97	49.8
Prospective - Truncated €10,000			
Demographic model (Model 1)	6.0	856.84	5.7
RE model (Model 2)	7.9	845.03	7.0
RE model incl. day cases (Model 3)	8.8	837.21	7.9
RE model incl. a chronic illness flag (Model 4)	9.9	830.14	8.7
Demographic model incl. 35 ICD diagnostic groupings (Model 6)	28.0	644.19	29.1
Concurrent - Truncated €50,000			
Demographic model (Model 1)	4.0	1217.08	5.5
RE model (Model 2)	43.5	883.44	31.4
RE model incl. day cases (Model 3)	49.8	757.34	41.2
RE model incl. a chronic illness flag (Model 4)	46.8	836.88	35.0
Demographic model incl. 35 ICD-9-CM diagnostic groupings (Model 6)	43.5	703.27	45.4
Prospective - Truncated €50,000			
Demographic model (Model 1)	3.9	1243.03	5.3
RE model (Model 2)	6.8	1217.92	7.2
RE model incl. day cases (Model 3)	7.9	1202.56	8.4
RE model incl. a chronic illness flag (Model 4)	8.4	1198.69	8.7
Demographic model incl. 35 ICD diagnostic groupings (Model 6)	20.4	964.24	26.5

Appendix B

ICD-9-CM codes, breakdown

Table B.1: Primary ICD-9-CM codes used to calculate high-cost categories (Chapter 7)

Category 1 = Alcoholism	
5711	AC ALCOHOLIC HEPATITIS
5712	ALCOHOL CIRRHOSIS LIVER
5713	ALCOHOL LIVER DAMAGE NOS
5353	ALCOHOLIC GASTRITIS*
53530	ALCHL GASTRTIS W/O HMRHG
53531	ALCHL GSTRITIS W HMRHG
29181	ALCOHOL WITHDRAWAL
2919	ALCOHOL MENTAL DISOR NOS
303	ALCOHOL DEPENDENCE SYNDR*
3030	AC ALCOHOL INTOXICATION*
30300	AC ALCOHOL INTOX-UNSPEC
30301	AC ALCOHOL INTOX-CONTIN
30302	AC ALCOHOL INTOX-EPISOD
30303	AC ALCOHOL INTOX-REMISS
3039	ALCOHOL DEPEND NEC/NOS*
30390	ALCOH DEP NEC/NOS-UNSPEC
30391	ALCOH DEP NEC/NOS-CONTIN
30392	ALCOH DEP NEC/NOS-EPISOD
30393	ALCOH DEP NEC/NOS-REMISS
30500	ALCOHOL ABUSE-UNSPEC
Category 2 = Chronic Kidney Disease	
5851	CHRO KIDNEY DIS STAGE I
5852	CHRO KIDNEY DIS STAGE II
5853	CHR KIDNEY DIS STAGE III
5854	CHR KIDNEY DIS STAGE IV

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Table B.1 – continued from previous page

5855	CHRON KIDNEY DIS STAGE V
5856	END STAGE RENAL DISEASE
5859	CHRONIC KIDNEY DIS NOS
Category 3 = Chronic Pulmonary Disease	
49321	CH OB ASTHMA W STAT ASTH
496	CHR AIRWAY OBSTRUCT NEC
492	EMPHYSEMA*
4920	EMPHYSEMATOUS BLEB
49122	OBS CHR BRONC W AC BRONC
49322	CH OBST ASTH W (AC) EXAC
4912	OBSTRUCT CHR BRONCHITIS*
4928	EMPHYSEMA NEC
49120	OBST CHR BRONC W/O EXAC
49121	OBS CHR BRONC W(AC) EXAC
49320	CHRONIC OBST ASTHMA NOS
Category 4 = CNS (MS)	
340	MULTIPLE SCLEROSIS
Category 5 = CNS Disorder (Cerebral Palsy)	
3430	CONGENITAL DIPLEGIA
3431	CONGENITAL HEMIPLEGIA
343	INFANTILE CEREBRAL PALSY*
3432	CONGENITAL QUADRIPLEGIA
3433	CONGENITAL MONOPLEGIA
3434	INFANTILE HEMIPLEGIA
3438	CEREBRAL PALSY NEC
3439	CEREBRAL PALSY NOS
Category 6 = CNS Disorder (Parkinson)	
3321	SECONDARY PARKINSONISM
Category 7 = CNS Disorders	
344	OTH PARALYTIC SYNDROMES*
3440	QUADRIPLEGIA NOS*
34400	QUADRIPLEGIA, UNSPECIFD
34401	QUADRPLG C1-C4, COMPLETE
34402	QUADRPLG C1-C4, INCOMPLT
Category 8 = Congestive Heart Failure	
4281	LEFT HEART FAILURE
4289	HEART FAILURE NOS
4294	HRT DIS POSTCARDIAC SURG
39891	RHEUMATIC HEART FAILURE
40201	MAL HYPERT HRT DIS W HF
40211	BENIGN HYP HT DIS W HF
40291	HYP HT DIS NOS W HT FAIL
4280	CHF NOS
Category 9 = Coronary Artery Disease	
41404	COR ATH ARTRY BYPAS GRFT

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Table B.1 – continued from previous page

41405	COR ATH BYPASS GRAFT NOS
41406	COR ATH NATV ART TP HRT
41407	COR ATH BPS GRAFT TP HRT
41412	DISSECTION COR ARTERY
4142	CHR TOT OCCLUS COR ARTRY
4143	COR ATH D/T LPD RCH PLAQ
4110	POST MI SYNDROME
4118	AC ISCHEMIC HRT DIS NEC*
41189	AC ISCHEMIC HRT DIS NEC
412	OLD MYOCARDIAL INFARCT
4130	ANGINA DECUBITUS
4131	PRINZMETAL ANGINA
4139	ANGINA PECTORIS NEC/NOS
41092	AMI NOS, SUBSEQUENT
410	ACUTE MYOCARDIAL INFARCT*
4100	AMI ANTEROLATERAL WALL*
41000	AMI ANTEROLATERAL,UNSPEC
41001	AMI ANTEROLATERAL, INIT
41002	AMI ANTEROLATERAL,SUBSEQ
4101	AMI ANTERIOR WALL NEC*
41010	AMI ANTERIOR WALL,UNSPEC
41011	AMI ANTERIOR WALL, INIT
41012	AMI ANTERIOR WALL,SUBSEQ
4102	AMI INFEROLATERAL WALL*
41020	AMI INFEROLATERAL,UNSPEC
41021	AMI INFEROLATERAL, INIT
41022	AMI INFEROLATERAL,SUBSEQ
41032	AMI INFEROPOST, SUBSEQ
41040	AMI INFERIOR WALL,UNSPEC
4140	CORONARY ATHEROSCLEROSIS*
41401	CRNRY ATHRSCL NATVE VSSL
41402	CRN ATH ATLG VN BPS GRFT
41403	CRN ATH NONATLG BLG GRFT
4148	CHR ISCHEMIC HRT DIS NEC
4149	CHR ISCHEMIC HRT DIS NOS
4111	MTH SUS STPH AUR ELS/NOS
41181	ACUTE COR OCCLSN W/O MI
41400	COR ATH UNSP VSL NTV/GFT
41411	ANEURYSM CORONARY VESSEL
Category 10 = CVA Stroke	
4353	VERTBROBASLR ARTERY SYND
4373	NONRUPT CEREBRAL ANEURYM
4374	CEREBRAL ARTERITIS
435	TRANSIENT CEREB ISCHEMIA*
4350	BASILAR ARTERY SYNDROME

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Table B.1 – continued from previous page

4351	VERTEBRAL ARTERY SYNDROM
4352	SUBCLAVIAN STEAL SYNDROM
4358	TRANS CEREB ISCHEMIA NEC
4359	TRANS CEREB ISCHEMIA NOS
436	CVA
437	OTH CEREBROVASC DISEASE*
4370	CEREBRAL ATHEROSCLEROSIS
4371	AC CEREBROVASC INSUF NOS
4372	HYPERTENS ENCEPHALOPATHY
4375	MOYAMOYA DISEASE
4376	NONPYOGEN THROMBOS SINUS
4377	TRANSIENT GLOBAL AMNESIA
4378	CEREBROVASC DISEASE NEC
4379	CEREBROVASC DISEASE NOS
Category 11 = Dementia	
3310	ALZHEIMER'S DISEASE
3320	PARALYSIS AGITANS
29040	VASCULAR DEMENTIA,UNCOMP
29041	VASC DEMENTIA W DELIRIUM
29042	VASC DEMENTIA W DELUSION
29043	VASC DEMENTIA W DEPRESSN
797	SENILITY W/O PSYCHOSIS
2900	SENILE DEMENTIA UNCOMP
2901	PRESENILE DEMENTIA*
29010	PRESENILE DEMENTIA
29011	PRESENILE DELIRIUM
29012	PRESENILE DELUSION
29013	PRESENILE DEPRESSION
2902	SENILE DELUSION/DEPRESS*
29020	SENILE DELUSION
29021	SENILE DEPRESSIVE
2903	SENILE DELIRIUM
2904	ARTERIOSCLEROT DEMENTIA*
2908	SENILE PSYCHOSIS NEC
2909	SENILE PSYCHOT COND NOS
Category 12 = Depression	
29650	BIPOL I CUR DEPRES NOS
29652	BIPOL I CUR DEPRESS-MOD
3091	PROLONG DEPRESSIVE REACT
29682	ATYPICAL DEPRESSIVE DIS
29620	DEPRESS PSYCHOSIS-UNSPEC
29622	DEPRESSIVE PSYCHOSIS-MOD
2980	REACT DEPRESS PSYCHOSIS
29680	BIPOLAR DISORDER NOS
29689	BIPOLAR DISORDER NEC

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Table B.1 – continued from previous page

3004	DYSTHYMIC DISORDER
3090	ADJUSTMNT DIS W DEPRESSN
Category 13 = Diabetes	
5881	NEPHROGEN DIABETES INSIP
2535	DIABETES INSIPIDUS
25000	DMII WO CMP NT ST UNCNTR
25001	DMI WO CMP NT ST UNCNTRL
25002	DMII WO CMP UNCNTRLD
25003	DMI WO CMP UNCNTRLD
2501	DIABETES W KETOACIDOSIS*
25010	DMII KETO NT ST UNCNTRLD
25011	DMI KETO NT ST UNCNTRLD
25012	DMII KETOACD UNCONTROLD
25013	DMI KETOACD UNCONTROLD
2502	DIAB W HYPEROSMOLAR COMA*
25020	DMII HPRSM NT ST UNCNTRL
25021	DMI HPRSM NT ST UNCNTRLD
25092	DMII UNSPF UNCNTRLD
25093	DMI UNSPF UNCNTRLD
25081	DMI OTH NT ST UNCNTRLD
25082	DMII OTH UNCNTRLD
25083	DMI OTH UNCNTRLD
2509	DIABETES W COMPLIC NOS*
25090	DMII UNSPF NT ST UNCNTRL
25091	DMI UNSPF NT ST UNCNTRLD
25022	DMII HPROSMLR UNCONTROLD
25023	DMI HPROSMLR UNCONTROLD
2503	DIABETES WITH COMA NEC*
250	DIABETES MELLITUS*
2500	DIABETES MELLITUS UNCOMP*
25071	DMI CIRC NT ST UNCNTRLD
25072	DMII CIRC UNCNTRLD
25073	DMI CIRC UNCNTRLD
25030	DMII O CM NT ST UNCNTRLD
25031	DMI O CM NT ST UNCNTRLD
25032	DMII OTH COMA UNCONTROLD
25033	DMI OTH COMA UNCONTROLD
2504	DIAB W RENAL MANIFEST*
25040	DMII RENL NT ST UNCNTRLD
25041	DMI RENL NT ST UNCNTRLD
25042	DMII RENAL UNCNTRLD
25043	DMI RENAL UNCNTRLD
2505	DIAB W OPHTHALMIC MANIF*
25050	DMII OPHTH NT ST UNCNTRL
25051	DMI OPHTH NT ST UNCNTRLD

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Table B.1 – continued from previous page

25052	DMII OPHTH UNCNTRLD
25053	DMI OPHTH UNCNTRLD
2506	DIAB W NEUROLOGIC MANIF*
25060	DMII NEURO NT ST UNCNTRL
25061	DMI NEURO NT ST UNCNTRLD
25062	DMII NEURO UNCNTRLD
25063	DMI NEURO UNCNTRLD
2507	DIABETES W CIRCULAT DIS*
25070	DMII CIRC NT ST UNCNTRLD
2508	DIABETES W MANIFEST NEC*
25080	DMII OTH NT ST UNCNTRLD
Category 14 = Disorder of the adrenal glands	
255	ADRENAL GLAND DISORDERS*
2550	CUSHING'S SYNDROME
2552	ADRENOGENITAL DISORDERS
2553	CORTICOADREN OVERACT NEC
2555	ADRENAL HYPOFUNCTION NEC
2556	MEDULLOADRENAL HYPERFUNC
2558	ADRENAL DISORDER NEC
2559	ADRENAL DISORDER NOS
Category 15 = Drug Abuse	
29284	DRUG-INDUCED MOOD DISORD
30460	DRUG DEPEND NEC-UNSPEC
30590	DRUG ABUSE NEC-UNSPEC
30490	DRUG DEPEND NOS-UNSPEC
Category 16 = Epilepsy	
34501	GEN NONCONV EP W INTR EP
3451	GEN CONVULSIVE EPILEPSY*
34510	GEN CNV EPIL W/O INTR EP
34511	GEN CNV EPIL W INTR EPIL
3452	PETIT MAL STATUS
3453	GRAND MAL STATUS
3454	PSYCHOMOTOR EPILEPSY*
34540	PSYMOTR EPIL W/O INT EPI
34541	PSYMOTR EPIL W INTR EPIL
3455	PARTIAL EPILEPSY NEC*
34550	PART EPIL W/O INTR EPIL
34551	PART EPIL W INTR EPIL
3456	INFANTILE SPASMS*
34560	INF SPASM W/O INTR EPIL
34561	INF SPASM W INTRACT EPIL
3457	EPILEPS PARTIAL CONTINUA*
34570	EPIL PAR CONT W/O INT EP
34571	EPIL PAR CONT W INTR EPI
3458	EPILEPSY NEC*

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3450	GEN NONCONVULS EPILEPSY*
34500	GEN NONCV EP W/O INTR EP
345	EPILEPSY*
34580	EPILEP NEC W/O INTR EPIL
34581	EPILEPSY NEC W INTR EPIL
3459	EPILEPSY NOS*
34590	EPILEP NOS W/O INTR EPIL
34591	EPILEPSY NOS W INTR EPIL
Category 17 = Gastroentestinal Disease (Crohns)	
5551	REG ENTERITIS, LG INTEST
5552	REG ENTERIT SM/LG INTEST
5559	REGIONAL ENTERITIS NOS
Category 18 = Gastroentestinal Disease (Ulcerative Colitis)	
556	IDIOPATHIC PROCTOCOLITIS*
5560	ULCERATIVE ENTEROCOLITIS
5561	ULCERATIVE ILEOCOLITIS
5562	ULCERATIVE PROCTITIS
5563	ULCERTVE PRCTOSIGMOIDTIS
5564	PSEUDOPOLYPOSIS COLON
5565	LFTSDED ULCERTVE COLITIS
5566	UNIVRSL ULCERTVE COLITIS
5568	OTHER ULCERATIVE COLITIS
5569	ULCERATVE COLITIS UNSPCF
Category 19 = Haemophilia	
2865	INTR CIRCUL ANTICOAG DIS
286	COAGULATION DEFECTS*
2860	CONG FACTOR VIII DIORD
2861	CONG FACTOR IX DISORDER
2862	CONG FACTOR XI DISORDER
2863	CONG DEF CLOT FACTOR NEC
2864	VON WILLEBRAND'S DISEASE
2866	DEFIBRINATION SYNDROME
2867	ACQ COAGUL FACTOR DEFIC
2869	COAGULAT DEFECT NEC/NOS
Category 20 = Hyperlipidemia	
E9502	POISON-SEDAT/HYPNOTIC
2725	LIPOPROTEIN DEFICIENCIES
2726	LIPODYSTROPHY
2727	LIPIDOSES
2728	LIPOID METABOL DIS NEC
2729	LIPOID METABOL DIS NOS
Category 21 = Hypertension	
4041	BEN HYPERT HRT/RENAL DIS*
4040	MAL HYPERT HRT/RENAL DIS*
4049	HYPERT HRT/RENAL DIS NOS*

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404	HYPERTEN HEART/RENAL DIS*
4021	BENIGN HYPERTEN HRT DIS*
4029	HYPERTENSIVE HRT DIS NOS*
403	HYPERTENSIVE RENAL DIS*
4030	MAL HYPERTENS RENAL DIS*
405	SECONDARY HYPERTENSION*
4050	MAL SECOND HYPERTENSION*
40501	MAL RENOVASC HYPERTENS
40509	MAL SECOND HYPERTEN NEC
4051	BENIGN SECOND HYPERTENS*
40511	BENIGN RENOVASC HYPERTEN
40519	BENIGN SECOND HYPERT NEC
4059	SECOND HYPERTENSION NOS*
40591	RENOVASC HYPERTENSION
40599	SECOND HYPERTENSION NEC
4011	BENIGN HYPERTENSION
4019	HYPERTENSION NOS
402	HYPERTENSIVE HEART DIS*
4031	BENIGN HYPERT RENAL DIS*
401	ESSENTIAL HYPERTENSION*
4010	MALIGNANT HYPERTENSION
4020	MAL HYPERTENSIVE HRT DIS*
4039	HYPERTENS RENAL DIS NOS*
40200	MAL HYP HT DIS W/O HF
40210	BENIGN HYP HT DIS W/O HF
40290	HYP HRT DIS NOS W/O HF
40300	MAL HY KID W CR KID I-IV
40310	BEN HY KID W CR KID I-IV
40390	HY KID NOS W CR KID I-IV
40400	MAL HY HT/KD I-IV W/O HF
40401	MAL HYP HT/KD I-IV W HF
40402	MAL HY HT/KD ST V W/O HF
40403	MAL HYP HT/KD STG V W HF
40410	BEN HY HT/KD I-IV W/O HF
40411	BEN HYP HT/KD I-IV W HF
40412	BEN HY HT/KD ST V W/O HF
40413	BEN HYP HT/KD STG V W HF
40490	HY HT/KD NOS I-IV W/O HF
40491	HYP HT/KD NOS I-IV W HF
40492	HY HT/KD NOS ST V W/O HF
40493	HYP HT/KD NOS ST V W HF
Category 22 = Infectious Disease (Hep A - E, HIV)	
0700	HEPATITIS A WITH COMA
0701	HEPATITIS A W/O COMA
0703	HEPATITIS B W/O COMA*

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07032	HPT B CHRN WO CM WO DLTA
0702	HEPATITIS B WITH COMA*
07020	HPT B ACTE COMA WO DLTA
07021	HPT B ACTE COMA W DLTA
07022	HPT B CHRN COMA WO DLTA
07023	HPT B CHRN COMA W DLTA
07031	HPT B ACTE WO CM W DLTA
07033	HPT B CHRN WO CM W DLTA
07041	HPT C ACUTE W HEPAT COMA
07044	CHRNC HPT C W HEPAT COMA
07051	HPT C ACUTE WO HPAT COMA
07054	CHRNC HPT C WO HPAT COMA
07042	HPT DLT WO B W HPT COMA
07043	HPT E W HEPAT COMA
07053	HPT E WO HEPAT COMA
070	VIRAL HEPATITIS*
0704	VIRAL HEPAT NEC W COMA*
07049	OTH VRL HEPAT W HPT COMA
0705	VIRAL HEPAT NEC W/O COMA*
07052	HPT DLT WO B WO HPT COMA
07059	OTH VRL HPAT WO HPT COMA
0706	VIRAL HEPAT NOS W COMA
0709	VIRAL HEPAT NOS W/O COMA
0795	RETROVIRUS*
07950	RETROVIRUS, UNSPECIFIED
07951	HTLV-1 INFECTION OTH DIS
07952	HTLV-II INFECTN OTH DIS
07953	HIV-2 INFECTION OTH DIS
07959	OTH SPECFIED RETROVIRUS
Category 23 = Infectious Liver Disease	
5714	CHRONIC HEPATITIS*
57140	CHRONIC HEPATITIS NOS
57141	CHR PERSISTENT HEPATITIS
57149	CHRONIC HEPATITIS NEC
Category 24 = Malignant Cancer, Leukemia	
20012	LYMPHOSARCOMA THORAX
20013	LYMPHOSARCOMA ABDOM
1968	MAL NEO LYMPH NODE-MULT
1969	MAL NEO LYMPH NODE NOS
197	SECONDRY MAL NEO GI/RESP*
20085	MIXED LYMPHOSARC INGUIN
1970	SECONDARY MALIG NEO LUNG
1971	SEC MAL NEO MEDIASTINUM
1972	SECOND MALIG NEO PLEURA
1973	SEC MALIG NEO RESP NEC

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1974	SEC MALIG NEO SM BOWEL
1975	SEC MALIG NEO LG BOWEL
1976	SEC MAL NEO PERITONEUM
1977	SECOND MALIG NEO LIVER
1978	SEC MAL NEO GI NEC
198	SEC MALIG NEO OTH SITES*
1980	SECOND MALIG NEO KIDNEY
1981	SEC MALIG NEO URIN NEC
1982	SECONDARY MALIG NEO SKIN
1983	SEC MAL NEO BRAIN/SPINE
1984	SEC MALIG NEO NERVE NEC
1985	SECONDARY MALIG NEO BONE
1986	SECOND MALIG NEO OVARY
1987	SECOND MALIG NEO ADRENAL
1988	OTH SECONDARY MALIG NEO*
19881	SECOND MALIG NEO BREAST
19882	SECOND MALIG NEO GENITAL
19889	SECONDARY MALIG NEO NEC
199	MALIGNANT NEOPLASM NOS*
1990	MALIG NEO DISSEMINATED
1991	MALIGNANT NEOPLASM NOS
200	LYMPHOSARC/RETICULOSARC*
2000	RETICULOSARCOMA*
20014	LYMPHOSARCOMA AXILLA
20015	LYMPHOSARCOMA INGUIN
20016	LYMPHOSARCOMA PELVIC
20018	LYMPHOSARCOMA MULT
2002	BURKITT'S TUMOR/LYMPHOMA*
20020	BRKT TMR UNSP XTRNDL ORG
20021	BURKITT'S TUMOR HEAD
20022	BURKITT'S TUMOR THORAX
1899	MAL NEO URINARY NOS
190	MALIGNANT NEOPLASM EYE*
1900	MALIGN NEOPL EYEBALL
1901	MALIGN NEOPL ORBIT
1902	MAL NEO LACRIMAL GLAND
1903	MAL NEO CONJUNCTIVA
1904	MALIGN NEOPL CORNEA
1905	MALIGN NEOPL RETINA
1906	MALIGN NEOPL CHOROID
1907	MAL NEO LACRIMAL DUCT
1908	MALIGN NEOPL EYE NEC
1909	MALIGN NEOPL EYE NOS
191	MALIGNANT NEOPLASM BRAIN*
1910	MALIGN NEOPL CEREBRUM

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1911	MALIG NEO FRONTAL LOBE
1912	MAL NEO TEMPORAL LOBE
1913	MAL NEO PARIETAL LOBE
1914	MAL NEO OCCIPITAL LOBE
1915	MAL NEO CEREB VENTRICLE
1916	MAL NEO CEREBELLUM NOS
1917	MAL NEO BRAIN STEM
1918	MALIG NEO BRAIN NEC
1919	MALIG NEO BRAIN NOS
192	MAL NEO NERVE NEC/NOS*
1920	MAL NEO CRANIAL NERVES
1921	MAL NEO CEREBRAL MENING
1922	MAL NEO SPINAL CORD
1923	MAL NEO SPINAL MENINGES
1928	MAL NEO NERVOUS SYST NEC
1929	MAL NEO NERVOUS SYST NOS
193	MALIGN NEOPL THYROID
194	MAL NEO OTHER ENDOCRINE*
1940	MALIGN NEOPL ADRENAL
1941	MALIG NEO PARATHYROID
1943	MALIG NEO PITUITARY
1944	MALIGN NEO PINEAL GLAND
1945	MAL NEO CAROTID BODY
1946	MAL NEO PARAGANGLIA NEC
1948	MAL NEO ENDOCRINE NEC
1949	MAL NEO ENDOCRINE NOS
20017	LYMPHOSARCOMA SPLEEN
195	MAL NEO OTH/ILL-DEF SITE*
1950	MAL NEO HEAD/FACE/NECK
1951	MALIGN NEOPL THORAX
1952	MALIG NEO ABDOMEN
1953	MALIGN NEOPL PELVIS
1954	MALIGN NEOPL ARM
1955	MALIGN NEOPL LEG
1958	MALIG NEO SITE NEC
196	MALIG NEO LYMPH NODES*
1960	MAL NEO LYMPH-HEAD/NECK
1961	MAL NEO LYMPH-INTRATHOR
1962	MAL NEO LYMPH INTRA-ABD
1963	MAL NEO LYMPH-AXILLA/ARM
1965	MAL NEO LYMPH-INGUIN/LEG
1966	MAL NEO LYMPH-INTRAPELV
1809	MAL NEO CERVIX UTERI NOS
181	MALIGNANT NEOPL PLACENTA
182	MALIG NEOPL UTERUS BODY*

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1820	MALIG NEO CORPUS UTERI
1821	MAL NEO UTERINE ISTHMUS
1828	MAL NEO BODY UTERUS NEC
183	MAL NEO UTERINE ADNEXA*
1830	MALIGN NEOPL OVARY
1832	MAL NEO FALLOPIAN TUBE
1833	MAL NEO BROAD LIGAMENT
1834	MALIG NEO PARAMETRIUM
1835	MAL NEO ROUND LIGAMENT
1838	MAL NEO ADNEXA NEC
1839	MAL NEO ADNEXA NOS
184	MAL NEO FEM GEN NEC/NOS*
1840	MALIGN NEOPL VAGINA
1841	MAL NEO LABIA MAJORA
1842	MAL NEO LABIA MINORA
1843	MALIGN NEOPL CLITORIS
1844	MALIGN NEOPL VULVA NOS
1848	MAL NEO FEMALE GENIT NEC
1849	MAL NEO FEMALE GENIT NOS
185	MALIGN NEOPL PROSTATE
186	MALIGN NEOPL TESTIS*
1860	MAL NEO UNDESCEND TESTIS
1869	MALIG NEO TESTIS NEC
187	MAL NEO MALE GENITAL NEC*
1872	MALIG NEO GLANS PENIS
1873	MALIG NEO PENIS BODY
1874	MALIG NEO PENIS NOS
1875	MALIG NEO EPIDIDYMIS
1876	MAL NEO SPERMATIC CORD
1877	MALIGN NEOPL SCROTUM
1878	MAL NEO MALE GENITAL NEC
1879	MAL NEO MALE GENITAL NOS
188	MALIGN NEOPL BLADDER*
1880	MAL NEO BLADDER-TRIGONE
1881	MAL NEO BLADDER-DOME
1882	MAL NEO BLADDER-LATERAL
1883	MAL NEO BLADDER-ANTERIOR
1884	MAL NEO BLADDER-POST
1885	MAL NEO BLADDER NECK
1886	MAL NEO URETERIC ORIFICE
1887	MALIG NEO URACHUS
1888	MALIG NEO BLADDER NEC
1889	MALIG NEO BLADDER NOS
189	MAL NEO URINARY NEC/NOS*
1890	MALIG NEOPL KIDNEY

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1891	MALIG NEO RENAL PELVIS
1892	MALIGN NEOPL URETER
20155	HODG NODUL SCLERO INGUIN
20156	HODG NODUL SCLERO PELVIC
20157	HODG NODUL SCLERO SPLEEN
20158	HODG NODUL SCLERO MULT
2016	HODGKINS MIX CELLULARITY*
20228	SEZARY'S DISEASE MULT
2023	MALIGNANT HISTIOCYTOSIS*
20161	HODGKINS MIX CELL HEAD
20162	HODGKINS MIX CELL THORAX
20231	MAL HISTIOCYTOSIS HEAD
20164	HODGKINS MIX CELL AXILLA
20165	HODGKINS MIX CELL INGUIN
20166	HODGKINS MIX CELL PELVIC
20167	HODGKINS MIX CELL SPLEEN
20168	HODGKINS MIX CELL MULT
2017	HODG LYMPHOCYTIC DEPLET*
20170	LYM DPLT UNSP XTRNDL ORG
20171	HODG LYMPH DEPLET HEAD
20172	HODG LYMPH DEPLET THORAX
20173	HODG LYMPH DEPLET ABDOM
20174	HODG LYMPH DEPLET AXILLA
20175	HODG LYMPH DEPLET INGUIN
20176	HODG LYMPH DEPLET PELVIC
20177	HODG LYMPH DEPLET SPLEEN
20178	HODG LYMPH DEPLET MULT
2019	HODGKINS DISEASE NOS*
20190	HDGK DIS UNSP XTRNDL ORG
20191	HODGKINS DIS NOS HEAD
20192	HODGKINS DIS NOS THORAX
20193	HODGKINS DIS NOS ABDOM
20194	HODGKINS DIS NOS AXILLA
20195	HODGKINS DIS NOS INGUIN
20196	HODGKINS DIS NOS PELVIC
20197	HODGKINS DIS NOS SPLEEN
20198	HODGKINS DIS NOS MULT
202	OTH MAL NEO LYMPH/HISTIO*
2020	NODULAR LYMPHOMA*
20200	NDLR LYM UNSP XTRNDL ORG
20201	NODULAR LYMPHOMA HEAD
20023	BURKITT'S TUMOR ABDOM
20024	BURKITT'S TUMOR AXILLA
20025	BURKITT'S TUMOR INGUIN
20026	BURKITT'S TUMOR PELVIC

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20027	BURKITT'S TUMOR SPLEEN
20028	BURKITT'S TUMOR MULT
2008	MIXED LYMPHOSARCOMA*
20080	OTH VARN UNSP XTRNDL ORG
20081	MIXED LYMPHOSARC HEAD
Category 25 = Maternity	
V239	SUPRV HIGH-RISK PREG NOS
V240	POSTPART CARE AFTER DEL
67683	LACTAT DIS NEC-ANTEPART
67690	LACTATION DIS NOS-UNSPEC
677	LATE EFFCT CMPLCATN PREG
67510	BREAST ABSCESS PREG-UNSP
67511	BREAST ABSCESS-DELIVERED
67520	MASTITIS IN PREG-UNSPEC
67600	RETRACT NIPPLE PREG-UNSP
63440	SPON AB W METAB DIS-UNSP
63590	LEGAL ABORT UNCOMPL-UNSP
630	HYDATIDIFORM MOLE
631	OTH ABN PROD CONCEPTION
632	MISSED ABORTION
63400	SPON ABOR W PEL INF-UNSP
63401	SPON ABOR W PELV INF-INC
63470	SPON AB W COMPL NEC-UNSP
65883	AMNION PROB NEC-ANTEPART
65693	FET/PLAC PROB NOS-ANTEPA
65700	POLYHYDRAMNIOS-UNSPEC
65701	POLYHYDRAMNIOS-DELIVERED
65703	POLYHYDRAMNIOS-ANTEPART
65800	OLIGOHYDRAMNIOS-UNSPEC
65801	OLIGOHYDRAMNIOS-DELIVER
65803	OLIGOHYDRAMNIOS-ANTEPAR
65810	PREM RUPT MEMBRAN-UNSPEC
65820	PROLONG RUPT MEMB-UNSPEC
65583	FETAL ABNORM NEC-ANTEPAR
65680	FET/PLAC PROB NEC-UNSPEC
65370	OTH ABN FET DISPROP-UNSP
65630	FETAL DISTRESS-UNSPEC
65640	INTRAUTERINE DEATH-UNSP
65643	INTRAUTER DEATH-ANTEPART
65650	POOR FETAL GROWTH-UNSPEC
65651	POOR FETAL GROWTH-DELIV
65653	POOR FETAL GRTH-ANTEPART
65670	OTH PLACENT COND-UNSPEC
65683	FET/PLAC PROB NEC-ANTEPA
65420	PREV C-DELIVERY UNSPEC

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65440	ABN GRAV UTERUS NEC-UNSP
65443	ABN UTERUS NEC-ANTEPART
65450	CERV INCOMPET PREG-UNSP
65380	DISPROPORTION NEC-UNSPEC
65490	ABN PEL NEC IN PREG-UNSP
65500	FETAL CNS MALFORM-UNSPEC
65510	FETAL CHROMOS ABN-UNSPEC
65283	MALPOSITION NEC-ANTEPART
65310	CONTRACT PELV NOS-UNSPEC
65313	CONTRAC PELV NOS-ANTEPAR
64780	INF DIS IN PREG NEC-UNSP
64664	GU INFECTION-POSTPARTUM
64670	LIVER DIS IN PREG-UNSPEC
64673	LIVER DISORDER-ANTEPART
64680	PREG COMPL NEC-UNSPEC
64681	PREG COMPL NEC-DELIVERED
64682	PREG COMPL NEC-DEL W P/P
64683	PREG COMPL NEC-ANTEPART
64690	PREG COMPL NOS-UNSPEC
64691	PREG COMPL NOS-DELIVERED
64693	PREG COMPL NOS-ANTEPART
64650	BACTERIURIA PREG-UNSPEC
64380	VOMIT COMPL PREG-UNSPEC
64383	VOMIT COMPL PREG-ANTEPAR
64390	VOMIT OF PREG NOS-UNSPEC
64391	VOMIT OF PREG NOS-DELIV
64393	VOMIT OF PG NOS-ANTEPART
64400	THREAT PREM LABOR-UNSPEC
64403	THRT PREM LABOR-ANTEPART
64410	THREAT LABOR NEC-UNSPEC
64413	THREAT LABOR NEC-ANTEPAR
64420	EARLY ONSET DELIV-UNSPEC
64421	EARLY ONSET DELIVERY-DEL
64600	PAPYRACEOUS FETUS-UNSPEC
64601	PAPYRACEOUS FETUS-DELIV
64603	PAPYRACEOUS FET-ANTEPAR
64610	EDEMA IN PREG-UNSPEC
64613	EDEMA IN PREG-ANTEPARTUM
64303	MILD HYPEREMESIS-ANTEPAR
64660	GU INFECT IN PREG-UNSPEC
64663	GU INFECTION-ANTEPARTUM
64320	LATE VOMIT OF PREG-UNSP
64323	LATE VOMIT PREG-ANTEPART
65453	CERV INCOMPET-ANTEPARTUM
64220	OLD HYPERTEN PREG-UNSPEC

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64222	OLD HYPERTEN-DELIV W P/P
64224	OLD HYPERTEN NEC-POSTPAR
64230	TRANS HYPERTEN PREG-UNSP
64233	TRANS HYPERTEN-ANTEPART
6424	MILD/NOS PRE-ECLAMPSIA*
64240	MILD/NOS PREECLAMP-UNSP
64241	MILD/NOS PREECLAMP-DELIV
64242	MILD PREECLAMP-DEL W P/P
64243	MILD/NOS PREECLAMP-ANTEP
64244	MILD/NOS PREECLAMP-P/P
64250	SEVERE PREECLAMP-UNSPEC
64251	SEVERE PREECLAMP-DELIVER
64253	SEV PREECLAMP-ANTEPARTUM
64260	ECLAMPSIA-UNSPECIFIED
64261	ECLAMPSIA-DELIVERED
64262	ECLAMPSIA-DELIV W P/P
64263	ECLAMPSIA-ANTEPARTUM
64620	RENAL DIS PREG NOS-UNSP
64310	HYPEREM W METAB DIS-UNSP
64313	HYPEREM W METAB-ANTEPART
64623	RENAL DIS NOS-ANTEPARTUM
64290	HYPERTEN PREG NOS-UNSPEC
64291	HYPERTENS NOS-DELIVERED
64292	HYPERTENS NOS-DEL W P/P
64293	HYPERTENS NOS-ANTEPARTUM
64294	HYPERTENS NOS-POSTPARTUM
64300	MILD HYPEREM GRAV-UNSPEC
6396	POSTABORTION EMBOLISM
6398	POSTABORTION COMPL NEC
6399	POSTABORTION COMPL NOS
640	HEMORRHAGE IN EARLY PREG*
64000	THREATENED ABORT-UNSPEC
64001	THREATENED ABORT-DELIVER
64003	THREATEN ABORT-ANTEPART
64080	HEM EARLY PREG NEC-UNSP
64083	HEM EARLY PG NEC-ANTEPAR
64090	HEMORR EARLY PREG-UNSPEC
64091	HEM EARLY PREG-DELIVERED
64093	HEM EARLY PREG-ANTEPART
64100	PLACENTA PREVIA-UNSPEC
64103	PLACENTA PREVIA-ANTEPART
64110	PLACENTA PREV HEM-UNSPEC
64113	PLACEN PREV HEM-ANTEPART
64270	TOX W OLD HYPERTEN-UNSP
64210	RENAL HYPERTEN PREG-UNSP

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64123	PREM SEPAR PLAC-ANTEPART
64180	ANTEPART HEM NEC-UNSPEC
64183	ANTEPART HEM NEC-ANTEPAR
64190	ANTEPART HEM NOS-UNSPEC
64191	ANTEPARTUM HEM NOS-DELIV
64193	ANTEPART HEM NOS-ANTEPAR
64200	ESSEN HYPERTEN PREG-UNSP
64120	PREM SEPAR PLACEN-UNSPEC
64130	COAG DEF HEMORR-UNSPEC
63790	AB NOS UNCOMPLICAT-UNSP
63791	AB NOS UNCOMPLICAT-INC
63792	AB NOS UNCOMPLICAT-COMP
6390	POSTABORTION GU INFECT
6392	POSTABORT PELVIC DAMAGE
63480	SPON AB W COMPL NOS-UNSP
63690	ILLEG ABORT UNCOMPL-UNSP
63700	ABORT NOS W PEL INF-UNSP
63710	ABORT NOS W HEMORR-UNSP
63490	SPON ABORT UNCOMPL-UNSP
63491	SPON ABORT UNCOMPL-INC
63492	SPON ABORT UNCOMPL-COMP
65200	UNSTABLE LIE-UNSPECIFIED
65203	UNSTABLE LIE-ANTEPARTUM
65220	BREECH PRESENTAT-UNSPEC
64880	ABN GLUCOSE IN PREG-UNSP
64783	INFECT DIS NEC-ANTEPART
64793	INFECT NOS-ANTEPARTUM
64800	DIABETES IN PREG-UNSPEC
64803	DIABETES-ANTEPARTUM
64810	THYROID DYSFUN PREG-UNSP
64814	THYROID DYSFUNC-POSTPART
64630	HABITUAL ABORTER-UNSPEC
64863	CV DIS NEC-ANTEPARTUM
64870	BONE DISORD IN PREG-UNSP
64873	BONE DISORDER-ANTEPARTUM
63300	ABD PREG W/O INTRAU PREG
63310	TUBAL PREG W/O INTRA PRG
63380	ECT PREG NEC W/O INT PRG
63390	ECT PREG NOS W/O INT PRG
64510	POST TERM PREG-UNSP
64511	POST TERM PREG-DEL
64940	EPILEPSY-UNSPECIFIED
64950	SPOTTING-UNSPECIFIED
64953	SPOTTING-ANTEPARTUM
64970	CERVICAL SHORTENING-UNSP

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64973	CERVICAL SHORTENING-ANTE
65570	DECREASE FETL MOVMT UNSP
65573	DEC FETAL MOVMT ANTEPART
65970	ABN FTL HRT RATE/RHY-UNS
67450	PERIPART CARDIOMY-UNSPEC
67800	FETAL HEMATOLOGIC-UNSPEC
67810	FETAL CONJOIN TWINS-UNSP
65130	TWINS W FETAL LOSS-UNSP
65180	MULTI GESTAT NEC-UNSPEC
65101	TWIN PREGNANCY-DELIVERED
65103	TWIN PREGNANCY-ANTEPART
65110	TRIPLET PREGNANCY-UNSPEC
65230	TRANSV/OBLIQ LIE-UNSPEC
65231	TRANSVER/OBLIQ LIE-DELIV
64820	ANEMIA IN PREG-UNSPEC
64840	MENTAL DIS PREG-UNSPEC
64844	MENTAL DISORDER-POSTPART
64860	CV DIS NEC PREG-UNSPEC
65350	FETAL DISPROP NOS-UNSPEC
65100	TWIN PREGNANCY-UNSPEC
65113	TRIPLET PREG-ANTEPARTUM
64883	ABN GLUCOSE-ANTEPARTUM
64890	OTH CURR COND PREG-UNSP
64891	OTH CURR COND-DELIVERED
64893	OTH CURR COND-ANTEPARTUM
650	NORMAL DELIVERY
Category 26 = Mental disorder	
29600	BIPOL I SINGLE MANIC NOS
29601	BIPOL I SINGLE MANC-MILD
29602	BIPOL I SINGLE MANIC-MOD
29603	BIPOL I SING-SEV W/O PSY
29604	BIPO I SIN MAN-SEV W PSY
29605	BIPOL I SING MAN REM NOS
29606	BIPOL I SINGLE MANIC REM
29640	BIPOL I CURRNT MANIC NOS
29641	BIPOL I CURNT MANIC-MILD
29642	BIPOL I CURRNT MANIC-MOD
29643	BIPOL I MANC-SEV W/O PSY
29644	BIPOL I MANIC-SEV W PSY
29645	BIPOL I CUR MAN PART REM
29646	BIPOL I CUR MAN FULL REM
29651	BIPOL I CUR DEPRESS-MILD
29653	BIPOL I CURR DEP W/O PSY
29654	BIPOL I CURRNT DEP W PSY
29655	BIPOL I CUR DEP REM NOS

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29656	BIPOL I CURRNT DEP REMIS
29660	BIPOL I CURRNT MIXED NOS
Category 27 = Mental disorder (Schizophrenia)	
29540	SCHIZOPHRENIFORM DIS NOS
29541	SCHIZOPHRENIC DIS-SUBCHR
29542	SCHIZOPHREN DIS-CHRONIC
29543	SCHIZO DIS-SUBCHR/EXACER
29544	SCHIZOPHR DIS-CHR/EXACER
29545	SCHIZOPHRENIC DIS-REMISS
29560	SCHIZOPHR DIS RESID NOS
29561	SCHIZOPH DIS RESID-SUBCH
29562	SCHIZOPHR DIS RESID-CHR
29563	SCHIZO RESID SUBCHR/EXAC
29564	SCHIZOPH RESID-CHRO/EXAC
29565	SCHIZOPH DIS RESID-REMIS
29570	SCHIZOAFFECTIVE DIS NOS
29571	SCHIZOAFFECTV DIS-SUBCHR
29572	SCHIZOAFFECTIVE DIS-CHR
29573	SCHIZOAFF DIS-SUBCH/EXAC
29574	SCHIZOAFFTV DIS-CHR/EXAC
29575	SCHIZOAFFECTVE DIS-REMIS
29590	SCHIZOPHRENIA NOS-UNSPEC
29591	SCHIZOPHRENIA NOS-SUBCHR
29592	SCHIZOPHRENIA NOS-CHR
29533	PARAN SCHIZO-SUBCHR/EXAC
29534	PARAN SCHIZO-CHR/EXACERB
29535	PARANOID SCHIZO-REMISS
2954	AC SCHIZOPHRENIC EPISODE*
2955	LATENT SCHIZOPHRENIA*
29550	LATENT SCHIZOPHREN-UNSP
29581	SCHIZOPHRENIA NEC-SUBCHR
29582	SCHIZOPHRENIA NEC-CHR
29583	SCHIZO NEC-SUBCHR/EXACER
29584	SCHIZO NEC-CHR/EXACERB
29585	SCHIZOPHRENIA NEC-REMISS
2959	SCHIZOPHRENIA NOS*
295	SCHIZOPHRENIC DISORDERS*
2950	SIMPLE SCHIZOPHRENIA*
29503	SIMP SCHIZ-SUBCHR/EXACER
29504	SIMPL SCHIZO-CHR/EXACERB
29505	SIMPL SCHIZOPHREN-REMISS
29593	SCHIZO NOS-SUBCHR/EXACER
29594	SCHIZO NOS-CHR/EXACERB
29595	SCHIZOPHRENIA NOS-REMISS
29500	SIMPL SCHIZOPHREN-UNSPEC

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29501	SIMPL SCHIZOPHREN-SUBCHR
29502	SIMPLE SCHIZOPHREN-CHR
2951	HEBEPHRENIA*
29510	HEBEPHRENIA-UNSPEC
29511	HEBEPHRENIA-SUBCHRONIC
29512	HEBEPHRENIA-CHRONIC
29513	HEBEPHREN-SUBCHR/EXACERB
29514	HEBEPHRENIA-CHR/EXACERB
29515	HEBEPHRENIA-REMISSION
2952	CATATONIC SCHIZOPHRENIA*
29520	CATATONIA-UNSPEC
29521	CATATONIA-SUBCHRONIC
29522	CATATONIA-CHRONIC
29523	CATATONIA-SUBCHR/EXACERB
29524	CATATONIA-CHR/EXACERB
29525	CATATONIA-REMISSION
2953	PARANOID SCHIZOPHRENIA*
29530	PARANOID SCHIZO-UNSPEC
29531	PARANOID SCHIZO-SUBCHR
29532	PARANOID SCHIZO-CHRONIC
Category 28 = Metabolism Disorders (Cystic Fibrosis)	
27702	CYSTIC FIBROS W PUL MAN
27703	CYSTIC FIBROSIS W GI MAN
27709	CYSTIC FIBROSIS NEC
Category 29 = Musculoskeletal/ connective tissue disorder	
714	OTH INFLAMM POLYARTHROP*
7140	RHEUMATOID ARTHRITIS
7141	FELTY'S SYNDROME
7142	SYST RHEUM ARTHRITIS NEC
7143	JUV CHRON POLYARTHRITIS*
71430	JUV RHEUM ARTHRITIS NOS
71431	POLYART JUV RHEUM ARTHR
71432	PAUCIART JUV RHEUM ARTHR
71433	MONOART JUV RHEUM ARTHR
7144	CHR POSTRHEUM ARTHRITIS
7148	INFLAM POLYARTHROP NEC*
71481	RHEUMATOID LUNG
71489	INFLAMM POLYARTHROP NEC
7149	INFLAMM POLYARTHROP NOS
Category 30 = Polycystic Ovary Syndrome	
2564	POLYCYSTIC OVARIES
Category 31 = Peripherial Vascular Disease	
4404	CHR TOT OCCL ART EXTREM
4400	AORTIC ATHEROSCLEROSIS
4401	RENAL ARTERY ATHEROSCLER

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44020	ATHSCL EXTRM NTV ART NOS
44021	ATH EXT NTV AT W CLAUDCT
44022	ATH EXT NTV AT W RST PN
44023	ATH EXT NTV ART ULCRTION
4409	ATHEROSCLEROSIS NOS
4410	DISSECTING ANEURYSM*
4411	RUPTUR THORACIC ANEURYSM
4412	THORACIC AORTIC ANEURYSM
4413	RUPT ABD AORTIC ANEURYSM
4414	ABDOM AORTIC ANEURYSM
4415	RUPT AORTIC ANEURYSM NOS
4416	THORACOABD ANEURYSM RUPT
4417	THRACABD ANURYSM WO RUPT
4419	AORTIC ANEURYSM NOS
4439	PERIPH VASCULAR DIS NOS
44024	ATH EXT NTV ART GNGRENE
44029	ATHRSC EXTRM NTV ART OTH
44030	ATHSCL EXTRM BPS GFT NOS
44031	ATH EXT AUTOLOGS BPS GFT
4403	ATHERO-BYP GRFT EXT*
44032	ATH EXT NONAUTLG BPS GFT
4408	ATHEROSCLEROSIS NEC
44100	DSCT OF AORTA UNSP SITE
44101	DSCT OF THORACIC AORTA
44102	DSCT OF ABDOMINAL AORTA
44103	DSCT OF THORACOABD AORTA
Category 32 = Renal Failure	
585	CHRONIC RENAL FAILURE*
V451	RENAL DIALYSIS STATUS*
V4511	RENAL DIALYSIS STATUS
V4512	NONCMPLNT W RENAL DIALYS
40301	MAL HYP KID W CR KID V
40311	BEN HYP KID W CR KID V
40391	HYP KID NOS W CR KID V
V560	RENAL DIALYSIS ENCOUNTER
V568	DIALYSIS ENCOUNTER, NEC
Category 33 = Severe Chronic Liver Disease	
5723	PORTAL HYPERTENSION
5715	CIRRHOSIS OF LIVER NOS
5716	BILIARY CIRRHOSIS
Category 34 = Systemic Lupus Erythematosus	
7100	SYST LUPUS ERYTHEMATOSUS

Note: Diagnoses reported outside these groups were categorised as ‘Other’ (Category 35).

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