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Costing Framework for the Expansion of GP Care

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HEALTH VOTE

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Paper Summary

- This paper provides a cost and policy overview of State provided General Practitioner (GP) care in Ireland, as provided through the Medical Card (MC) and GP Visitation Card (GPVC) schemes.
- We present estimations of the cost of expanding free GP care in Ireland, based on the results of a model developed for this analysis using the Survey on Income and Living Conditions (SILC) and augmented with update price information. We consider expansion through (i) age cohorts and through (ii) means assessment threshold adjustment.
- Associated considerations such as eligibility by income decile and regional distribution of eligibility are also analysed in the context of eligibility expansion.

Key Features in free GP Care Eligibility

- Currently, approximately 2.1m people in Ireland (43% of the population) have access to free GP care through either the Medical Card or GP Visitation Card.
- The majority of cardholders are eligible on the basis of an income and expense means assessment. Other avenues to eligibility exist however, such as age based eligibility to the GP Visitation Card Scheme for those under 6 and over 70, GPVC for Carers, and discretionary Medical Cards.

	Number of Cards	% Population
Medical Cards	1,561,383	32.6%
GPV Cards	515,924	10.8%
Total free GP Coverage	2,077,308	43.4%

Source: PCRS Performance Report July 2019

- The 2019 allocation for GMS which consists of the MC and GPVC schemes is €1.9bn (€550m of which relates to GP fees and allowances – the budget line directly associated with an expansion of GPVCs). In this paper we consider how the expansion of eligibility would impact these costs in the near-medium term.
- Cost drivers such as GP capitation rates, additional GP rates and allowances are assumed to have current costs by age cohort, adjusted to take into account contractually mandated increases for the near-term (i.e. the recently agreed GP contract).
- In the event of large scale rollout of free GP care costs would likely be subject to change. This should therefore be considered when interpreting the analysis findings.

Key Findings

- On adjusted current cost assumptions, the Exchequer cost of free GP care for the entire Irish population would be an **estimated additional €630m per annum, expanding to €840m over the next ten years**. This estimation does not consider any cost implications of implementing a new model of GP care in Ireland which might accompany expansion to universal eligibility. It also does not factor in future costs which would likely be subject to upward pressure in negotiation with General Practitioners.
- Marginal expansion of eligibility can be achieved through adjustment of *age based eligibility* or *means assessment thresholds*. While there may be different policy objectives associated with these two pathways, means assessment change is shown to target lower income decile households first.
- The current strategy of discrete phased expansion by age cohort should be considered given the requirement for repeated engagement with GPs; this approach may ultimately yield more expensive capitation rates (or other payments) for newly-covered cohorts, in the absence of a specific overarching strategy.
- In terms of next steps, further work could be done considering and costing avenues to universal GP care, such as examining alternative service provision models, as well as financial mechanisms such as co-payment to help ensure financial sustainability.

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1. Introduction

Ensuring access to medical care for all residents is a long-standing policy of the Irish State. The Medical Card (MC) came into being with the General Medical Services (GMS) scheme, legislated under the Health Act of 1952.[1] Under GMS, scheme applicants who are deemed to lack the means of procuring medical care privately are issued a medical card which grants the cardholder eligibility for free at point of access GP, dental, ophthalmic and aural services, and heavily reduced prescription and medical instrument services. In 2011 care under GMS was augmented by the introduction of the GP Visitation Card (GPVC), which provides access to GP care only to individuals or households ineligible for the medical card, but with incomes below given scheme income thresholds. The GPVC is also universally open to those under six years, to those over seventy and those in receipt of Carer's Allowance.[2]

Reform of primary care, with a general view toward expanding free at point of access care, has been a part of successive Irish Government agendas for some time. The Department of Health's publication *Primary Care - A New Direction* (2001) contained a strategic objective to ensure wider availability of improved services[3], identifying the need to define a "clarified and simplified system of eligibility … so that people will know what services they are entitled to and how they can access the services". At the time of publication 30% of the population were entitled to free at point of access general care through the medical card. Today around 33% of people possess a medical card, with a further 11% entitled to free at point of access GP care, through the GPVC. 43% of the population are therefore entitled to free GP services through the use of a medical or GP visit card. The remaining 57% must access primary care services out-of-pocket or through private health insurance.[4]

In more recently published primary care strategies the main objectives remain the same – (i) increase eligibility to reduce gaps in coverage, and (ii) reduce the complexity of eligibility criteria. However, despite the publication of *Future Health* the Department of Health's new primary care Strategy in 2012 and the more recent 2017 Óireachtas Report *Sláintecare,* Ireland remains unique as the only EU health system that does not offer universal coverage for primary care[5]. *Sláintecare* outlines an intention to make eligibility universal, acknowledging a need however to consider "…*The rationale and methodology for phased eligibility for the services*..."

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[1] http://www.irishstatutebook.ie/eli/1953/act/26/enacted/en/print#sec14

[2] Details of services provided under the MC and GPVC are provide in table form in the Appendix.

[3] Department of Health. (2001) Primary Care a New Direction, https://health.gov.ie/blog/publications/primary-care-a-new-direction/

[4] This refers to primary care specifically; several health schemes exist, which are open to all citizens, which subsidise or cover costs of other types of health care.

[5] Thomson S., Jowett M., and Mladovsky P. (2012) Health system responses to financial pressures in Ireland: policy options in an international context, http://www.euro.who.int/__data/assets/pdf_file/0006/260088/Health-system-responses-to-financial-pressures-in-Ireland.pdf

The purpose of this paper is (i) to analyse the current status of free GP care eligibility in Ireland, and (ii) to set out a framework for costing the impacts of changes in eligibility, either through granting universal eligibility to given age cohorts or adjusting means assessment thresholds. The framework seeks to provide a means of assessing likely costs associated with incremental expansion of GP care, through demographic eligibility changes and through changes in income eligibility thresholds.

This paper was developed by the Department of Public Expenditure and Reform. We would like to thank colleagues in the Department of Health and ESRI for their useful information and feedback. The findings, implications and recommendations of this paper are the responsibility of the authors, and are subject to limitations and assumptions as set out.

2. Free GP Care: Context

Key message:

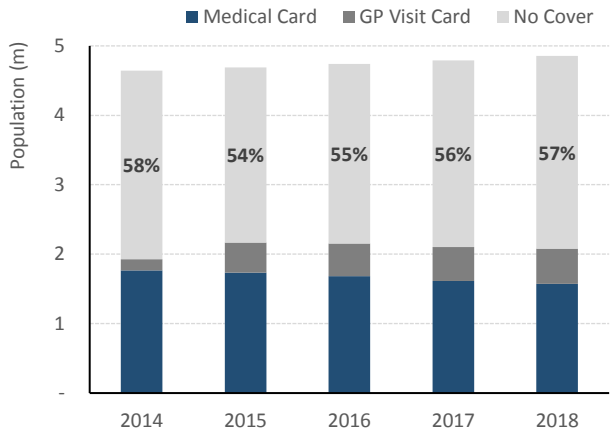
- **The growth in free GP Coverage (+8%) in recent years is primarily due to an increase in GPVC eligibility associated with age-based expansion of GP care; proportional growth in GP Fees & Allowances has far outstripped this (+37%).**
- **Government policy aims to extend access to the whole population but to under 13s in the medium-term.**
- **Recent agreements to roll out care to under 6s coincided with significantly increased rates for GP fees. Phased expansion based on age-cohorts could incur yet further increases.**

2.1 Current Coverage:

As of end-July 2019 around 43% of Ireland's population of 4.9 million were eligible for free GP care through either a medical card (1.6m cardholders) or a GPV card (0.5m cardholders). As illustrated in Figure 1, while the absolute numbers of MC and GPV cards has increased since January 2014 (driven primarily by the expansion of GPVCs to under 6s and over 70s in 2015), the absolute number of MCs has consistently trended downwards over this period. While the number of people covered by the GPVC has increased since 2015, this has not offset the reduction in MCs; consequently the overall proportion of people cover meaning the care has fallen. The downward trend in medical cards is driven by improving in economic conditions (falling unemployment and increasing income) following the downturn.[6] The number of GPVCs continues to gradually trend upwards in spite of improving economic conditions as policy decisions take effect and a latent cohort of eligible people who have not yet joined the scheme gradually come on board.

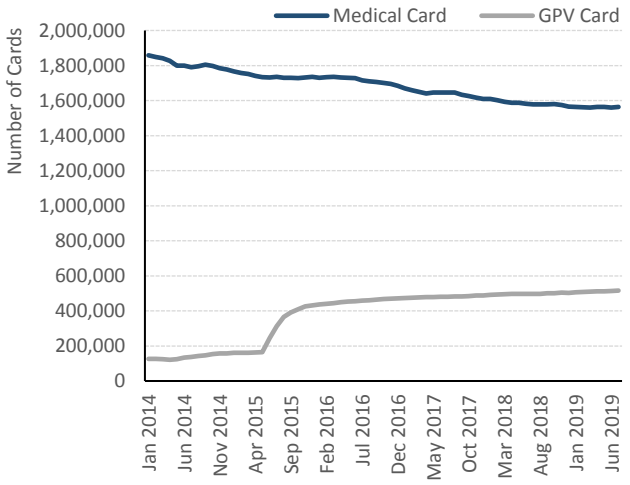
[6] Thomson, S. Jowett, M., and Mladovsky P. (2012) Health System Responses to financial pressures in Ireland: policy options in an international context

Figure 1: Population Coverage 2014 to 2018



Source: PCRS Performance Reports/CSO Population Statistics

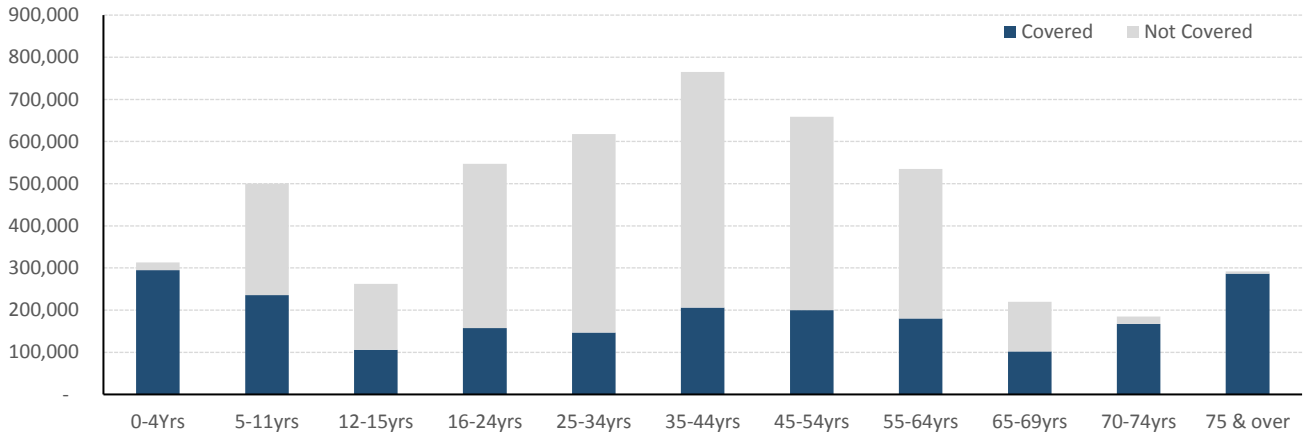
Figure 2: Number of MCs and GPVCs 2015 to 2018



Source: PCRS Performance Reports

Figures 1 and 2 illustrate the trends in the numbers of medical and GPV cards, and their coverage over the population as a whole. Since January 2014 Growth in GP Visit Cards due to policy decisions to extend free GP care to the under 6s and over 70's from 2015. These allow GP visits without charge but do not provide access to essential medication, aids and appliances or to the whole range of public primary and social care services granted by a medical card.

Figure 3: Medical Card & GPV Card Coverage by Age Cohort (2019)



Source: PCRS Performance Reports

2.2 Expenditure on Cover

While medical cards entitle cardholders to general primary care (GP, dental, ophthalmic, prescribed drugs etc.) free of charge, GPV cards cover only the costs of GP visitation. GPV cards, as a result, are significantly less costly. In terms of National Health expenditure/budgeting, both cards are provided under the General Medical Services (GMS) scheme which comprises 72% of Primary Care Reimbursement Service (PCRS) expenditure. The main components of PCRS spend are set out in Table 1.

Table 1: Overview of PCRS Expenditure (€m)

€m	2014	2015	2016	2017	2018	2019 (F)*	2014- 2019 Growth €m	2014- 2019 Growth %
PCRS	2,287	2,393	2,513	2,566	2,673	2,737	*450*	*20%*
Of which: GMS			1,772	1,779	1,922	1,869		
Of which: GP Fees & Allowances	428	464	518	525	532	547	*119*	*28%*
GP Contract Provision[7]	-	-	-	-	-	*40*		
Revised GP Fees & Allowances	**428**	**464**	**518**	**525**	**532**	**587**	***159***	***37%***

The expansion of free GP care is expected to continue through increased GP Visit Card eligibility, the large majority of costs of which are associated with expansion are fees and allowances paid to GPs (Table 2). The primary driver in expenditure on the *GP Fees and Allowances* line since 2014 has been capitation payments[8] (two-thirds), partly driven by the expansion of over 70s and particularly under 6s.

Table 2: Expenditure on GP Fees and Allowances 2014-2019

€m	2014	2015	2016	2017	2018	2019 (F)	2014- 2019 Growth €m	2014- 2019 Growth %
Capitation Fees	225	244	276	276	283	327	*99*	*44%*
Fees for Services	67	75	91	93	99	94	*27*	*40%*
Allowances	108	114	118	122	117	118	*10*	*9%*
Superannuation	23	26	29	29	30	31	*8*	*35%*
Salaries	5	5	4	4	4	3	*-2*	*-40%*
Sub-Total	**428**	**464**	**518**	**525**	**532**	**573**	*143*	*33%*
GP Contract Provision	-	-	-	-	-	*13*		
Total	**428**	**464**	**518**	**525**	**532**	**586**	*159*	*37%*

**Around €27m of the €40m provision for the new GP Contract has been allocated to Capitation rate increases as per the agreement.*

2.3 Government Policy in Relation to Free GP Care

The development of a single-tier health system has been a policy objective of Government since 2011.[9] The overarching policy document on the future of healthcare in Ireland is the cross-party report, *Sláintecare* (2017).[10] Sláintecare represents a high level policy road map for delivering whole system reform and universal health-care in Ireland. The overarching goal of the strategy is the delivery of a single-tier health service, where the development and integration of GP and community care diverts much of the provision of healthcare from

[7] A provision was made with relation to ongoing contract negotiations into 2019.

[8] Primary Care Reimbursement Service (PCRS) payments to GPs - GPs receive a range of fees and allowances under the GMS scheme. The key payment is the annual 'capitation' payment in respect of each medical card and GP visit card patient on their list. This payment is weighted for age and gender to reflect differential risks in need for healthcare. Additionally, there are allowances for such things as out-of-hours fees, a rural practice allowance, a remote area payment and a range of other allowances. The GMS payment has been described as 'highly valued by GPs because it is superannuated and attracts staffing subsidies. (Óireachtas Library and Research Service, 2014)

[9] Programme for Government 2011-2016. Access here.

[10] Committee on the Future of Healthcare: Sláintecare Report (2017). Access here.

the hospital to the community setting. *Sláintecare* also recognises the prospect of capacity constraints within the sector as well as the potential for "co-payment or cost-sharing" models to help meet the likely increase in demand. One of the key underlying principles outlined in *Sláintecare* is that care be "provided free at point of delivery, based entirely on clinical need".

The rationale for the delivery of free healthcare is discussed in the document in the context of (i) social principles, (ii) system overhaul and (iii) available funding options. With the view of public health as a public good, the document argues "[..] from both a societal and individual perspective, the fragmented Irish healthcare system has many direct and indirect costs, both human and financial. There is a cost to individuals who lose the ability to participate in specific activities, might lose income or might even lose years of life due to untreated or inadequately treated illness. For society, these factors matter too – when residents of a country are healthy, they are more productive and are able to participate in employment and in the economy." Free healthcare in that sense would be an investment in the public good, removing many of the hidden costs which are borne out. The effects of social inequality are also discussed, and the need for progressive expansion of care during the implementation period is emphasised (i.e. expansion through adjustments of means test thresholds). Secondly a major focus of the Sláintecare strategy is the goal of moving the care-setting to the most appropriate and cost-effective setting – in many cases from the acute setting to the community. While this is expected to generate efficiencies, it is not expected that they would manifest in the short-term. In that sense, reducing barriers to accessing care in the community through GPs is a behavioural end to broader strategy.

The proposed rollout strategy and costing for free GP care is in Sláintecare: "extending access to GPs to the whole population by extending it to an additional 500,000 people each year for five years, on the basis of means. This is estimated to cost €91m per year additional cost".

2.4 Current Eligibility Criteria

Eligibility for both the Medical Card and GPV Card is decided on the basis of cohort eligibility, discretionary eligibility and a complex mix of means assessment thresholds and allowances. Cohort eligibility (by age or for recipients of Carer's Allowance) exists only for the GPVC, where 56% of cardholders are eligible on this basis. Around 10% of MC holders are eligible on a discretionary basis i.e. while they do not meet the means assessment criteria, they are provided eligibility based on other considerations of their personal situation. The remaining cardholders qualify on the basis of income and expense means assessment. The means assessment is based on weekly income (after housing, childcare and travel to work costs) and varies depending on age and household composition. Additionally there are allowances for dependants which are offset against income; these vary depending on the number of children, the age of children, and the third-level and grant status of children. The main means assessment threshold criteria are outlined below in Table 3.

Table 3: Basic Rate Weekly Income Thresholds and Allowances (MC and GPVC)

Living Situation	Medical Card	GP Visit Card
Single person living alone aged up to 65:	€184.00	€304.00
Single person living alone aged 66 and over:	€201.50	€333.00
Single person living with family aged up to 65:	€164.00	€271.00
Single person living with family aged 66 and over:	€173.50	€286.00
Married, co-habiting couple/single parent family aged up to 65 with dependents:	€266.50	€441.00
Married, co-habiting couple/single parent family aged over 66 with dependents:	€298.00	€492.00
Additional allowance for first two children under 16 financially dependent on applicant:	€38.00	€57.00
Additional allowance for 3rd and subsequent children under 16 financially dependent on applicant:	€41.00	€61.50
Additional allowance for first two children over 16 financially dependent on applicant:	€39.00	€58.50
Additional allowance for 3rd and subsequent children over 16 financially dependent on applicant:	€42.50	€64.00
Additional allowance for dependent over 16 who is in full time 3rd level education, not grant aided:	€78.00	€117.00

2.5 Recent Developments

Free GP Care for Under 6s

The decision to introduce free GP care for under 6s was first announced by the Department of Health in the context of Budget 2014. At this time there were approx. 424K eligible children in the country, 43%[11] of these were already covered either by a medical or GP visit card. This initiative would therefore expand eligibility to the remaining c.242K children.

The Department of Health secured €37m in Budget 2014[12] and a further €25m in Budget 2015 to fund the scheme's development. In July 2015, following significant consultation between the Irish Medical Organisation (IMO) and the Department of Health, a new GP contract was agreed, backed by the vast majority of GPs (95%) and the scheme commenced.

A new capitation rate for this age cohort of €125 was negotiated (an increase of 70% on the previous €73.68) whilst the contract also stipulates the new fees payable to GP's for diagnosis, registration and visits for children under 6 who suffer from asthma and also reiterates a number of costs for Special Items of Service (Appendix 2).

[11] 2014 PCRS reports, Department of Health.

[12] https://health.gov.ie/blog/press-release/minister-reilly-announces-free-gp-care-for-children-aged-5-and-under-as-part-of-budget-2014-progress-made-in-achieving-more-for-less-but-2014-will-be-a-challenging-year-for-the-health-services/

In return for this significant increase in remuneration, the new GP contract[13] set out the enhanced level of service provision. Under the contract, GPs are required to take an active approach toward promoting health and preventing disease through the provision of periodic assessments to child patients at ages 2 and 5 which record age, gender, weight and height, and taking appropriate follow-up action. This would include, where appropriate, the provision of health promotion advice, brief intervention and support, or referral to specialist services. The contract also includes a cycle of care for children with asthma. GPs are required to maintain a patient register and reminder system for their child patients aged between 2 and 5 years with a confirmed diagnosis of asthma, and provide structured management of the condition which includes an annual review and submission of data return[14]. An enhanced capitation fee was provided for this service in the case of asthmatic patients in this cohort.

Free GP Care for Under 70s[15]

The introduction of Universal GP care for all persons aged 70 and over came into effect on August 5th 2015 and replaced the existing GP service arrangement for this age group which was based on a means-test. These additional number of citizens were covered within existing contractual arrangements.

The estimated annual cost at the time of introduction was €18m.

Free GP for Recipients of Carer's Allowance

In September 2018 GPVC eligibility was extended to recipients of the Carer's Allowance scheme. It was estimated that this would result in an additional 14,000 cards.[16]

Recent GMS Contract

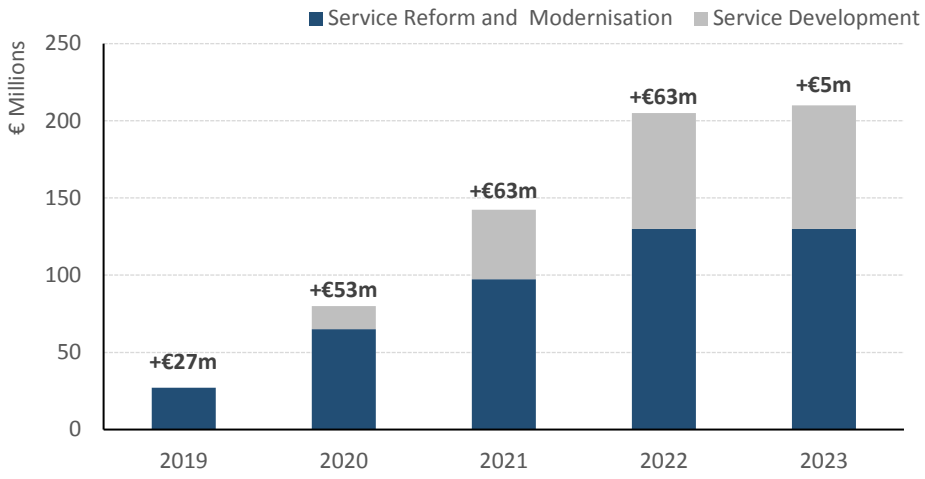
The recent GMS contract was agreed in April 2018 and was approved by GPs in May.

The new contract includes an expansion of services for patients, notably over 400,000 Medical Card and GP Visit Card patients suffering from those suffering from chronic illnesses such as asthma, chronic obstructive pulmonary disease (COPD) and heart disease. In addition there are opportunities for increased use of technology based solutions and significantly improving prescribing and medication safety (these are outlined in greater detail in Appendix III).

The new contract is estimated to cost €27m in 2019 (July) but significant annual increases will see the annual cost for the reach €200m by 2023. The largest increase in fees and allowances is a €115m (+49%) increase in capitation rates for all age cohorts (excl. Under 6's). New special items of service for Chronic Disease Management (€80m) account for the majority of the remaining cost.

[13] GP Circular 011-2015 – GP Visit Card Scheme Under 6s. Available Here.
[14] Department of Health correspondence.
[15] https://health.gov.ie/blog/press-release/free-gp-care-for-everyone-over-70/
[16] HSE Article 3 September 2018. Available Here.

Figure 4: Expected Annual Costs of the New GMS Contract 2019-2023



2.6 Age Cohort Expansion:

The introduction of free GP care for Under 6s and Over 70s has been recognised as the first steps towards universal GP care in Ireland. It creates a precedent in which the following age cohorts can follow. Indeed, the most recent contract notes that the IMO accept that the Minister of Health intends to extend free GP care to all children under 12 on a phased basis from mid-2020 onwards. However, the IMO have agreed on the basis that there will be engagement on contractual and remuneration in advance of implementation.

The sheer cost of universal eligibility necessitates expansion on a phased expansion, however the limitations of expansion based on age cohorts should still be considered. Costs have the potential to increase exponentially if GPs demand increased capitation rates (or other fees) each time a new cohort is covered (over and above what recent significant increases approved for the Under 6's expansion and other cohorts as part of the recent GMS contract). In principle, universal expansion of free GP care by age cohort regardless of means is inefficient and arguably promotes inequality. Any universal expansion by age-cohort would take considerable time and risks not targeting those least able to afford such cover.

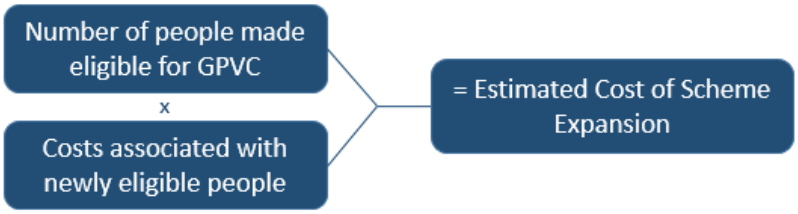
3. Costing Framework

Key message:

- **Eligibility and costing analysis is based a model developed using the nationally representative Survey on Income and Living Conditions.**
- **Assumed Cost per person is based on current costs, adjusted to incorporate planned capitation rate increases over the next two years. In the context of expansion, costs may be subject to renegotiation, and thus different from findings shown here.**

3.1 Model Methodology

This section sets out the costing framework developed and used in this analysis to estimate the Exchequer cost of expanding free GP care through the GPV card. The goal of the framework is assist in understanding how scheme eligibility and costs will change as a result of expanding eligibility through either changes in eligible age cohorts or changes to means assessment thresholds. While granting eligibility to a given age cohort will simply increase eligibility by the number of people of that age in Ireland, at the cost of that cohort, the effects of expanding eligibility by adjusting means allowance threshold is more difficult to grasp as it is dependent on the income and expenditure distribution across households in Ireland, and well as household member age, family size and dependent/student status.



The solution which has been developed is to adopt a similar methodology to that employed in the ESRI SWITCH model[17] in using the Survey on Income and Living Conditions (SILC) to develop a model for Medical Card and GP Visitation Card eligibility in Ireland. While the SWITCH model is regularly used to inform costings of potential policies, for this exercise we opted to develop a similar model on the same basis. This allowed us carry out an in depth analysis directly with the SILC data, to consider various assumptions, as well employ the more recent 2017 SILC data, rather than adjusted 2010 data on which SWITCH runs.

The SILC 2017 dataset which is administered by the CSO is made up of 12,612 survey responses from 5,029 unique households, weighted to be nationally representative. SILC captures almost all the variables which are necessary to determine whether an individual or household is eligible for an MC or GPVC, such as household

[17] https://www.esri.ie/publications/income-tested-health-entitlements-microsimulation-modelling-using-silc

composition, the ages of household members, household and individual income, cost of rent/mortgage, whether the family uses private childcare facilities and for how many hours per week. Unfortunately, for the purposes of this exercise however, SILC does not capture travel to work costs, or status as a recipient of Carer's Allowance.

The basic logic of the model is as laid out formally below, where ne represents the total number of people eligible for the GPVC. The first part of the first equation simply states that any person in SILC aged under six or seventy or over is counted as eligible: $\sum_{i=1}^{n}[6 > age_i \geq 70]$. The second part of this equation illustrates that any person who's household income (y_h) after housing and childcare costs ($h_h + cc_h$) is less than the appropriate threshold inclusive of allowances (th_h) is counted as eligible. These two queries establish the number of people eligible for a MC or GPVC (ne). The total cost of the GPVC (C) then is simply the sum of each eligible person multiplied by their specific cost of cover ($e_i * c_i$), which varies dependant on age.

$$ne = \sum_{i=1}^{n}[6 > age_i \geq 70] + \sum_{i=1}^{n}[y_h - (h_h + cc_h) < th_h]$$

$$C = \sum_{i=1}^{ne}(e_i * c_i)$$

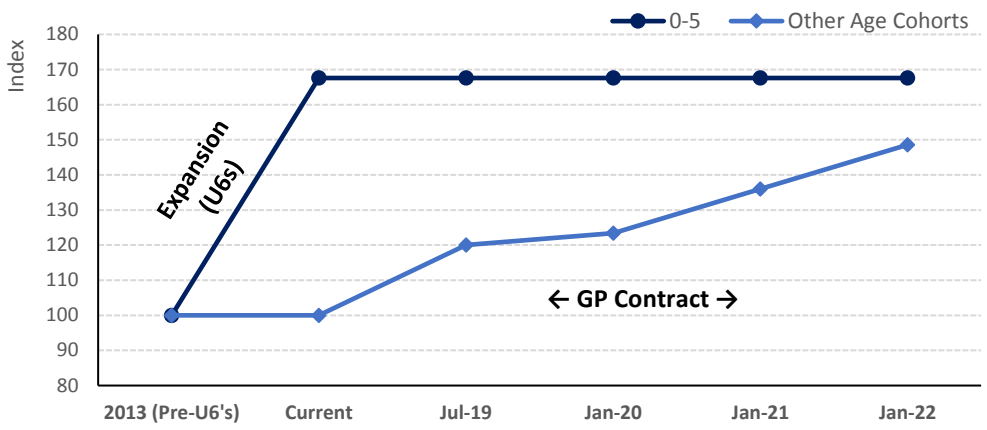
As with any model, its accuracy and results are subject to its underpinning assumptions. The core assumptions that the model relies on are participant cost assumptions, as discussed in the next subsection, and an assumption that real life income and expense patterns are reflect in those reported in SILC, and are thus representative on national household income distribution. The model also makes assumptions that scheme take-up among all those eligible is 100% - in that respect the model costs eligibility, rather than actual eligibility expansion. Caveats which should be noted are the model's incapacity to consider travel to work costs, due to the fact that that variable is not included in the SILC dataset, as well as that Carer's GPVC and discretionary MCs cannot be considered.

3.2 Participant Cost

It is particularly important to caveat the costing section of this model, as it is the piece most likely to change as expansion is phased in the real world. For this framework we have assumed participant costs based on current cost of a GPV card,[18] as set out in PCRS monthly reports, which are adjusted to reflect the increases in capitation to take effect over the next three years. The difficulty in modelling cost is that expansion itself may stimulate a cost change, such as the changes to terms of agreement between the State and GPs which preceded the rollout of free GP care to Under 6s, as shown below.

[18] These are adjusted to reflect the contractually agreed rate increases being rolled out over the next two years.

Figure 5: Index of GP Capitation Rates 2013-2022



This agreement involved an increase in capitation rates for under 6s, and a phased increase in capitation for all other cohorts up to January 2022. It is not a foregone conclusion however that costs should increase by the same scale, or increase generally as eligibility is expanded in the future. The population which are not currently covered by free GP care are, on average, healthier and therefore would place a smaller burden on GP resources, putting downward pressure on capitation. On the other hand however, some studies indicate that the introduction of free GP care for Under 6s led to a 26% increase in attendance, a factor which would likely place upward pressure on GP payments in the context of expansion.[19]

On this basis it was decided not to second-guess the outcome of any future negotiations by assuming either higher or lower average costs and instead to adopt adjusted current costs as an indication of the likely costs associated with actual scheme expansion. The reader should keep in mind when interpreting findings that indicative costs may be subject to significant change as eligibility is actually expanded.

Table 4: Calculation of Average Cost of Card Employed in Model

	PCRS Average Cost of GPVC	Additional Capitation Cost under GMS Contract (July 2019-Jan 2022)	Cost used in Model
0-4	€243	€0	€243
5-15	€165	€21	€186
16-44	€154	€35	€189
45-64	€223	€56	€279
65-69	€252	€60	€312
70+	€500	€132	€632

[19] https://www.tcd.ie/news_events/articles/introduction-of-free-gp-care-for-u6s-led-to-significant-increase-in-service-use/

3.3 Model Base-Scenario

Running the model under current eligibility policy results in a very close final picture of current free GP coverage in Ireland; this is composed, however, of an underestimation of MCs, offset by an overestimation of GPVCs. Looking closely at this discrepancy, there are a number of considerations which form a partial explanation, however the limitations of the model itself should be kept in mind and may be explored more deeply in further work on this model. Regarding the overestimation of MCs, as referenced earlier, 10% of existing MCs are 'discretionary', meaning that the MC-holders do not qualify on the basis on standard means assessment, and therefore are counted as GPVC eligible or ineligible in the model. A second explanatory factor is that previously unemployed MC holders who no longer qualify on the basis of means assessment are permitted to retain their MC for three years after returning to work; this means actual MC holders may be counted as GPVC eligible or ineligible in the model. With regard to the overestimation of GPVCs, it would appear that many of the modelled GPVC holders are actually MC holders, potentially for reasons outlined above. Secondly the overestimate may point to an issue with lack of take-up in the GPVC scheme, which should be explored further as eligibility is expanded.

Table 5: Base Scenario Model Prediction

	End-2017 Actual	Model Prediction	Difference
Number of Medical Cards	1,609,820	742,491	-867,329
Number of GP Visitation Cards	487,510	1,291,992	804,482
Total GP Coverage	**2,097,330**	**2,034,483**	**-62,847**

3.4 Model Application

The methodology employed in the following *findings* section has been in comparing the model using various different assumptions to the base-scenario. In this way we report the deviations from base – i.e. additional number of people becoming eligible, and the additional costs resulting from increased eligibility.

We first look closely at short-term measures to increase eligibility, such as the planned expansion to under thirteens, and we look at threshold adjustments which would bring a similar number of people into eligibility. Secondly we look at the cost implications of universal care, expanded through age cohorts and threshold adjustments. It should be noted that neither of these methods of expansion to universal care are Government policy, and that alternative models of expansion may be developed in the context of universal roll-out. That being said the overall cost of universal rollout still serves as an indicative cost, under the assumptions of current costing.

4. Findings

This section details the findings of the analysis which have been derived from the SILC model, as outlined above. Immediate or near-term expansion options are first considered, though the expansion of the GPVC scheme to children under 13, and through a serious on sequential 5% increases in GP basic rate thresholds and allowances. Secondly we map the estimated eligibility and cost implications of full expansion through age cohorts and increases in GPVC thresholds and allowances. As noted findings are subject to the assumptions which underpin the model and should be interpreted in that respect.

4.1 Near Term Expansion

Cohort Based Expansion to Under 13s

Current policy on GP care includes the planned phased expansion of GPVC cards to children of primary school age (under 13). We estimate that expansion to Under 13s will result in an additional 260k GPVCs, at an additional cost of just under €50m per annum, given our cost assumptions. This would increase national coverage by around 5.5% to just under 48% coverage nationally.

Figure 6: Estimated Additional Cards from Expansion to Under 13s

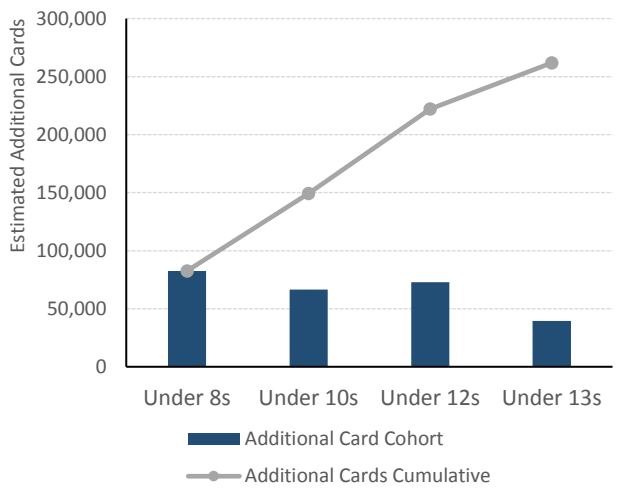
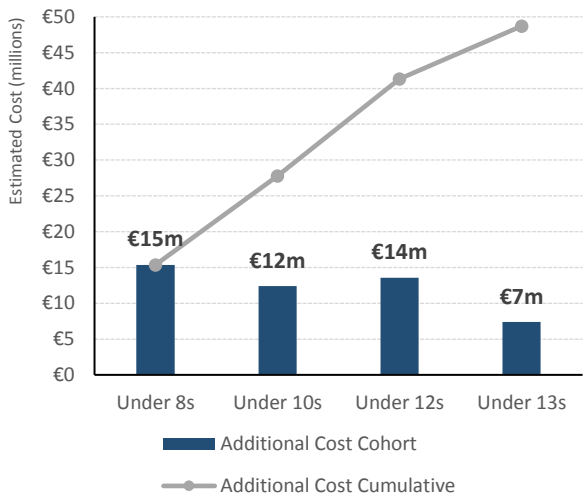


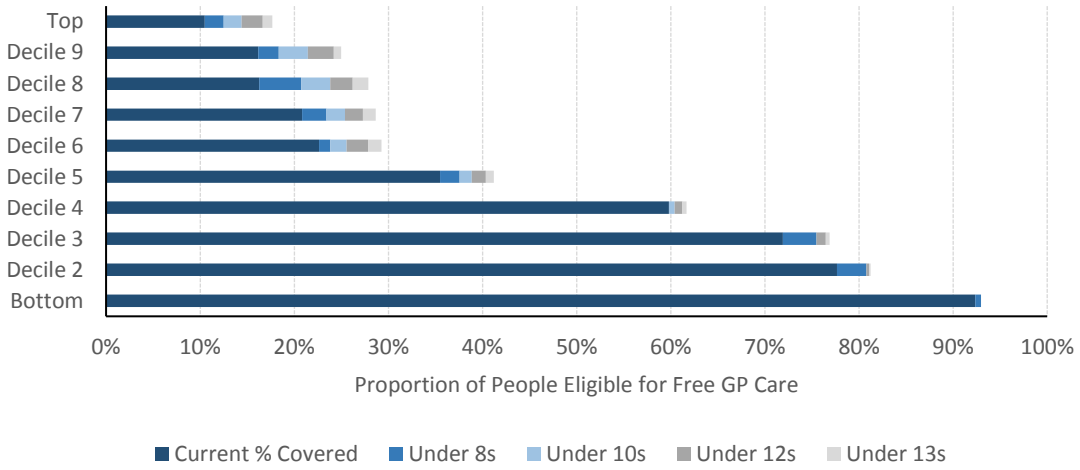
Figure 7: Estimated Cost of Expansion to Under 13s



As illustrated above, we estimate that expansion to under 13s would result in an additional 262k cards, with expansion to under 8s, under 10s and under 12s bringing in on average 74k new cards. Expansion from under 12s to under 13s would bring around 40k additional children into the scheme. Cost implications of expansion to under 13s are linked closely to eligibility. We estimate full expansion would cost just under €50m per annum at current prices, with each of the first three additional cohorts costing on average €14m, and the final expansion from under 12s to under 13s costing €7m per annum.

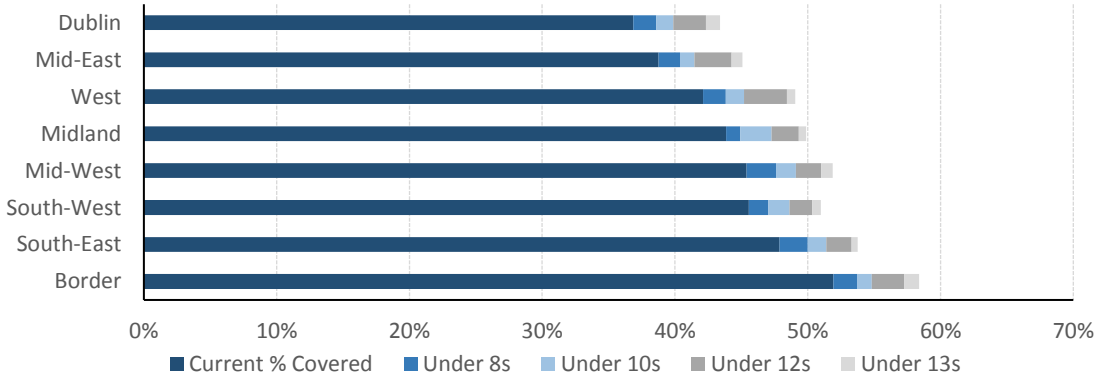
Considering the distributional effect of expansion to under 13s, all shown below in Figure 8, the benefits would manifest disproportionately in the upper five deciles. This is due to the universal nature of age-based expansion, and the high level of coverage among lower deciles due to means assessment element of the MC and GPVC.

Figure 8: Free GP Coverage Before and After Expansion to Under 13s, by Income Decile



At a regional level the effects of age based expansion to under 13s would be relatively evenly distributed, increasing coverage regionally from between 4.8% and 6.3%. After expansion, the model predicts that the Border region would remain the region with the highest rate of coverage, followed by the South-East and Mid-West. Dublin would remain the region with lowest coverage, due to average higher incomes.

Figure 9: Free GP Coverage Before and After Expansion to Under 13s, by NUTS 3 Region



<u>Near-term Expansion through Threshold/Allowance Adjustment</u>

This subsection considers the options for adjusting various thresholds in the short-term, which would stimulate an expansion of eligibility for the GPVC. As discussed previously, the means assessment is relatively complex, in that there are a variety of thresholds depending on age, family composition, as well as number,

age and dependency status of children. There are six basic rate thresholds and five allowance rates which could be adjusted individually to expand eligibility. Alternatively all rates could be increased simultaneously by a given amount or percentage, depending on policy preference. We first look at the effects of increases in each threshold individually, in order to inform of the magnitude of effect. It should be noted that combining options between basic rate changes and allowances, illustrated below, by summing the effects may overstate the impact of the change, as individuals and families who become eligible as a result of the first change, may also become eligible due to the second change (both compared to the base scenario). The effects of various combinations are too many to conclusively portray here, however it should be possible to meet requests for specific scenarios where needed.

Table 6: Estimated Effect of Increases in Individual Basic Rate Thresholds

Living Arrangement	Current Threshold (€)	Change (€)	Change in GPVC Scheme Eligibility	Additional Cost
Single Person living alone (Under 66)	304	+25 +50 +100	+ 4,762 + 10,480 + 23,237	€1,215,481 €2,706,199 €5,936,969
Single Person living alone (66+)	333	+25 +50 +100	+ 999 + 2,089 + 3,538	€ 311,643 €651,676 €1,103,849
Single Person Living with family (Under 66)	271	+25 +50 +100	+ 4,699 + 20,369 + 43,028	€1,249,510 €4,871,072 €10,898,938
Single Person Living with family (66+)	271	+25 +50 +100	+ 1,048 + 2,938 + 5,447	€326,931 € 916,511 €1,699,258
Couple/Lone Parent with Children (Under 66)	441	+25 +50 +100	+ 41,527 + 85,824 + 175,647	€8,752,870 €18,232,020 € 37,315,055
Couple/Lone Parent with Children (66+)	492	+25 +50 +100	+ 217 + 1,000 + 1,612	€67,644 €311,854 €502,752

The above table provides a picture of the responsiveness of the different basic rate thresholds to change, and the costs associated with changes. It is immediately clear cohorts for over 65s are significantly less sensitive to change; the reason for this is the relatively small amount of people aged between 66 and 69 (over 70s automatically qualify for a GPVC), versus the larger cohort of people aged between 18 and 65. The second takeaway from the table illustrates that thresholds aimed towards families are significantly more sensitive, due to the fact that changes grant eligibility to households, rather than individuals.

Table 7: Estimated Effect of Increases in Individual Allowances

Living Arrangement	Allowance (€)	Change (€)	Change in Cards	Cost
Allowance for each of first two children (aged under 16)	57	+10 +25 +50	+ 20,877 + 44,295 + 94,516	€4,159,095 €8,862,469 €19,027,526
Allowance for third and subsequent children (aged under 16)	61.5	+10 +25 +50	+ 596 + 6,184 + 15,198	€114,988 €1,215,056 €3,034,036
Allowance for each of first two children over 16 with no income	58.5	+10 +25 +50	+2,665 +9,807 +24,083	€610,011 €2,122,950 €5,270,914
Allowance for third and subsequent children aged over 16 with no income	64	+10 +25 +50	Cohort too small to permit estimation	
Allowance for each dependant over 16 in full time non-grant aided education	117	+10 +25 +50	+ 8,398 + 21,431 + 51,259	€1,692,528 €4,512,161 €10,905,029

Table 7, above, illustrates the cost and eligibility impacts of changes in allowances for children. In monetary terms, an increase of €X to allowance thresholds has a larger effect when added to the allowances than the basic rate. We can see that the allowance for third and subsequent children has a smaller effect, due to the smaller number of households with more than two children either under 16 or over 16 with no income.

The eligibility and cost impacts of phased 5% increases in both basic rate thresholds and allowances are presented below in Figures 10 and 11. In current prices the cost effect of each expansion would be between €14m and €20m, bringing between 62,000 and 92,000 people into eligibility in each iteration. Five phased 5% increases (an increase of 28% against current rates) would cost an estimated additional €82m per annum, and grant eligibility to 370,000 additional people; this would bring national coverage to over 50% (assuming no age based expansion in this time).

Figure 10: Estimated Eligibility Impact of Phased 5% Increases to Allowances and Basic Rate Thresholds

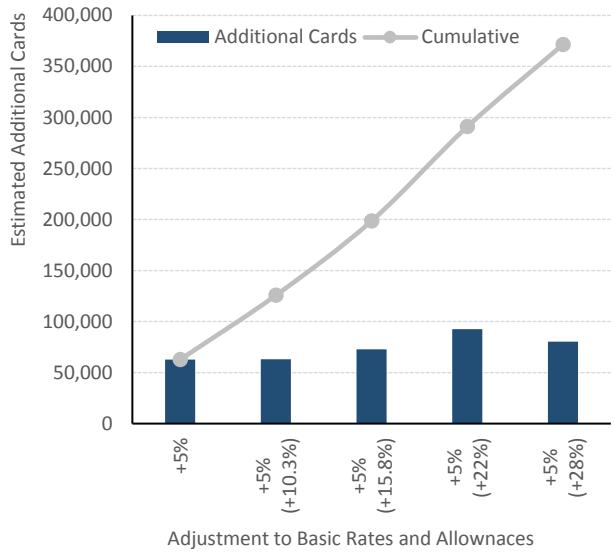
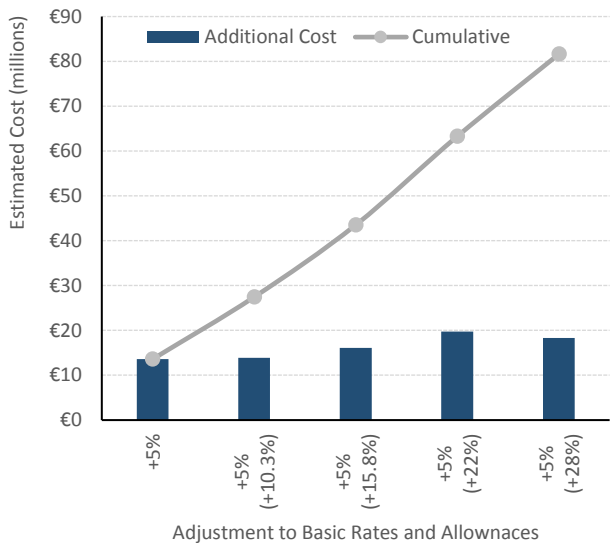
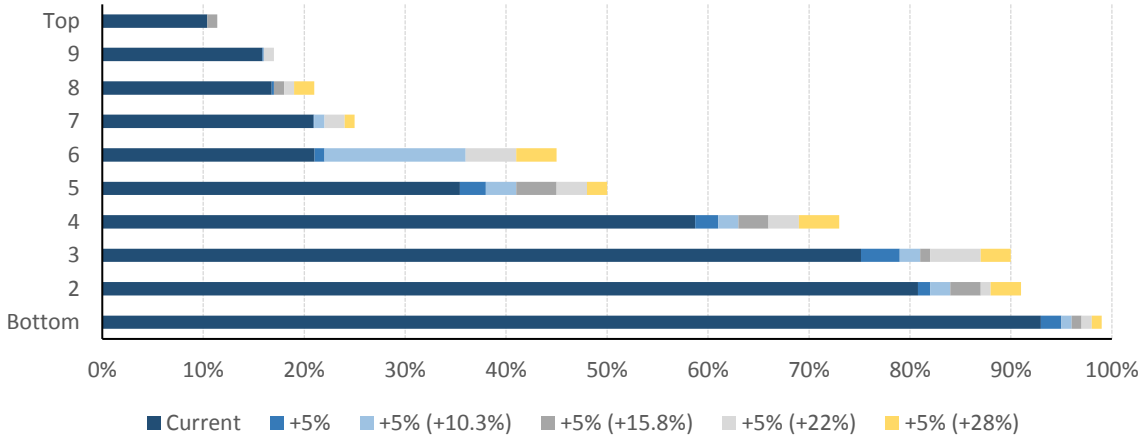


Figure 11: Estimated Cost of Phased 5% Increases to Allowances and Basic Rate Thresholds



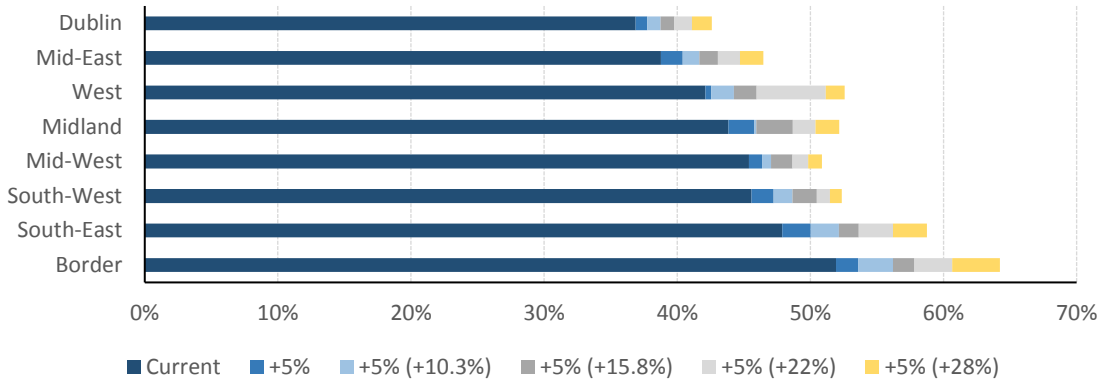
As shown in Figure 12, below, the impact of these phased expansions would accrue disproportionately to the bottom and middle income deciles. Post adjustment, eligibility in the bottom three deciles would be almost 90% or above; the majority of people in each of the bottom five deciles would be eligible for free GP cover.

Figure 12: Income Decile Impact of Phased 5% Increases to Allowances and Basic Rate Thresholds



Regionally, the benefits of 5% threshold increases would be distributed relatively evenly, with slightly higher proportions of the impact going to the Border region, West and South-East. After these expansions coverage in all regions would be above 40%, with coverage in all regions outside Dublin and Mid-East above 50%.

Figure 13: Regional Impact of Phased 5% Increases to Allowances and Basic Rate Thresholds



4.2 Long Term Expansion (Universal Rollout)

This section presents cost and eligibility findings on the phases towards universal roll-out of free GP care. We find, based on adjusted current cost, the cost of providing universal GP care would be €630m per annum. These costing assumptions however, do not consider costs associated with implementing a new model for GP care, or any future rate increases bar those already agreed. We present the findings first in terms of expansion in eligibility through age, largely for illustrative purposes, a secondly through adjustment of basic rate thresholds and allowances – the pathway favoured by Sláintecare.

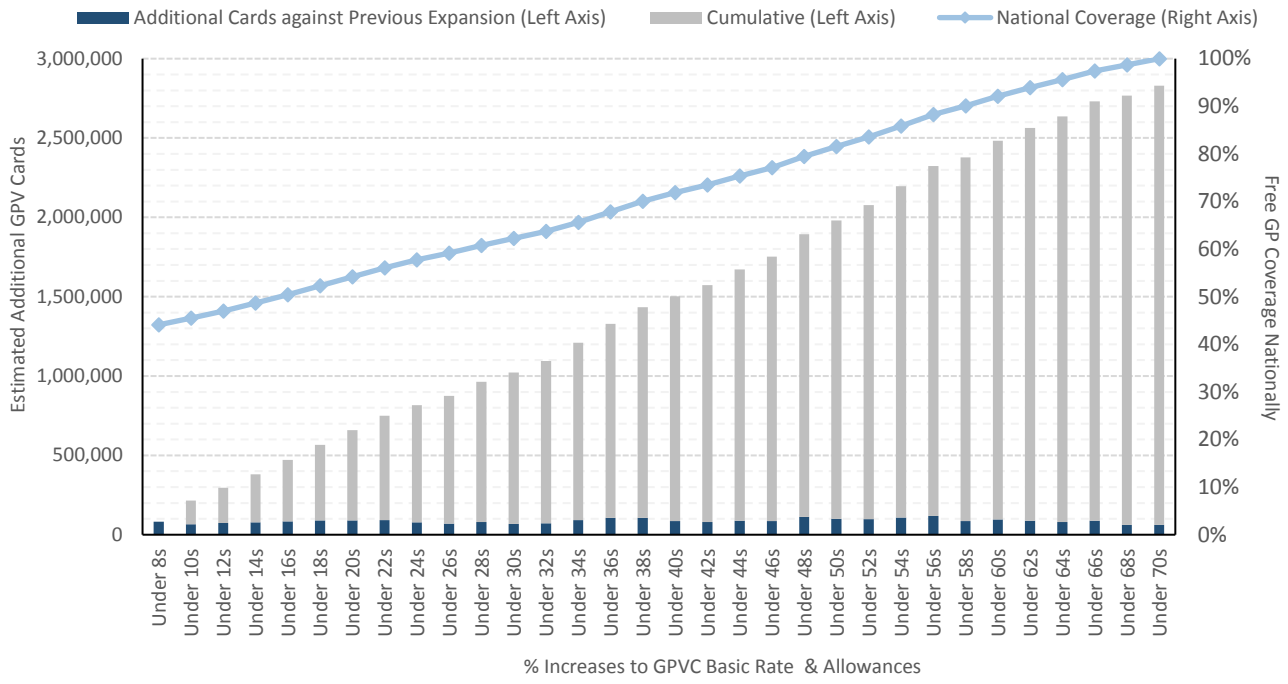
Universal Expansion by Age Cohort

While this exercise is largely an illustrative scenario as there are currently no plans to expand eligibility to age cohorts beyond under 13s, the perspective is a useful breakdown for understanding the costs of covering the uncovered older child and working age population, and could in the future form part of a multi-faceted approach to eligibility expansion – i.e. coverage for under 18s.

Figure 15 below shows the additional numbers of people who would become eligible for free GP care as coverage expanded across age cohorts. The increase in relatively linear, with between an additional 62k and 117k people becoming eligible with each two year expansion.

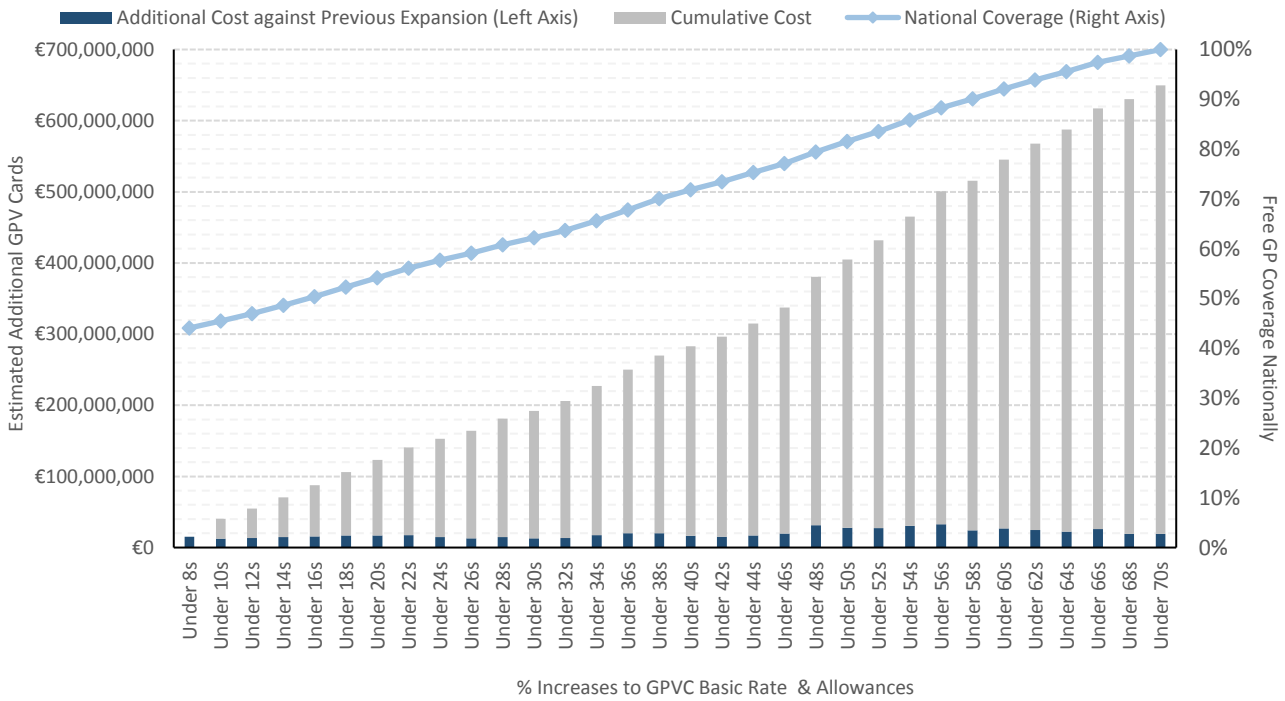
The dark blue areas in the below graphs represent the cost/expansion as a result of providing eligibility to that specific cohort, e.g. under 32s. The grey area represents the cumulative cost/expansion e.g. assuming eligibility for everybody under 32. The light blue lines, which correspond to the right hand axis illustrate the total national free GP coverage as a result of cumulative expansion i.e. if eligibility was granted to all under 40s, national coverage would be an estimated 70%.

Figure 15: Eligibility Implications of Universal Rollout by Age Group



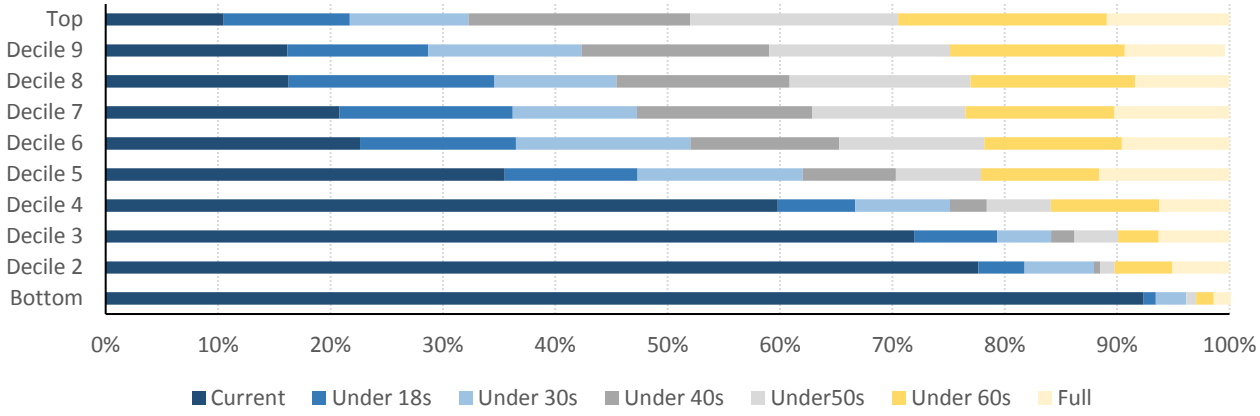
As shown below in Figure 16, the full estimated cost of universal rollout at adjusted current costs is around €650m. Expansion up until over 50s is relatively linear, at an average of €17m for each additional two year cohort. Expansion past 50 costs would be expected to cost an average of around €25m for each additional two year cohort.

Figure 16: Cost Implications of Universal Rollout by Age Group



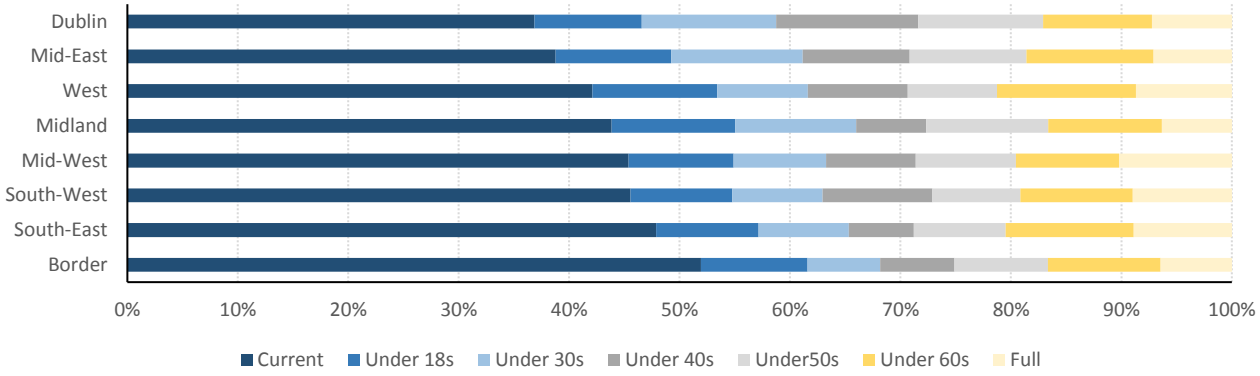
In terms of impact by income decile, as discussed in the previous section, the benefits of age based expansion accrue disproportionately to higher income deciles, due to the fact that age and household income are not closely associated for households under 70. Due to the fact that lower income deciles have higher rates of cover, there are fewer numbers of ineligible people to be granted cover in lower deciles compared with higher deciles.

Figure 17: Coverage by Decile Following Age Based Expansions



Regionally, additional coverage is more evenly distributed with all areas making comparable gains with expansion. By definition, expansion to universal cover means regions with lower current levels of cover, such as Dublin, will ultimately have greater benefit from full cover. As illustrated below in Figure 18 however, the benefits of phased rollout to under 18s and under 30 is of greater benefit to Midlands and the South-East.

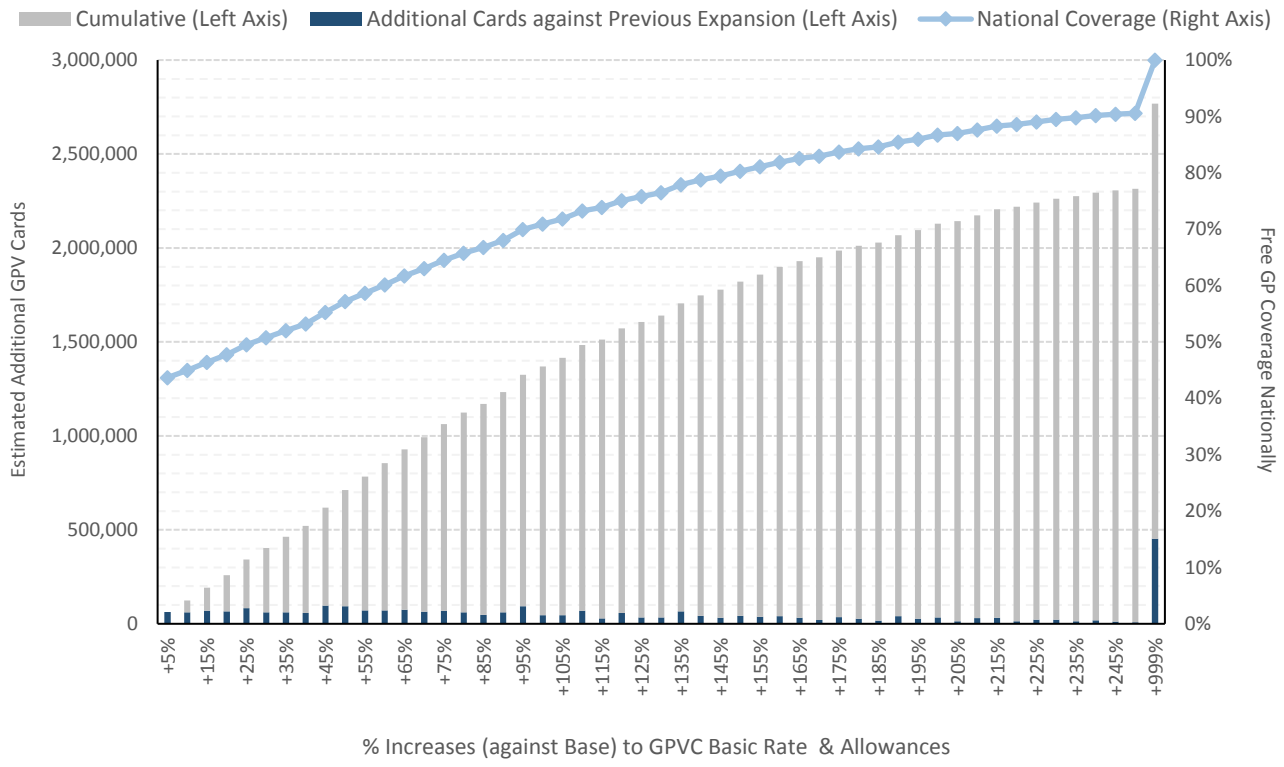
Figure 18: Coverage by Region Following Age Based Expansions



Universal Expansion by Threshold Adjustment

Expansion of eligibility through increases in basic rate thresholds and/or allowances is a feasible policy option for expansion over the medium to long-term. This is not without precedent as a policy measure to increase eligibility, as part of Budget 2019 the weekly income thresholds were increased by 10% on April 1st with an estimated €19m in 2019. It should be noted however that expanding eligibility does not mean the number of cards will necessarily increase accordingly; the complexity of means assessment means that many people may not realise that they are eligible for cards.[20] There has been a 7,000 increase in GPVCs since April (from 508,859 to 515,924)[21] with the HSE projecting an increase in GPVC numbers to 528,079 by year-end.

Figure 19: Eligibility Implications of Universal Rollout by Threshold/Allowance Adjustment



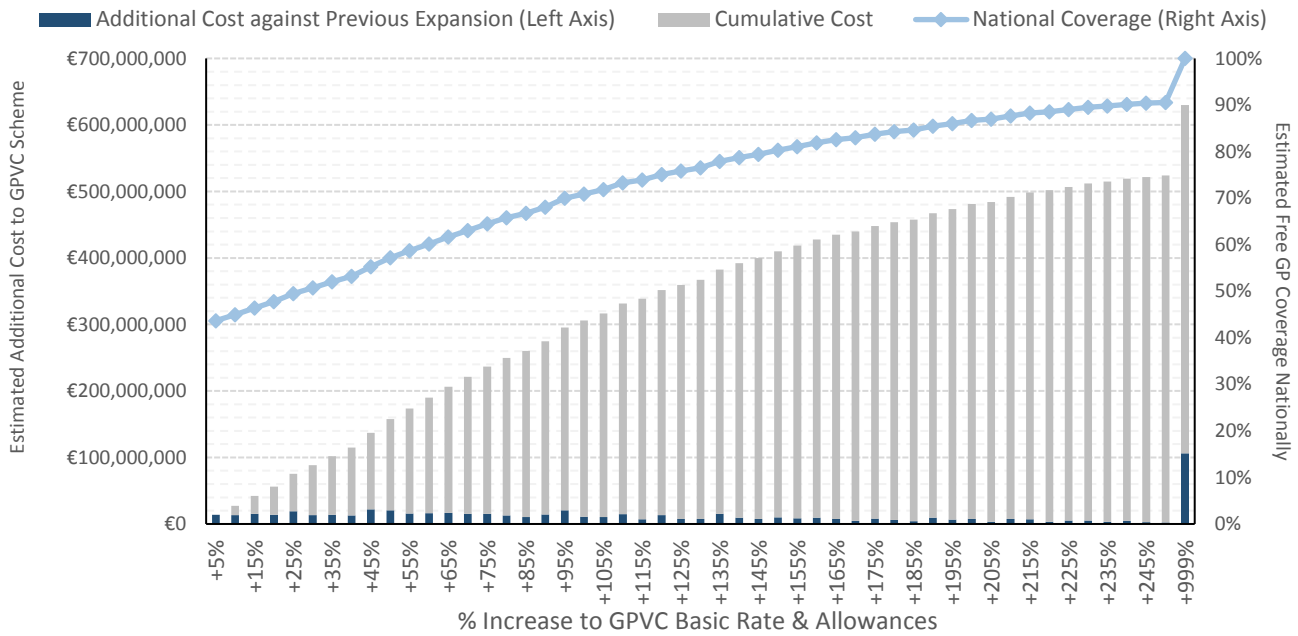
Shown in Figure 19 above is the eligibility impacts of across the board percentage increases to GPVC basic rate and allowances. A 50% increase for example would make an additional seven hundred thousand people eligible for a GPVC and would bring national eligibility to just under 60%. A threefold increase in thresholds and allowances (+200%) would make an additional 2.1m people eligible, bringing national eligibility to 87%. The marginal effect of threshold/allowance increases is generally decreasing, meaning that the effect of each

[20] The base scenario of our model output indicates that many more people are eligible for cards than there are GPVC holders. It should be kept in mind however that there was a concomitant underestimation of MC holders, meaning that many of these eligible GPVC holders, may be MC holders who are in the three year MC retention phase.
[21] PCRS Reports: March & July

5% increase against base is on average smaller than the previous one; this is shown by the concave slope in the blue/grey bars. This is due to the income distribution in Ireland which is a convex function (increasing towards the high end).

The estimated cost effects of expansion based on basic rate thresholds and allowances are naturally similar in pattern, shown below in Figure 20. An increase of 50% in thresholds against base would cost an additional €160m per annum, which a threefold increase would cost €480m at current adjusted prices.

Figure 20: Cost Implications of Universal Rollout by Threshold/Allowance Adjustment



The cost of full cover, as shown by the final bar above, at current adjusted prices would be an additional €630m, and if done solely through income means assessment, would require a significant jump in rates to get to 100% coverage nationally.

Figure 21: Coverage by Income Decile Following Threshold/Allowance Based Expansions

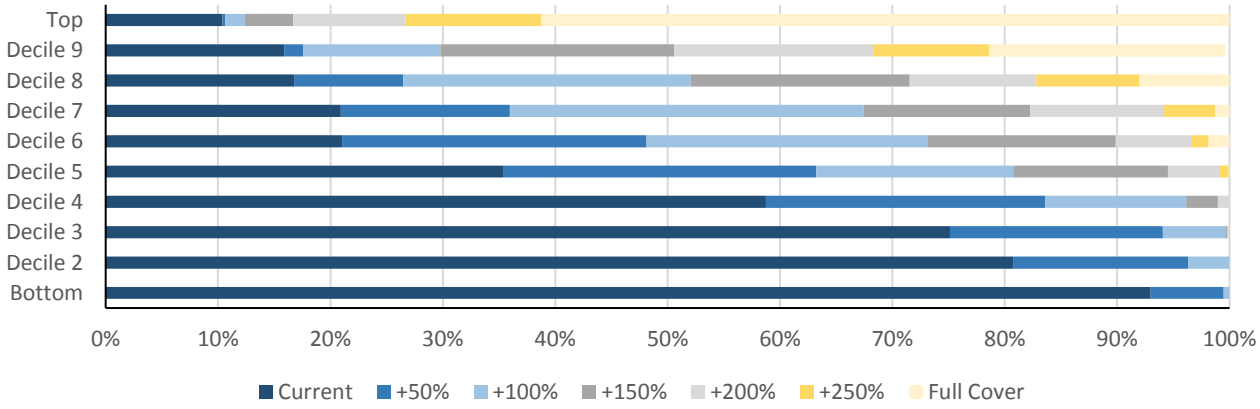
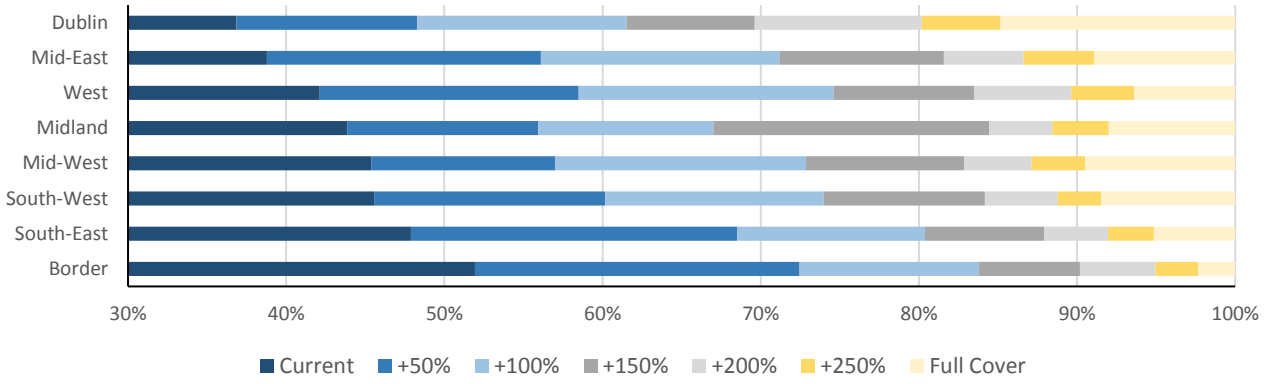


Figure 22: Coverage by NUTS 3 Region Following Threshold/Allowance Based Expansions



This section presents the findings of completed analysis looking at the effects on eligibility and cost of (i) age cohort expansion and (ii) upward adjustments of thresholds and allowance. It is very important to consider that these costings are based on current prices of care, and future prices expected in the near-term. In the event of a policy decision for mass rollout, it would be expected that prices per person would be subject to negotiation, thus actual total costs may ultimately be quite different to those presented here.

Demographic Considerations (10 year horizon)

Because the model is based on 2017 data, it is in effect a point in time snapshot of eligibility and costings. This means it cannot be used to estimate the costs of demographic change. Using an alternative method based on population projections (see Appendix VI), we estimate that the demographic effects of an ageing and increasing population would result in cost growth, even at current adjusted costs.

Table 8: Cost of Total Expansion (incorporating GMS Contract and 2030 Horizon)

Capitation Rate Increases (GMS Contract)	-	20%	3%	10%	9%	-
€m	**2019**	**2019 (July)**	**2020**	**2021**	**2022**	**2030**
Capitation Cost (incl. Superannuation)	263	309	321	347	382	488
Other Fees and Allowances	298	298	321	325	317	353
Total	**561**	**607**	**642**	**672**	**699**	**841**
Additional People Covered	*2.82m*	*2.82m*	*2.84m*	*2.86m*	*2.89m*	*3.20m*

This methodology found that 2030 costs would rise to over €840m as a result of demographic change. While part of this demographic cost would be endured even in the case of no further expansion in eligibility (due to existing coverage), it should be noted that further expansion places additional cost pressures on the State in the form of population growth and aging.

5. Conclusion

Universal free access to GP care has been a policy ambition for a number of years through many iterations of policy documents. However, it is only in recent years that the expansion has begun in earnest primarily through age-cohort expansion (under 6s, over 70s) but also through the adjustment of thresholds in Budget 2019. This paper illustrates the substantial cost of the overall expansion through the increase in the price and volume of capitation. This does not include the cost of new services, new fees/allowances or any other cost-increasing element as part of subsequent negotiations. Significantly, future funding streams that will inevitably be required by Government to address capacity constraints from this ambitious extension is not addressed.

In the short to medium-term, the Department of Health has made the phased expansion to under 13s the next priority and this has been accepted by GPs in the new GMS contract contingent on separate negotiations and increased funding. Given the propensity for substantial rate increases in recent negotiations, it is vital that the cost of expansions is clearly linked to the actual cost of providing the service to the newly eligible cohorts.

Given the enormity of the projected costs, it is clear that any universal expansion should be carefully considered. As such, expansion through threshold alterations in order to ensure that those most in need of these health services is recommended as a policy option.

Appendix

(I) GP Care (U6's)

First, the new contract also stipulates the fees payable to GP's for diagnosis, registration and visits for children under 6 who suffer from asthma, these are set out below.

Table A: Asthma Capitation Payments for Under 6's

New Under 6's GP Contract – Asthma Capitation Payments	Capitation
Initial Asthma diagnosis and registration after child reaches the age of 2 years	€50.00
Enhanced capitation in year 1 post registration. Includes 2 visits	€90.00
Enhanced capitation for each subsequent year up to and including the age of 5	€45.00

Source: SI No. 277/2013 – Health Professionals (Reduction of Payments to General Practitioners) Regulations 2013

Additional payments shall be made where special services are provided to eligible persons in accordance with the list specified by the Minister for Health[22]. These are called Special Items of Service and there are a number of these that a GP participating in the new arrangement can provide to eligible children. The costs of all of the special items of service for the under 6's are same as the rates payable under the GMS Capitation contract except for the "Suturing of cuts and lacerations". The rate of reimbursement for this special item under the GMS contract is €24.80, the same item in the Under 6s contract costs the Government €37.21. Table 3 sets out the list of special items available to participating GP's.

Table B: Special Items of Service for Under 6 Patients

Special Items of Service for Under 6 Patients	Capitation
Removal of lodged or impacted foreign bodies from ear, nose, throat and skin	€24.80
Removal of adherent foreign bodies from the conjunctival surface of eye	€24.80
Suturing of cuts and lacerations (including application of tissue glue)	€37.21
Excisions/cryotherapy/diathermy of skin lesions	€24.80
Draining of abscess	€24.80
Nebuliser treatment in the case of acute asthmatic attack	€37.21
Treatment and plugging of nasal and dental haemorrhages	€24.80
Attendance by General Practitioner at case conferences	€62.02

Source: GP Circular 011-2015 GP Visit Card Scheme Under 6s

[22] GMS Contract 1989

(II) Medical and GP Visit Card Services

The range of services that a medical card or GP visit card holder are entitled to are set out below:

Table C: Medical and GP Visit Card Services Ireland

Medical and GP Visit Card Services	Medical Card*	GP Visit Card
GP Visit	Free	Free
Prescribed Medicines	Free	Not covered
Public in-patient and in-patient services	Free	Not covered
Eye and Ear Tests	Free	Not covered
Dental Checks	Free	Not covered

Source: HSE www2.hse.ie/costs-schemes-allowances/

(III) New GMS Contract

A variety of areas will be a focus of reform:

1) **eHealth**: Progression of the eHealth agenda including the use of; IHI/Electronic summary care records/Shared Care records/E-prescribing/diagnostic imaging (NIMIS) services/electronic lab tests (MEDLIS).
2) **Medicines Management Programme (MMP):** agreement to cooperate with the HSE and their plan to hire pharmacists to carry out medication reviews. Again the over 75 cohort will be first addressed.
3) **GP involvement in CHOs:** There will initially be 9 trial sites (one per CHO) with a plan to expand to the entire 96 network sites over the 4 years. This is the first time GP's will sign up to a structured working arrangement with the HSE.
4) **Supports for Rural Practices**: GP rural practice fees will increase and other additional support will also be provided.
5) **Improved Family-Friendly Arrangements for GP's:** The locum rate for GP's availing of maternity leave will be increased and paternity leave will be increased from 3 days to 2 weeks.

Table D: Cost of New GMS Contract by Fee & Allowance Type

€m	2019	2020	2021	2022	2023	Total
Capitation	24	32	30	30	-	115
+ Superannuation	2	3	3	3	-	12
Dispensing Fees (incl. superannuation)	-	0	0	0	-	0
Urban Deprivation	1	1	-	-	-	2
Rural Practice	-	0.4	-	-	-	0
Maternity & Paternity	0	2	-	-	-	2
CDM + Special Items	-	15	30	30	5	80
Total	**27**	**53**	**63**	**63**	**5**	**212**

(IV) Capitation Rates: 2013-2022

Table E: New Capitation Rates Applying under GP Contract

	Under 6's				New GP Contract							
€	2013		Post U'6s (68%)[23]		July 2019 (20%)		Jan 2020 (3%)		Jan 2021 (10%)		Jan 2022 (9%)	
Gender	M	F	M	F	M	F	M	F	M	F	M	F
0-5	75	73	125	125	125	125	125	125	125	125	125	125
6-15	43	44	43	44	52	53	53	54	59	60	64	65
16-44	55	90	55	90	66	108	68	112	75	123	82	134
45-64	110	121	110	121	132	146	136	150	150	165	164	180
65-69	116	130	116	130	140	156	143	160	158	176	173	193
70+	272	272	272	272	326	326	335	335	369	369	403	403
70+ (PNH)	434	434	434	434	434	434	434	434	434	434	434	434

(V) Corroborative Analysis: Age Cohort Expansion Using Population Projection

Current Average Card Cost (2019 Costs)

In order to corroborate model findings, an additional approach was employed to cost expansion using demographic projections. We applied our current costs of cards directly to the numbers of uncovered people in demographic cohorts.

Applying this to population projections for 2019, a cost of extending cards to different cohorts can be estimated. Extension to under 12's would cost almost €40m, all remaining children under 18 would cost a further €40m whilst extension to all the population would cost over €500m. This is in line with model findings, albeit lower due to current rather than adjusted card cost assumptions.

Table F: Cost of Age Cohort Expansion

Cohort	Population Covered (2019)	Total Cost (€m)
6/7 Yrs	72,305	12
8/9 Yrs	78,259	13
10/11 Yrs	77,286	13
12-17 Yrs	247,989	40
18-74 Yrs	2,339,797	429
Total	**2,818,522**	**506**

[23] The increase evident here applied to the under 6's cohort only, under the new GP contract the rates increases apply to other cohorts.

Alternate Costing Approach: Capitation Fees & Expenditure Lines

Without a forward-oriented average cost of card forecasts becoming available from the HSE for at least the lifespan of the new GMS contract, the uncovered portion of the population in the medium-term (up to 2030) is estimated as this not only captures the increased capitation costs applying up to 2023 under the GMS contract but also captures demographic movements likely to drive the average cost of card in the medium term (as cohorts become older and hence more costlier). Estimating the other fees and allowances is more challenging. The ESRI (2018) calculated €96 per non-cardholder which is updated to €106 per cardholder in this table below and increases slightly over the years examined in line with the GMS contract (this likely underestimates the non-capitation costs arising from new developments in those years).

Table G: Non-Capitation Fees and Allowances (2019)

€m	2019
Total Fees and Allowances	**555**
Capitation Fees	304
Superannuation	32
Other fees and allowances	**220**
No. of GPVC/GMS Holders	2,077,307
Cost of 'other' per GPVC/GMS Holder (€)	*106*

This allows for a more accurate reflection of the cost of universal expansion (illustrated below) which incorporates the near 50% increase in capitation rates which will apply under the new GMS contract and the demographic pressures applying until 2030.

The cost of expansion to the entire population would be €607m based on 2019 rates and population (almost €100m more than under the average cost of card scenario.) However, this cost would increase to almost €700m as projected increases in capitation rates and demographics apply by 2022 and, taking a ten-year view, to almost €850m by 2030 as demographic costs play a larger role.

Potential additional costs arising from negotiations with GPs in the form of higher still fees and allowances are not assumed in the above projection although the ESRI have previously noted that age-cohort expansion involves an implicit assumption that GPs receive an equivalent level of remuneration despite the newly-covered cohorts would have higher incomes than the cohort currently covered and, generally, better health status that might be expected to result in lower visiting rates.[24]

[24] ESRI, *Universal GP Care in Ireland: Potential Cost Implications*

(VII) Model Code (R Software, Accessed through CSO's VDI System)

```
### MODEL FOR ASSESSING THE IMPACT OF THRESHOLD CHANGES IN THE GMS SCHEME ###

##SETUP##
setwd("//vdi/Research_Projects/_Datasets/SILC_RMF/SILC 2017") #load in data set
rmf_17<-read.csv("rmf_2017.csv") #delare RMF in environment

#install necessary packages
options(repos=NULL)
install.packages("dplyr", contriburl=("file:////crctxksc001/CRAN/bin/windows/contrib/3.3")
install.packages("data.table", contriburl = "file:////crctxksc001/CRAN/bin/windows/contrib/3.3")

library("dplyr", lib.loc="~/R/win-library/3.3")
library("data.table", lib.loc="~/R/win-library/3.3")
library("tibble", lib.loc="~/R/win-library/3.3")
library("ggplot2", lib.loc="~/R/win-library/3.3")

get_decile <- function(x) ceiling(10*rank(-x, ties.method = "random") / length(x))

#######################################################################

#MODEL VARIABLES FOR ADJUSTMENT#

max.age.gp <- 5 #adjust max age for child GPVC (for under 6s max age = 5)
min.age.gp <-70 #adjust min age for senior GPVC (for over 70s min age = 70)

mc.br.adj <- 1    #factor to adjust medical card basic rate thresholds (0.95 for 5% reduction, 1.05
for 5% increase...)
mc.al.adj <- 1    #factor to adjust medical card allowances (0.95 for 5% reduction, 1.05 for 5%
increase...)
gp.br.adj <- 1    #factor to adjust gpv card basic rate thresholds
gp.al.adj <- 1    #factor to adjust gpv card allowances
y.adj <- 1        #factor to adjust all income levels for model tuning

gp.br.adj.1 <- 0   # increase to basic rate for single person living alone (under 66)
gp.br.adj.2 <- 0   # increase to basic rate for single person living alone (66+)
gp.br.adj.3 <- 0   # increase to basic rate for single person living with family (under 66)
gp.br.adj.4 <- 0   # increase to basic rate for single person living with family (66+)
gp.br.adj.5 <- 0   # increase to basic rate for couple/lone parent with children (under 66)
gp.br.adj.6 <- 0   # increase to basic rate for couple/lone parent living with children (66+)

gp.al.adj.1 <- 0  # increase to allowance for each of first 2 children under 16
gp.al.adj.2 <- 0  # increase to allowance for third and subsequent children under 16
gp.al.adj.3 <- 0  # increase to allowance for each of first two children over 16 (no income)
gp.al.adj.4 <- 0  # increase to allowance for third and subsequent children over 16 (no income)
gp.al.adj.5 <- 0  # increase to allowance for each dependant over 16 in education (no grant)

#######################################################################

##MODEL##

##CREATE DATAFRAME##
#start buliding dataframe from the RMF
euroweight <- rmf_17$euroweight #weighting for national representation
hhid <- rmf_17$Db030 #household id
hhsize <- rmf_17$person_count_h #count of people in household
indvid <- rmf_17$RB030 #individual id
yob <- rmf_17$rb080 #year of birth
age <- (2017-yob) #create age vector from yob
sex <- rmf_17$rb090
grossy <- rmf_17$hy010 #gross income variable; not used in analysis
dispy <- rmf_17$hy020 #disposable income variable; not used in analysis
is_parent<-indvid %in% unique(c(rmf_17$RB220[!is.na(rmf_17$RB220)],
rmf_17$RB230[!is.na(rmf_17$RB230)])) #boolean vector showing whether person has child also in survey
is_child<-!is.na(rmf_17$RB220)|!is.na(rmf_17$RB230) #creates boolean vector showing whether person
has child also recorded in survey
is_partner<-!is.na(rmf_17$RB230)
is_student <- rmf_17$PE010; is_student[is.na(is_student)]<-0; is_student[is_student==2]<-0
region <- rmf_17$region
eq.y <- rmf_17$eq_inc1nat
eq.y.dec <- get_decile(eq.y)
med.card <- rmf_17$Med_Card; med.card[med.card==2|med.card==3|med.card==8|med.card==9]<-0;
med.card[is.na(med.card)]<-0
gp.card <- rmf_17$Med_Card; gp.card[gp.card==1|gp.card==3|gp.card==8|gp.card==9]<-0;
gp.card[gp.card==2]<-1; gp.card[is.na(gp.card)]<-0

#combine above vectors in dataframe
modeldf<-data.frame(euroweight, indvid, age, sex, is_student, is_parent, is_child, is_partner,
hhsize, hhid, region, eq.y, eq.y.dec, med.card, gp.card) #bind for dataframe

#create household composition columns
modeldf1<-modeldf %>% group_by(hhid) %>% mutate (famsize=sum(age>-1), nkids = sum(age<16), n16to18 =
sum(age>=16 & age<18))
```

```
#INCOME#
emp_y <- rmf_17$PY010N; emp_y[is.na(emp_y)]<-0 #employee income/wages
slf_emp_y <- rmf_17$PY050N; slf_emp_y[is.na(slf_emp_y)]<-0 #self-employment income
pen <- rmf_17$PY080N; pen[is.na(pen)]<-0 #private pension income
ub_y <- rmf_17$PY090N; ub_y[is.na(ub_y)]<-0 #unemployment benefit income
oab_y <- rmf_17$PY100N; oab_y[is.na(oab_y)] <- 0 #old age benefit
sb_y <- rmf_17$PY110N; sb_y[is.na(sb_y)]<-0 #survivors benefit income
sck_y <- rmf_17$PY120N; sck_y[is.na(sck_y)]<-0 #sickness benefit income
db_y <- rmf_17$PY130N; db_y[is.na(db_y)]<-0 #disability benefit income
ea_y <- rmf_17$PY140N; ea_y[is.na(ea_y)]<-0 #education allowances income
stud_nogrant <- ifelse(is_student==1 & ea_y==0, 1, 0)
ind_net_y <- (emp_y + slf_emp_y + pen + ub_y + oab_y + sb_y + sck_y + db_y + ea_y)/52.143
modeldf1<- add_column(modeldf, ind_net_y, .after = "indvid") #individual id
modeldf1<- add_column(modeldf1, stud_nogrant, .after = "is_student")
modeldf2 <- as.data.frame(modeldf1 %>% group_by(hhid) %>% mutate (hh_net_y = sum(ind_net_y))) #add
column for household net income
modeldf2 <- modeldf2 %>% group_by(hhid) %>% mutate (child_no_mon = sum(age>15 & age<18 &
ind_net_y==0)) #add colum for dependants with no income

modeldf2 <- modeldf2 %>% group_by(hhid) %>% mutate (hh_stud_no_grant = sum(stud_nogrant))
modeldf2 <- modeldf2 %>% group_by(hhid) %>% mutate (nchild = sum(age<16), nkid_no_y = sum(age>16 &
age<18 & ind_net_y==0 & stud_nogrant==0))

##Expenses##

#mortgage/rent
mortg_wk <- rmf_17$hh060; mortg_wk[is.na(mortg_wk)]<-0
rent_wk <- rmf_17$hh071; rent_wk[is.na(rent_wk)]<-0
modeldf2<-cbind(modeldf2, house_cost_wk=(((mortg_wk + rent_wk)*12)/52.1429))

#childcare
#see "early years sector profile report, pobal (pg80)" - took full day care cost and divided by 5days
& 7hours for hourly average.
childcare_cost <- (rmf_17$rl030*4.48) + (rmf_17$rl040*4.48) + (rmf_17$rl050*5.065) +
(rmf_17$rl060*3.84); childcare_cost[is.na(childcare_cost)]<-0
modeldf2 <- cbind(modeldf2, childcare_cost = childcare_cost)
modeldf2<- modeldf2 %>% group_by(hhid) %>% mutate (tot_childcare_cost = sum(childcare_cost))

hh_disp_y <- (modeldf2$hh_net_y - (modeldf2$tot_childcare_cost + modeldf2$house_cost_wk)) * y.adj
modeldf2<-cbind(modeldf2, "hh_disp_y" = hh_disp_y)

#THRESHOLD CATEGORIES#
cat1 <- (as.data.frame(filter(modeldf2, hhsize==1, age<66)))$indvid #vector of individual ids in
category_1 (live alone, under 66)
cat2 <- (as.data.frame(filter(modeldf2, hhsize==1, age>=66)))$indvid #vector of individual ids in
category_2 (live alone, 66 or older)
cat3 <- (as.data.frame(filter(modeldf2, is_parent==0, age>=16, is_partner!=1, hhsize>1,
age<66)))$indvid #vector of individual ids in category_3 (single, lives with family)
cat4 <- (as.data.frame(filter(modeldf2, is_parent==0, age>=16, is_partner!=1, hhsize>1,
age>=66)))$indvid #vector of individual ids in category_3 (single, lives with family)
cat5 <- (as.data.frame(filter(modeldf2, hhsize>1, age<66, hhsize>1)))$indvid #vector of individual
ids in category_4 (has kids, under 66)
cat6 <- (as.data.frame(filter(modeldf2, hhsize>1, age>=66, hhsize>1)))$indvid #vector of individual
ids in category_5 (has kids, over 66)

gpvc_br1 <- (304 * gp.br.adj) + gp.br.adj.1 #single person living alone > 66
gpvc_br2 <- (333 * gp.br.adj) + gp.br.adj.2 #single person living alone 66+
gpvc_br3 <- (271 * gp.br.adj) + gp.br.adj.3 #single person living with family > 66
gpvc_br4 <- (271 * gp.br.adj) + gp.br.adj.4 #single person living with family
gpvc_br5 <- (441 * gp.br.adj) + gp.br.adj.5 #married/cohabiting couple/single parent family aged up
to 65
gpvc_br6 <- (492 * gp.br.adj) + gp.br.adj.6 #married/cohabiting couple/single parent family 66+

mc_br1 <- (184 * mc.br.adj) #single person living alone >66
mc_br2 <- (201.5 * mc.br.adj) #single person living alone 66+
mc_br3 <- (164 * mc.br.adj) #single person living with family >66
mc_br4 <- (173.5 * mc.br.adj) #single person living with family
mc_br5 <- (266.5 * mc.br.adj) #married/cohabiting couple/single parent family aged up to 65
mc_br6 <- (298 * mc.br.adj) #married/cohabiting couple/single parent family 66+

gp_th_mat <- rbind(cbind(cat1, gpvc_br1),cbind(cat2, gpvc_br2), cbind(cat3, gpvc_br3), cbind(cat4,
gpvc_br4), cbind(cat5, gpvc_br5), cbind(cat6, gpvc_br6)); colnames(gp_th_mat) <- c("indvid",
"gp_threshold")
gp_th_mat <- gp_th_mat[!duplicated(gp_th_mat[,1]),]
modeldf2 <- merge(modeldf2, gp_th_mat, "indvid")

mc_th_mat <- rbind(cbind(cat1, mc_br1),cbind(cat2, mc_br2), cbind(cat3, mc_br3), cbind(cat4, mc_br4),
cbind(cat5, mc_br5), cbind(cat6, mc_br6)); colnames(mc_th_mat) <- c("indvid", "mc_threshold")
mc_th_mat <- mc_th_mat[!duplicated(mc_th_mat[,1]),]
modeldf2<-merge(modeldf2, mc_th_mat, "indvid")

##ALLOWANCES##
#medical card allowances#
mc_al1<-(38 * mc.al.adj) #Allowance for each of First Two Children under 16
mc_al2<-(41 * mc.al.adj) #Allowance for Thrird and Subsequesnt Children Under 16
```

```
mc_al3<-(39 * mc.al.adj) #Allowance for each of First Two Children Over 16 (with no income)
mc_al4<-(42.5 * mc.al.adj) #Allowance for third and subsequesnt children over 16 (with no income)
mc_al5<-(78 * mc.al.adj) #Allowance for each dependant over 16 in full time non grant aided education

#gpv card allowances#
gp_al1<-(57 * gp.al.adj) + gp.al.adj.1 #Allowance for each of First Two Children under 16
gp_al2<-(61.5 * gp.al.adj) + gp.al.adj.2 #Allowance for Thrird and Subsequesnt Children Under 16
gp_al3<-(58.5 * gp.al.adj) + gp.al.adj.3 #Allowance for each of First Two Children Over 16 (with no
income)
gp_al4<-(64 * gp.al.adj) + gp.al.adj.4 #Allowance for third and subsequesnt children over 16 (with no
income)
gp_al5<-(117 * gp.al.adj) + gp.al.adj.5 #Allowance for each dependant over 16 in full time non grant
aided education

#create allowances for each houshold#
gp.allowance <- ifelse(modeldf2$nchild < 3, gp_al1*modeldf2$nchild, gp_al1*2 +
gp_al2*(modeldf2$nchild-2)) + ifelse(modeldf2$child_no_mon < 3, gp_al3*modeldf2$child_no_mon,
gp_al3*2 + (gp_al4*(modeldf2$child_no_mon-2))) + modeldf2$hh_stud_no_grant * gp_al5
mc.allowance <- ifelse(modeldf2$nchild < 3, mc_al1*modeldf2$nchild, mc_al1*2 +
mc_al2*(modeldf2$nchild-2)) + ifelse(modeldf2$child_no_mon < 3, mc_al3*modeldf2$child_no_mon,
mc_al3*2 + (mc_al4*(modeldf2$child_no_mon-2))) + modeldf2$hh_stud_no_grant * mc_al5
modeldf2 <- cbind(modeldf2, "gp.allowance" = gp.allowance, "mc.allowance" = mc.allowance)

#determine eligibility#
mc.elig <- ifelse(modeldf2$mc_threshold > (modeldf2$hh_disp_y - modeldf2$mc.allowance), 1, 0)
gp.elig <- ifelse(mc.elig ==1, 0, ifelse((modeldf2$age<=max.age.gp | modeldf2$age>=min.age.gp), 1,
ifelse(modeldf2$gp_threshold > (modeldf2$hh_disp_y - modeldf2$gp.allowance), 1, 0)))
modeldf2<- cbind(modeldf2, gp.elig, mc.elig)

#add card costs#
card.cost <- data.frame(age=c("0-4", "5-15", "16-44", "45-64", "65-69", "70+"), mc=c(390, 268, 688,
1286, 1663, 2130), gpvc=c(243, (165+21), (154+35), (223+56), (252+60), (500+132))) #annual cost of
cards as per PCRS performance report June 2019
card_cost <- data.frame(age=(0:100), mc_cost=c(rep(card.cost[1,2],5), rep(card.cost[2,2],11),
rep(card.cost[3,2], 29), rep(card.cost[4,2],20), rep(card.cost[5,2], 5), rep(card.cost[6,2], 31)),
gpvc_cost=c(rep(card.cost[1,3],5), rep(card.cost[2,3],11), rep(card.cost[3,3], 29),
rep(card.cost[4,3],20), rep(card.cost[5,3], 5), rep(card.cost[6,3], 31))) #creates dataframe of all
ages and associated mc and gpvc cost
modeldf2 <- merge(modeldf2, card_cost, by= "age")

#calculate number of cards#
n.gpvc <- round(sum(modeldf2$euroweight * modeldf2$gp.elig), 0)
c.gpvc <- round(sum(modeldf2$euroweight * modeldf2$gp.elig * modeldf2$gpvc_cost), 2)
n.mc <- round(sum(modeldf2$euroweight * modeldf2$mc.elig), 0)
c.mc <- round(sum(modeldf2$euroweight * modeldf2$mc.elig * modeldf2$mc_cost), 2)

#return calculation#
paste("Number of GPVCs:",(n.gpvc), sep = " ")
paste("GPVC Cost:", c.gpvc, sep=" ")
paste("Number of MCs:",(n.mc), sep = " ")
paste("MC Cost:", c.mc, sep=" ")

paste("% covered:", (n.gpvc + n.mc)/sum(modeldf2$euroweight), sep = " ")

a <- subset(modeldf2, gp.elig==1|mc.elig==1)
a %>% group_by(eq.y.dec) %>% summarise(total_weight = sum(euroweight)) #cardholders by y decile
a %>% group_by(region) %>% summarise(total_weight = sum(euroweight)) #cardholders by region
```

Quality Assurance process

To ensure accuracy and methodological rigour, the author engaged in the following quality assurance process.

- ☑ Internal/Departmental
  - ☑ Line management
  - ☑ Spending Review Steering group
  - ☑ Other divisions/sections

- ☑ External
  - ☑ Other Government Department

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