Crowe

Final Report to

An Roinn Leanaí
agus Gnóthaí Óige
Department of Children
and Youth Affairs

Review of the Cost of Providing Quality Childcare Services in Ireland

March 2020

Contents

Glossary

- CCS – Community Childcare Subvention
- CPD – Continuing Professional Development
- CSO – Central Statistics Office
- DCYA – Department of Children and Youth Affairs
- DES – Department of Education and Skills
- DfE – Department for Education
- ECCE – Early Childhood Care and Education
- ECEC – Early Childhood Education and Care
- EE – East of England
- EM – East Midlands
- EU – European Union
- FTE – Full-time Equivalent
- GDP – Gross Domestic Product
- LA – Local Authorities
- NAHT – National Association of Head Teachers
- NCS – National Childcare Scheme
- NFQ – National Framework of Qualifications
- NGO – Non-Governmental Organisation
- NLH – Nigel Lloyd Healthcare
- NI – Northern Ireland
- NUTS – Nomenclature of Territorial Units of Statistics
- OECD – Organisation for Economic Co-operation and Development
- OLS – Ordinary Least Squares
- PIP – Programme Implementation Platform
- PRSI – Pay Related Social Insurance
- PSO – Public Service Obligation
- PVI – Private Voluntary Initiative
- QAP – Quality Assurance Programme
- QE – Quantitative Easing
- SEED – Study of Early Education and Development
- SGEI – Services of General Economic Interest
- TFEU – Treaty of the Functioning of the European Union
- UCD – University College Dublin
- WM – West Midlands

Summary Report

Background

Crowe (formerly Crowe Horwath), in association with Apteligen, were commissioned by the Department of Children and Youth Affairs (DCYA) to undertake an independent review on the cost of providing quality childcare in Ireland. The project was part of a wider commitment by the DCYA to establish an evidence base for the development and support of quality Early Learning and Care (ELC) and School Age Childcare (SAC) provision in Ireland. This contract was awarded in Autumn 2017. The brief included:

- analysing the current costs of providing ELC and SAC and the factors that impact on these costs;
- the development and delivery of a model of the unit costs of providing ELC and SAC that allows analysis of policy changes and variation in cost-drivers, including the potential impact of professionalisation; and
- providing an objective, high-level market analysis of the sector in Ireland, including analysis of fee levels charged to parents.

An Oversight Group for this work was established by DCYA, comprising representatives from the DCYA, the Department of Education and Skills (DES), and Pobal. The Oversight Group met regularly to provide insight, review outputs, discuss and sign off on key project decisions, including the design of the survey tool. An overall approach and methodology was decided upon in partnership with the Oversight Group and Crowe/Apteligen and a number of key activities have been undertaken to date. These include:

- review of literature, context, existing data, and reports, including those submitted via a call for evidence and literature searches (comprising peer-reviewed and “grey” literature);
- an initial scoping exercise of early-stage informative engagement with 19 providers of different sizes, types, and locations comprising an overview of the providers’ business models and financial records to understand the cost drivers and key issues impacting on the operation of the providers’ businesses;
- engagement with key stakeholders from the sector, including the Early Years Forum, provider representative organisations, the City/County Childcare Committees, Statutory bodies, professional training bodies, and academics;
- the administration of a survey to all centre-based providers nationally, to provide the data on which the cost modelling tool would be based;
- the development of a cost modelling tool (and guidance document) to present the baseline cost data and enable the impact of a range of scenarios on unit cost, to be tested; and
- the production of a final report.

Outputs from the independent review of costs were subject to an independent peer review.

Review of the Literature & Market Analysis

A high-level literature review was undertaken to inform the review, including the Irish and international context for ELC and SAC provision, quality, and costs. Examples of international research into determining the costs of ELC and SAC provision and the principal components and drivers of such costs were examined, including studies from England, Scotland, and New Zealand.

A high-level market analysis is also undertaken, examining the ELC and SAC market in Ireland as it pertained at the time of the provider survey, including features of the market such as the current structure of Exchequer funding in Ireland, market drivers, and the profile of centre-based providers in terms of size, type, urban/rural location. Consideration was also given to "reasonable profit" for State aid in respect of ELC and SAC services and brief analysis of this issue was undertaken to inform future policy decisions in terms of setting the levels of subvention for these services in Ireland.

Stakeholder Engagement

In addition to the literature review, there was a consultation process with key stakeholders, principally via the Early Years Forum, and direct engagement with a number of providers. These providers were selected by Crowe to cover the various aspects of provision, and varied in size, location (in terms of geographic and urban/rural mix), and type (private and community providers). Irish-language providers were included in the cohort of providers visited. These engagements included reviewing the financial accounts of the provider to understand key cost issues and provided a useful insight on key cost items recorded, and how this information was typically captured.

The stakeholder engagement was informative in relation to understanding the primary concerns and insights of providers to inform the process and to assist in developing a survey tool to capture information to examine some of the issues involved in a more structured way.

Survey Administration & Dataset

All ELC and SAC services were invited to participate in the survey. The list of relevant services and contact details was provided by Pobal. This list totalled 4,504 services at the time the survey was launched. Over the course of the survey roll-out, in order to encourage a higher participation rate, the deadline to return completed surveys was extended; the Minister for Children and Youth Affairs and the DCYA issued several press releases to encourage participation and called upon members of the Early Years Forum to encourage participation among their membership bases; and Crowe engaged with stakeholder organisations to promote the survey among their membership. The survey responses totalled 859, yielding a 19% response rate.

As is typical with exercises of this nature, it was necessary to undertake a cleaning process to "correct" or remove data, which were considered to be implausible. During the cleaning, a variety of common inaccuracies were discovered and rectified, including missing values, mistyping, and misinterpretation. The final cleaned dataset used for analysis totalled 573 responses. The profile of the cleaned dataset is closely aligned to the overall profile of the sector in terms of geographic distribution, urban/rural location, and provider type.

Survey Findings- Quantitative

The survey responses were analysed and key descriptive outputs are set out in the report. Key findings are as follows:

Profile

Services in Dublin accounted for 25% of respondents while services in Leitrim accounted for less than 1%. Just under 70% of services were private, with the remainder community services. The Mid-East

had the lowest proportion of community provider respondents, with the highest in the South-West (46%). Almost half (49%) of respondents stated that they were a sole trader, with company limited by guarantee being the next most popular answer at 31%. Of the 4% that indicated Other, the responses included “community-based”, “limited company”, and “associated with a school”. Community organisations primarily (88%) consist of companies limited by guarantee. Conversely, 70% of private services responding were sole traders.

When asked if the service was part of a chain or multiple-centre provider with a central or head-office function, the majority of participants who answered the question (91%) indicated that they were stand-alone; only a minority of respondents were part of a chain of providers. This varies only slightly between community and private providers, with a slightly higher proportion (12%) of community providers indicating they were part of a multiple-centre organisation with 7% of private providers indicating this.

For those that own the building used for services (28% of respondents), they were then asked if grant aid was availed of for building, extending, or renovating the premises. A number of providers (22%) indicated that they had availed of grant aid. The total grant aid availed of was €23m, the vast majority of which (€20.9m) was for building rather than extending or renovating. The distribution of grants among provider types revealed a significant difference between community and private providers. Although more individual private provider respondents reported receiving grants (82 private versus 36 community providers), the amounts received by those in the community sector for building grants are substantially more than those reported by private providers in the survey.

Services

The majority of respondents (91%) indicated that they provided, at a minimum, sessional services in the mornings. Only a very small number of providers (7%) stated that they provide services other than ELC and SAC. Community providers who responded indicated that they more frequently offered afterschool, out-of-term, and part-time services than the overall profile or that of private providers. Almost all services offering other services were in the community sector. Half (50%) of providers who responded to the question stated that they had a waiting list. However, when asked if there were plans to change the capacity of the service, 76% of the respondents indicated that there was no plan to change capacity. Only 2% stated that they planned to decrease capacity.

Rooms, Sibling Discounts and Provision of Food

The number of rooms available to and in use in the services ranged from one room to 15 rooms. Of providers who responded, 66% operate with only one or two available rooms. Just under a quarter (23.3%) have more than three rooms available. As might be expected, those providers only offering the ECCE Programme typically have fewer rooms available and in use, with 69% of ECCE Programme-only respondents having only one room available and in use.

Less than half of providers (41%) indicated that they offered sibling discounts. In addition, the provision and inclusion of food within the fees varies by the type of service provided. For services providing full-day places, nearly 90% of services indicated they provided food included within their fees. Sessional services were less likely to provide food, with 73% of morning sessional services and 68% of afternoon sessional services not providing food.

Staffing

The survey asked for details in relation to managers, ELC and SAC staff, and ancillary staff in the services. The numbers varied considerably, from one to four in the case of managers; one to 45 in the case of ELC and SAC staff; and from zero to nine for ancillary staff. The average number of managerial staff across all respondents is 1.2 while the average number of ELC and SAC staff is 5.3. Only 36% of services provided any numbers for ancillary staff – average 0.9. Community providers who responded had higher average numbers of ELC and SAC and ancillary staff than private providers. The average ELC and SAC staff numbers in ECCE Programme-only services are considerably lower than the overall average, at 2.2.

Over half of providers (57%) considered CPD to be mandatory for all employees, regardless of if they worked directly with children or not. When looking at private enterprises and community organisations, there is still a strong emphasis across both provider types on CPD. However, a larger percentage of community organisations considered CPD to be mandatory for all employees. More than two-thirds (69%) of respondents stated that the employer pays for all CPD, with a smaller proportion (23%) stating that the employer part-pays for CPD. Other options for payment of staff CPD activities were in the minority. Funding of CPD was broadly similar across the different provider types. For these CPD activities, 56% of providers noted that CPD is undertaken outside work hours only, with no leave available. Paid leave or overtime was available from 32.5% of respondents, and 11% made unpaid leave available for CPD.

The majority of respondents indicated that they had no plans to change staffing resources, with no change planned for either number of staff or staff hours. Only 5% of providers who answered the question planned to decrease in the coming 12 months and only 6% of those responding planned to decrease hours in the coming months. Slightly more planned to increase staff or hours in the coming 12 months (27% and 21% respectively), but, overall, providers were not planning on making any changes to staffing resources in the following year.

Across all respondents, the average percentage of staff leaving within the past 12 months was 12%, ranging from 0 to 100%. However, 59% reported no staff leaving in the preceding 12 months. The majority of respondents (83%) indicated that the capacity to offer attractive wages or salary levels was a key concern. Another key concern for many providers (72%) was the difficulty of attracting suitably qualified and experienced staff. The responses less commonly highlighted by respondents included difficulty attracting staff with appropriate language competency, and competition from other providers.

Survey Findings – Qualitative

The survey included some opportunities for participants to express their opinion on the key issues. A brief overview of these qualitative responses is set out here.

- Providers believed that the low salaries within the sector impact on the ability of providers to both recruit and retain qualified staff.
- The part-time nature of work in the sector, including services that lay off staff in the summer months as services are not funded year-round (e.g. ECCE Programme), was also cited by providers as a significant challenge to recruitment and retention of staff.
- Providers also reported experiencing difficulty in finding appropriately qualified, capable, and motivated staff.
- All providers reported experiencing significant financial challenges and pressures.
- Some providers indicated they perceived a great of deal of financial uncertainty operating in the sector, reportedly reducing the ability of providers to plan ahead, particularly with regards to

staffing decisions, stemming from not being able to predict income due to not knowing how many numbers they will have until the beginning of a term.

- Providers reported a perception of poor morale amongst those working in the sector, driven by some of the issues listed above and a more general sense of the work of the sector not being fully valued.
- A common frustration expressed by a number of providers was the perceived complex level of administration required to operate in the sector and comply with regulations; this administrative workload was reported as onerous and time-consuming.
- A number of providers who worked in rural areas referenced specific challenges due to their operating environment, including low population numbers which impact on income, (in)accessibility of training events for staff, and operating in areas of lower income.
- Many of the issues cited by Irish language providers were aligned with those of English-language providers, such as difficulty in recruiting staff, paperwork, and so on.

Advanced Analysis of Dataset: Regression

A statistical technique known as regression analysis was undertaken on the survey dataset to better determine cost drivers. Regression allows for a more robust understanding of the relationship between variables. The design of the regression approach was informed by review of documentation to develop a set of hypothetical cost drivers and this was used to identify key hypothesised drivers of unit costs.

The principal findings from the regression analysis are summarised below:

- Size played a key role in the variation in unit cost, with large services cheaper than smaller services. Much of the advantage in size may be due to efficiencies that come with scale. Other efficiencies were also important, however. For example, those services where all the hours were filled had a lower unit cost than those with vacancies. Similarly, the effect of the age of the children on cost was apparent, with school age children being cheaper to provide for than younger children. This is likely related to regulations concerning the number of staff required (adult-child ratio) for different age groups.
- Where there was more non-contact time, the service was generally more expensive.
- There also appeared to be cost savings for particular entity and premises types, and this may be due to differences in overheads. For example, sole traders appeared to have lower unit costs, and those services which did not have a formal lease also benefitted. This may be related to very small service providers operating out of their homes.
- The model shows that the service characteristics play a clear role in driving variation in unit cost and suggests there may be some potential value in segmenting services into categories to support policy decision-making. In particular, there appear to be some distinct service types, with a contrast between smaller services that primarily focus on ECCE provision, and larger services that offer a range of different session types.
- The unit cost was higher in services with higher capitation, presumably as the costs of employing staff are higher. This is consistent with the findings in other studies.
- Services that opened all year appeared to have a lower unit cost than those that did not. This contrasts a UK study, which found that all year opening was associated with a higher cost than term only. It may be that the association of all-year opening with size is responsible for this (very large services tended to open all year).
- In terms of geographic variables, the final model retained an indicator for rurality, with urban services being more expensive than those in rural areas.

Cost Modelling Tool & Unit Cost

A cost modelling tool was developed for the DCYA using the survey data. The cost modelling tool has been designed to allow the DCYA to test a range of different assumptions and scenarios and identify the impact of these on unit cost.

The average unit cost per hour is based on the cost modelling tool outputs from the data supplied by providers. Whilst every individual provider is different and will have a different actual cost per hour, this will be reflected in the average unit cost per hour. The cost modelling tool does not attempt to reflect differences in operating models or any local circumstances that may impact on cost.

Unit costs were calculated using filled places, hours per place per year (derived from hours per week/day and service weeks per year), and total costs.

The cost modelling tool assessed the average unit cost per hour of ELC and SAC provision as €4.14. This is averaged across all age groups, staff ratios, service types, and so on. There is a wide distribution of unit costs (see main report for further details as well as average unit cost for a range of service characteristics).

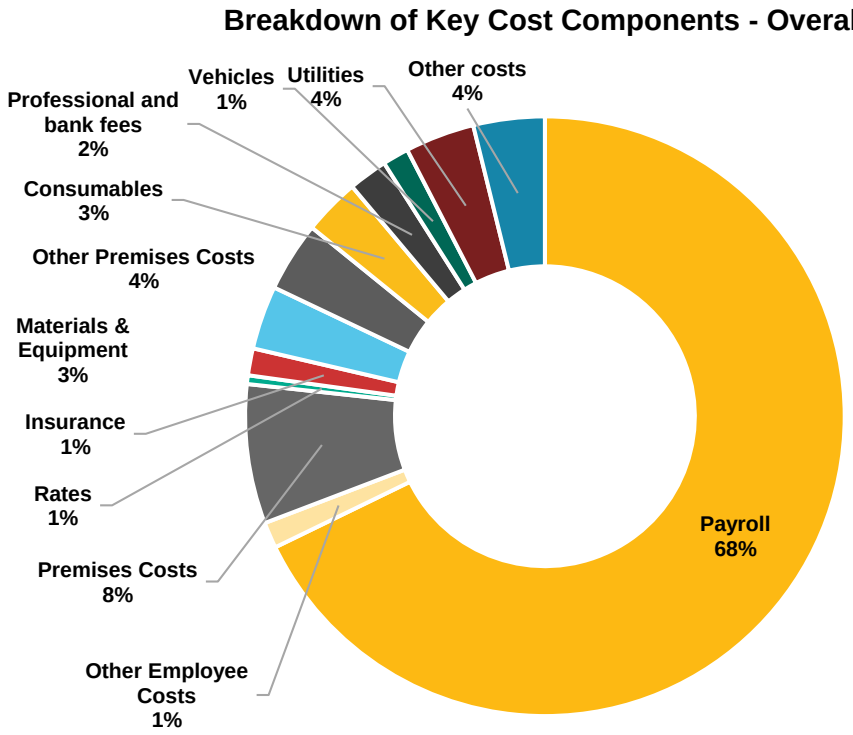
This average unit cost is closely aligned to comparative cost data found in other jurisdictions. For example, a detailed study of costs and income for childcare providers in Scotland in 2016 provided a detailed breakdown of the per hour costs to providers as being on average £3.70/hour (roughly €4.20). In New Zealand, in 2013 the average cost per child per hour of childcare was calculated as ranging from $5.80NZ to $10.20NZ (somewhere in the region of €3 to €6). Findings from work undertaken on behalf of the Department for Education in England is also provided (below)

	Age Group			
Provider Type	**2-year-olds**		**3- & 4-year-olds**	
	1:3.2 Ratio	**1:4 Ratio**	**1:6 Ratio**	**1:8 Ratio**
Private group-based	£5.87	£5.00	£4.25	£3.56
Voluntary group-based	£5.39	£4.54	£3.81	£3.14
			1:10 Ratio	**1:13 Ratio**
Primary schools – nursery	n/a	n/a	£4.37	£3.60

(Source: Review of Childcare Costs: the Analytical Report, DfE, 2015)

Overall Cost Breakdown

The broad components of cost identified suggests a pattern consistent with those found in other jurisdictions: a dominance of staff costs in the make-up of the overall cost figures, as illustrated below:



Concluding Comments

Over time the cost modelling tool will need to be updated to reflect changes in costs through normal inflationary pressures or as a result of policy changes. These policy changes may be reflective of sector-specific initiatives but may also encompass wider governmental decisions that may impact on the cost base of providers.

These findings should be useful to the DCYA in the consideration of future policy decisions in respect of childcare subsidy rates.

The capacity to examine further the impact of different cost drivers and scenarios within the cost modelling tool will further support the DCYA in policy formation.

Background and Context

1 Introduction

1.1 Background

Crowe (formerly Crowe Horwath), in association with Apteligen[1], was commissioned by the Department of Children and Youth Affairs (DCYA) to undertake an independent review on the cost of providing quality childcare[2] in Ireland.

The project was part of a wider commitment by the DCYA to establish an evidence base for the development and support of quality childcare provision in Ireland. This is in the context of more than ten years of an expansion of childcare in Ireland, an associated increase in investment in childcare by the State and a series of initiatives aimed at addressing the affordability, and improving the quality, of childcare. Such initiatives include the introduction and roll-out of Aistear and Síolta, the National Practice Frameworks; the introduction of the ECCE pre-school programme in 2010, with subsequent expansions in 2016/2017 and in 2018/2019; new regulations and a registration system for pre-school childcare and school-age childcare providers; and the introduction of the National Childcare Scheme (NCS).

The 2016 Programme for Government included a commitment to "conduct and publish an independent review of the cost of providing quality childcare in private and community settings, consistent with the principle of on-going professionalisation of the sector". This project was commissioned in order to deliver on this commitment.

The DCYA indicated that the cost modelling tool developed through this project would form a key input into the setting of capitation and subvention rates for future childcare funding schemes, with a particular focus on the roll-out of the NCS.

1.2 Terms of Reference

The Terms of Reference for the review were articulated by the DCYA as follows:

> *In order to understand the true cost of providing childcare, a complex set of interlinked variables must be considered and accounted for. The recent 'Review of Childcare Costs' in England (Department for Education, 2015) did this by developing a representative cost model, based on inputs that represent variable cost components.*
>
> *By adopting a 'bottom-up' approach to cost calculation, a standardised cost framework will be developed which is transparent and transferable, allowing comparisons between childcare settings types and other variables.*
>
> *The Client requires the development of such a cost model (or similar), which can be used for sensitivity (what-if?) analysis, in terms of the impact that certain policy or practice changes would have on unit costs. The approach also allows for a longitudinal perspective.*
>
> *The successful Tenderer shall:*

[1] Apteligen, based in London, provides specialist consultancy services to the public sector, with expertise in, among other things, modelling and decision analysis, forecasting, and simulation. Apteligen were technical experts on the project team, working with Crowe, who in consultation with the DCYA, had principal responsibility for the development of the modelling tool and the statistical analysis of cost drivers.

[2] Throughout this report, the term "childcare" is used to encompass early learning and care and school age childcare.

- *Develop a methodology for calculating the unit cost/costs (the cost model) of providing childcare in Ireland (i.e. cost per child per hour), including factors that result in variation in the cost of provision.*
- *Identify what data is available through the Client and other Departments/Agencies (e.g. DES and Pobal) to support this cost model.*
- *Undertake primary research (primarily quantitative with some qualitative also required) where current data is not sufficient. This will at minimum include a survey to examine issues of costs and fee structures. The survey should be designed and tested in consultation with childcare providers to ensure reliability of the results, with these results being validated and triangulated against qualitative research.*
- *Calculate the unit cost of providing childcare for a range of session-types, provider-types and age of children, and provide supporting documentation, to support the objective setting of capitation and subvention rates within childcare funding schemes.*
- *Develop and provide a usable cost calculator which can be used by the Client for future planning and financial policy sensitivity analysis.*
- *Provide a report which includes the following:*
    - *The methodology for developing the outputs above;*
    - *The methodology for the data collation and collection (both qualitative and quantitative);*
    - *A high level market analysis of the childcare sector in Ireland, which should include analysis of fee data;*
    - *The current costs of providing childcare under a number of pre-determined headings and service types;*
    - *A statistical analysis of costs including the attributes and variables associated with costs;*
    - *A statistical analysis of costs or variables associated with costs as they relate to objective quality measures (e.g. Early Years Education-Focused Inspection Ratings of the Inspectorate at DES and Síolta QAP validation ratings);*
    - *An analysis of the main drivers of cost, including the extent to which certain factors drive cost as well as an analysis of why and under what circumstances they affect cost; and*
    - *The projected costs of providing childcare under a number of scenarios (to be agreed between the successful Tenderer and the Client), including scenarios related to increased professionalisation in the childcare sector.*

The cost model should include all costs associated with the provision of childcare services. The cost model is therefore likely to include factors such as staffing costs (e.g. qualification levels, pay rates, staff hours and contracted weeks, average and minimum adult-child ratios, non-contact time), overheads (e.g. rental, capital costs, commercial rates, degree of cost-sharing within and across services), service types (e.g. community / private / childminder, session types, age bands of children, opening hours, size of service, range of activities provided), environmental factors (e.g. geographic location, socio-economic profile of the area) as well as occupancy rates.

The cost model should also include analysis of what constitutes a measure of 'reasonable profit' in the childcare sector in Ireland, based on the considerations set out in Article 5 of European Commission Decision 2012/21/EU[3].

[3] Commission Decision of 20 December 2011 on the Application of Article 106(2) of the Treaty on the Functioning of the European Union to State Aid in the Form of Public Service Compensation Granted to Certain Undertakings Entrusted with the Operation of Services of General Economic Interest. 2012/21/EU.

1.3 Oversight Group

To oversee the project and provide key input to the review, the DCYA established an Oversight Group comprising representatives from the DCYA, the Department of Education and Skills, and Pobal.

The Oversight Group met regularly to provide insight, review outputs, discuss and sign off on key project decisions, assist with the design of the survey questionnaires, work with the Crowe and Apteligen teams in developing the cost modelling tool, and review the draft and final reports. We would like to thank the members of the Oversight Group for their support and input to the review.

1.4 Overall Project Approach

Crowe agreed an approach and methodology with the Oversight Group, which was reviewed and refined over the course of the assignment. The principal elements of the approach were as follows:

Key Activities in the Review
Stakeholder engagement
 This entailed interviews with key sector stakeholders, principally drawn from the membership of the Early Years Forum, including provider representative organisations, the City and County Childcare Committees, statutory bodies, childcare professional training bodies, academics, etc. The key themes arising from this engagement are set out in Section 2.
Initial scoping exercise
 Comprising direct engagement with childcare providers, the timing and format of this element was refined from the original proposal whereby it was decided to engage with providers at a much earlier stage than originally envisaged, to inform the survey and other aspects of the review and modelling. In addition, the number of providers was increased to 19 from an initial plan of 11, all randomly selected by Crowe without input from the Department or other stakeholders. As outlined in Section 2, this engagement comprised an overview of the providers' business models and financial records to understand the cost drivers and key issues impacting on the operation of the providers' businesses.
Review of literature, context, existing data, and reports
 A call for evidence was issued, aimed at childcare providers; parents; representative / umbrella bodies within the childcare sector; academics with an interest in the childcare sector; voluntary organisations; statutory agencies; and other stakeholders. The call for evidence requested the submission of: ■ Existing studies and research about the cost of childcare in Ireland; ■ Evidence from childcare providers about the factors that make up the cost of providing childcare, and how much of the total cost they represent; ■ Evidence on the additional cost of providing childcare of high quality;

- Evidence from other jurisdictions in respect of establishing, reviewing, or modelling the costs of childcare provision.

Crowe conducted a literature review using the material submitted via the call for evidence, additional literature searches (examining a mix of peer-reviewed and "grey" literature, i.e. published and unpublished reports, reviews, and other documentation produced by, for example, government agencies, NGOs, sector representative bodies, and other relevant organisations), and material submitted by stakeholders arising from our engagement with them. The key findings from this element of the assignment are set out in Section 2.

Development and roll-out of a survey of childcare providers

As described in Section 4, the development of a comprehensive survey tool to be rolled out to all of the approximately 4,500 centre-based childcare providers nationally was a critical element of the methodology, intended to provide the majority of the data on which the cost modelling tool would be based. The survey, seeking details in respect of childcare providers' services, staffing, premises, operating costs, fees, and other key data, was originally intended to be run earlier in the review's timeline, but changes to the approach, such as engaging with providers earlier in the process, and the process of drafting, refining, and piloting taking longer than anticipated, resulted in the survey rolling out over March and April 2018.

An Irish-language version of the survey, and a shorter, tailored survey for registered childminders, were developed and rolled out following the launch of the main survey.

Analysis of data gathered

The survey served to provide a dataset on which the cost modelling tool would be based, and once the survey data collection process was complete, data cleaning and testing was undertaken to shape the cost modelling tool and the dataset on which it has been based. This is set out in Section 5. In addition, quantitative and qualitative outputs from the survey, set out in Section 7, were analysed as key information for the development of the overall findings from the review.

Development of cost modelling tool

This aspect of the review comprised the development of a cost modelling tool to present the baseline cost data and enable the testing of the impact of a range of scenarios in respect of changes to cost drivers on the unit costs of delivering childcare services.

Production of final project outputs

At the close of the project, the final outputs were drafted, refined, and following external peer review, finalised. Final outputs include this report and a cost modelling tool for internal use only, with an associated guidance document.

This report was developed to set out the elements of the review, the methodologies and approaches used, and the key outputs and findings for the DCYA and the sector.

1.5 Structure of this Report

This report is structured as follows:

Background & Context	
1.	Introduction
2.	Evidence and Documentation Review
3.	High-Level Market Analysis
Methodologies	
4.	Survey Development
5.	Data Robustness and Cleaning
6.	Regression Analysis
Outputs and Findings	
7.	Childcare Provider Survey Findings
8.	Analysis of Cost Data
9.	Highlighted Modelling Outputs
Conclusion	
10.	Concluding Comments

2 Evidence and Documentation Review

2.1 Setting the Context for the Review of Costs of Childcare Provision

2.1.1 Sources of Evidence

Prior to the design and development of the survey questionnaire for the primary research stage of the project, and in order to inform our approach to analysis and reporting, we examined a range of evidence sources in respect of establishing the cost of providing childcare services. These include:

- Literature searches in respect of childcare provider costs, approaches to determining these for policy purposes, approaches to the analysis of cost drivers in childcare provision, and the issue of quality in the provision of childcare;
- Sources arising from a call for evidence at an early stage of the project;
- Engagement with stakeholders from the childcare sector;
- Site visits to and interviews with a small selection of childcare providers to inform the design of the survey questions and to inform the analysis.

The literature search strategy sought a mix of peer-reviewed and "grey" literature, i.e. published and unpublished reports, reviews, and other documentation produced by, for example, government agencies, NGOs, sector representative bodies, and other relevant organisations. As much of the focus of this project is intended to inform and support policymaking in respect of government support and development of the childcare sector to drive access and quality, it was appropriate to examine, where possible, some examples of how other jurisdictions have approached the issue of the cost of childcare provision.

Relevant literature was searched using search terms in Google Scholar and UCD's OneSearch[4] search engines. A range of relevant search terms was used, such as:

- childcare provision costs
- childcare delivery costs
- "early education" provision costs
- "early education" delivery costs
- "early childhood care" provision costs
- "early childhood care" delivery costs
- childminding provision costs
- childminding delivery costs
- each of the above with "quality" as an additional term

At this stage, the initial search was restricted to material from the past 10 years. English-language literature was selected as there was insufficient time and resources to undertake translations of literature published in other languages. Countries of most interest included the following:

[4] UCD library's OneSearch facility enables the simultaneous searching of a wide number of online databases, publishers, and other sources of peer-reviewed and other material, including PubMed, ProQuest, EBSCOHost, JStor, BioMed Central, ScienceDirect, Taylor and Francis, and Emerald Insight.

- United Kingdom and its individual jurisdictions;
- Other EU countries;
- Canada and its individual provinces;
- New Zealand;
- Australia and its individual states.

The results of the literature searches identified more than 10,000 potential matches. However, when these were reviewed for relevance, it was evident that most were not directly relevant, as search terms including costs and the term childcare or similar terms generated large numbers of results that refer to the market cost to parents of childcare services, i.e. the fees paid by families accessing childcare, which has been the subject of much research.

2.2 Call for Evidence

In the early stages of the review, a call for evidence was issued, aimed at childcare providers (crèches, preschool providers, after-school childcare providers, childminders, etc.); parents; representative / umbrella bodies within the childcare sector; academics with an interest in the childcare sector; voluntary organisations; statutory agencies; and any other stakeholders. The call for evidence specifically sought the following:

- Existing studies and research about the cost of childcare in Ireland;
- Evidence from childcare providers about the factors that make up the cost of providing childcare, and how much of the total cost they represent;
- Evidence on the additional cost of providing childcare of high quality;
- Evidence from other jurisdictions in respect of establishing, reviewing, or modelling the costs of childcare provision.

The call for evidence elicited approximately 60 documentary sources, mostly grey literature, in relation to the value of quality childcare, the need to support such provision with subsidies, costs to families to access childcare, the funding structures for childcare in Ireland, and cost reviews from other jurisdictions. Much of the material provided was from sources that had already been identified as part of the literature searches.

2.3 Literature and Policy Documentation

2.3.1 Overview

In the following paragraphs, we present a high-level review of the academic literature and the public policy discourse concerning approaches to improving quality in formal childcare provision and the development of cost models to inform childcare subvention in Ireland and in international comparator jurisdictions. This is intended to inform an understanding of quality indicators and cost drivers in childcare, and to provide context for the interpretation of the analysis described in this report.

2.3.2 The Need for High-Quality Childcare

The availability of childcare in society is important for a number of reasons, including encouraging parental labour market participation, in particular for mothers; benefits in social and cognitive development for children, especially those in situations of disadvantage; and

reduced social costs at a later point (by addressing inequality and disadvantage) (Himmelweit, et al., 2014; McGinnity, et al., 2013). State support and public funding of childcare is linked to realising these benefits within national policy objectives, such as the improvement of educational and social objectives for children and employment activation and economic objectives for families – particularly mothers (Bertram & Pascal, 2016; Evers, et al., 2005).

However, the evidence points to the importance of quality within childcare in delivering positive benefits to children (Himmelweit, et al., 2014; Parker, 2013). It is necessary, therefore, to try to obtain high quality provision of childcare in order for the social benefits and policy objectives to be most effectively achieved.

2.3.3 What Constitutes High-Quality Childcare?

Whilst quality within childcare can be difficult to define, comprising a range of complex interactions between provider and child (Parker, 2013), it is generally internationally agreed that there are certain common indicators of the quality of childcare provision (Bertram & Pascal, 2016, p. 81; Rentzou, 2017).

These are generally divided into structural indicators which are amenable to regulation, and dynamic (or process) characteristics of the service, which are more difficult to directly measure and regulate. Examples of the former indicators include:

- Staff to child ratios and group sizes.
- The level of competence, training, and qualification of the staff.
- The existence of other regulatory standards – which typically focus on the health and safety of the children and the standard of the care environment.
- The existence and standard of any preschool curriculum for delivery.

Dynamic or process indicators include the processes operating within the childcare settings, such as the quality of the interactions between carers and children, or the way in which activities are organised (Parker, 2013). Structural quality factors have been associated with better outcomes, and can be used as proxies for process ones: for example, it can be assumed that more highly qualified staff who have more time with individual children will more frequently engage those children in quality activities. Nevertheless, process factors need to be considered in assessing quality (Parker, 2013).

2.4 The Relationship Between Quality and Costs

2.4.1 Key Cost Drivers

The evidence internationally points to staffing as the principal cost driver for the delivery of childcare services, as would be expected for human service providers (Cleveland & Krashinsky, 2004).

In England, a survey of childcare providers published in 2012 by the Department for Education suggested the proportion of provider costs represented by staff was 77%, with 7% rent or mortgage costs, 7% on materials, including food, and the remainder for administration and other overheads (Brind, et al., 2012). This survey is examined in more detail later in this section, along with others illustrating the strong relationship between total costs and staffing costs (Arnold, 2013; Martin, et al., 2016; Department for Education, 2015).

Cleveland & Krashinsky (2004, p. 7) identify a clear relationship between costs and staffing: "costs are very sensitive to staff:child ratio (they rise rapidly as the staff-child ratio improves) in the region of 1:6 to 1:3 …as staff compensation levels rise, the annual cost of care rises by close to the same percentage".

2.4.2 Quality and Costs

Because of this strong relationship between staffing and costs, it is unsurprising to see a similar relationship between quality indicators (many of which relate to staffing) and costs of provision:

> *major drivers of quality are lower user-staff ratios … higher staff qualifications, an overall staff profile that has a high proportion of people who have significant qualifications and experience, and adequate remuneration to ensure the attraction and retention of good staff… these are precisely the major cost drivers for human service providers"* (Davidson, 2009, p. 49)

This is reinforced by Penn & Lloyd (2013), who note that the general finding in the literature, and assumed by the OECD, is that the quality of childcare service provision is linked to staffing, principally "child staff ratios and levels of training" (Penn & Lloyd, 2013, p. 25).

Higher staff ratios and employing more highly qualified staff are likely to result in increased costs. Staff qualifications are one of the most significant element of cost (Penn, 2014), and as previously mentioned, a structural indicator of quality of service (Gorry & Thomas, 2017; Doherty, 2014).

Using a policy approach to improve quality through specific indicators like staff ratios and qualifications, therefore, can lead to increased unit costs for providers: "regulations on child–staff ratios, group size restrictions, and education requirements are all associated with higher care prices" (Gorry & Thomas, 2017, p.4139).

2.5 Developing a Unit-Cost Model

2.5.1 Overview

Although the charging policies and cost bases of providers are not normally comprehensively documented internationally (Bertram & Pascal, 2016), and the development of cost models for supply-side public funding of childcare providers is not discussed in significant detail in the literature, a number of countries have undertaken exercises to obtain data on the costs to providers of delivering childcare services.

2.5.2 *England*

England has a legacy of childcare and early years provision under three strands: childcare, welfare, and early education, which, over many years and under different government policies, have been differently administered and costed (Penn & Lloyd, 2013, p. 13).

2015 Review of Childcare Costs

The DCYA's specification for this review made reference to a major review of childcare costs conducted in 2015 by the Department for Education (DfE) to inform decisions about early years funding rates, ahead of the introduction of an entitlement to 30 hours of free childcare to three- and four-year-olds (Department for Education, 2015). This report, supported by research by Deloitte, comprised an economic assessment of the early education and childcare market and providers' costs. The DCYA's project terms of reference suggested that this study from 2015 should form the basis of the approach to the review of childcare provider costs in Ireland.

The review compiled data from a range of sources, including primary research in the form of a survey, along with data available from local authority childcare services and other sources.

As part of the primary research, Deloitte sent a survey questionnaire to 1,821 childcare providers (from a list of providers supplied by the Department for Education along with additional contacts provided by local authorities). 282 responses were received, a 15% response rate for the sample selected. The estimated market size is 25,500 group-based providers; 17,900 school-based providers; and 46,600 registered childminders in England.

This DfE report put forward assumed average unit costs per hour of childcare for different provider types and age groups, for different staff ratios in each case, as illustrated in the following table[5]:

	Age Group			
Provider Type	**2-year-olds**		**3- & 4-year-olds**	
	1:3.2 Ratio	**1:4 Ratio**	**1:6 Ratio**	**1:8 Ratio**
Private group-based	£5.87	£5.00	£4.25	£3.56
Voluntary group-based	£5.39	£4.54	£3.81	£3.14
			1:10 Ratio	**1:13 Ratio**
Primary schools – nursery	n/a	n/a	£4.37	£3.60

(Source: Review of Childcare Costs: the Analytical Report, DfE, 2015)

These costs were calculated by combining data on staffing levels, pay rates, staff qualifications, and related information to establish average staff costs, which were then added to a non-staff cost estimate covering cost of premises, utilities, rates, maintenance, interest, insurance, food costs, and others.

[5] The table set out here with the cost figures from this review is to illustrate how the report presented the breakdown of costs across ages and provider types, and the relative differences between them; they do not imply a relationship with childcare provider costs in Ireland. They are therefore not presented in euro equivalents as this might be misleading.

In this review, as suggested by the international evidence, staff costs represented the bulk of the provider costs. For private providers, the review estimated that staff costs represented between 58% and 74% of the hourly cost of delivering care, depending on the staff ratios involved for different age groups. Voluntary providers' staff costs were between 64% and 79% of total costs.

	Proportion of hourly unit costs represented by staff costs			
Provider Type	**Private group-based**	**Voluntary group-based**	**Primary school nursery**	**Childminders**
Highest staff-child ratios	74%	79%	76%	77%
Lowest staff-child ratios	58%	64%	71%	63%

(Source: Review of Childcare Costs: the Analytical Report, DfE, 2015)

Other cost factors varied in significance, although none represented more than a small percentage of total costs. For private group-based providers, rent or mortgage costs represented around 8% of the highest hourly cost and 14% of the lowest, with materials costs representing between 5% and 8%. For voluntary providers, rent and mortgage costs were lower, and materials was the highest cost factor after staffing costs (between 5% and 8% of hourly costs). For primary school nurseries, rent or mortgage costs were negligible, with again materials representing the next biggest cost component after staffing, at between 6% and 8%).

According to the Department for Education, the findings of the review formed the evidence base for their decision to allocate funding for a substantial uplift to the funding rate, entailing additional investment in the sector of more than £1 billion more per year by 2019-20, including £300 million for an increase in the rate paid for the two-, three- and four- year-old entitlements (Department for Education, 2015, p. 2).

An evaluation of the programme one year after its roll-out (Paull & La Valle, 2018) found that capacity issues were not proving to be a problem, with providers capable of accommodating the demand under the new entitlements. However, a substantial proportion of providers reported negative financial impacts, with between 29% and 47% of providers of different types reporting a decrease in profit or surplus; the most-affected providers were in the private sector. The qualitative interviews with providers indicated that reviews to their operating models would be needed after a further settling-in period with the new funding structures, and there was concern expressed by providers in relation to the long-term viability of operating the programme.

Other Studies in England on the Cost of Delivering Childcare

A report in 2017 as part of the SEED (Study of Early Education and Development) project, a major eight-year study commissioned by the Department for Education to explore how childcare and early education can give children the best start in life and the factors which are important for the delivery of high quality provision, summarised the various approaches to cost assessments undertaken in recent years, as summarised in the following table taken from the report (Blainey & Paull, 2017, pp. 102-104):

Methodologies, samples and timing for previous delivery cost estimates
Sources, methodology, samples and timing
This study (Blainey & Paull (2017)): ■ Methodology: Primary data from face-to-face interviews on child numbers, staff use and salaries, room use and venue costs; and other costs for each session and core running. Calculations: salaries imputed for staff not paid directly; rents imputed for venues used at no direct cost; employer NI and pension added to gross salaries where needed; staff session costs allocated equally across children; venue session costs allocated by room size; core costs allocated by child hours ■ Type of provider: separate estimates for 7 types ■ Regional distribution: 36% north + East Midlands (EM); 51% West Midlands (WM) + East of England (EE) + south; 13% London ■ Timing: March – December 2015 ■ Sample sizes: 66 private, 28 voluntary, 3 independent, 18 nursery class, 11 maintained nursery school, 16 LA/children's centres and 24 childminder settings
Gaheer & Paull (2016) Methodology: as per Blainey & Paull, 2017, above ■ Type of provider: children's centres ■ Regional distribution: 38% north + EM; 46% WM + EE + south; 17% London ■ Timing: data collected in 2012-2014 and indexed to March 2014 ■ Sample size: 14 children's centres
Ceeda (2014) ■ Methodology: Primary data from child attendance and staff activity diaries in each room completed by staff over two weeks and pro-forma data on gross salaries and other financial expenditure. Calculations: employer NI, 1% pension and time for sickness, training and holiday added to gross salaries (approx. 16%); staff session costs allocated within session by child age; staff core costs, venue and other costs allocated by number of places in rooms; costs calculated for funded children ■ Type of provider: funded children in PVI nurseries and playgroups (59% private and 41% voluntary) with good or outstanding Ofsted rating ■ Regional distribution: 41% north + EM; 52% WM + EE + south; 7% London ■ Timing: June/July 2014 ■ Sample size: 100 settings
NLH Partnership (2015) (DfE Childcare Cost Review) ■ Methodology: Primary pro forma data on total hours delivered in each age group; total expenditures on staff and 6 other categories and data on staff:child ratios from interviews. Calculations: staff costs allocated by observed staff:child ratios and child hours; venue and other costs allocated by child hours; statistics weighted by region, deprivation level and ownership type ■ Type of provider: PVI settings from NLH network (58% private 37% voluntary 5% independent) offering funded places ■ Regional distribution: 30% north + EM; 49% WM + EE + south; 21% London ■ Timing: June/July 2015 ■ Sample size: 47 settings

Methodologies, samples and timing for previous delivery cost estimates
Sources, methodology, samples and timing
KPMG (2015) ■ Methodology: Primary data pro-forma data (checked by follow-up telephone interview where needed) on weeks and hours open; number of children in each age group; number of FTE staff; average gross hourly pay; overtime payments; all other costs. Calculations: staff costs allocated according to statutory staff:child ratios and child hours; venue and other costs allocated by child hours ■ Type of provider: PVIs and childminders (81% PVI 19% childminders) offering funded places ■ Regional distribution: Birmingham ■ Timing: 2014/2015 (collected over 5-week period) ■ Sample size: 79 settings
Green et al (2015) ■ Methodology: Primary pro-forma data on expenditures and take-up of places for two year olds. ■ Type of provider: schools with good or outstanding Ofsted rating participating in the two-year-olds in schools demonstration project for DfE ■ Regional distribution: 48% north; 10% WM; 29% London (EM, EE and south unreported) ■ Timing: June and August 2014 ■ Sample size: 12 schools
DfE Analytical Report (DfE (2015a)) (DfE Childcare Cost Review) ■ Methodology: Secondary data and some primary data by type of provider on (a) Child attendance using number of places, opening weeks and days per week, distribution by child age and occupancy rates from DfE Providers Survey 2013, Ceeda (2014), and Deloitte survey/interviews (which were at the time of writing this report unpublished); (b) Staff hours using staff:child ratios, number of contact hours and ratios of non-contact to contact hours from DfE Providers Survey 2013, NLH (2015), NAHT (2015), Ceeda (2014), DfE Providers Finances Survey 2012, and Deloitte survey/interviews; (c) Staff costs using hourly gross pay by qualification, 10% allowances for training, sickness and holidays, addition of employers' NIC and pensions from DfE Providers Survey 2013, Deloitte survey/interviews and regulations; and (d) Mark-up for non-staff costs using DfE Providers Finances Survey 2012. ■ Type of provider: separate estimates for private, voluntary, nursery class and childminder settings ■ Regional distribution: varies by original data sources ■ Timing: varies by original data sources (2012 to 2015) but rebased to 2014/15 prices using GDP deflator ■ Sample size: varies by original data sources

Methodologies, samples and timing for previous delivery cost estimates
Sources, methodology, samples and timing
NEF (2014) ■ Methodology: Secondary data on (a) Staff composition and average staff salaries for three grades of staff from DfE Providers Survey 2011 and (b) Proportion of noncontact time for staff and proportion of total costs that are non-wage costs from DfE Providers Finances Survey 2012. Calculations: employers NI and 3 percent pensions added to staff salaries and staffing assumed to be at the legal staff-to-child ratios. ■ Type of provider: all types ■ Regional distribution: varies by original data sources ■ Timing: varies by original data sources (2011-2012) ■ Sample size: varies by original data sources

(Source: Study of Early Education and Development: Cost and Funding, DfE, 2017)

These studies are often characterised by small sample sizes, albeit with more in-depth data gathering for each provider than would be possible with just a survey approach. Few have undertaken explicit cost driver analysis although most present cost component breakdowns.

2.5.3 New Zealand

In New Zealand in 2013 the average cost per child per hour of early childhood care was calculated as ranging from $5.80NZ to $10.20NZ (somewhere in the region of €3 to €6) (Arnold, 2013). This was determined by dividing the operating expenditure of the provider by the number of child-hours accounted for in a variety of settings. However, this figure was heavily caveated in the report by noting that:

- Teacher salaries were by far the biggest cost, except where volunteer labour was used;
- The New Zealand Government subsidy towards 20 hours of free childcare for zero to one-year olds did not cover most providers' costs (it covered about 80%) and the subsidy for two to five-year olds covered up to 75% of costs;
- The estimates of cost had fairly large margins for error, which was complicated by the variety of settings and types of provider.

Expenditure was determined through periodic surveys of provider organisations, and depended on accurate reporting of costs. The 2013 survey had an overall response rate of 44%, comprising 1,895 providers from a total of 4,284 (Arnold, 2013). The survey does not address school-age care services.

The costs per hour for each type of childcare in the 2013 report are as follows:[6]

[6] As with the previous example, the table is included here to illustrate how the report presented the breakdown of costs across provider types, and the relative differences between them; they do not imply a relationship with childcare provider costs in Ireland. They are therefore not presented in euro equivalents as this might be misleading.

	2011		2013		Change 2011-2013
Provider Type	Average cost	Margin of error	Average cost	Margin of error	
Education and care	$9.20	$0.15	$10.20	$0.40	11%*
Kindergarten	$9.10	$0.10	$9.70	$0.05	6%*
Home-based	$8.10	$0.20	$8.90	$0.15	9%*
Playcentre	$5.70	$0.25	$5.80	$0.20	1%
Kōhanga reo[7]	n/a	n/a	$7.40	$0.05	n/a

(Source: Income, Expenditure and Fees of Early Childhood Education Providers, NZ Ministry of Education, 2013)

The lower costs in playcentres are due to the use of volunteer labour. The report provides a breakdown of cost components, as illustrated in the following table:

Provider Type	Teacher salaries	Other staff costs	Ongoing property costs	Other operational costs
Education and care	65%	12%	12%	12%
Kindergarten	69%	11%	8%	13%
Home-based	78%	11%	2%	9%
Playcentre	15%	3%	9%	72%
Kōhanga reo	72%	0%	8%	20%

(Source: Income, Expenditure and Fees of Early Childhood Education Providers, NZ Ministry of Education, 2013)

As can be seen, the report indicates that teacher salaries made up around two-thirds of costs for kindergartens and education and care services, and more for kōhanga reo (72%) and home-based services (78% of costs). When both salaries and other staff costs are considered together, the proportion increases to between 72% and 89% of total costs for most services, with the exception of playcentres, where staff costs are exceptionally low, at only 15%, because these services are structured around volunteer staff.

The report in 2013 was part of a series of regular reviews of childcare provider costs, following the introduction in 2005 of a new funding system, one of the aims of which was to link funding more explicitly to costs and to incentivise quality by providing higher funding rates to services achieving high quality standards (such as the number of qualified teaching staff) (Arnold, 2013).

Whilst the introductory text makes reference to the survey and its predecessors being focused on “cost drivers”, it does not appear that the cost components have been analysed specifically in relation to the drivers of cost.

7 “Kōhanga reo” are “language nests” which are part of a national initiative in New Zealand, designed to promote, reinforce and strengthen the use the Māori language.

2.5.4 Scotland

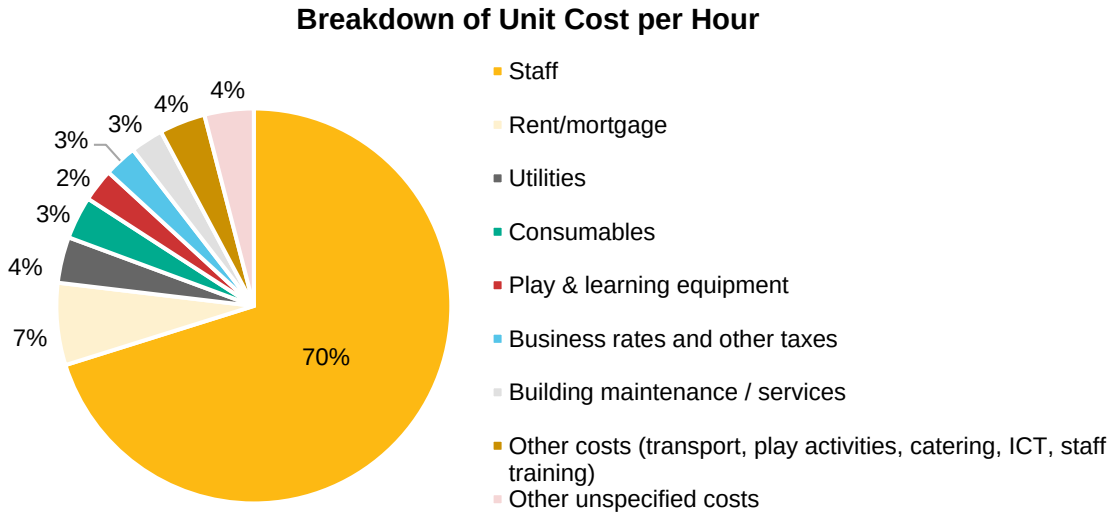
A detailed study of costs and income for childcare providers in Scotland in 2016 provided a detailed breakdown of the per hour costs to providers as being on average £3.70/hour (roughly €4.20) (Martin, et al., 2016). Costs were determined through survey questions across a variety of headings including staff, mortgages and utilities and so on.

The aim of the research was to inform Scottish Government analysis of options for extending free ELC provision from the current 600 hours to 1,140 hours for eligible two, three and four year-olds by August 2020.

This survey appears to have taken a census approach, albeit to a subsection of the market, targeting 965 for-profit and not-for-profit providers who provided funded childcare places (not including local authority provision, which comprised a further 1,500 sites). An online survey tool was used and 222 responses were received, representing a 22% response rate.

The number of hours was calculated by multiplying the number of weeks per year the provider was open by the average hours per child per session by the number of children were currently in attendance. This approach also allowed the researchers to determine detailed regional and sectoral breakdowns of costs in specific categories.

In line with other research, the Scottish survey found staffing costs represented the lion's share of the costs of delivering care, as illustrated in the following chart:



(Source: Costs and Early Learning and Childcare Provision in Partner Provider Settings (Technical Report), Martin* et al*, 2016)

Staff costs represented 72.5% of total annual costs for voluntary providers in the survey; private providers' staff costs were 67.5% of their total costs for the year. However, rent and mortgage costs comprised 7% of total annual costs for private providers but only 4% for voluntary providers.

This study did not undertake analysis of cost drivers.

2.5.5 *Considerations*

Process for Establishing Provider Costs

Some of the various cost determination exercises discussed above included in the reports concerns about the provision of complete and accurate cost data by providers. For example, the Scottish study notes issues in some data provision by providers, resulting in "a relatively high volume of missing data, particularly in relation to non-staff costs" (Martin, et al., 2016, p. 13). According to Campbell-Barr (2009), some providers may have capability gaps on the business side of their operations to understand and develop their business and cost structures.

Many of these cost calculation exercises have small samples and/or low survey response rates. Some mitigate this by relying to a greater extent on extrapolation and assumptions from other data sources. However, it is also evident that different reporting requirements in respect of publicly-funded or subsidised service provision can allow for greater accuracy in data validation and analysis, and the capacity to combine data sources to calculate costs of provision.

In considering the approach to the survey for the DCYA, we took account of some of these considerations; for example, we undertook a census approach rather than a small sample of providers, and validated the responses against the consultation with service providers in the early part of the project, and against existing datasets, principally Pobal's contemporaneous survey of the sector.

Principal Cost Factors

It is unequivocal from the findings of these cost reviews that the evidence demonstrates that staff costs represent by far the greatest component of the cost of delivering childcare. The proportion represented by staffing costs range from just under 60% to more than 80% depending on the provider type and the staff ratios applicable. Rent and mortgage costs are frequently the next most significant cost component for private providers, but less so for those in the voluntary sector.

Cost Drivers

The work undertaken in more recent years (see below for more details), such as the SEED project and other work in the UK (Paull & Xu, 2019), has identified cost drivers including higher costs associated with settings with higher average staff qualifications, lower child-to-staff ratios and smaller group sizes, all associated with quality indicators as discussed above. These findings are in line with the outputs from the regression analysis of the dataset of Irish provider cost data as set out in Section 8 of this report.

2.5.6 *Taking More Recent Research into Account*

The bulk of the literature and documentation review was undertaken in early 2018 to inform the design of the survey. However, a key piece of research from England was published in 2019 which informed the regression analysis of cost drivers: the Early Years Providers Cost Study 2018, another report arising from the SEED project which assessed hourly costs and undertook regression analysis to identify key drivers of cost (Paull & Xu, 2019).

> *Data on costs and income was collected from 120 early years settings providing childcare for children under the age of five during March to July 2018. The sample of childcare providers was randomly selected from two administrative data sources covering all providers in England. The sample was balanced across provider types and regions in order to ensure sufficient sample numbers in each region and for each provider type to analyse differences in cost by region and provider type. A total of 278 providers were approached to take part in the study and visits were completed with 132 settings, generating a response rate of 46 percent. The final sample consisted of 120 settings who provided complete data.* (Paull & Xu, 2019, p. 8)

This research identified some key cost drivers including staff qualifications, provider size, proximity to London, and higher staff-to-child ratios. However, the limitations and possibility of bias in the small sample is noted in the report.

Another recent report from the Department for Education (Cattoretti, et al., 2019) failed to find strong associations between staff qualifications and unit cost, although some associations were identified between lower staff-child ratios and unit cost. Provider type, size, and location were associated with unit costs, as was providing care to children under two.

2.6 Engagement with the Sector

2.6.1 Overview

To gain an in-depth understanding of the context for this review, we engaged with a range of stakeholders. These included individual providers, representative bodies, and funding providers. This engagement was to inform the review overall and the survey development in particular: the views of the stakeholders were taken into account in the design and content of the survey questionnaire.

2.6.2 Consultation Process

The process involved meeting with an agreed list of stakeholders: members of the Early Years Forum. Meetings were also held with a small number of individual providers, with Pobal staff, and with the DCYA.

The project team randomly selected a small number of providers from around the country to meet with and discuss the costs of provision. These providers were selected to comprise a diverse group including geographic spread with a mix of urban and rural locations, and to include both community and private providers. These meetings were an opportunity for the project team to understand how providers would normally capture, report on, and manage key costs. For instance, staff pay is normally measured in terms of hourly rates.

2.6.3 Provider Selection and Site Visits

It was agreed at the outset of the project that the team would engage with approximately 20 individual providers. These providers were selected by the project team to cover the various aspects of childcare provision, and varied in size, location (in terms of geographic and urban/rural mix), and type (private and community providers). Irish-language providers were included in the cohort of providers visited.

To ensure impartiality, Crowe selected the sample without reference to the Department or any other stakeholder. No details of the individual providers selected have been provided as part of the project to any stakeholder. The services were selected on a random basis to meet the criteria above.

At these meetings, we discussed the financial accounts of the provider to understand key cost issues and how they may relate to other similar service providers. This on-the-ground engagement with the sector provided a useful insight to the key cost items recorded, and how this information was typically captured. This information was then utilised for the development of the survey tool, in informing what questions should be asked to elicit key data from providers participating in the survey. The providers with whom we engaged directly also assisted us in the piloting of the survey (see Section 4 below).

Some of the principal common themes arising from the consultations with providers are set out briefly below. It was useful to understand the primary concerns and insights of providers to inform the process and to assist in developing a survey tool to capture information to examine some of the issues involved in a more structured way.

The key costs that were highlighted by the sector were:

- **Staffing and pay:** the providers we spoke to estimated their staffing costs at 70% to 80% of total costs and therefore by far the most significant driver of the cost of providing care. They expressed concern about the balance of pay rates and the desire to increase quality, and highlighted a common perception about differences in pay and other conditions of employment between community and private providers.
- **Premises:** the cost and availability of premises was another cost driver raised by many providers. Costs were reported to be rising and there was a concern that the economic recovery would drive rents up further and reduce availability of facilities, limiting expansion and in some cases even threatening the sustainability of existing service provision.
- **Rates:** private providers with whom we engaged expressed concerns in relation to the level of rates payable by service providers who are not solely providing ECCE services, and the limitations on expansion or diversification of service type (e.g. from ECCE-only to provide additional services) that this issue poses for some.
- **Insurance:** for many providers to whom we spoke, insurance costs were an issue and were reported to have risen in recent years.

3 High-Level Market Analysis

3.1 Market Profile and Composition

3.1.1 Overview

This section sets out a high-level analysis of the childcare market in Ireland as it pertained at the time of the childcare provider survey, i.e. the first half of 2018, and provides an overview of the sector in respect of the childcare services within the scope of the review. This analysis is designed to set out a high-level perspective on the profile of the childcare sector and to contextualise the childcare provider survey and the data emerging from that research. Data is drawn primarily from Pobal's Programme Implementation Platform (PIP).

3.1.2 Definition of Childcare Provider for the Purposes of this Assignment

Childcare services are provided in a number of ways. The main types of childcare (other than care provided by parents and other relatives) are divided into three categories:

- Centre-based services, where children are cared for in a group setting in a space for this purpose;
- Childminders, who provide childcare for children in the childminder's home on a self-employed basis;
- Nannies and au pairs, who care for children in the children's home.

Preschool sessional services (almost all now funded entirely through the Early Childhood Care and Education (ECCE) Scheme, but in some cases with additional private fee income for children not qualifying for ECCE or for additional hours or services offered) are sometimes delivered in the home of the provider, albeit in a space set aside for this purpose. In some such cases, a childminder may also be classified as a centre-based provider if, for example, they are providing an ECCE service in the mornings and a childminding service in the afternoons.

It has been estimated in the Draft Childminding Action Plan published by the Department of Children and Youth Affairs that there may be up to 19,000 childminders nationally (DCYA, 2019). As there is no regulatory requirement to register as a childminder (unless one is caring for seven or more children, or four or more pre-school children) there is extremely sparse reliable data in respect of this aspect of the childcare market. Similarly, there is no registration or regulation of nannies or au pairs, and a similar lack of reliable data on childcare delivered in this context. A requirement for school-age childcare providers to register with Tusla only came into force in 2019, and so there is also little data available on school-age childcare.

Given this absence of data and the exclusion of home-based childcare and non-Tusla-registered childminders from the scope of this review, the analysis presented here relates to centre-based childcare provision in Ireland only.

3.2 Features of the Irish Childcare Market

3.2.1 Public versus Private Provision

Countries vary substantially in their mix of public and private provision: Sweden, for example, has a predominantly public provision model, with over 80% of formal ECEC places provided by municipalities, with low parental fee contributions (7% of preschool fees and 17% of after-school fees are provided by parents). Norway, by contrast, has roughly half of its childcare provision from private providers, although state subsidies to private and public providers are the same[8]. The capacity of policymakers and funders to establish the costs of childcare may be dependent on the visibility of costs, which may be higher for State-delivered service provision rather than independent provision.

Ireland's childcare market is almost entirely independently operated (with a mix of for-profit provision and not-for-profit provision), with the State subsidising at varying levels but not directly delivering the majority of childcare services.

The State subsidies are an important part of providing childcare across Ireland, especially in disadvantaged areas. There are a number of childcare providers that rely heavily on State funding in order to provide childcare in their areas, especially to disadvantaged families that would not otherwise be able to avail of childcare.

3.2.2 Government Funding

Public funding of childcare is linked to incentivising achievement of national policy objectives. Typically, these relate to the improvement of educational and social objectives for children and employment activation and economic objectives for families – particularly mothers[9].

Many mothers' choice on whether or not to return to work following maternity leave is based on the cost of childcare and if the income from returning to work would be higher than the cost of childcare minus any forgone welfare[10].

A public policy intention to encourage economic agency among mothers and to increase participation and resulting benefits for children in childcare settings must be supported by funding which is linked to either the opportunity cost of not returning to work (sufficient demand-side funding), or the real cost of providing the service (sufficient supply-side funding).

The scope and nature of government funding plays an important role in the marketplace – specifically in determining the structure and costs of childcare. The level of government funding can also influence the number of childcare places available. Funding models internationally are complex and can be "*fully publicly funded, fully privately funded, or receive a mixture of public and private funding*"[11]. Funding models and approaches vary internationally, and indeed within countries by region and/or by the age and socio-economic status of the child.

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8 Dr Ingela Naumann and others, 'Early Childhood Education And Care Provision: International Review Of Policy, Delivery And Funding Final Report', 2013.

9 Pascal and Bertram; Evers, Lewis, and Riedel.

10 Devon Gorry and Diana W. Thomas, 'Regulation and the Cost of Childcare', *Applied Economics*, (2017).

11 Chris Pascal and Tony Bertram, *Early Childhood Policies and Systems in Eight Countries: Findings from IEA's Early Childhood Education Study.* (New York: Springer, 2016), p. 56.

Funding can be provided on the *demand* side or the *supply* side, or, as in many countries, a combination of both. Supply-side funding, i.e. funding paid to the providers of childcare services, is designed to defray the various costs of providing childcare (facilities, resources, salaries, etc.) or to increase the quality of provision through, for example, staff training. Cost-based supply-side funding often takes the form of subsidisation of funded places for children in regulated providers. Some countries provide funding against costs on a per capita basis, as with ECCE funding in Ireland. Typically, this funding is linked to regulatory requirements, quality assurance indicators and public policy objectives[12].

Demand-side funding is designed to defray the cost of procuring care for families. It is often means-tested and may take the form of tax relief, vouchers, reduced fees, and allowances. Demand-side funding is described by some as 'pump-priming' funding to stimulate the childcare market by allowing families a choice[13], and is traditionally seen as a way to reduce costs to families whilst maintaining parental choice[14].

Demand-side funding usually takes place in the context of at least *some* supply-side funding, such as capital grants and/or subsidisation.

The current structure of funding in Ireland is a mix of demand-side and supply-side: there are a range of funding schemes paid directly to childcare providers, along with capital grants and other supports for providers. Furthermore, child benefit payments are a universal statutory payment to parents; in addition, parents have flexibility in relation to their choice of care provider, the extent to which they opt for childcare, and the type of service of which they wish to avail.

3.2.3 Education or Care?

Early years services are often considered from two perspectives: childcare and early education. Countries differ in their approach to responsibility for policy in relation to early years services, whereby it may be split across different government departments or ministries, with some providing support or policy measures from the perspective solely of childcare, usually for infants and younger children, and others responsible for the preschool education elements of policy, which may be linked in to school-age education services.

Others have an integrated approach with policy responsibility within a single department or ministry. This can extend to structure and delivery of services, with a clear 'break' in some countries between the services provided to children in the earlier years (typically 0-35 months) and the later ones (3 years to school starting age, usually around 5 or 6). In other jurisdictions all services provided to children before entering formal schooling are provided within one structure[15].

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12 Helen Penn, 'The Business of Childcare in Europe', *European Early Childhood Education Research Journal*, 22.4 (2014); Linda A. White and Martha Friendly, 'Public Funding, Private Delivery: States, Markets, and Early Childhood Education and Care in Liberal Welfare States – A Comparison of Australia, the UK, Quebec, and New Zealand', *Journal of Comparative Policy Analysis: Research and Practice*, (2012).

13 Helen Penn, 'Childcare Market Management: How the United Kingdom Government Has Reshaped Its Role in Developing Early Childhood Education and Care', *Contemporary Issues in Early Childhood*, (2007); Adalbert Evers, Jane Lewis, and Birgit Riedel, 'Developing Child-Care Provision in England and Germany: Problems of Governance', *Journal of European Social Policy*, (2005).

14 Gordon Cleveland and Michael Krashinsky, *The Benefits and Costs of Good Child Care: The Economic Rationale for Public Investment in Young Children. A Policy Study.* 1998.

15 Naumann and others.

In Ireland, a more integrated approach is taken. Key policy responsibility and oversight in relation to childcare lies with the Department of Children & Youth Affairs, with support from the Department of Education & Skills. This integrates policy approaches to care at the earliest age with pre-school and school-age education and childcare.

3.3 Market Factors

3.3.1 Female Participation in Workforce

Mothers' participation in the workforce is a key driver for market demand for childcare and vice-versa, i.e. the availability of childcare increases maternal participation in the workforce[16]. The availability of childcare places on the market simultaneously influences the participation of mothers in employment and is influenced by it in terms of driving demand. Early developments in respect of statutory support for childcare services in Ireland were driven principally by objectives relating to labour force participation by – and equality of opportunity for – women and were led by the then-Department of Equality and Law Reform.

The maternal labour force participation rates in Ireland increased from 37% in 1992 to 60% in 2008, supported by substantial investment in the childcare sector by a series of programmes funded by that Department, including:

- the Pilot Childcare Initiative 1994-1996 for the purpose of facilitating participation by socially excluded mothers in employment, development, training, or education;
- the Equal Opportunities Childcare Programme (2000–2006) and its successor, the National Childcare Investment Programme (2006–2010), which resulted in the creation and retention of more than 40,000 childcare places through capital funding and subvention of the cost of delivery of services[17].

Following a dip in female participation in the workforce over the course of the economic downturn (along with an overall rise in unemployment and a reduction in workforce participation for all), the current rates are similar to those pre-recession, and will need to be supported by an expanding childcare market.

The National Childcare Scheme (originally called the Affordable Childcare Scheme), has replaced a multiplicity of existing targeted schemes and will continue to provide some universal benefits.

3.3.2 Staff Resources in the Sector

There were 22,132 staff working directly with children in childcare services in 2017/18 (according to the Pobal Early Years Sector Profile 2017/2018 report), excluding ancillary and relief staff. Almost half of the staff reported working in the sector worked on a part-time basis.

In addition, around a quarter (26%) of services in Pobal's survey stated that they had at least one staff vacancy, indicating a level of unmet demand for staff resources in the market.

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16 Lefebvre Pierre and Philip Merrigan, 'Child-Care Policy and the Labor Supply of Mothers with Young Children: A Natural Experiment from Canada', *Journal of Labour Economics*, 26.3 (2008).

17 Frances McGinnity and others, *Mothers' Return to Work and Childcare Choices for Infants in Ireland*, 2013.

3.3.3 *Qualifications*

Qualifications levels of staff working directly with children have increased over time. 94% (20,698) of staff working directly with children are qualified to NFQ level 5 or above. This is an increase on previous years: 92% in 2016/17 and 88% in 2015/16. 65% of staff have NFQ Level 6 (or above) qualifications, which again, represents an increase on previous years.

Numbers of staff with no formal childcare qualifications have been decreasing in the sector, with only 6% of staff holding no formal childcare qualification in 2017/18. This is a decrease from previous years: 7% in 2016/17 and 11% in 2015/16.

This increase in staff qualifications (in total numbers and level) can be directly tied to a 2016 amendment to the Child Care Act 1991[18] which required all staff working directly with children to hold a minimum of a NFQ Level 5 qualification or to sign a 'Grandfather Declaration', which stated the staff member's intention to retire or resign before 1 September 2021 if they do not hold such a qualification. This requirement did not extend to staff working in school-age childcare.

3.4 Profile of the Irish Childcare Market

3.4.1 *Market Description*

The childcare sector consists of a variety of centre-based providers: these range from small sole-trader operations to large group providers. There is a range of provision types, with some providers only offering ECCE, while others offer a full suite of services including full and part-time care. There is also a mix of for-profit and not-for-profit operators.

There are minimal constraints to entering the sector: besides the requisite capital costs, there are some regulatory requirements. The cost of compliance with these requirements is an additional expense for providers; however, they are recognised as important in driving service quality within the sector.

3.4.2 *Geographic Distribution*

According to Pobal data at the time of this research there were 4,523 registered childcare providers across Ireland[19]. The breakdown of these providers across the State is set out in the table below:

[18] *Child Care Act 1991 (Early Years Services) (Amendment) Regulations*, 2016.

[19] This is the figure as per the Pobal PIP database as at February 2019. It is marginally different from the figure of 4,504 in the database as at March 2018, used as the basis for the survey target population. As services enter and leave the childcare market, the live PIP database reflects a snapshot of Pobal-registered services at a point in time, hence the slight variation in figures in this report.

Childcare providers		
Region	**Number**	**Percentage**
Dublin	1,194	26.4%
Rest of Leinster	1,260	27.9%
Munster	1,218	26.9%
Connacht	571	12.6%
Ulster	280	6.2%
Total	**4,523**	**100.0%**

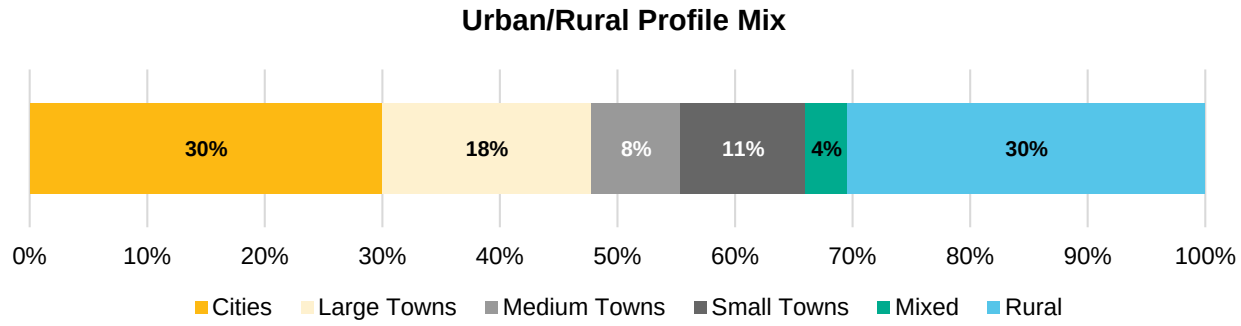
Source: Pobal PIP database, September 2018

3.4.3 Urban/Rural Profile

Pobal categorises providers at a more granular level than simply 'urban or rural'. The more nuanced categories comprise the following:

- Cities (Urban)
- Large Towns
- Medium Towns
- Small Towns
- Mixed
- Rural

The blend of these categories are illustrated below:



Approximately 30% of providers fall into each of the traditional urban and rural categories with the remaining 40% being distributed across the more nuanced categories.

3.4.4 Provider Type

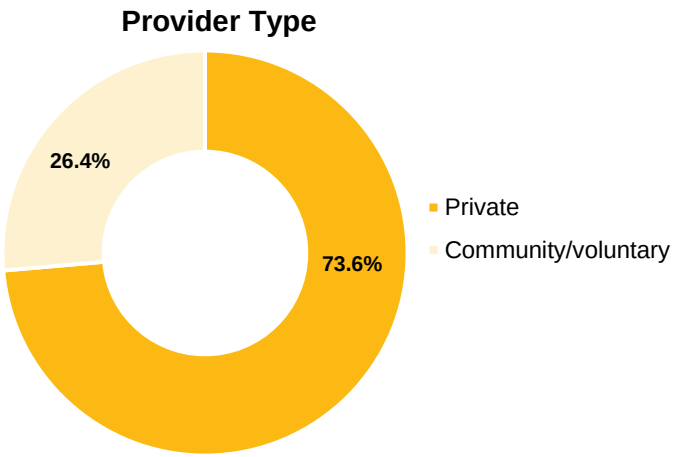
The childcare provider market consists of a combination of private, for-profit enterprises and community/voluntary not –for profit enterprises.

Private enterprises are (generally) for-profit providers offering childcare services as a commercial operation. Private operators have been eligible for ECCE payments since the inception of the scheme, and have recently also become eligible to access other childcare funding schemes.

Community/voluntary enterprises were established to address the need for low-cost subsidised childcare in areas with lower incomes or higher deprivation and were established

mostly in areas where there was market failure, and until recently were the only providers eligible to provide places under the Community Childcare Schemes.

Just over a quarter, 1,193 or 26.4%, of the providers are community/voluntary enterprises, with the remainder (3,330 or 73.6%) private enterprises, as illustrated in the figure below:



3.4.5 Distribution in Respect of the Pobal HP Deprivation Index

Pobal's HP Deprivation Index[20] classifies the relative affluence or deprivation of particular geographical areas. It is based on three dimensions: demographic profile, social class composition and labour market situation.

Areas can be classified using absolute and relative scores, and fall into the following principal categories:

- Extremely affluent
- Very affluent
- Affluent
- Marginally above average
- Marginally below average
- Disadvantaged
- Very disadvantaged
- Extremely disadvantaged.

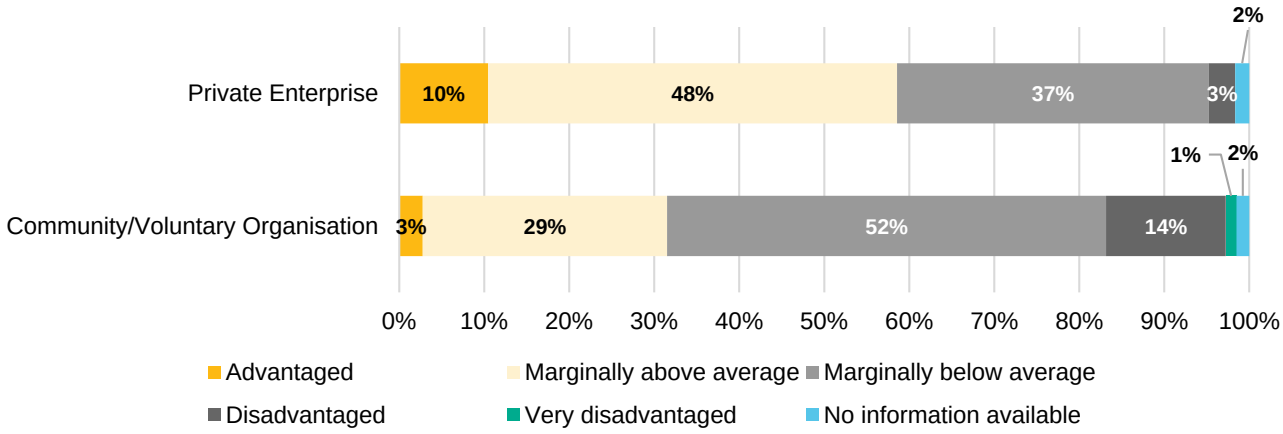
The distribution of childcare providers according to this Index is described in Table 2.3.5a below. The majority of providers operate in areas marginally above and marginally below average relative deprivation.

[20] Pobal, 'HP Deprivation Indices' <https://maps.pobal.ie/WebApps/DeprivationIndices/index.html>.

Deprivation Score	Percentage
Advantaged	8.4%
Marginally above average	43.0%
Marginally below average	40.6%
Disadvantaged	6.0%
Very disadvantaged	0.4%
Information not available	1.6%
Total	**100.0%**

As expected and given the rationale for community/voluntary enterprises providing childcare, the distribution of community and private providers differs in respect of the deprivation of the areas in which they operate. As illustrated in the figure below, many community providers are located in areas with disadvantage or below average.

Distribution of Childcare Provider Type / Pobal HP Deprivation Index



3.4.6 Trends

The market is characterised by relatively small but consistent changes in scale over time. Between 2016/17 and 2017/18, there was an increase of 95 providers – a 2% increase, the same increase as in the previous year (2015/16 to 2016/17). There was a 1% increase between 2014/15 and 2015/16; a 3% increase between 2013/14 and 2014/15; and a 3% decrease between 2012/13 and 2013/14.

The number of community service providers has remained somewhat constant, while private service providers are slightly increasing. There has also been a decline in the proportion of services that are rural (40% rural in 2016/17 to 30% rural in 2017/18).

3.5 Fees

3.5.1 Overview

This section sets out the landscape of fees charged in the childcare market in Ireland alongside some of the factors influencing these. The fee information set out here is drawn from data and information published by Pobal[21].

3.5.2 Average Fees

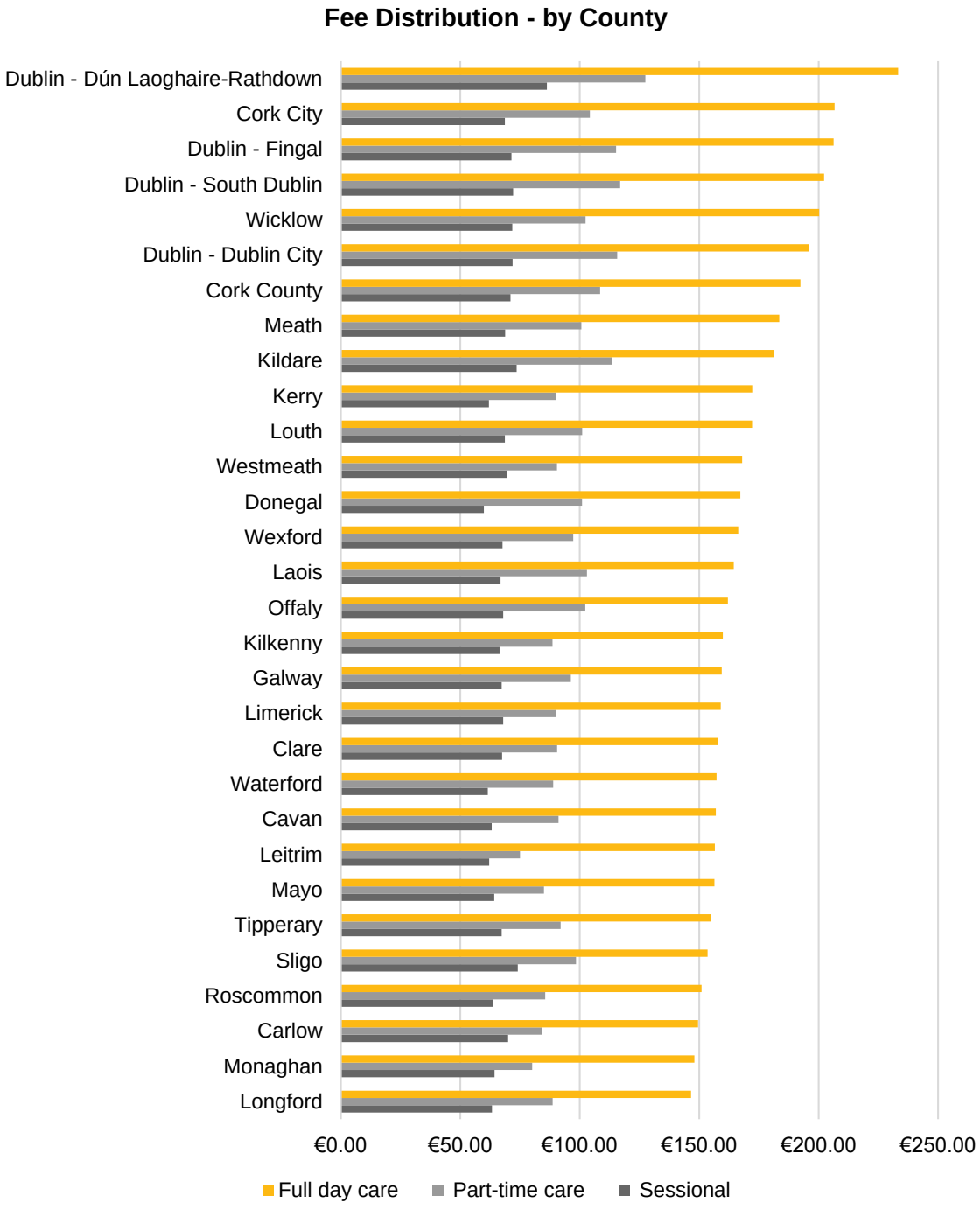
The average weekly fees by session and provider type are set out in Table 3.2a below:

Average Weekly Fee			
Session Type	**All providers**	**Community**	**Private**
Full Day Care	€177.92	€161.24	€184.08
Part-Time Day Care	€101.82	€84.14	€110.52
Sessional	€68.95	€61.05	€71.89

Table 3.2a: Average weekly fees by session and provider type

There is significant variability in fee rates when examined with regard to geographic location, as illustrated in the figure below. Fees tend to be higher in Dublin and the surrounding counties; and in Cork city and county, with the lowest fee rates seen in Carlow, Monaghan, and Longford. These fee rates correlate with the Deprivation Index scores for the relevant counties: the counties with the highest scores for affluence have the highest fees; likewise, the counties with the lowest fees score low on the Deprivation Index.

[21] Pobal, *Early Years Sector Profile Report*, 2018 2017.


Fee Distribution - by County
Dublin - Dún Laoghaire-Rathdown
Cork City
Dublin - Fingal
Dublin - South Dublin
Wicklow
Dublin - Dublin City
Cork County
Meath
Kildare
Kerry
Louth
Westmeath
Donegal
Wexford
Laois
Offaly
Kilkenny
Galway
Limerick
Clare
Waterford
Cavan
Leitrim
Mayo
Tipperary
Sligo
Roscommon
Carlow
Monaghan
Longford
€0.00
€50.00
€100.00
€150.00
€200.00
€250.00
Full day care
Part-time care
Sessional

3.6 Economic Analysis of Reasonable Profit

3.6.1 Background and Purpose

This section sets out a brief analysis of the *"reasonable profit"* for State aid in respect of childcare services, to inform future policy decisions in terms of setting the levels of subvention for these services in Ireland. It is important to note that this is a *discussion* of reasonable profit and does not seek to propose or set a reasonable profit rate. The points made are illustrative only and not intended to be definitive, recommended, or proposed.

For context: the Treaty of the Functioning of the European Union (TFEU)[22] provides for EU Member States granting special or exclusive rights to public or private sector organisations to perform "*services of general economic interest*" (SGEI). These special or exclusive rights are generally related to the performance of a public service obligation (PSO).

When granting these rights, Member States must comply with EU competition rules, including State aid rules (set out in Article 106(1) of the TEFU). Member States have some flexibility in defining what constitutes a SGEI.

3.6.2 Key Principles

As outlined in Competition Law – A Practitioner's Guide:

> *"Payments by the State to an undertaking for performing public service obligations could give rise to State aid if the amount paid is too high and gives the undertaking more than a reasonable profit. However, if there is a sufficient degree of equivalence between the compensation paid and the additional costs incurred in performing the public service obligation, the undertaking 'will not be enjoying any real advantage' for the purposes of Article 107(1) and therefore the payment will not give rise to State aid."*[23]

This raises the question: where is the borderline between acceptable compensation and an overpayment that confers an economic advantage?

In the Altmark case (2003), the Court of Justice laid down four conditions, which, if satisfied, would show that the compensation paid for public service obligations (PSOs) is not State aid, namely:

- The recipient undertaking must actually have PSOs to discharge, and the obligations must be clearly defined.
- The parameters on the basis of which the compensation is calculated must be established in advance in an objective and transparent manner.
- The compensation cannot exceed what is necessary to cover all or part of the costs incurred in the discharge of PSOs, taking into account the relevant receipts and a reasonable profit for discharging those obligations.
- Where the undertaking is not chosen pursuant to a public procurement procedure which allows for the selection of the tenderer capable of providing the services at the least cost, the level of compensation must be determined on the basis of an analysis of the costs that a typical efficient undertaking with the means to meet the PSOs would

[22] *The Treaty on the Functioning of the European Union*.

[23] Nathan Dunleavy, *Competition Law: A Practitioner's Guide*, 2010, p. 754.

have incurred in discharging those obligations, taking into account relevant receipts and a reasonable profit.

Following the landmark *Altmark* case, the European Commission adopted a Decision (2005) and Framework (2005, which applied until November 2011), which set out the conditions under which State aid in the form of public service compensation can be considered compatible with the common market. The Decision was effectively a block exemption, designed to facilitate competition within organisations performing PSOs.

After November 2011, the Commission adopted a new package of State aid rules for SGEI. They also include a Decision and a Framework (December 2011). These allow compensation for SGEIs subject to certain conditions, including the amount of compensation and *reasonable profit*. Specifically, the amount of compensation may not exceed the net costs to the organisation, plus a reasonable profit.

3.6.3 Assessment

Reasonable profit is to be determined as the rate of return on capital that would be required by an organisation considering whether or not to provide the PSO, taking into account the degree of risk. In simple terms, the rate should be the point at which a childcare provider considers it worth investing and taking on the risk.

Self-employed childcare providers and registered businesses have an obligation to ensure proper financial reporting and tax compliance. Therefore, specification of a reasonable profit should not present a major difficulty in terms of the treatment of costs or the measurement of profit for these businesses, or create a difference between sole traders and companies.

A profit below the relevant swap rate (which is assumed to be equal to risk-free investment) plus a liquidity premium of 100 basis points is considered to be reasonable. This approach under the EU Framework reflects the evolution from an accounting approach to an economic approach for SGEI, in regulated PSOs, such as childcare.

The relatively low swap rate of the Eurozone members currently reflects the very (historically) low interest rate environment in the Eurozone that has persisted since the 2008 economic crisis. The quantitative easing (QE) employed since the onset of the crisis was reversed in the US to a small extent and there was an expectation that interest rates would increase in other advanced economies (such as the UK and the EU) over the past year. However, international economic uncertainty (arising from Brexit, international trade conflicts) have meant that the 'quantitative tightening' in the US has been paused. Accordingly, the anticipated upward movement in interest rates in the EU, including in Ireland, has also paused. Due to the various uncertainties in the global economy (particularly Brexit), it is unlikely that interest rates will rise in Ireland in the near future either (as at the end of 2019).

3.6.4 Risks to Market Provision

The EU framework and decision regarding SGEI is designed to support the effective functioning of the market and not to protect any particular segment within this. This includes the specification of a reasonable profit rate to fundamentally ensure that supply is aligned with demand and that quality is assured.

In considering the influence of risk, there is a fine balance to be struck in setting or suggesting a reasonable profit that incentivises supply (including new entrants) to respond to the strong demand in the market. The strong demand should in principle obviate the need to set a higher reasonable profit rate.

According to the aforementioned Commission Decision of December 2011 (Article 5, Compensation, paragraph 5, p. 9):

> *"The level of risk depends on the sector concerned, the type of service and the characteristics of the compensation."*

A key source of risk is the structure of the market and in particular the number and relative sizes of the providers of childcare services, where reasonable profit may serve to confer an economic advantage to some providers over others, and distort or threaten to distort competition in the market.

The question may then be posed: what are the risks of a low reasonable profit rate calculated based on the currently low interest rate environment outlined above? The possible risks include:

- It will confer an advantage on larger providers over smaller providers;
- It will make entry to the childcare market in Ireland less attractive;
- There will be lower or less developed childcare services in certain parts of the country, where population density is lower and/or where transport networks are less developed, and;
- It will or may lead to excess demand.

It is, however, worth bearing in mind that Ireland is approaching full employment and the strong demand for childcare services will likely act as an incentive for existing providers as well as for new entrants to the market.

3.6.5 Concluding Remarks on Reasonable Profit

The assessment above provides the *principles* by which reasonable profit can be calculated. In order to identify the reasonable profit a further study would be required to calculate an appropriate range.

Methodologies

4 Development of the Survey Tool

4.1 Methodological Approach to the Survey

As outlined in Section 2, a range of survey approaches have been used in Ireland and in other jurisdictions to gather data on the cost of providing childcare services. Many surveys of this nature have identified a sample of the overall provider numbers to use as the target population for the survey tool. In considering a sample-based approach, some concerns were raised in relation to how a sample might be selected in a manner that would not be perceived to be biased or (intentionally or otherwise) to reflect an inaccurate picture of costs of providing childcare.

It was decided to conduct this survey for the DCYA using a census approach, i.e. to send an invitation to the questionnaire to all those in the target population, and to track the responses to try to ensure a response profile that was closely aligned to the overall sector profile (using data such as that collected by Pobal in both the PIP reporting system and the annual Early Years Sector Profile survey).

Variables considered for comparative purposes included:

- Geographic distribution;
- Urban / rural profile;
- Provider type (i.e. community and private);
- Size in terms of staff and number of places;
- Type of service provision (age range and number of hours offered);
- Proportion of ECCE-only services.

4.2 Key Areas Addressed in Survey Tool

The survey tool was developed with a structure grouping together related questions under the following headings:

- **Profile:** key profiling information about each provider, including legal structure and questions in relation to the premises in which the service operates;
- **Services:** types of service provided, capacity, and waiting lists for services;
- **Rooms:** detailed description of each room used for childcare, with numbers of staff and children in each room, area of room, and access to sanitary facilities;
- **Management:** questions in relation to each manager working at the relevant location, including hours, qualifications, experience, and remuneration;
- **Childcare staff:** questions in relation to each staff member working with children at the relevant location, including hours, qualifications, experience, and remuneration;
- **Ancillary staff:** questions in relation to each ancillary staff member working at the relevant location, including role, hours, and remuneration;
- **Staff development:** questions in relation to continuous professional development of childcare staff in each provider;
- **Fees:** information in respect of fees charged for services provided at the relevant site;

- **Financial data:** summary financial statements, including income and expenditure details;
- **Opinion:** opportunity for participants to provide opinion in respect of the issues explored in the survey and any other comment they wished to provide.

4.3 Drafting and Refining

The survey tool was detailed and was developed in collaboration with the Department and the Oversight Group, with several drafts and refinements undertaken to reach a draft ready for piloting.

Key areas discussed during the development of the survey tool included aligning terminology and questions with those used by Pobal, both in PIP reporting and in its Early Years Sector Profile survey. The Oversight Group also considered the level of detail required in respect of individual staff members (as opposed to, for example, asking for collective or average details on rates of pay, qualifications, or hours for different roles). Whilst it was recognised that filling in details for each individual staff member was more onerous, the capacity required for modelling scenarios with the data collected meant it was important to be able to clearly link qualifications, experience, hours, and remuneration in a way that would not be feasible with less detailed breakdowns of the data from providers.

4.4 Challenges in Developing the Survey

A key area of concern in seeking to develop the survey tool was how to strike the balance between the amount of information desired in order to have the most flexible and robust modelling capacity and the practicalities for providers in completing a long and detailed survey. The more information sought, the more questions in the survey and the greater the level of detail requested, resulting in a more burdensome and time-consuming process for participants.

The survey tool was helpful in this regard because it only presented questions to participants as relevant, i.e. each respondent had the shortest possible route through the survey because any “dependent” or “conditional” questions, i.e. questions arising from the responses to earlier ones in the survey, appeared on-screen only when an earlier response triggered this. Survey respondents did not have to skip irrelevant questions or assess for themselves if they had to answer any particular question. For example, participants were asked how many staff members they had in each category (management, childcare staff, and ancillary staff), following which only the questions for that number of staff appeared on-screen to each respondent.

However, the requirements of the review and the needs of the DCYA in relation to modelling for variables such as qualifications and remuneration, as discussed above, meant that the survey was detailed and for larger services in particular, time-consuming to complete.

Another challenge was the capacity to facilitate those services who operate through the Irish language, including both Gaeltacht-region services and non-Gaeltacht Irish-language providers such as naíonraí. This was addressed by having the survey tool translated into Irish through the translation service used by the Department. Providers were then given the option to complete an Irish-language or English-language version of the survey. Of those who opted to complete the survey in Irish, 20 full responses were received. Quantitative responses were able to be combined with the main survey as the coding was kept identical. Qualitative

responses were collated and translated using the same translators, but this was kept entirely separate from the Department, i.e. the material went to the translation firm and was returned with the translated output without having been routed through DCYA.

4.5 Piloting

A small number (10) of the providers who had participated in the direct provider engagement described in earlier sections of the report also agreed to take the time to pilot the survey. A variety of service types, sizes, and locations were represented in the pilot providers.

The results of the piloting exercise included useful feedback: the survey was considered clear and easy to use, albeit with a recognition that it would be time-consuming for larger services to complete. Pilot participants suggested that it needed to be more explicit about the "why": why services should give up time to complete the survey, and why we were asking particular questions. The pilot process also suggested a small number of additional questions and some minor refinements to those in the pilot survey, including the addition of more explanatory and help text to clarify the purpose and value of the questions being asked, which were implemented in the final version of the survey tool rolled out subsequently.

4.6 Childminder Survey

As part of the review of the cost of delivering childcare, the DCYA wished to include those childminders (i.e. self-employed individuals operating single-handedly in providing childcare in their own homes) registered with Tusla, the Child and Family Agency.

The vast majority of the estimated 19,000 childminders in Ireland are not registered with any statutory body. A number are voluntarily notified to their local City or County Childcare Committee. However, any childminder who provides childcare for four or more pre-school children must register with Tusla, Tusla-registered childminders are subject to inspection by Tusla's Early Years' Inspectorate. Only approximately 120 childminders were registered with Tusla at the time of the research.

A survey similar to that for centre-based childcare providers was developed for childminders registered with Tusla. This survey was considerably shorter and simpler, given that it did not require details of staff members or premises, for example.

However, **only ten responded to the survey**. The cohort of Tusla-registered childminders was already very small in relation to the overall dataset of childcare providers, and the tiny number of responses to the survey makes any meaningful analysis of this data impossible.

4.7 Survey Target Population

As outlined above, it was decided to conduct a census survey, that is, to invite all those included to participate, rather than a selected sample thereof. The target population for the main survey was all centre-based childcare services. The list of relevant services and contact details was provided by Pobal. This list totalled **4,504 services** at the time the survey was launched.

4.8 Issues Relating to the Operation of the Survey

A challenge with the survey, once launched, was its timing. There were two dimensions to this: the first was that the survey launched just before the Easter break for many services. This meant that some services were closed entirely and others had a much-reduced service with fewer staff and children at this time. However, some providers welcomed the opportunity to complete the survey at a quieter time when there was less demand on their time in relation to the day-to-day operation of their services.

The second issue was the fact that the annual Pobal Early Years Sector Profile survey was rolled out just as this survey was closing to respondents. Whilst it would have been preferable in some ways to separate the two exercises more fully, it had been discussed and agreed with the Oversight Group that it was also a potential benefit to providers, as it would be easier to complete the Pobal survey having already brought together the data required to complete the cost survey. However, there was some confusion among providers as to which survey was which; this was explained and clarified to providers who contacted Crowe by email or phone.

In order to encourage a higher participation rate, the deadline to return completed surveys was extended; the Minister for Children and Youth Affairs and the DCYA issued several press releases to encourage participation and called upon members of the EY Forum to encourage participation among their membership bases; and Crowe engaged with stakeholder organisations to promote the survey among their membership.

The eventual response rate of 19% was considerably below the response rate to the Pobal Early Years Sector Profile survey, which had a response rate of 85%.

5 Data Cleaning and Robustness

5.1 Survey Responses and Cleaned Dataset Overview

The target population for the childcare provider survey was the total number of centre-based providers (including childminders who provided ECCE services) on Pobal's PIP database at the time of distribution, i.e. 4,504[24].

An initial total of 835 completed surveys were submitted using the main survey tool. A number of these had to be discarded as they did not have a valid DCYA reference or had submitted a survey that had little or no actual response content. We added further survey responses from the Irish-language survey, and a small number of incomplete responses from the main survey where the providers had answered all or nearly all of the survey but had failed to formally submit the response online. Crowe contacted these providers to ask permission to include their responses in the dataset. Inclusive of these responses, **the initial dataset for the survey totalled 859 responses, or 19% of the target population.**

5.2 Need for Data Cleaning

As is typical with any self-reporting data collection exercise, it was necessary to check the data provided by respondents for errors or omissions. In some cases, errors were obvious and easily corrected, in others they were less clear despite being suspected. To ensure the data used in the cost modelling tool and regression analysis was as accurate and reliable as possible, a range of checks were undertaken to validate the data and attempt to correct any suspected errors. The data were checked for completion, the presence of extreme outliers, and misinterpretation of the questions. Answers on a theme were cross-referenced where they should logically relate to one another, and variables derived from the data were also checked.

During the cleaning, a variety of common inaccuracies were discovered and rectified:

- Occasional missing values, particularly where the same data had to be repeatedly entered;
- Mistyping, e.g. where an additional zero has been added to a salary, etc.;
- Misinterpretation of questions, e.g. where hours/day had been entered instead of hours/week;
- Duplication of data, e.g. where a respondent could not decide how to enter salary data and did so in both hourly and monthly amounts.

As with any data cleaning of this nature, there is some degree of subjectivity around how data cleaning rules are determined and applied. Decisions were made based on our own experience and professional judgement where appropriate, but also through discussions with the Oversight Group to confirm where it appeared to be necessary to make adjustments to apparent outlying values. Whilst in an ideal world we would have sought to go back to all the

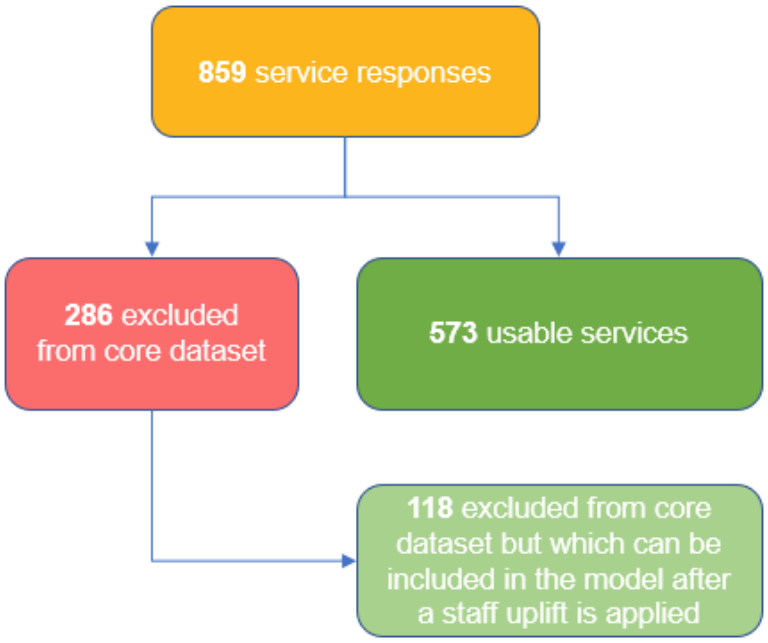
[24] This is the figure as per the Pobal PIP database as at March 2018. As noted in Section 3, it is marginally different from the figure of 4,523 in the database as at February 2019, used as the basis for the market analysis. As services enter and leave the childcare market, the live PIP database reflects a snapshot of Pobal-registered services at a point in time, hence the slight variation in figures in this report.

services and ask for their support in addressing the queries, the scale of this task was not possible within the timeframe and budget available.

5.3 Data Cleaning Approach

Of the 859 services who provided a response, all services had at least one variable cleaned. However, for 217 services (25%) only one field was corrected. 164 had three or more changes, of which 90 were subsequently included in the dataset for the cost modelling tool and regression analysis.

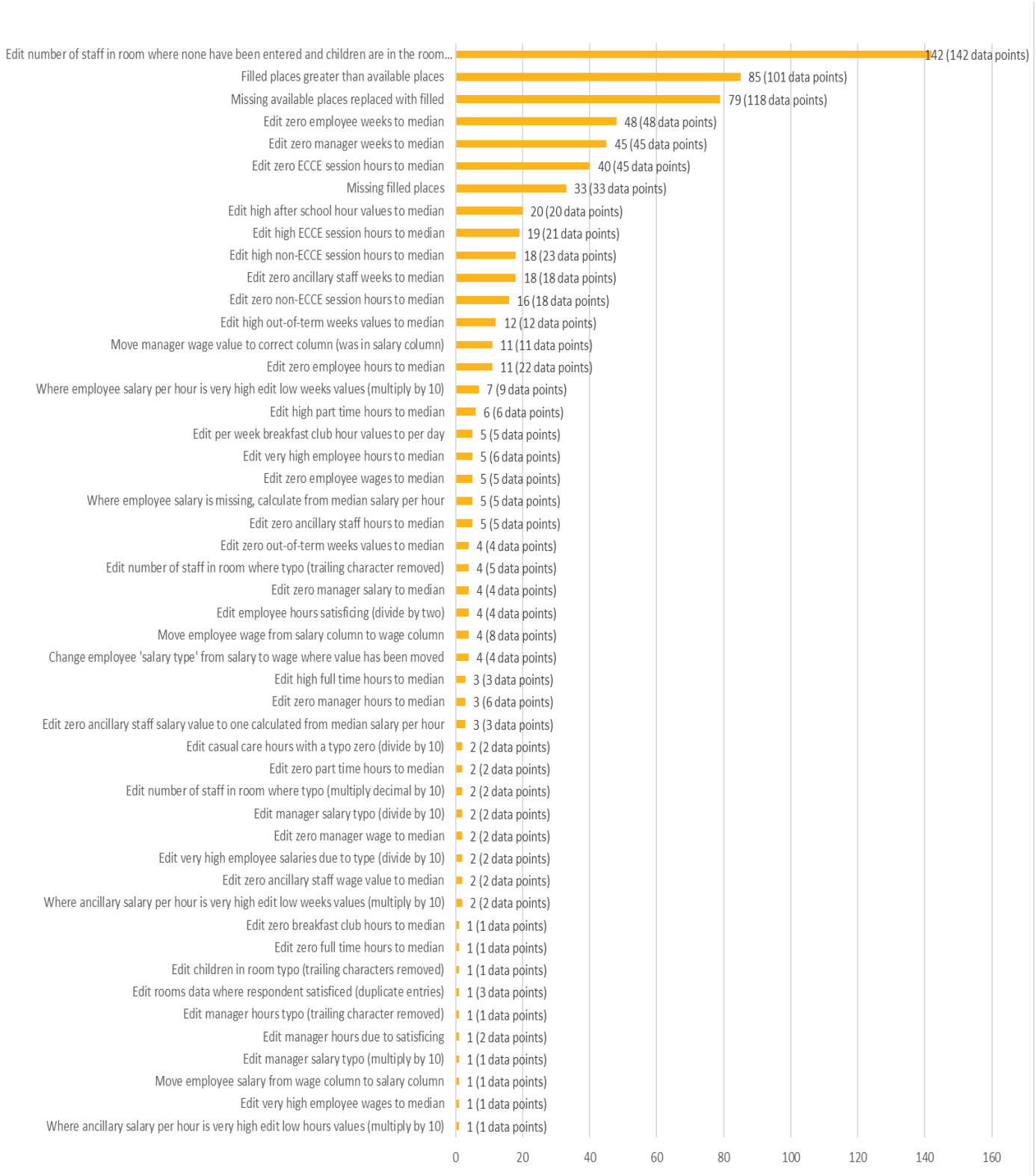
The overall profile of the of responses cleaned and what was included in the analysis is represented in the diagram below. In total, 573 services were considered to have data usable for the unit cost calculations, with a further 118 excluded from the cost calculations and core cost modelling tool, but usable when an uplift was applied to complete near-complete staff data. This is implemented by weighting up the hours worked by staff with complete data to compensate for the number of staff with incomplete data. The maximum possible weighting was a 50% increase (i.e. two employees could be weighted up to three, for example) and the calculations were made separately for managers and employees.



Overview of number of services cleaned and their use in the cost modelling tool

5.4 Types of Correction

The following chart shows the types of corrections that were made, and the number of data points corrected. The chart shows only the data for the 573 services where the data was cleaned and subsequently used within the analysis.



Number of services where the type of correction was applied for the included services

A list of all the corrections and brief description of the context for each of these can be found in Appendix 3.

The edit which impacted on the largest number of services was in relation to room data. Whilst a sizeable change, it should be noted that this does not impact on the unit cost calculations, and was required for the cost modelling tool to undertake scenario changes.

The next two listed, which account for 30% of all the remaining edits, relate to changes because of the incorrect entry of available places. This was due to an apparent misinterpretation of what was meant by “available” places, with respondents interpreting this as places which had not been filled, rather than the total number of available places. A further 6% were due to adding in data where the filled places had been left blank and which were filled by the median.

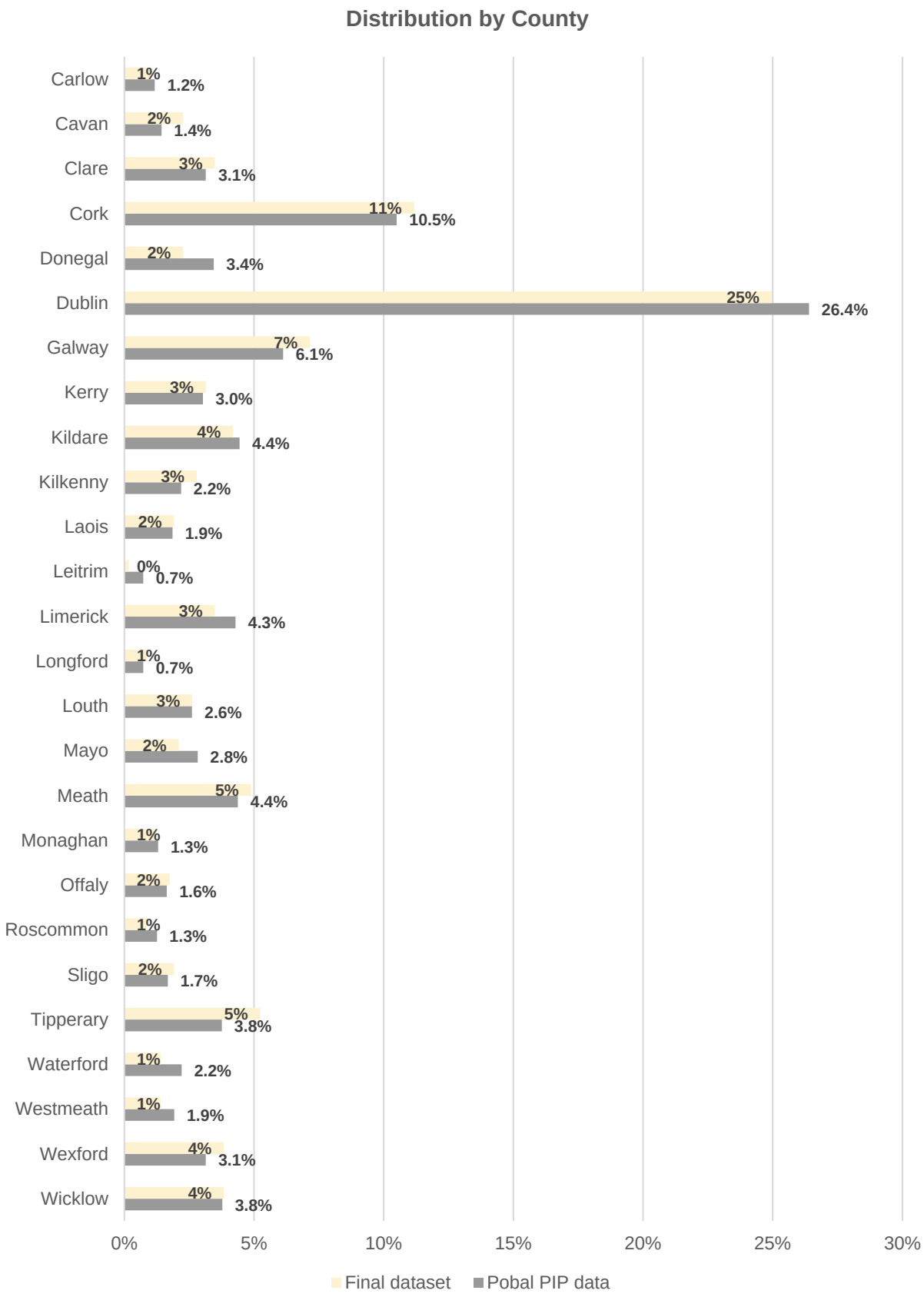
The next most common error was services failing to complete the data fields in relation to the number of employee and manager weeks. In these cases, the data was filled with the median value. For managers this involved setting the number of weeks worked to a value of 47, and for employees this involved setting the number of weeks to 52.

5.5 Alignment of Dataset to Existing Sector Data

5.5.1 Geographic Profile

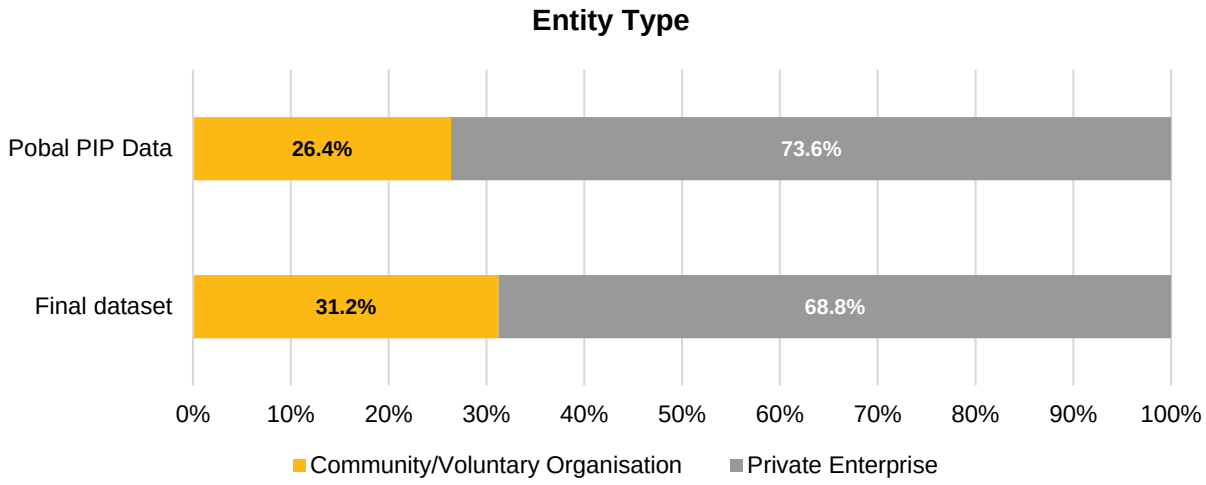
To validate the robustness of the cleaned dataset, we compared key profiling variables to data from the Pobal PIP database. A close match is indicative that it is reasonable to assume the representativeness of the dataset. Further validation comparisons were used with various survey findings as indicated in the following section.

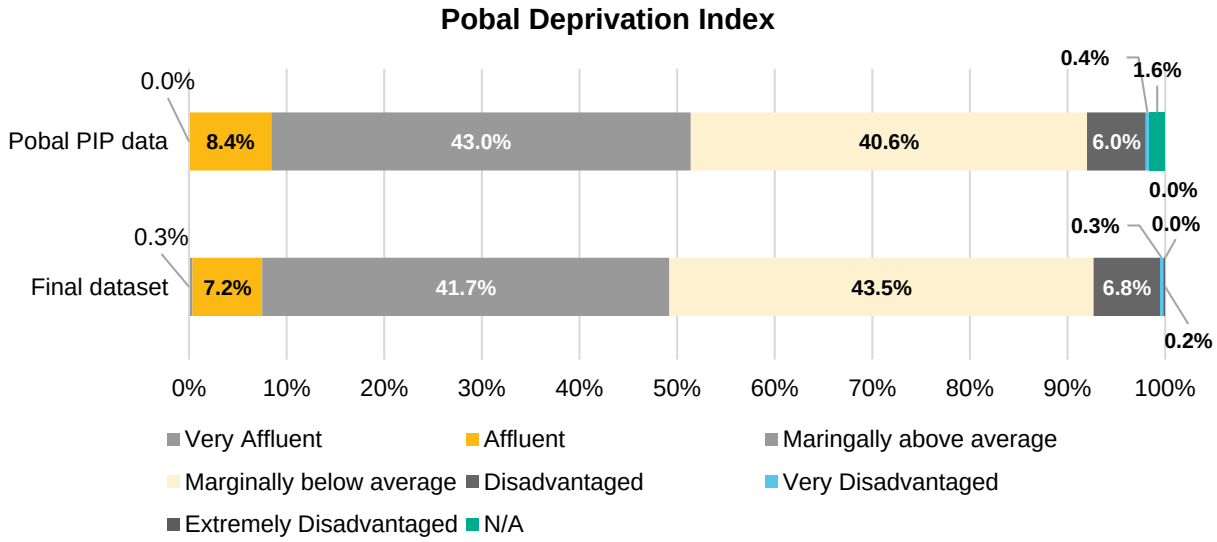
The geographic profile of responses matched closely with existing data from Pobal (extracted from the PIP database at the time of the survey) on the distribution of services. Similarly, the response dataset aligned well with existing data such as the urban/rural split. The alignment of the dataset against Pobal data geographically is illustrated in the following chart. This shows the county-by-county distribution of providers according to Pobal PIP data compared against the survey responses included in the final dataset.


Distribution by County
Carlow 1% 1.2%
Cavan 2% 1.4%
Clare 3% 3.1%
Cork 11% 10.5%
Donegal 2% 3.4%
Dublin 25% 26.4%
Galway 7% 6.1%
Kerry 3% 3.0%
Kildare 4% 4.4%
Kilkenny 3% 2.2%
Laois 2% 1.9%
Leitrim 0% 0.7%
Limerick 3% 4.3%
Longford 1% 0.7%
Louth 3% 2.6%
Mayo 2% 2.8%
Meath 5% 4.4%
Monaghan 1% 1.3%
Offaly 2% 1.6%
Roscommon 1% 1.3%
Sligo 2% 1.7%
Tipperary 5% 3.8%
Waterford 1% 2.2%
Westmeath 1% 1.9%
Wexford 4% 3.1%
Wicklow 4% 3.8%
0% 5% 10% 15% 20% 25% 30%
Final dataset
Pobal PIP data

5.5.2 *Distribution by Other Factors*

When we compare other key profiling data in the responses, the following charts show the distribution of the dataset sample against Pobal data by entity type (community and private), urban/rural mix, and level of deprivation as indicated by the Pobal Deprivation Index. As can be seen, the dataset is closely aligned with the overall sector profile, increasing the reliability and robustness of the analysis using this data.





Wages

A further validator is a comparison of the average staff hourly wage between the cost modelling tool outputs and the Pobal *Early Years Sector Profile Report 2017-2018*. For example, childcare/early years assistant wages are on average (across all levels of experience) €11.35 as calculated within the cost modelling tool, differing just over 1% from the average hourly rate of €11.20 for early years assistants in the Pobal data. This indicates a close match in respect of wage costs.

5.6 Data Issues and Limitations

There were some broader considerations relevant to the accuracy of the data, which were not always able to be rectified by the data cleaning. In many cases, the staffing component of the services' accounts did not match well with the staffing costs calculated using a bottom-up approach. In many cases, this was to be expected, as the accounts information tended to be from previously submitted accounts (from the previous year). In some cases, however, the difference was unexpectedly large. Due to the cost modelling tool requiring bottom-up calculation (based on staffing data) to investigate many of the policy scenarios of interest, it was decided to rely on this approach, and effectively replace the staffing component of the accounts with the figures calculated from the underlying staffing data.

However, a number of services (n=118) were excluded due to missing staffing data had missing items or staff members in their staffing data. This may have been due to this part of the survey requiring considerable effort to complete. Because of this, the modelling was designed to be based on the subset of services where all the required data is complete. However, a weight has been added to services with incomplete staffing data, so that they can be included in models if desired. This weight effectively up-weights the available staffing data for these services. By doing so, it assumes that the missing staff are well-approximated as an average of the complete staff in that service.

Also, in some modelled scenarios, the data did not lend itself ideally to making the necessary calculations. For example, some scenarios involved complex data, with some characteristics not collected at a sufficiently granular level, e.g. the number of CPD hours for those who currently have paid leave or overtime for their CPD. There were added complications where policy scenarios under consideration were not easy to analyse, given the way that childcare services are structured. As an example, the modelling of adult-child ratios relates to regulations on the number of children of specific ages a childcare professional can care for. However, the data collected reflected the reality of provision, which is quite complex – children of mixed ages are often cared for in various sessions by multiple adults, which is often related to the rooms available at the service. In this case, averages across sessions were calculated at the service level, and assumptions were made regarding which regulation to apply for modelling. Similar issues arose with regard to CPD and benefits (see the cost modelling tool guidance for further information).

There were a number of challenges encountered. Firstly, the sample is not statistically random, despite the good coverage in comparison to key variables (county, service size, deprivation, etc.) This means that the results may have some degree of bias. Secondly, there were some issues with data reliability and validity, including responses where the providers:

- failed to complete parts of the survey;
- interpreted questions incorrectly;
- made errors in data entry.

A significant amount of effort was expended in attempting to validate the data and correct errors, but it is likely that not all have been captured or amended correctly. However, the use of average costs and the complexity of the cost modelling tool are mechanisms to mitigate this issue.

The fact that there are so many elements which make up the unit cost means that a number of services (286) had to be excluded from the main analysis, due to overlapping errors. The

unit costs returned by the cost modelling tool are averages across services. There is a large amount of diversity in the calculated unit costs per service. Relying on averages across services allows us to be more confident that anomalous responses or data issues are not unduly influencing the results.

As with all exercises of this nature, without perfect information from all service providers in the sector, we cannot be certain that the sample is not biased in any way. However, our validation of the profile of responses against external data in the form of the Pobal survey dataset and the information collected during the consultation with providers promotes confidence in the cost modelling tool's representativeness. Likewise, when using this dataset in the cost modelling tool, a reliance on averages across services and relative change in unit costs acts to minimise the influence of data discrepancies on the resulting scenarios. The cost modelling tool is designed to be used to investigate possible relative effects of policy scenarios on unit costs.

Future research of childcare provision and costs would benefit greatly from reviewing the challenges of data collection and modelling in this study, such as following up with non-participating services to explore the reasons why they did not take part.

6 Regression Analysis Methodology

6.1 Preamble

The analysis has been undertaken using the services that were included within the cleaned dataset used for the cost modelling tool and the survey findings (n=573) in order to ensure consistency, and the use of the most robust dataset available. In addition to the survey data, other local geographical data such as local deprivation classification was considered for inclusion.

6.2 Method

The work began with a review of documentation to develop a set of conceptual drivers and clarify causal pathways. We undertook a detailed review of the Frontier Economics Paull and Xu study (Paull and Xu, 2019) and compared this to the findings of our own research. This review process was used to identify key hypothesised drivers of unit cost. We documented any potential complexities of the causal pathway relating drivers to unit cost such as:

- Mediation: where factors can lie on a sequential causal path between an initial driver and the outcome.
- Moderation: where interactions in model terms are appropriate because one driver can combine with another to produce a differentiated effect on unit cost.
- Endogeneity: a common infringement of the distributional assumptions of regression models (related to the error term), which occurs where a driver does not have an independent effect on the outcome.

Each of these complexities can affect the way in which researchers specify and test their models, and the resulting estimates produced. They also aid in the interpretation of estimates and caveating of proposed causal explanations. Through this process we were able to identify where particular care in model specification was required.

Following the development of this framework, we began the process of specifying the necessary variables to draw from the raw data and identified where there were potential gaps. Where there were gaps, we sought suitable proxies. Proxy variables were derived from those available in the survey when the available data did not precisely match the ideal specification. The data preparation was undertaken in Microsoft Excel (see appendix, Table A10 for more information on the review).

Once the regression dataset had been created, we undertook a descriptive analysis of each of the variables. This allowed us to explore the overall profile of the services and identify any issues with the data to makes sure that the variables were suitably defined. The findings from this work are presented in the results section of this report.

The analysis was undertaken using the services that were included within the cost modelling tool with the exception of five outliers where the unit cost was €15 or more[25]. To prevent these outliers from unduly influencing the regression, the dataset was limited to those services with a unit cost of less than €15, leaving 568 services. In addition to the survey data, other local geographical data such as local deprivation and a rurality indicator were included.

[25] The range of the outliers' unit cost values was €15 to €38.

We estimated pairwise correlations between the variables to identify both (a) those which are nominally associated with unit cost, and (b) those with a risk of problematic collinearity. Pairwise correlations can influence model specification decisions (identifying the strongest/weakest candidates for drivers) and identify where problems might arise due to covariates being strongly correlated with one another (this can lead to instability in the estimation of standard errors and associated p-values). They also help to identify variables which may mediate one another. As with the descriptive analysis, more details on the pairwise correlations can be found in the results section of this document. We also estimated the bivariate associations of our explanatory variables with unit cost by estimating models of unit cost with each explanatory variable included separately. This provided an early indication of which of our variables might have a statistically significant association with unit cost (without statistically controlling for all other variables).

We then analysed the missing data to identify patterns of missingness and available sample sizes based on listwise deletion (where only complete cases are used to estimate the model). This enabled us to identify where the inclusion of certain drivers would have a notable impact on the sample size available for analysis. This informed which variables we incorporated when specifying the model, as missing data can lead to bias in the resulting estimates and reduce statistical power by reducing available sample size. We did not employ any imputation methods for filling-in missing data as there was generally very little missing data and this would have been a considerable undertaking in and of itself.

6.3 Development of Regression Model

At this point we had developed a dataset that we understood well and were able to start developing the regression model. Analyses were undertaken in Stata (version 13.1 SE) and the steps involved are set out below. There are also associated plots set out in the appendix which show outputs from the tests and checks involved.

- Estimating an initial, saturated model using ordinary least squares (OLS), which contains all the explanatory variables. This is simply the initial model from which we used backward selection to arrive at a more parsimonious model.
- Backward selection by removing non-significant terms from the model, to arrive at a parsimonious model which contains only those drivers that are reliably associated with unit costs. Likelihood ratio tests were used to compare nested models.
- Repeating this process with fixed effects included for (1) the county in which the service is based, and (2) the region in which the service is based, to identify whether there are area level effects which have not been accounted for.
- Running residual-based diagnostics to determine whether there is any infringement of model assumptions. OLS models usually assume that the error term is random-normal distributed and has constant variance and infringements can bias estimates. By comparing the calculated unit cost with the unit cost predicted by the model, the distribution of residuals can be examined, and any problems identified.
- Running leverage-based diagnostics to determine whether there are outliers with undue influence on the estimates. Extreme outliers (cases with unusual values on a variable) can have a large influence on the estimation of regression coefficients, causing bias. Leverage-based methods (such as Cook's distance) were used to identify any services which are having an extreme effect on estimates. It was not necessary to remove any data prior to re-estimation.

- Estimating the risk of problematic collinearity using variance inflation factors. Collinearity amongst explanatory variables can lead to instability in the estimation of standard errors and associated p-values, affecting model specification decisions. This occurs when two variables are so closely correlated that they largely explain the same variance in the outcome. When this occurs, it is usual to discard one variable in preference of the other. In this case, the morning session variable was highly correlated with the ECCE only variable, and so dropped (after correlation analysis). No other variables were dropped.

Findings and Outputs

7 Childcare Provider Survey Findings

7.1 Overview

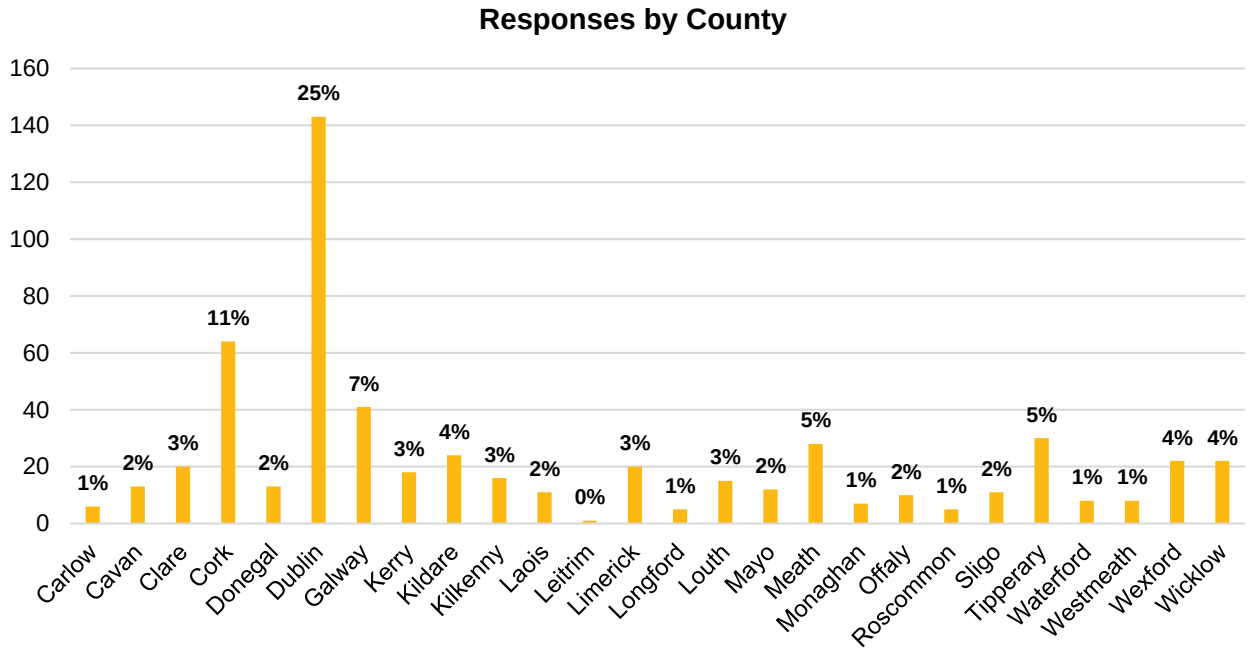
These survey findings are intended to provide context for the dataset used for the regression analysis and the development and operation of the cost modelling tool, to enable comparison with other sector profile data for validation, and to add to the body of knowledge in relation to the operation of childcare services in Ireland.

7.2 Profile of Survey Responses

7.2.1 Introduction

In order to reduce the scale of the survey slightly, in recognition of the time it would take to complete, we had not included some profiling questions in the survey, instead using the DCYA reference to extrapolate profiling quantitative data by cross-referring to pre-existing data in the Pobal PIP database, such as geographic location and provider type (i.e. whether respondents were private or community providers). Data for Crowe survey respondents in relation to these variables is illustrated below:

7.2.2 Geographic Distribution

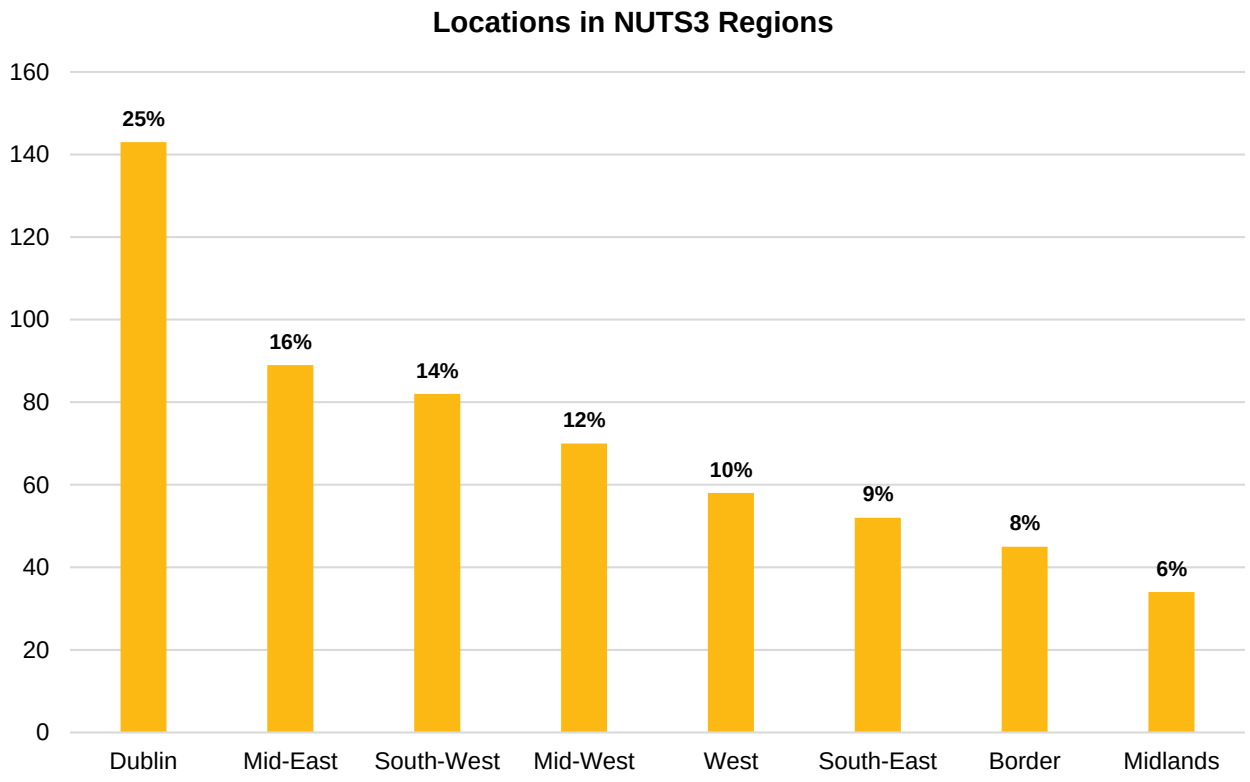


As we have noted in the preceding section, this is closely aligned with the overall geographic distribution of centre-based providers in the sector as indicated by Pobal PIP data.

We can also consider the distribution in respect of the NUTS 3 regional definitions, as set out in the following table:

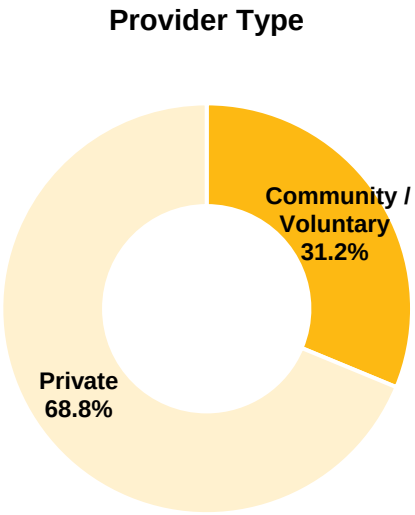
Region Name	Local government areas included
Border Region	Cavan, Donegal, Leitrim, Monaghan, Sligo
West Region	Mayo, Roscommon, Galway and Galway City
Mid-West Region	Clare, Tipperary, Limerick City and County
South-East Region	Carlow, Kilkenny, Wexford, Waterford City and County
South-West Region	Kerry, Cork City and County
Dublin Region	Dun Laoghaire-Rathdown, Fingal, South Dublin and Dublin City
Mid-East Region	Kildare, Meath, Wicklow, Louth
Midlands Region	Laois, Longford, Offaly, Westmeath

Following this classification, the survey response profile across the NUTS 3 regions is illustrated below:



7.2.3 *Provider Type*

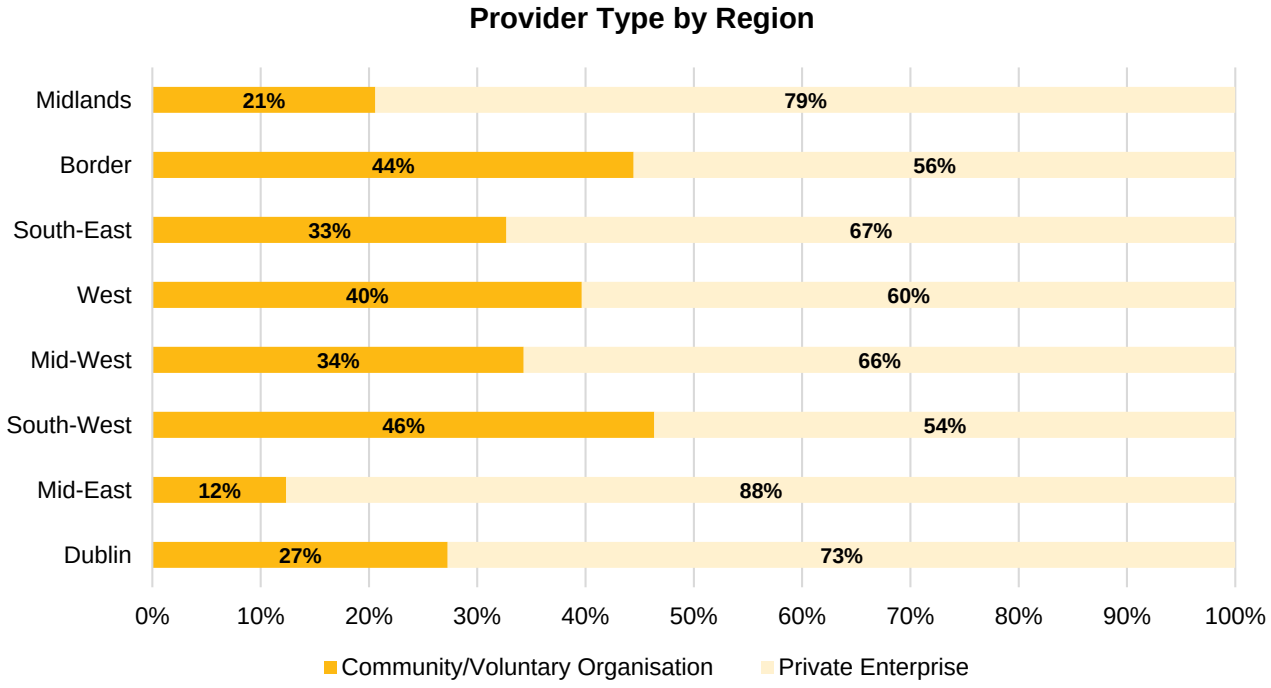
Just over two-thirds (n=394; 68.8%) of respondents were private providers, with the remaining 179 (31.2%) of responses coming from those in the community and voluntary sector.



Of the providers, approximately 37% (n=214) provided ECCE services only.

7.2.4 *Distribution of Provider Type by Region*

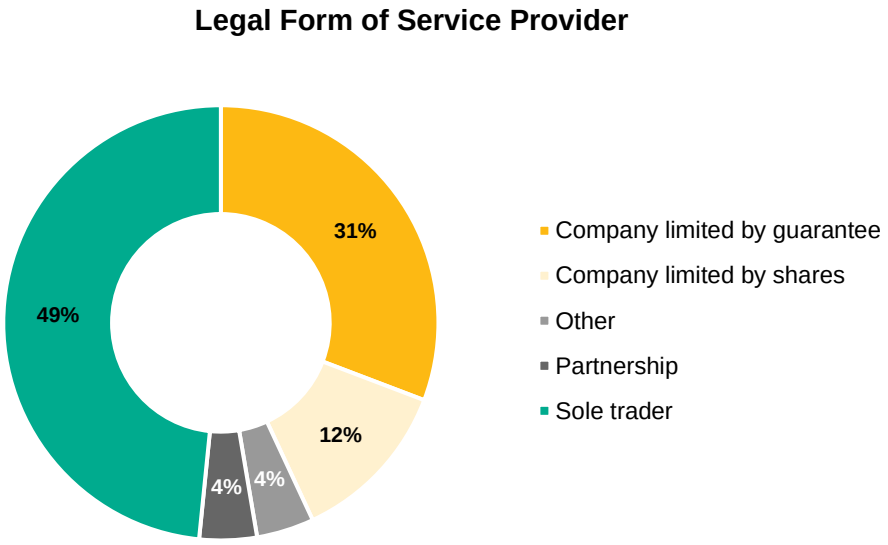
The split in each region between community/voluntary organisations and private enterprises can be seen below:



The region with the lowest proportion of community/ voluntary respondents was the Mid-East region. This is consistent with the findings of the Pobal Early Years Sector Profile Report 2017-2018, which noted that the counties with the lowest proportions of community services were in Dublin and the Mid-Eastern Region.

7.2.5 Legal Form

We asked providers to indicate the legal form of their services, as set out in the chart below:

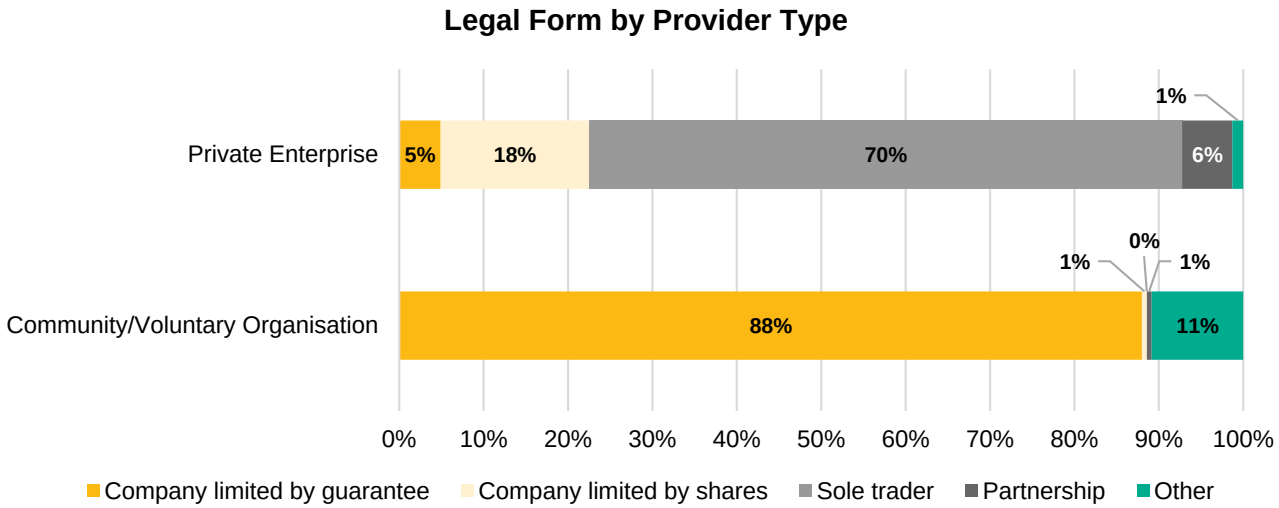


As the chart above illustrates, almost half (49%; n=272) of respondents to this question stated that they were a sole trader, with company limited by guarantee being the next most popular answer at 31% (n=173). Of the 4% (n=24) that indicated Other, the responses included "community-based", "unlimited company", and "associated with a school".

This breakdown corresponds closely with data provided by Pobal from their 2017/2018 Sector Profile Survey, which indicated that 49% of responding providers were sole traders and 24% were companies limited by guarantee.

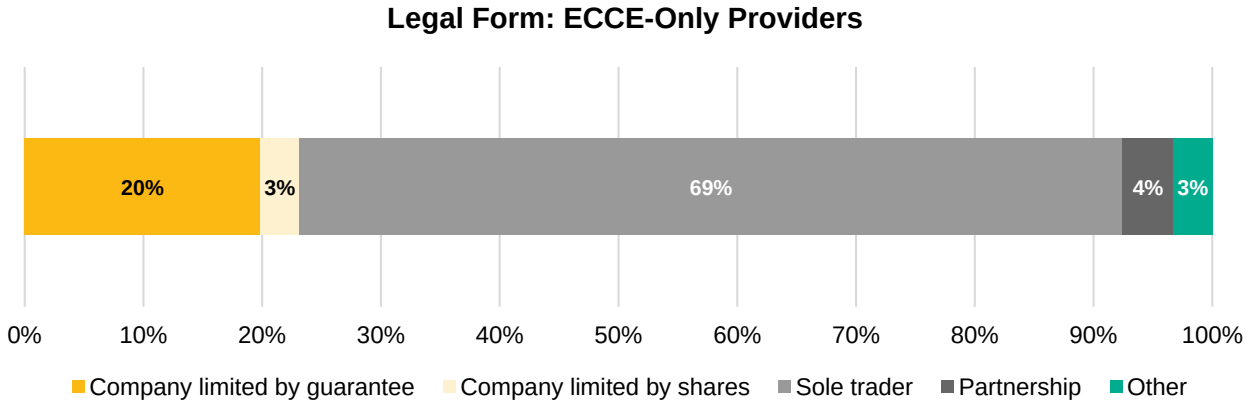
7.2.6 *Legal Form of Different Types of Provider*

We have considered the legal form types across different categories of providers. The following chart illustrates the different profile of legal forms between community and private providers:



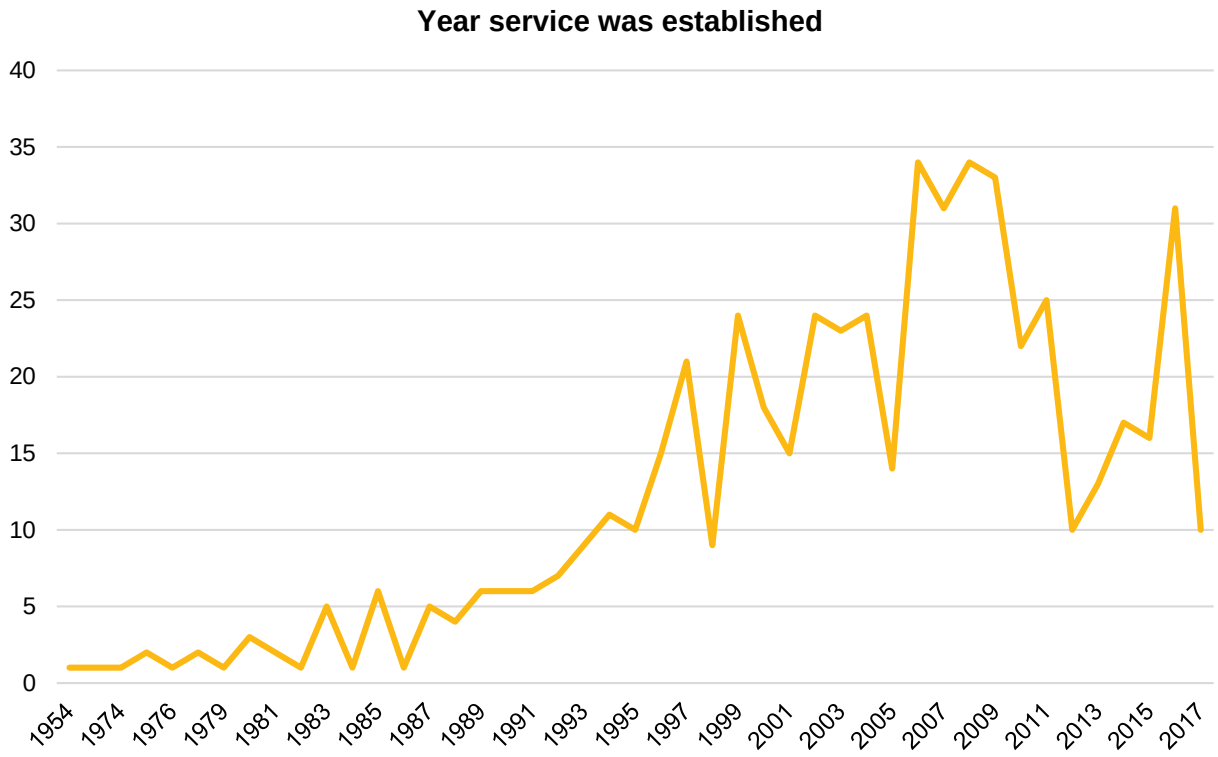
As can be seen, community/voluntary organisations primarily (88%; n=154) consist of companies limited by guarantee, whilst 5% (n=19) of private enterprises indicated that they were companies limited by guarantee. Conversely, 70% (n=272) of private enterprises responding were sole traders whereas only 1% of community/voluntary organisations indicated they were sole traders.

As a further example, ECCE-only providers' responses indicated they were predominantly sole traders (69%; n=147), with the next largest group being company limited by guarantee (20%; n=42), as illustrated below:



7.2.7 *Length of Time in Sector*

Providers were asked what year their service was established. The earliest year given was 1954, and the most recent was 2018. As can be seen from the graph below, the majority of respondents (85%; n=473) were established in 1995 or later, with 38% (n=211) of responding providers established in 2008 or after.



A clear uptick in service providers is evident in line with the announcement in 2009 of the free pre-school year, and another correlates with the expansion of the ECCE scheme in 2016.

7.2.8 *Individual Versus Chain Providers*

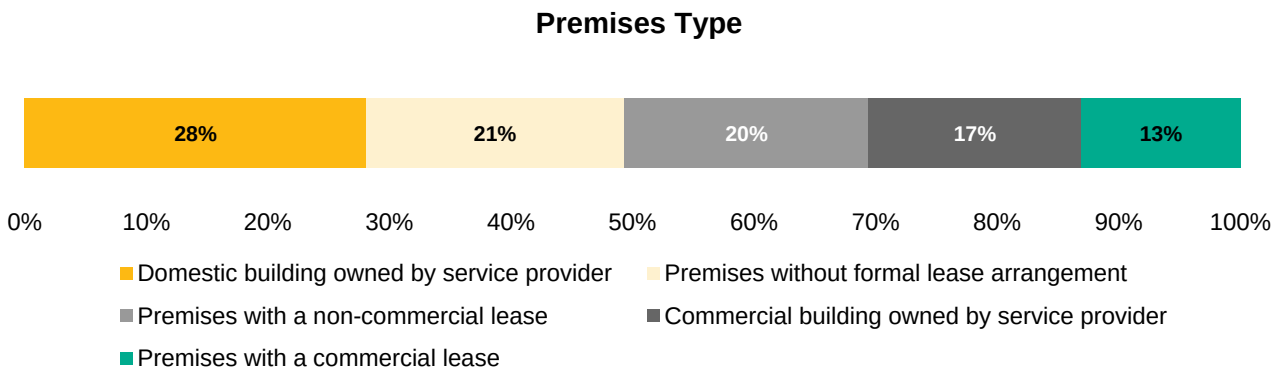
When asked if the service was part of a chain or multiple-centre provider with a central or head-office function, the majority of participants who answered the question (91.4%; n=513 of 561 respondents) indicated that they were stand-alone; only a minority of respondents were part of a chain of childcare providers. This varies only slightly between community/voluntary and private providers, with a slightly higher proportion (12%; n=21) of community/voluntary providers indicating they were part of a multiple-centre organisation with 7% (n=27) of private providers indicating this. This may be influenced by the participation of a network of community Irish-language service providers in Gaeltacht areas supported by a central administration office.

7.3 Premises

7.3.1 Premises Type

The table and chart below indicates the types of premises in which the service is provided. When we consider the dataset as a whole, the responses were fairly spread across the five options, with the largest being *domestic building owned by service provider* (156 or 28% of respondents). Only 30% (n=170) of providers' premises were commercial in nature (*commercial building owned by service provider* or *premises with a commercial lease*).

Type of premises	Number	%
Domestic building owned by service provider	156	28%
Premises without formal lease arrangement	118	21%
Premises with non-commercial lease	112	20%
Commercial building owned by service provider	97	17%
Premises with a commercial lease	73	13%
Total responses	**556**	**100%**

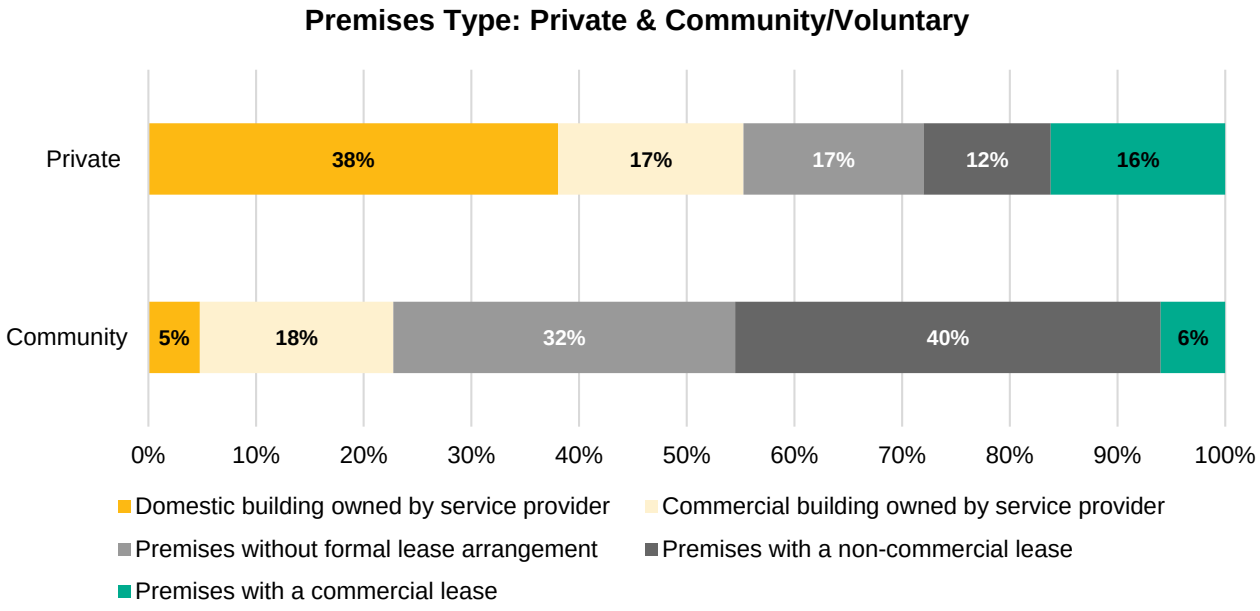


The Pobal Early Years Report 2017-2018 had a slightly different categorisation, but could be roughly compared to the data above. The table below shows the Pobal data compared to the survey findings:

Premises ownership	Pobal Data %	Survey %
Leased	42%	34%
No formal agreement	10%	21%
Owned	48%	45%
Total	**100%**	**100%**

The survey findings do vary from the Pobal data, mostly in the "no formal agreement" category. It is unclear why this may be the case, but there may be some differing interpretation in relation to "non-commercial lease" and "without a formal lease arrangement"; this is further explored below in examining the key differences in private and community providers by comparison with the Pobal survey data.

There is a clear difference between private providers and community/voluntary organisations in premises type, as set out in the chart below:



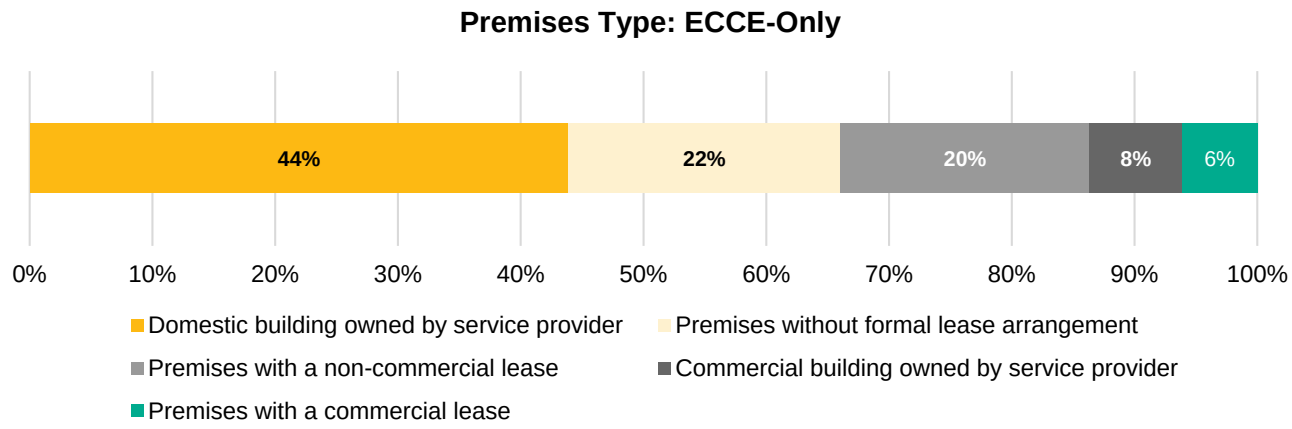
72% (n=119) of community/voluntary organisations who responded are operating in leased premises with non-commercial leases or without formal lease agreements, with 18% (n=30) in owned commercial premises. Private enterprises indicated that more than a third (38%; n=148) of such providers operate in a domestic building owned by the service provider, with a similar percentage (33%; n=130) operating in commercial premises, either owned or leased.

We compared these findings to Pobal's 2017/2018 Sector Survey data, as follows:

	Private		Community/Voluntary	
Premises ownership	**Pobal Data %**	**Survey %**	**Pobal Data %**	**Survey %**
Leased	40%	28%	48%	46%
No formal agreement	7%	17%	17%	32%
Owned	53%	55%	35%	23%
Total responses	**100%**	**100%**	**100%**	**100%**

The biggest differences are in relation to "leased" and "no formal agreement" in the private sector whereby Pobal data shows a higher proportion of their respondents falling into the former category with a lower number indicating a lack of formal agreements than in the Crowe survey, and vice versa. There is a significant difference in the community sector in respect of buildings owned versus those with no formal agreement. It is not clear why these differences between the different surveys exist.

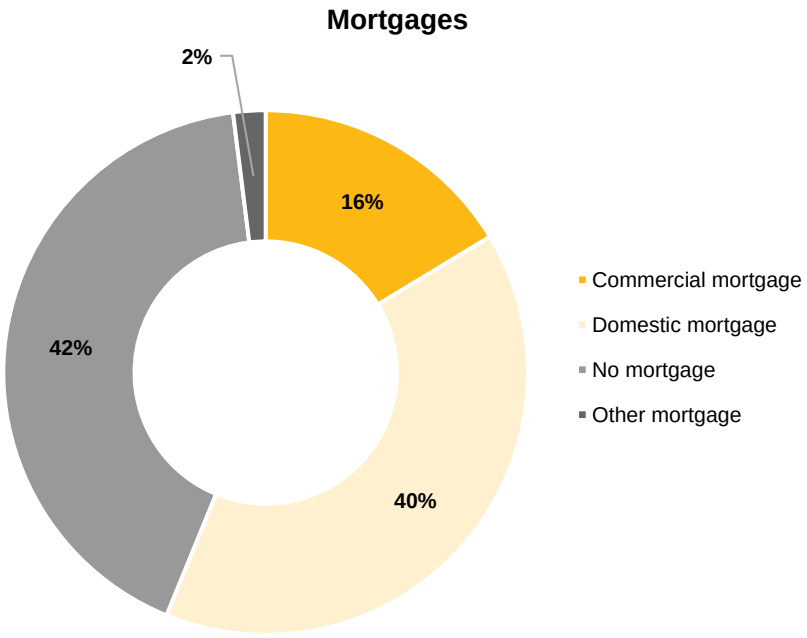
ECCE-only providers use a much higher percentage (44%; n=93) of domestic buildings owned by the provider, with only 14% (n=28) operating in commercial premises either owned or leased, as the following chart illustrates.



7.3.2 Mortgages

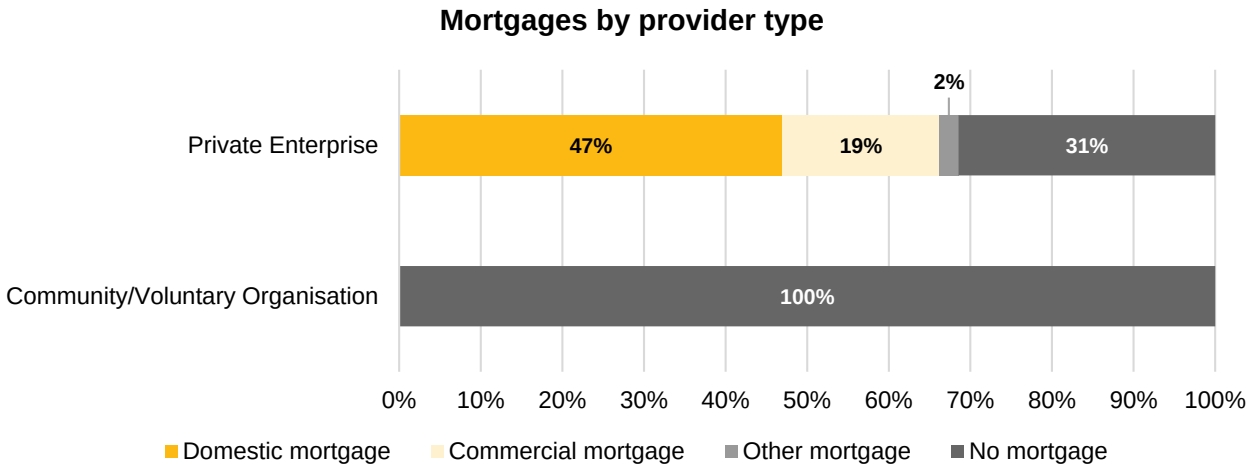
For those survey respondents that owned the property where the service was provided (n=253), only 16% (n=41) had a commercial mortgage. Just over half of respondents (58%; n=146) stated that they had any mortgage, with 42% (n=105) having no mortgage at all.

Of those that had a mortgage, respondents were asked how long was left on the loan. The answers ranged from 1 year to 40 years, with the median being 14 years.



When we further examine the responses by provider type, it is still clear that commercial mortgages are the minority. The charts below illustrate that none of the community/voluntary

providers in the dataset have mortgages on the premises, with 19% (n=41) of private providers holding a commercial mortgage.



7.3.3 Grants

For those that own the building used for childcare, they were then asked if grant aid was availed of for building, extending, or renovating the premises. A number of providers (n=124; 22%) indicated that they had availed of grant aid for any of the activities; see the table below.

Type of Grant Aid	Number
For building premises	66 (12%)
For extending premises	28 (5%)
For renovating premises	30 (5%)

The total grant aid availed of by these 124 respondents to the survey totals €23m, the vast majority of which (€20.9m) was for building rather than extending or renovating.

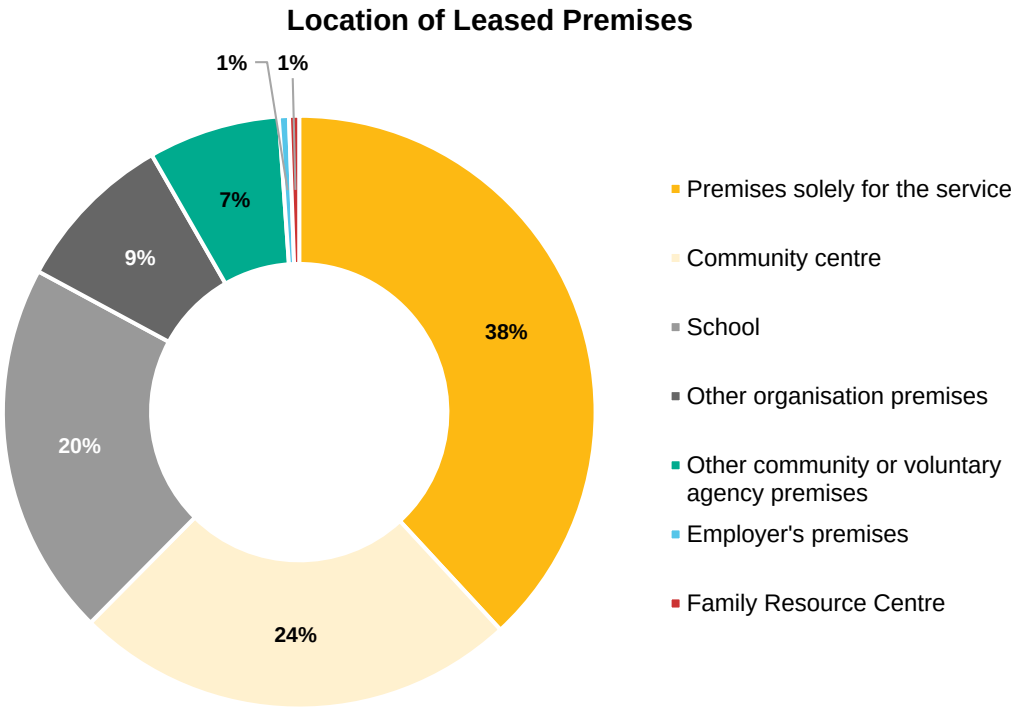
When we look at the distribution of grants among provider types, there is a significant difference between community and private providers. Although more individual private provider respondents reported receiving grants (82 private versus 36 community providers), the amounts received by those in the community and voluntary sector for building grants are substantially more than those reported by private providers in the survey. This is illustrated in the following table.

	Number of Providers Receiving Grants		Grant Amounts		% of grant amounts	
Grant Type	**Community**	**Private**	**Community**	**Private**	**Community**	**Private**
Building	25	41	€18,288,186	€2,572,000	88%	12%
Extending	2	26	€335,156	€816,747	29%	71%
Renovating	6	24	€100,000	€1,117,273	8%	92%

As can be seen, the bulk of the value of the grants for building premises was for community rather than private providers, which is reflective of the target of the Large Scale Capital Investment Programmes.

7.3.4 *Leased Premises*

For those participants that did not own, but leased, the premises used for childcare (n=185; 33% of overall responses), they were asked where the leased premises were based. Approximately 38% (n=69) of respondents who leased their premises stated that the premises were solely for the service. Of the respondents who indicated that the premises were based at a location shared with another service or agency, many indicated their service was based at a community centre (24%; n=44) or a school (20%; n=37). Only a minority are based with other organisations, agencies, or family resource centres.



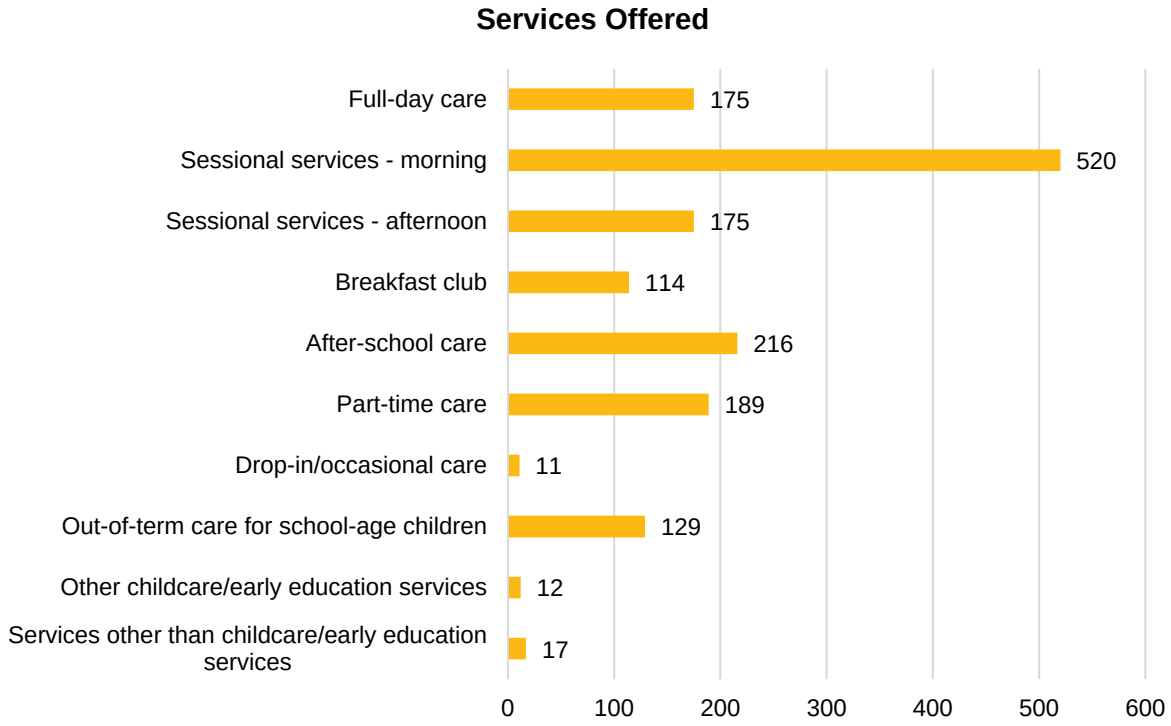
7.4 Services

7.4.1 Overview

We asked providers a series of questions in relation to the services provided, the responses to which are set out here.

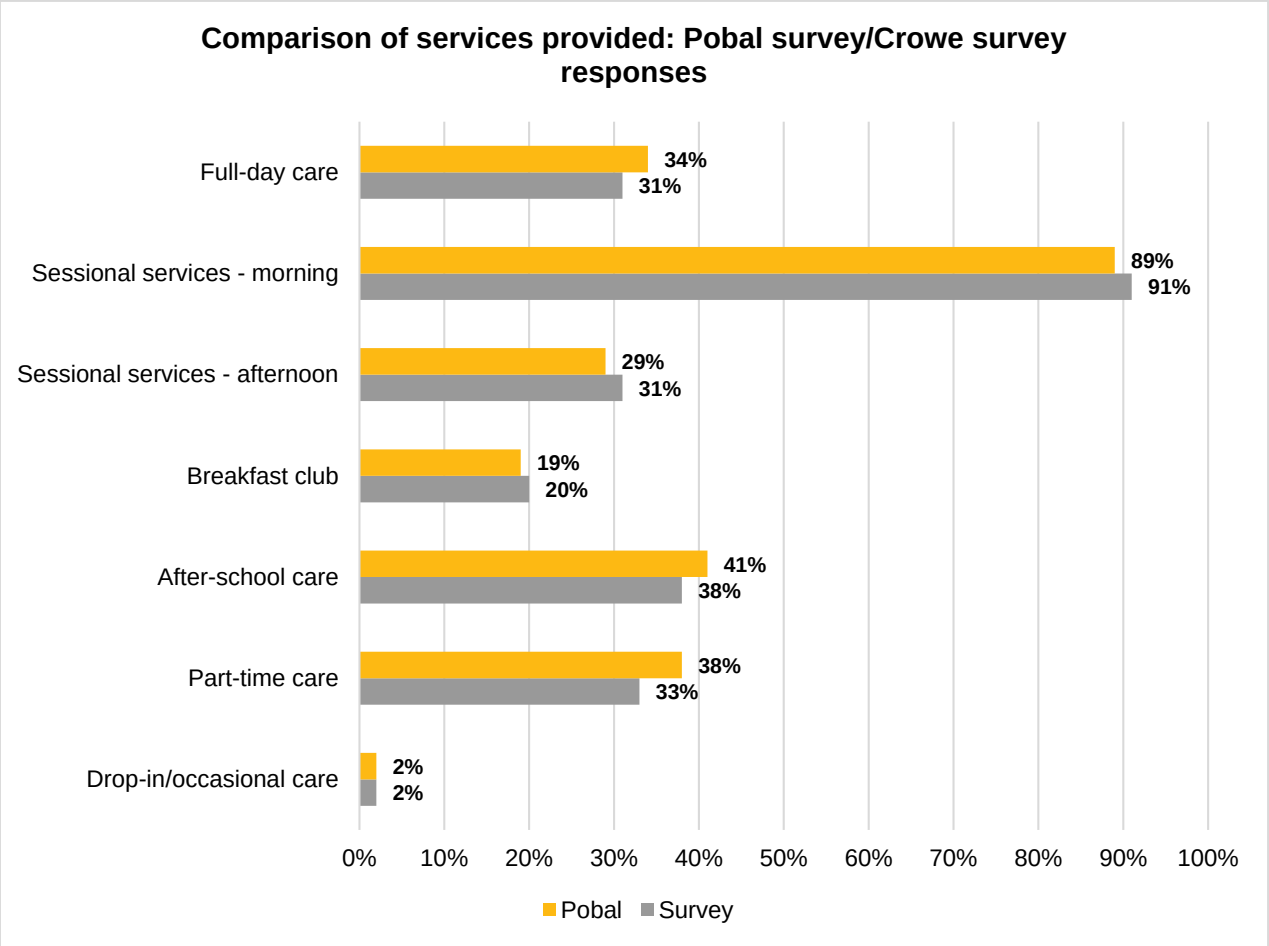
7.4.2 Services Offered

When asked what services they offered, the results were as set out in the chart below. *(Note: Because many providers can and do offer more than one service, e.g. full-time and sessional care, the totals exceed the total dataset responses.)*

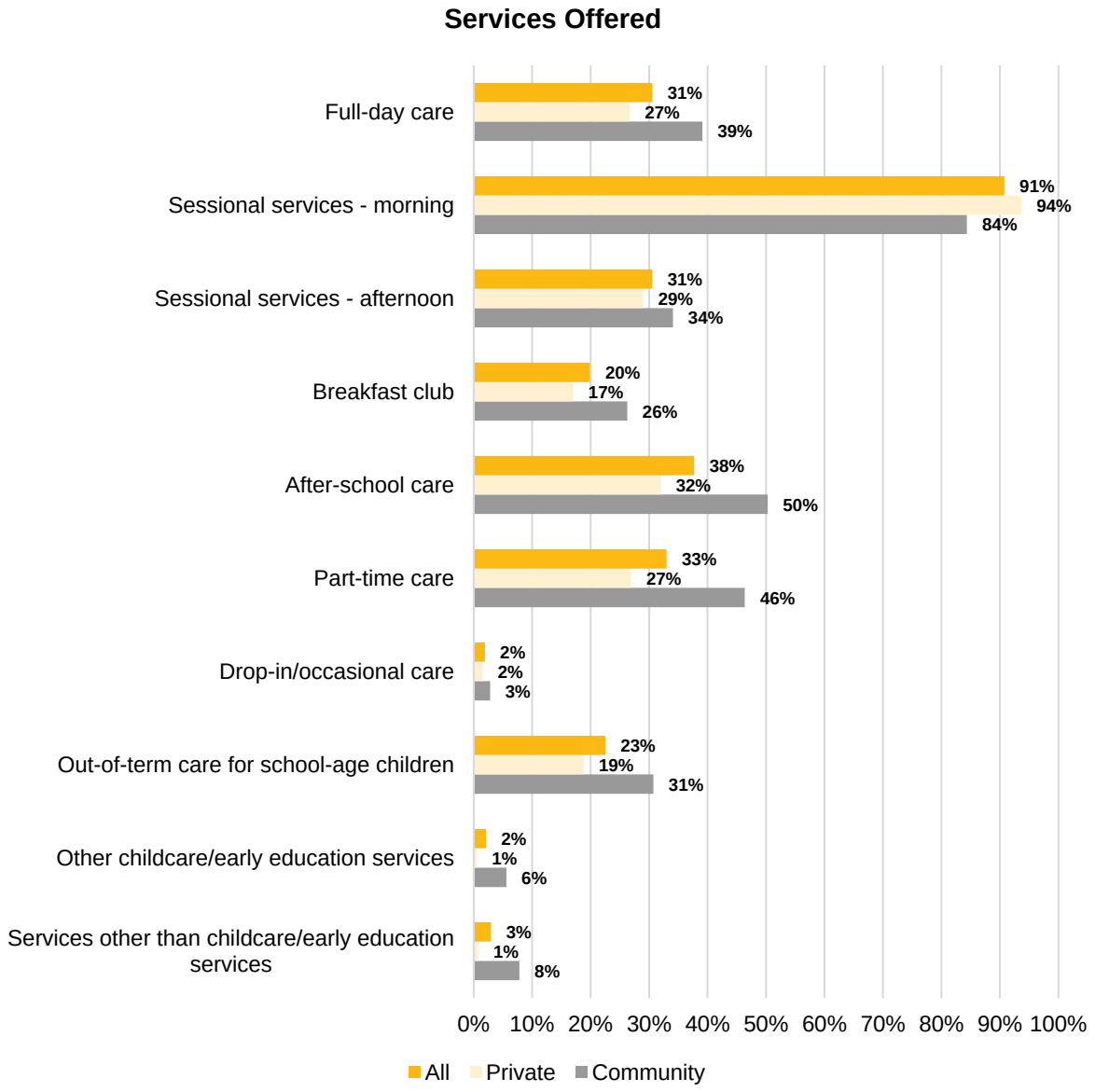


As illustrated above, the majority of respondents (n=520; 91%) indicated that they provided at a minimum sessional services in the mornings. Only a very small number of providers (n=40; 7%) stated that they provide services other than childcare, other childcare services, or drop-in/occasional care.

When compared with Pobal's sector profile data, the breakdown of service type is very similar, as can be seen in the following chart:



We can see when we compare the provider types that the overall distribution of services provided is broadly similar between private and community providers, as the following chart indicates.

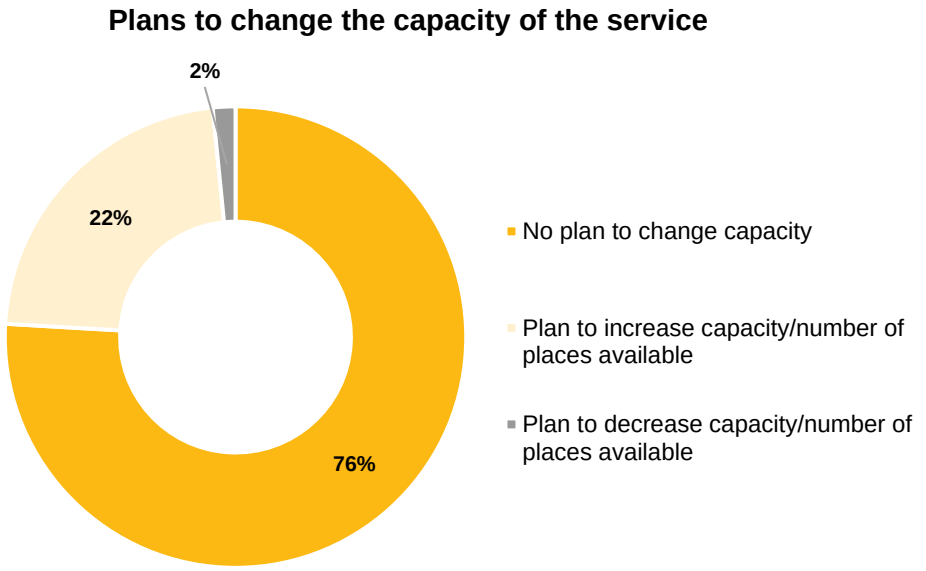


(Note: because providers could select more than one service, the percentages do not add up to 100%. The percentages represent the proportion of providers who indicated they provided the service in question, i.e. 91% of all providers provide full-day care; 32% of private providers offer after-school care, etc.)

Community providers who responded indicated that they more frequently offered after-school, out-of-term, and part-time care services than the overall profile or that of private providers. Almost all services offering non-childcare services were in the community and voluntary sector.

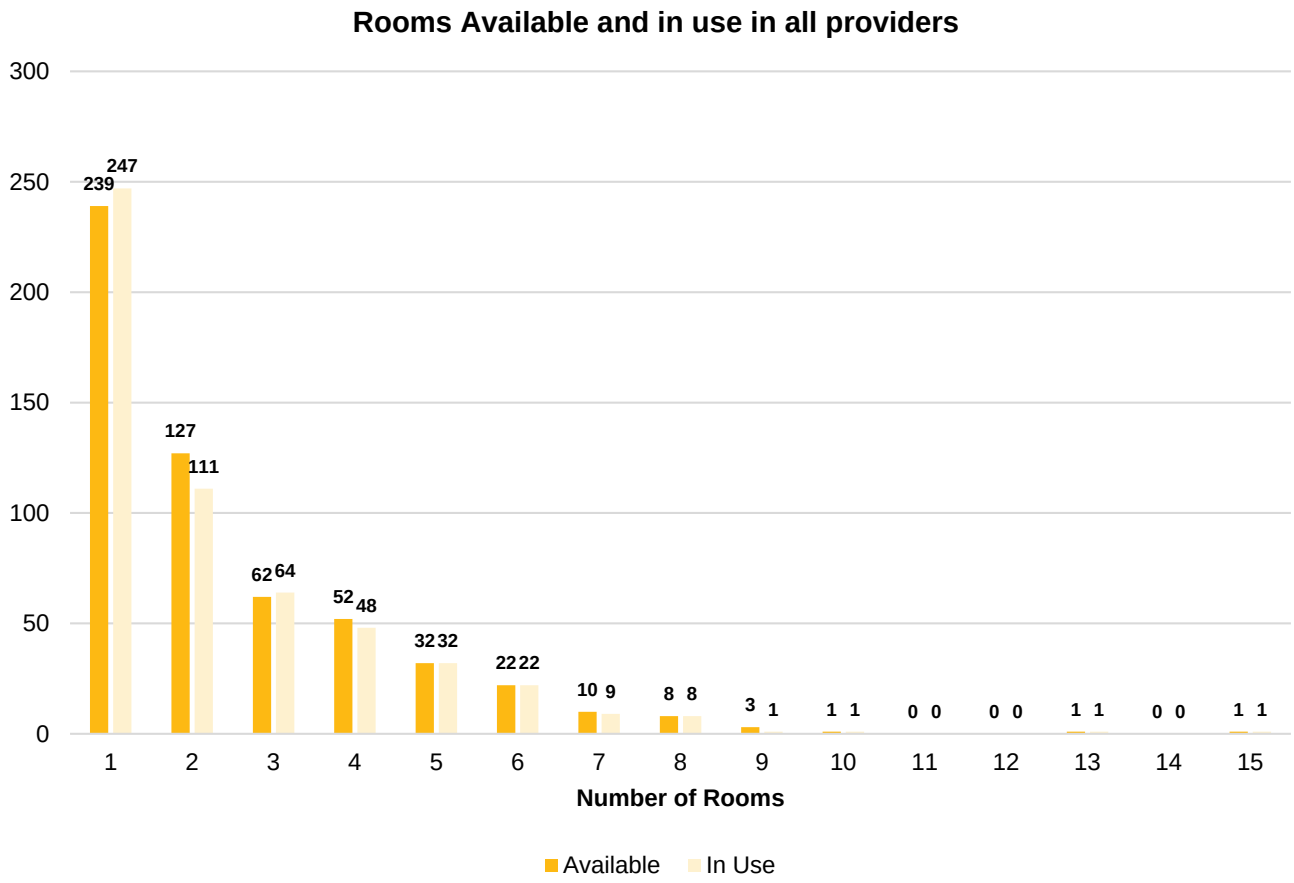
7.5 Capacity

Half (50%; n=283) of providers who responded to the question stated that they had a waiting list. However, when asked if there were plans to change the capacity of the service, 76% (n=432) of the respondents indicated that there was no plan to change capacity. Only 2% (n=9) stated that they planned to decrease capacity. (This does not vary across provider type.)



7.6 Rooms

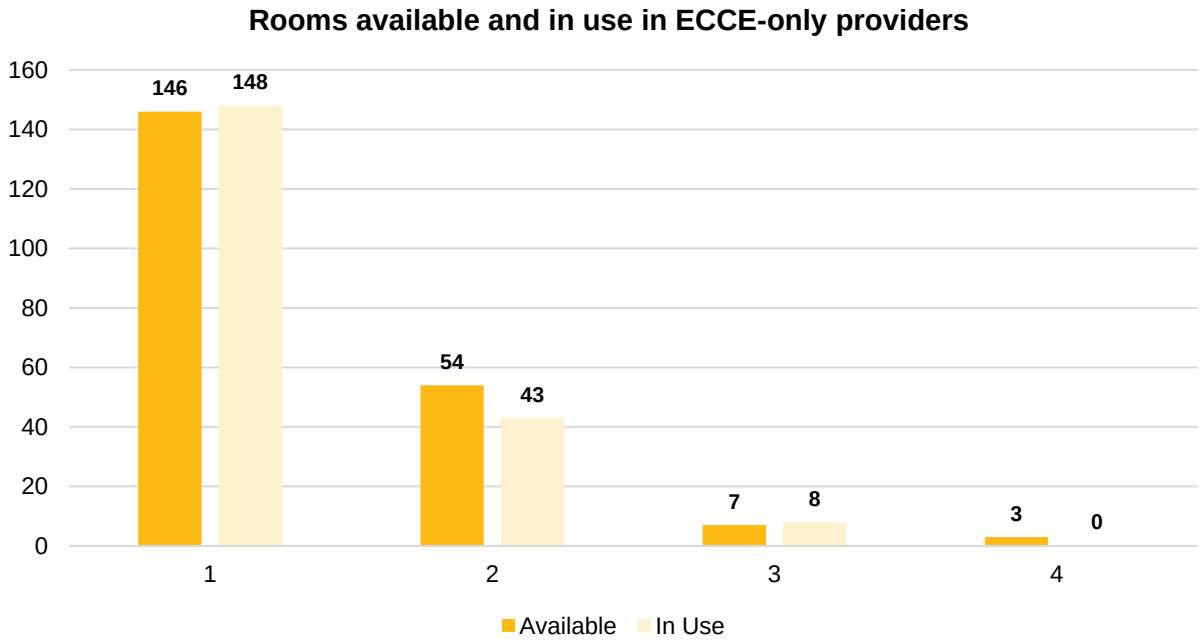
Providers were asked to provide information regarding the number of rooms available and the number of rooms currently being used by the service.



Note that where the number of rooms in use looks higher than the number of rooms available, this is due to, for example, where 52 providers have four rooms available but four of these are not using all four available rooms, which then explains why it appears that the number of providers using three rooms is higher than providers with a maximum of three rooms available.

The number of rooms available to and in use in the services for the provision of childcare services ranged from one room to 15 rooms. Of providers who responded, 66% (n=366) operate with only one or two available rooms. Just under a quarter (23.3%; n=130) have more than three rooms available.

As might be expected, those providers only offering ECCE services typically have fewer rooms available and in use, with 68/69% (n=146/148) of ECCE-only respondents having only one room available and in use. A mere 5% (n=10) of these providers had more than two rooms available and 4% (n=8) had more than two rooms in use. The chart below illustrates the rooms available and in use for ECCE-only providers:



7.7 Charges and Discounts

7.7.1 Sibling Discounts

Less than half of providers (41%; n=235) indicated that they offered sibling discounts. When asked the amount of the discount, responses for the second child ranged between €3 and €80, with an average of €12.00. Discounts for the third child ranged between €3.85 and €70, with the average at being €13.76. For a fourth child or more, the discount ranged between €3.85 and €100, with an average of €15.39.

7.7.2 Food

The provision and inclusion of food within the fees varies by the type of care provided. For services providing full-day care, nearly two-thirds (65%; n=158) of services indicated they provided food included within their fees. Sessional services were less likely to provide food, with 73% (n=357) of morning sessional services and 68% (n=166) of afternoon sessional services not providing food. For those services that did provide food at an extra cost to the parents, the cost ranged between €2 and €25 per child per week.

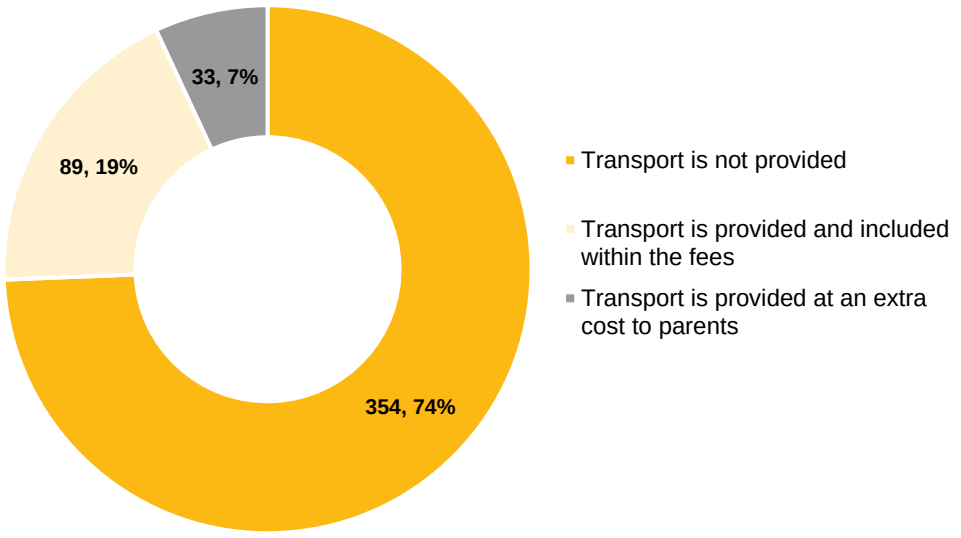
The table overleaf sets out the responses in relation to the provision of food and cost to parents for different service types.

	Food included within fees		Food provided at extra cost		Food not provided	
Type of Care	**%**	**N**	**%**	**N**	**%**	**N**
Full-day care	65%	158	1%	2	34%	83
Sessional services – a.m.	23%	115	4%	19	73%	357
Sessional services – p.m.	30%	74	2%	5	68%	166
Breakfast club	61%	112	2%	4	37%	69
After-school care	69%	180	3%	8	28%	72
Part-time care	63%	155	2%	6	35%	86
Drop-in/occasional care	32%	39	2%	3	66%	81
Out-of-term care	64%	125	1%	2	35%	68

7.7.3 Transport

Providers were asked if transport was provided for school-age children to drop to and collect them from school. The majority of providers (74%; n=354) stated that transport was not provided. Approximately 26% (n=122) indicated that transport was available, whilst only 7% (n=33) stated that it was provided at an extra cost to parents. The extra weekly cost for transport ranged between €5.00 and €50, with an average of €15.30.

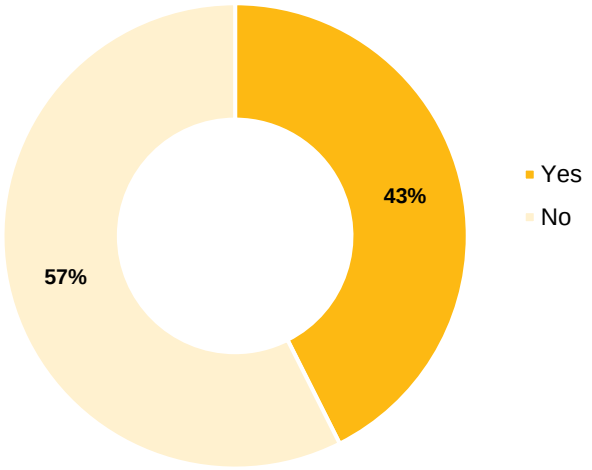
Transport provided to drop to and collect from school



7.7.4 *Additional Services for ECCE-Only Attendees*

Providers were asked about additional optional services offered to families availing of ECCE only. A little over half (57%; n=321) indicated that there were no additional optional services offered.

Additional optional services offered to families availing of ECCE



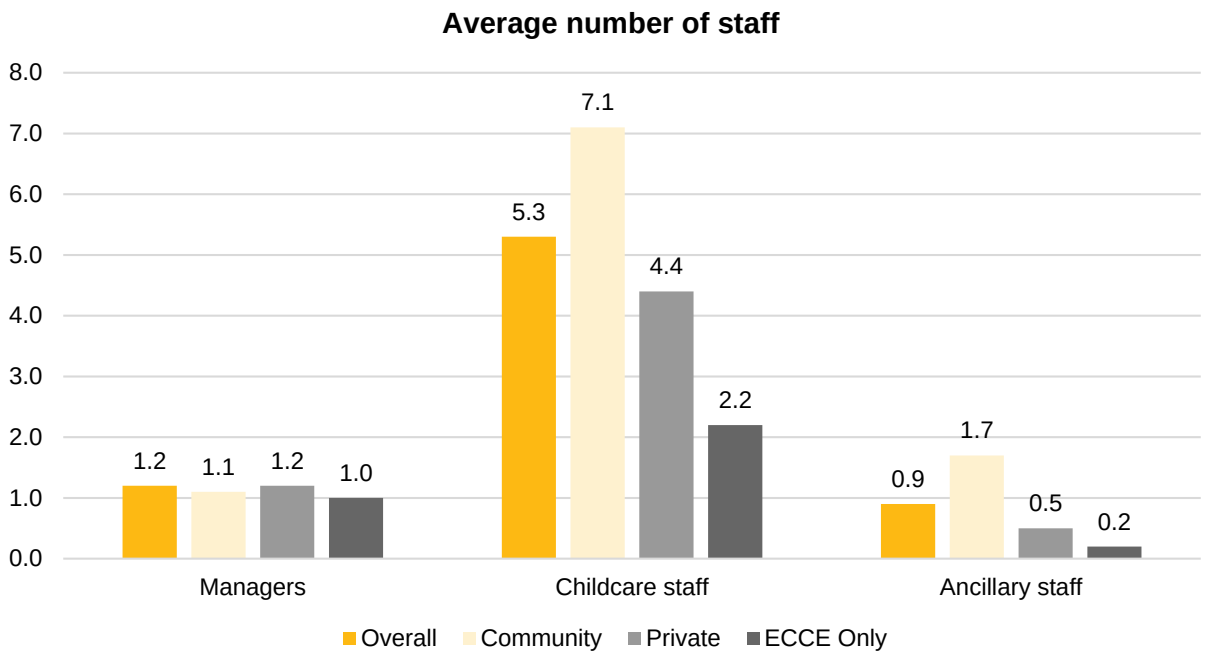
Of those who did offer additional optional services, these included the following, amongst others:

- Additional hours of care, including options for early drop-off and late collection;
- School tours;
- Educational and physical classes, such as music and yoga;
- Camps, such as summer camp;
- Outings;
- Gymboree.

7.8 Staffing

The survey asked for details in relation to managers, childcare staff, and ancillary staff in the services. The numbers varied considerably, from one to four in the case of managers; one to 45 in the case of childcare staff; and from zero to nine for ancillary staff. A little over one-third of the providers (n=207) responding indicated that they employed any ancillary staff.

The average numbers of managerial, childcare, and ancillary staff working in the respondents' services are illustrated in the chart below.

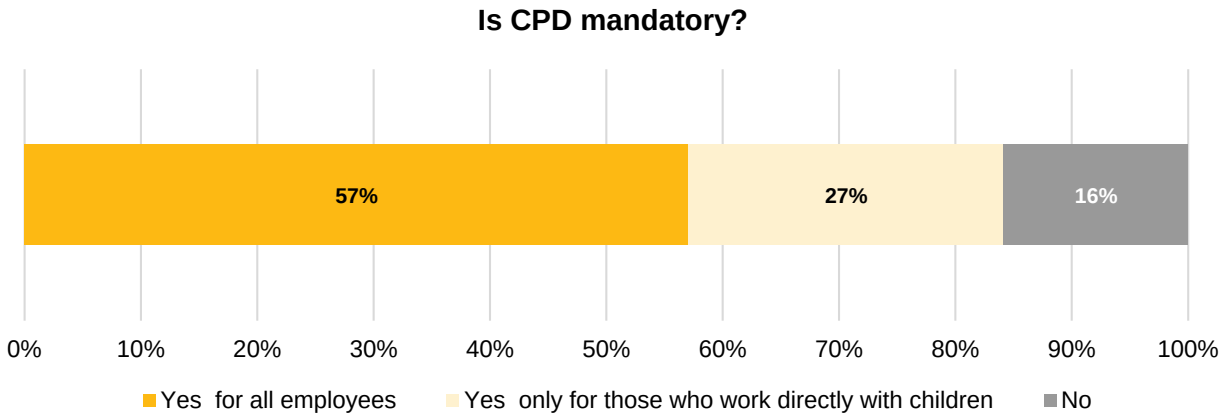


As can be seen, the average number of managerial staff across all respondents is 1.2; the average number of childcare staff is 5.3, and ancillary staff – where these are employed: as above, only 36% of services provided any numbers for ancillary staff – average 0.9. Community provider who responded had higher average numbers of childcare and ancillary staff than private providers. The average childcare staff numbers in ECCE-only services are considerably lower than the overall average, at 2.2.

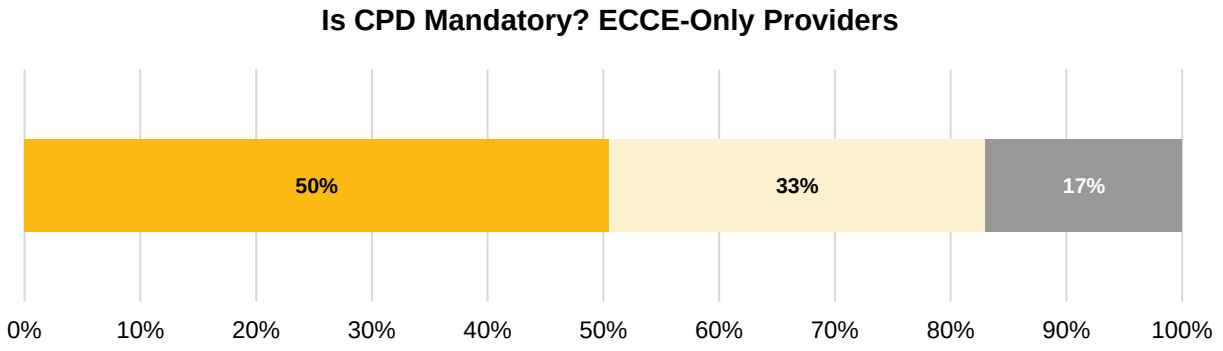
7.9 Staff Development

7.9.1 CPD

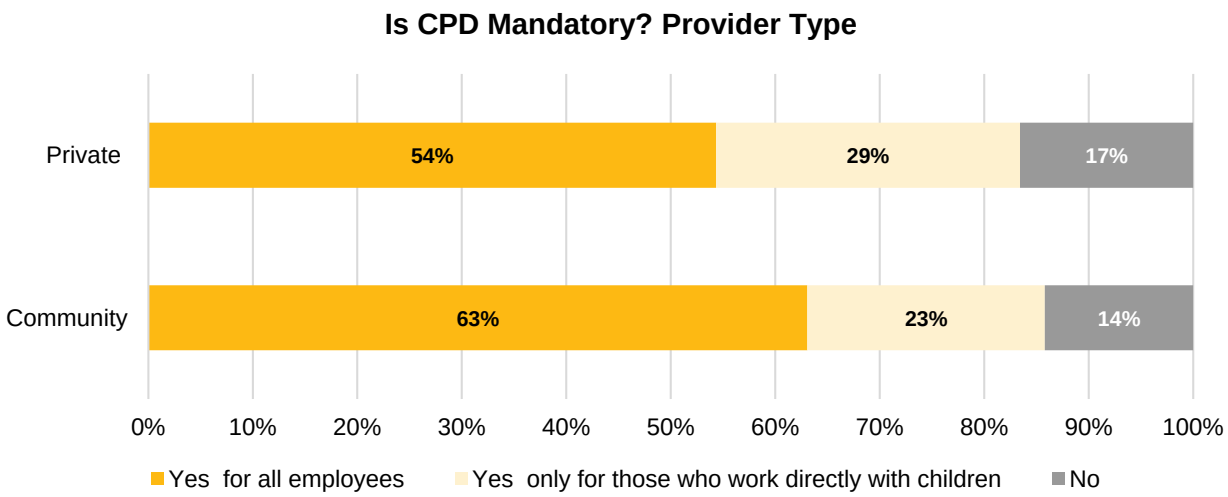
Over half of providers (57%; n=324) considered CPD to be mandatory for all employees, regardless of if they worked directly with children or not. Only 16% (n=90) of providers stated that CPD was not mandatory for any employees. Over a quarter (27%; n=154) stated it was only mandatory for those that worked directly with children. This is illustrated in the following chart.



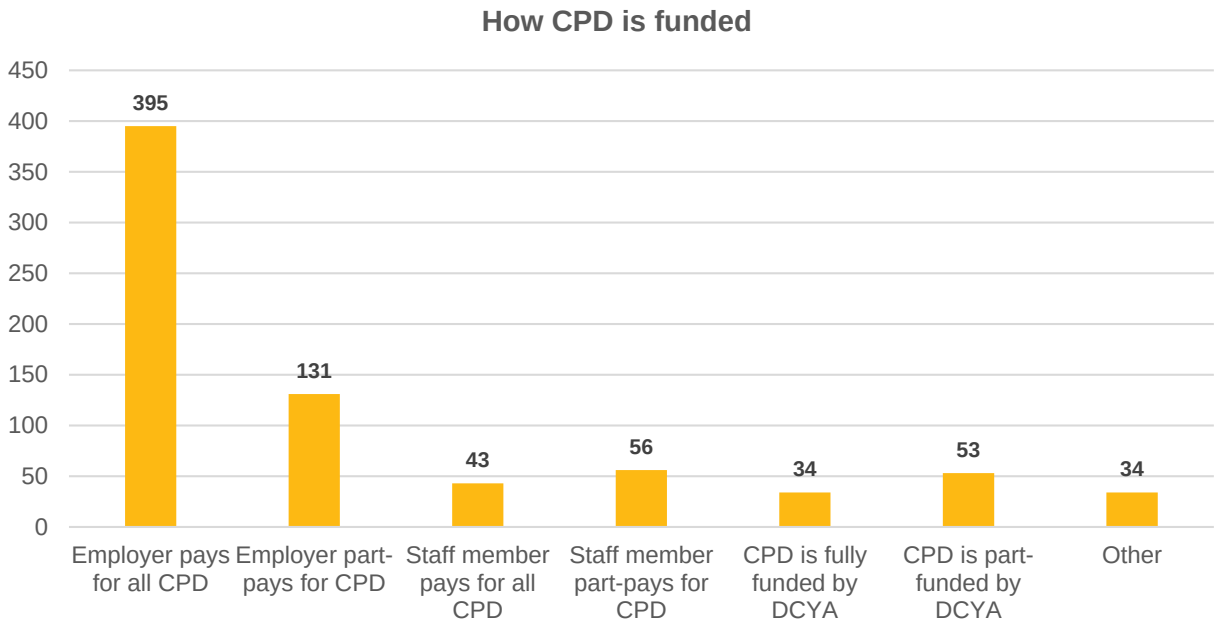
ECCE-only providers were broadly in line with their views on CPD being mandatory and for which employees, as can be seen in the graph below:



When looking at private enterprises and community/voluntary organisations, there is still a strong emphasis across both provider types on CPD. However, a larger percentage of community/voluntary organisations considered CPD to be mandatory for all employees, as illustrated in the following chart.



7.9.2 Funding of CPD



As can be seen from the chart above, more than two-thirds (69%; n=395) of respondents stated that the employer pays for all CPD, with a smaller proportion (23%; n=131) stating that the employer part-pays for CPD. Other options for payment of staff CPD activities were in the minority. Funding of CPD was broadly similar across the different provider types.

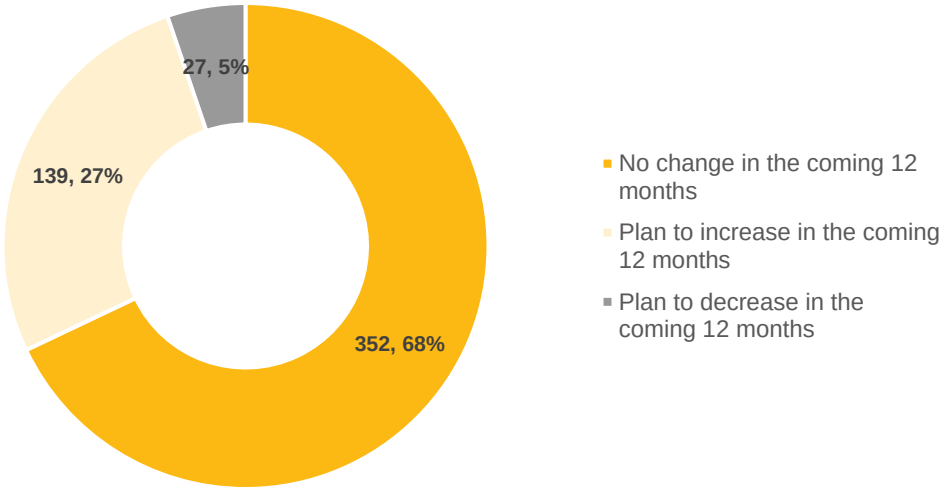
For these CPD activities, 56% (n=310) of providers noted that CPD is undertaken outside work hours only, with no leave available. Paid leave or overtime was available from 32.5% (n=179) of respondents, and 11% (n=62) made unpaid leave available for CPD.

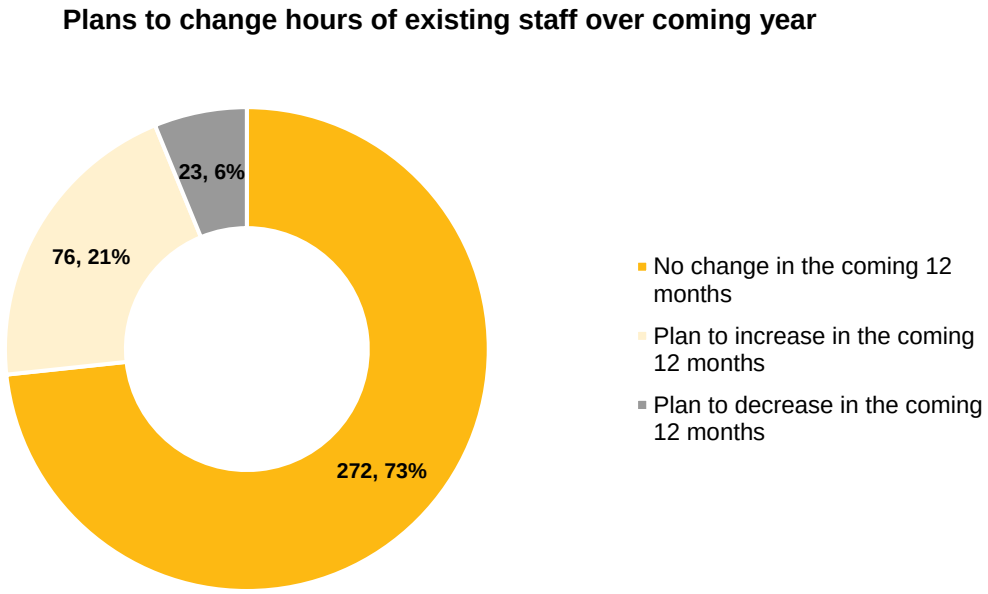
7.10 Staffing Resources and Turnover

7.10.1 Plans for Staffing Resources

When asked about plans to change staffing resources over the coming year, the majority of respondents indicated that they had no plans to change staffing resources, with no change planned for either number of staff or staff hours. Only 5% (n=27) of providers who answered the question planned to decrease in the coming 12 months and only 6% (n=23) of those responding planned to decrease hours in the coming months. Slightly more planned to increase staff or hours in the coming 12 months (27%; n=139; and 21%, n=76; respectively), but, overall, providers were not planning on making any changes to staffing resources in the following year. The following charts illustrate this.

Plan to change number of staff over coming year





7.10.2 Staff Turnover

To gather information around staff turnover, questions were asked about the number of staff who left the service within the last 12 months, staff who joined within the past 12 months, and current vacancies. We examined the turnover by considering the figures for staff who left as a percentage of the overall staff of each provider. Across all respondents, the average percentage of staff leaving within the past 12 months was 12%, ranging from 0 to 100% However, 59% (n=319) reported no staff leaving in the preceding 12 months.

This table sets out the regional averages for turnover as a percentage of overall staff, the range of percentages across the responses, and the number of respondents that answered this particular question.

NUTS3 Region	Total staff	No. of staff leaving post in year	Staff turnover
Dublin	1,088	167	15%
Mid-East	630	76	12%
South-West	553	49	9%
Mid-West	580	53	9%
West	347	28	8%
South-East	298	43	14%
Border	394	58	15%
Midlands	272	30	11%
Total	**4,162**	**504**	**12%**

Average turnover percentages did not vary across provider type, i.e. private and community providers had similar averages and ranges to the overall figures.

The average turnover figures indicated in the survey are substantially lower than those reported to Pobal in the Early Years Sector Profile Report 2017-2018, which indicates

reported turnover of on average 24% across the sector. It is not clear why this difference exists.

When analysing turnover without single-employee owner-managed providers, the turnover percentage did not change significantly.

7.10.3 Staff Recruitment, Retention, and Development Issues

Providers were asked about their key concerns in respect of recruiting, retaining, developing, and maximising the skills of appropriately qualified and experience employees. The majority of respondents (83%; n=475) indicated that the capacity to offer attractive wages or salary levels was a key concern. Another key concern for many providers (72%; n=414) was the difficulty of attracting suitably qualified and experienced childcare staff. The responses less commonly highlighted by respondents included difficulty attracting staff with appropriate language competency, and competition from other childcare providers.

The following diagram illustrates the key concerns (note that because more than one concern could be selected, the total of the responses exceeds 100%).

Key concerns in relation to attracting and retaining staff

7.11 Survey Findings – Qualitative

The survey included some opportunities for participants to express their opinion on the key issues relating to the cost of providing quality childcare. A brief overview of these qualitative responses is set out here.

- **Low Salaries:** Providers believed that the low salaries within the sector impact on the ability of providers to both recruit and retain qualified staff.
- **Part-Time Conditions:** The part-time nature of work in the childcare sector, including services that lay off staff in the summer months as services are not funded year-round (e.g. ECCE), was also cited by providers as a significant challenge to recruitment and retention of staff.
- **Difficulty Finding Staff:** In addition to low salaries and part-time working year, providers also reported experiencing difficulty in finding appropriately qualified, capable, and motivated staff. In addition, some providers reported difficulty in finding staff with the appropriate language skills, including English and/or – in Gaeltacht areas and for Irish-language services – Irish.
- **Financial Challenges:** All providers reported experiencing significant financial challenges and pressures.
- **Uncertainty:** Some providers indicated they perceived a great of deal of financial uncertainty operating in the childcare sector, reportedly reducing the ability of providers to plan ahead, particularly with regards to staffing decisions, stemming from not being able to predict income due to not knowing how many numbers they will have until the beginning of a term.
- **Poor Morale across Sector:** Providers reported a perception of poor morale amongst those working in the sector, driven by some of the issues listed above and a more general sense of the work of the childcare sector not being fully valued.
- **Administration Workload:** A common frustration expressed by a number of providers was the perceived complex level of administration required to operate in the sector and comply with regulations; this administrative workload was reported as onerous and time-consuming.
- **Rural Challenges:** A number of providers who worked in rural areas referenced specific challenges due to their operating environment, including low population numbers which impact on income, (in)accessibility of training events for staff, and operating in areas of lower income.
- **Irish-Language Providers:** Many of the issues cited by Irish language providers were aligned with those of English-language childcare providers, such as difficulty in recruiting staff, paperwork, and so on. Providers perceived that their work was not afforded the recognition they believe it deserves, with a reported lack of support for the additional costs of equipment and translation services required to provide childcare services through the Irish language.

8 Regression Analysis Outputs

8.1 Introduction

This paper sets out of the details of the outputs from the regression analysis undertaken to improve the understanding of the drivers of costs in relation to childcare. The work develops on the data cleaning, data analysis, and development of the cost modelling tool undertaken in 2018 and 2019, drawing on the same dataset, as well as some additional geographical factors.

As discussed in Section 6, the work involved reviewing findings from the current research project alongside previous work by Paull and Xu for Frontier Economics (2019). These findings were used to compile a range of potential drivers of unit costs. We then sought to operationalise these drivers using the data available to us. This dataset was analysed descriptively before being incorporated into multivariate regression models. The aim of this study was to identify and quantify the independent associations of these drivers with the calculated unit costs of the childcare services previously surveyed.

8.2 Results

8.2.1 Overview

This section shows the results from both the data preparation and checking as well as the final regression model developed.

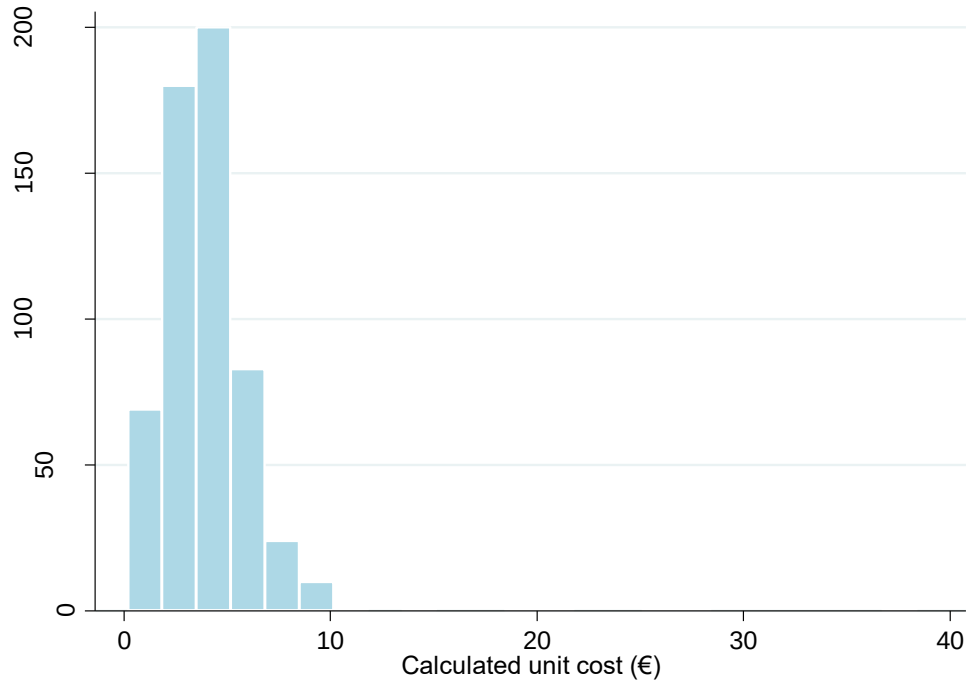
8.2.2 Descriptive Analysis

A descriptive analysis of the data identified several interesting features (see appendix, Table A1 for frequency tables of categorical variables).

Unit cost:

- The original unit cost variable was highly positively skewed (skewness = 5.44, see Figure 1). This was mostly due to several outliers above €15. Five cases with very high unit cost values (€15 to €38) were therefore removed from the analysis so that they would not unduly affect the results of the regression. This reduced the skewness to 0.83. The remaining sample size was N=568. (See Figure A1 for the histogram with outliers excluded).
- The mean of the unit cost variable (trimmed of outliers) was €3.93, and the median was €3.77. Standard deviation was €1.87.

Figure 1: Histogram of original calculated service-level unit cost (€ per child-hour)



Size:

- There was an almost equal split in services across the four different size categories of small, medium, large and very large, with 25% in each category. This was due to the size variable being derived from the available hours in services, split into quartiles. Small represents approximately 13,000 hours or less per year; medium between 13,000 and 25,000 hours per year; large between 25,000 and 90,000 per year; and very large more than 90,000 hours per year.

Ownership profile:

- Just over two thirds (69%) were private enterprises.
- Most of the services (78%) were either companies limited by guarantee (30%) or sole traders (48%).
- There was a mix of the location in which services were based with the most notable being a domestic building owned by service provider (28%), premises without formal lease arrangements (21%) and premises with a non-commercial lease (20%)
- Not many providers had multiple sites (8%).

Service categorisation:

- Only 10% of services did not provide ECCE-funded services.
- Just under half of all the services were in receipt of the ECCE higher capitation rate (48%).

Geographical profile:

- Nearly all of the services were categorised as being in localities either marginally above (44%) or below (42%) average deprivation. There were some very low incidence categories – very and extremely disadvantaged (N=2 and N=1 respectively) – which

were subsequently grouped with the disadvantaged category for inclusion in the regression analysis.

- The services were fairly evenly split between urban (58%) and rural (42%).
- The largest number of services was located in the Dublin region (25%), with the smallest in the Midlands region (6%).
- The county of Dublin was the largest in terms of service numbers (25%, 143 services). Three counties had 5 or fewer services.

Services provided:

- Just under a third (30%) provided full-day services and 29% part-time services. 91% provided morning services and only around a third (31%) provided afternoon services. 19% provided breakfast services and 37% provided after school services. 21% provided an out-of-term service, but almost none provided drop-in services (1%). As a result of this, the drop-in service indicator was excluded from the remainder of the analysis.
- Around 37% of services had at least 95% of their available hours filled (see appendix, Figure A2) but a large minority of services (36%) had more than 20% of their available hours unfilled.
- The average percent of non-contact hours across services was 22% (see appendix, Figure A3), with the vast majority (91%) falling between 0% and 40% of total hours.
- Only 17 services (3%) were recorded as having a quality award (i.e. Síolta accreditation and/or excellent scores in DES inspections).
- Around 29% of services were open nearly the whole year, with the rest mostly (63%) open during the school year (38 weeks).

Staff qualifications, child contact and turnover:

- Two thirds of the services (61%) were graduate led (either a manager or room leader being a graduate).
- The average qualification level of staff in services (see appendix, Figure A4) was just above level 6 (6.2). There was considerable variation around this, however, with some services (14%) having an average level of 7 and above. There was a definite peak at level 6, indicating that this is a commonly required level of qualification for staff.
- Most services had mandatory CPD (81%) for either all (55%), or for care staff (26%). However, this tended to be outside work hours (49%), with a smaller proportion (33%) getting paid CPD (overtime or leave).
- Staff turnover was zero for the majority of services (61%). Eighteen percent (18%) of services had a staff turnover of 20% or less and a further 18% had a turnover of more than 20%, up to 50%.

Child profile:

- The youngest children for many services (54%) were aged between 3 and 5 years. A minority only provided for school age children (4%). 17% of services provided for children less than 12 months of age.

Staff-child ratios:

- The average staff-child factors[26] suggested that most sessions safely conformed to regulations with more adults per child than the legal limits (see appendix, Figure A6).
- The average factor was 86%, meaning that there was 86% of the maximum number of children permitted by the regulation applicable in sessions on average. The standard deviation was 22%[27].
- The average group size in rooms was 15 children, with a standard deviation of 5.8. Considering the child-to-adult regulations, this suggests that many sessions had multiple staff members looking after larger groups of children in a room (see appendix, Figure A7).

Income:

- The income of services was strongly dependent on ECCE (see appendix, Figures A8 and A9).
- For around half of the services 75% or more of their income was from ECCE, and for more than a quarter of them, 95% or more of their income was from ECCE. This was reflected in the proportion of income from fees, which showed that for two-thirds of services, fees made up 25% or less of their income.

8.2.3 Missing Data

Some variables suffered from missing values for some services (see appendix, Table A2). An average staff-child factor could not be estimated (or imputed during the data cleaning process) for one service, nor could the average staff qualification level. The data on children being provided services in rooms was not complete for 19 services (and so the average group size and youngest children could not be calculated); the type of premises was missing for 17 services, and the entity type was missing for 11 services. Also, the level of local deprivation was missing for two services. The most missing data related to CPD: 22 services did not respond as to whether CPD was mandatory, and 35 did not state whether leave was provided for CPD or not. The overlapping combinations of these variables (see appendix, Table A3) meant that a sample size of N = 487 was available for a complete case analysis.

8.2.4 Pairwise Correlations

The estimation of pairwise correlations between all variables (see appendix, Table A4) identified one particular issue. Services which provided morning sessional care were almost perfectly (negatively) correlated (-0.99) with those which did not provide ECCE services. This high correlation is a problem in regression modelling and can lead to instability in standard errors due to multicollinearity. Therefore, this indicator for morning sessional services was excluded from the regression modelling.

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[26] Rather than use a simple adult-child ratio (which is uninformative when varying regulations are relevant according to the ages of the children), we calculated a factor which was the comparison of the adult-child ratio to the relevant regulation. Thus, a factor of one implies that the number of children meets the limit of the regulation. Less than one means there is spare capacity before the regulation limit is reached, etc.

[27] At the time of the survey, no regulatory requirement for staff-child ratios for school age children was in place: a limit of 20 was used within the modelling here as an upper limit was required and this was considered appropriate. It would be misleading to use the new regulation of 1:12 here as this would imply services were not in line with regulatory requirements at the time of data collection.

The estimates of pairwise correlation between variables identified many associations indicative of the characterisation of services. The indicators of service provision were correlated with one another in many cases. Full day, breakfast, after school, and out-of-term services were correlated with one another (r = 0.53 to 0.64), suggesting that services providing one of these services also often provided the others. These service types were also correlated with the opening weeks of the service (r = 0.41 to 0.76) and the ages of the youngest children provided for. Generally, these service types were less likely to be provided where the youngest children were 3-5 years old (r = -0.26 to -0.60).

Non-provision of ECCE services was almost perfectly negatively correlated with provision of morning services (r = -0.99). This multicollinearity motivated the exclusion of the morning service indicator from the regression modelling. Essentially, the service types, opening weeks and ages of the youngest children appeared to collectively provide a characterisation of the service. There appeared to be services that were predominantly providing morning ECCE services, and services which offered a broader range of provision. Indeed, the income of services from fees was correlated with these broader ranges of provision (r = 0.39 to 0.64), and negatively correlated with provision to the ECCE eligible age group (3-5 years, r = -0.54). Likewise, income from fees and ECCE were also associated with opening weeks (r = 0.60, -0.67), as might be expected for ECCE's school year-only provision.

There appeared to be a distinct type of service that was very large (in terms of available hours of service provision). The indicator for this group (which was in the top quartile of the distribution of available hours) was correlated with service types, opening weeks, ECCE only status and the age of the youngest children provided for. The very large services were strongly correlated with provision of full day care (r = 0.74) and being open most of the year (r = 0.71), with breakfast, after school, part-time and out-of-term provision also being associated with this size of organisation (r = 0.47 to 0.58). They were less likely to only provide ECCE services (-0.45) and tended not to have 3-5-year-old children as the youngest they catered for (r = -0.55).

Finally, services with higher average levels of staff qualification were also more likely to be graduate led (r = 0.60), and services that were graduate led were predominantly in receipt of the higher capitation rate for ECCE funding (r = 0.73).

8.2.5 Bivariate Associations

A table of results from the models identifying bivariate associations with unit cost are shown in Table A5 in the appendix. These models showed that many of the bivariate associations with unit cost were statistically significant at the α = 5% level. These results provide a simple way to calculate the average unit cost for particular levels of the explanatory variables. However, they do not statistically control for other variables, and so are of limited use for identifying the drivers of unit cost. Thus, for the remainder of this report we focus on the results of the multivariate regression modelling.

8.2.6 Regression Modelling

A saturated model (excluding county and region) was estimated first. This is a model that included all the identified possible explanatory variables (see appendix, Table A6). All models were specified as ordinary least squares models with unit cost as the response variable.

Model selection proceeded by backward selection in order of significance. The α = 5% level of significance was used as a general guideline by which to identify whether terms could be dropped from the model. The sample was restricted to complete cases so that likelihood ratio tests could be employed to test for significance (this is particularly useful for testing categorical variables which consist of multiple terms).

The following variables were dropped from the model:

- provides after-school service;
- CPD mandatory;
- multisite provider;
- service is graduate led;
- average group size;
- CPD leave;
- provides breakfast service;
- organisation type;
- average staff-child factor;
- staff turnover;
- local deprivation;
- average staff qualification level;
- provides full-day service;
- quality award;
- provides out-of-term service;
- provides part-time service.

The model was then re-estimated with no restriction on case completeness, so that any services with complete data for the retained variables were included. The results are shown in Table 1.

This selection process was repeated for models including (1) indicators for which county the services were located in, and (2) indicators for which region the services were located in. The results of the final models in these cases are shown in the appendix in Tables A7 and A8.

8.2.7 Characteristics Independently Associated with Unit Cost

The resulting estimates identified various characteristics that were independently associated with unit cost.

- There was a definite association with the size of the service, with larger services having lower unit costs (-0.44 to -2.93) than smaller services; this likely reflects efficiencies of scale.
- There appeared to be cost savings associated with the type of premises a service occupied. Those services with no formal lease arrangement appeared to benefit from reduced costs (-0.41). This could have been due to special arrangements reducing their premises costs substantially or even resulting in free premises (perhaps where community space was being used).

- In contrast to the effects for the size of the service, sole traders had lower unit costs (-0.49) than other entity types, presumably because many overheads are avoided by small, solo providers.
- Services which did not offer ECCE services were more expensive (1.95) than those that only offered ECCE services (0.69), compared to those which offered both (i.e. mixed).
- Those services in receipt of the ECCE higher capitation rate were also more expensive (0.46) as is expected, and urban services were more expensive than rural services (0.45).
- In terms of services provided, only afternoon sessional provision was associated with unit cost. Those services providing afternoon sessions were more expensive (0.47) on average.
- Services which managed to fill more of their available hours also had lower unit costs on average (-1.05).
- The percentage of staff hours which were involved in non-contact work was associated with higher unit costs (1.83).
- Services open most of the year were less expensive (-0.73) than those that were open only during the school year.
- The age of the youngest children the service provided for was associated with unit cost. The older the children, the lower the unit cost, with school age children being associated with a far lower unit cost (-3.20) than the younger age groups.
- Both the percent of income from fees and ECCE were associated with lower unit costs. Considering these measures were strongly associated with one another (-0.77), this suggests that higher proportions of ECCE income were associated with slight reductions in unit cost (approximately -0.56), accounting for the associated reductions in fees income.

The models including fixed effects for county and region were similar to this, except that the indicator for rurality was dropped from both models. The area level indicators in each case serve as proxies for this rural indicator, alongside other unmeasured area level characteristics. In both cases, the area level indicators were significantly associated with unit cost at the α = 5% level of significance.

8.2.8 Model Diagnostics

Various diagnostic tests were undertaken to determine whether the final model infringed any of the assumptions on which ordinary least squares regression models are based. A plot of residuals against fitted values (see appendix, Figure A10) and a plot of residuals against quantiles of the normal distribution (see appendix, Figure A11) showed some evidence of heteroskedasticity and outliers, but nothing very alarming. Plots of leverage (see appendix, Figure A12) and Cook's distance (see appendix, Figure A13) showed that the outliers were unlikely to have very dramatic effects on the estimates from the model and were reasonable considering the heteroskedasticity. Variance inflation factors (see appendix, Table A9) identified no variables at risk of multicollinearity (those with moderately high inflation factors were generally part of categorical variables where the dummy indicators would necessarily be correlated).

8.3 Conclusions

The table at the end of this section sets out the estimates from the final regression model (without fixed effects for county and region) after backward selection. Those variables that do not have estimates listed were dropped from the model. The final model was based on 530 services after those with missing data on the retained variables were excluded.

Size played a key role in the variation in unit cost, with large services cheaper than smaller services. Much of the advantage in size may be due to efficiencies that come with scale. Other efficiencies were also important, however. For example, those services where all the hours were filled had a lower unit cost than those with vacancies. Similarly, the effect of the age of the children on cost was apparent, with school age children being cheaper to provide for than younger children. This is undoubtedly related to regulations concerning the number of childcare staff required (adult-child ratio) for different age groups.

In contrast, non-contact hours acted as an inefficiency as these are hours which are not available for greater room capacity. However, this may be indicative of a more professional service. In our dataset, there were very few services with a quality award, and so it was not possible to explore the relationship between costs and objective measures of quality using the quality indicator available.

There also appeared to be cost savings for particular entity and premises types, and this may be due to differences in overheads. For example, sole traders appeared to have lower unit costs, and those services which did not have a formal lease also benefitted. This may be related to small service providers operating out of their homes.

The model shows that the service characteristics play a clear role in driving variation in unit cost and suggests there may be some potential value in segmenting services into categories to support policy decision making. In particular, there appear to be some distinct service types, with a contrast between smaller services that primarily focus on ECCE provision, and larger services that offer a range of different session types.

The unit cost was higher in services with higher capitation, presumably as the costs of employing staff are higher. This is consistent with the findings in the Frontier Economics Paull and Xu study. As is consistent with the Frontier Economics study, the model does not include the variables in relation to CPD, whether the service is graduate-led, and average staff qualifications.

Curiously, services that opened all year appeared to have a lower unit cost than those that did not. This contrasts with the Paull and Xu study, which found that all-year opening was associated with a higher cost than term only. It may be that the association of all-year opening with size is responsible for this (very large services tended to open all year).

In terms of geographic variables, the final model retained an indicator for rurality, with urban services being more expensive than those in rural areas. This is likely related to city prices being higher than those in rural areas. The models which were estimated with the inclusion of fixed effects for county and region found that this rurality indicator dropped out of the modelling, its effect being supplanted by these indicators. However, the county effects did not provide a very clear picture of differences in unit cost (one might expect Dublin to be the most expensive, but this was not the case according to the estimates). This might be due to the varying sample sizes for each of the counties. The regional effects appeared to offer a more

predictable result, with Dublin being associated with the highest coefficient for unit cost in the model.

As with most research, this study leads naturally onto further avenues for investigation. Although the regression results have identified associations of individual characteristics of services with unit costs, the descriptive analysis suggested that there are particular service types that share characteristics. Large services that offer a multitude of services year-round are very different to smaller services which might have a much more informal and community-based approach. Future work could look at segmenting the services to see whether they do indeed form relatively homogenous, yet distinct, groups. The differences in unit costs between these groups (taking into account combinations of characteristics at once) could then be estimated.

Table 1: Results of regression analysis after backward selection from saturated model (with no region or county fixed effects, n=530, R^2=0.408[28])

Variable	Category	Coef.	Std. Err.	P-value	lower CI	upper CI	
Size	Size small (ref. category)						
	Size medium	-0.435	0.204	0.034	-0.836	-0.034	*
	Size large	-0.886	0.267	0.001	-1.410	-0.362	***
	Size v.large	-2.931	0.358	0.000	-3.634	-2.227	***
Organisation type	Community/voluntary org. (ref.						
	Private enterprise						
Premises type	Commercial owned (ref. category)						
	Domestic owned	0.048	0.224	0.831	-0.393	0.489	
	Commercial lease	0.120	0.252	0.634	-0.375	0.616	
	Non-commercial lease	-0.168	0.231	0.469	-0.623	0.287	
	No formal lease	-0.414	0.231	0.074	-0.869	0.041	
Entity type	Limited by guarantee (ref. category)						
	Limited by shares	-0.186	0.250	0.456	-0.677	0.304	
	Other	-0.443	0.344	0.199	-1.120	0.234	
	Partnership	-0.003	0.353	0.993	-0.696	0.690	
	Sole trader	-0.491	0.187	0.009	-0.858	-0.124	**
Multisite provider	Yes (ref. category: No)						
ECCE only	Mixed (ref. category)						
	No	1.948	0.305	0.000	1.349	2.546	***
	Yes	0.689	0.213	0.001	0.272	1.107	***
High capitation	Yes (ref. category: No)	0.457	0.139	0.001	0.183	0.731	***
Local deprivation	Affluent (ref. category)						
	Disadvantaged						
	Marginally below average						
	Marginally above average						
Rurality	Urban (ref. category: Rural)	0.448	0.143	0.002	0.167	0.730	**
Services provided	Full day						
	Afternoon sessions	0.467	0.164	0.005	0.145	0.789	**
	Breakfast club						
	After school club						
	Part-time						
	Out of term						
Percent hours filled		-1.049	0.369	0.005	-1.774	-0.324	**
Percent non-cont.		1.833	0.555	0.001	0.742	2.924	***
Quality award	Yes (ref. category: No)						

[28] R^2 is the square of correlation between two variables, x and y. The correlation R tells the strength of linear association between x and y and R^2 tells about the amount of variability in y (unit cost in this case) that is explained by the model.

Variable	Category	Coef.	Std. Err.	P-value	lower CI	upper CI	
Open most of year	Yes (ref. category: No)	-0.731	0.277	0.008	-1.275	-0.188	**
Graduate led	Yes (ref. category: No)						
Ave. staff qual. level							
CPD mandatory	No (ref. category)						
	Yes - all staff						
	Yes - care staff						
CPD leave	Outside work hours (ref. category)						
	Paid leave						
	Paid overtime						
	Unpaid leave						
Staff turnover							
Youngest children	Less than 12 months (ref. category)						
	12-23 months	-0.237	0.304	0.436	-0.835	0.361	
	24-35 months	-0.770	0.316	0.015	-1.390	-0.149	*
	3-5 years	-0.903	0.322	0.005	-1.536	-0.271	**
	School age	-3.196	0.530	0.000	-4.236	-2.156	***
Ave. staff-child factor							
Ave. group size							
Percent fees income		-1.963	0.442	0.000	-2.832	-1.094	***
Percent ECCE		-2.524	0.454	0.000	-3.417	-1.631	***
_model_constant		7.786	0.670	0.000	6.470	9.103	***

9 Sample Cost Modelling Tool Outputs

9.1 Overview

The cost modelling tool developed for the DCYA using the data from this review is intended as a scenario modelling support alongside other inputs to considerations of policy in relation to childcare subsidies. We set out here some illustrative outputs from the cost modelling tool to demonstrate the types of outputs of which it is capable in supporting policy decision-making.

9.2 Average Unit Cost per Hour of Childcare Provision

9.2.1 Overview

The average unit cost per hour outlined below is based on the cost modelling tool outputs from the data supplied by childcare providers. Whilst every individual provider is different and will have a different actual cost per hour, this will be reflected in the average unit cost per hour. The cost modelling tool does not attempt to reflect differences in operating models or any local circumstances that may impact on cost.

The cost modelling tool provides average unit cost under a range of scenarios. These include:

- Providers with designated quality standards[29]
- Urban and rural settings
- Region (based on NUTS3)
- Type of childcare provided

Unit costs were calculated using filled places, hours per place per year (derived from hours per week/day and service weeks per year), and total costs.

9.2.2 Overall Average Unit Cost per Hour

The cost modelling tool assessed the average unit cost per hour of childcare provision as €4.14. This is averaged across all age groups, staff ratios, service types, and so on.

This average unit cost is closely aligned to comparative cost data found in other jurisdictions (see Section 2).

9.2.3 Distribution of Unit Cost

The average unit cost per hour as outlined above arises from a range of modelled unit costs, as illustrated in the following tables.

[29] Services who have achieved Síolta QAP validation ratings or those achieving excellent scores in DES inspection reports

Costs	All sites N=573	Only offer ECCE N=215	Does not offer ECCE N=56	Both ECCE and non-ECCE N=302
€0 to €0.5	10	0	0	10
€0.6 to €1	13	0	2	11
€1.1 to €1.5	29	2	3	24
€1.6 to €2	31	3	2	26
€2.1 to €2.5	57	8	8	41
€2.6 to €3	48	12	2	34
€3.1 to €3.5	71	24	4	43
€3.6 to €4	72	31	6	35
€4.1 to €4.5	55	33	3	19
€4.6 to €5	56	31	3	22
€5.1 to €5.5	33	19	1	13
€5.6 to €6	23	12	4	7
€6.1 to €6.5	24	15	6	3
€6.6 to €7	16	8	2	6
€7.1 to €7.5	9	6	1	2
€7.6 to €8	6	3	0	3
€8.1 to €8.5	4	2	2	0
€8.6 to €9	1	0	1	0
€9.1 to €9.5	4	2	2	0
€9.6 to €10	3	1	1	1
More than €10	8	3	3	2

Costs	All sites N=573	Only offer ECCE N=215	Does not offer ECCE N=56	Both ECCE and non-ECCE N=302
€0 to €0.5	2%	0%	0%	3%
€0.6 to €1	2%	0%	4%	4%
€1.1 to €1.5	5%	1%	5%	8%
€1.6 to €2	5%	1%	4%	9%
€2.1 to €2.5	10%	4%	14%	14%
€2.6 to €3	8%	6%	4%	11%
€3.1 to €3.5	12%	11%	7%	14%
€3.6 to €4	13%	14%	11%	12%
€4.1 to €4.5	10%	15%	5%	6%
€4.6 to €5	10%	14%	5%	7%
€5.1 to €5.5	6%	9%	2%	4%
€5.6 to €6	4%	6%	7%	2%
€6.1 to €6.5	4%	7%	11%	1%
€6.6 to €7	3%	4%	4%	2%
€7.1 to €7.5	2%	3%	2%	1%
€7.6 to €8	1%	1%	0%	1%
€8.1 to €8.5	1%	1%	4%	0%
€8.6 to €9	0%	0%	2%	0%
€9.1 to €9.5	1%	1%	4%	0%
€9.6 to €10	1%	0%	2%	0%
More than €10	1%	1%	5%	1%

9.2.4 *Average Unit Cost per Hour for Services with Quality Designations*

The average unit cost for providers with designated quality standards (i.e. Síolta accreditation and/or excellent scores in DES inspections; n=18) in the cost modelling tool is €4.26 compared with €4.13 for all other providers. This is a possible indicator that providing increased quality may have some impact on the cost.

The number of providers included in this cohort is very small (n=18), so wider conclusions cannot be drawn nor specific cost drivers identified, but it is an interesting illustration of the possible additional costs associated with high-quality service delivery. it is not possible to confidently identify cost drivers for these services in any way other than by qualitatively identifying potential candidate drivers for future research.

9.2.5 *Urban Versus Rural*

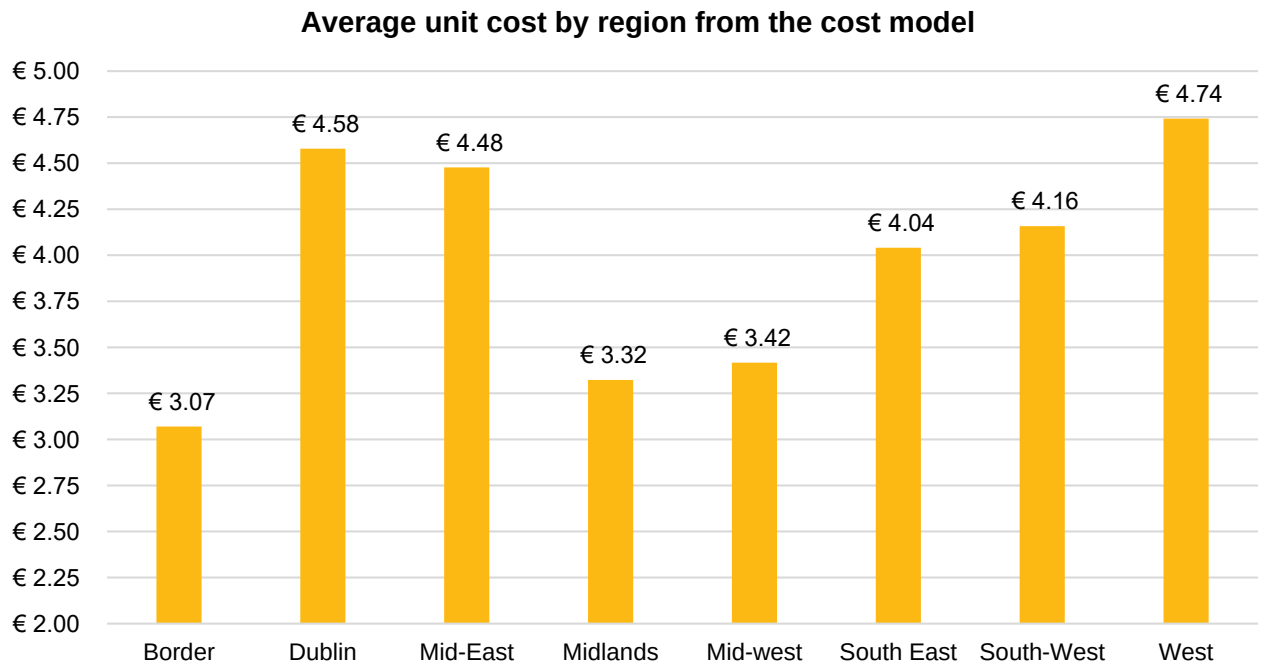
The average unit cost per hour in the cost modelling tool is 63 cent higher for providers operating in urban settings versus those in rural areas. The urban rural split is based on the CSO classification of services. The average unit cost in urban settings is €4.37 as opposed to an average unit cost of €3.74 for those providing childcare in rural settings.

While this shows there is a difference in cost for those operating in urban and rural settings, it does not take into account the variation in cost within these settings.

9.2.6 *Regional Average Unit Costs*

The average unit cost by NUTS 3 region varies from €3.07 in the Border region to €4.74 in the West. The average unit cost for Dublin is €4.58 which is the second highest region. The average unit cost for the West is 54% higher than that in the Border region.

The figure below illustrates the range of average unit cost across the eight NUTS 3 regions.



9.2.7 Type of Childcare Provided

Based on the information provided, the cost modelling tool indicates that the average unit cost is highest for those services that do not provide ECCE services. The average unit cost for services that do not provide ECCE is €5.20; this compares to €4.91 for ECCE only providers, and €3.39 for those that provide ECCE alongside other childcare services.

9.3 Sample Scenario Modelled: Staff-Child Ratios in School-Age Childcare

At the time of the survey, there were no regulatory requirements in respect of staff-child ratios for school-age childcare. Since that time, a limit of 1:12 has been introduced as an upper limit for school-age services. As an example of the scenario modelling that the cost modelling tool can provide to DCYA, the impact on overall average unit cost from this change was explored. Including a staff-child ratio of 1:12 for school-age childcare results in an overall average unit cost per hour of €4.22.

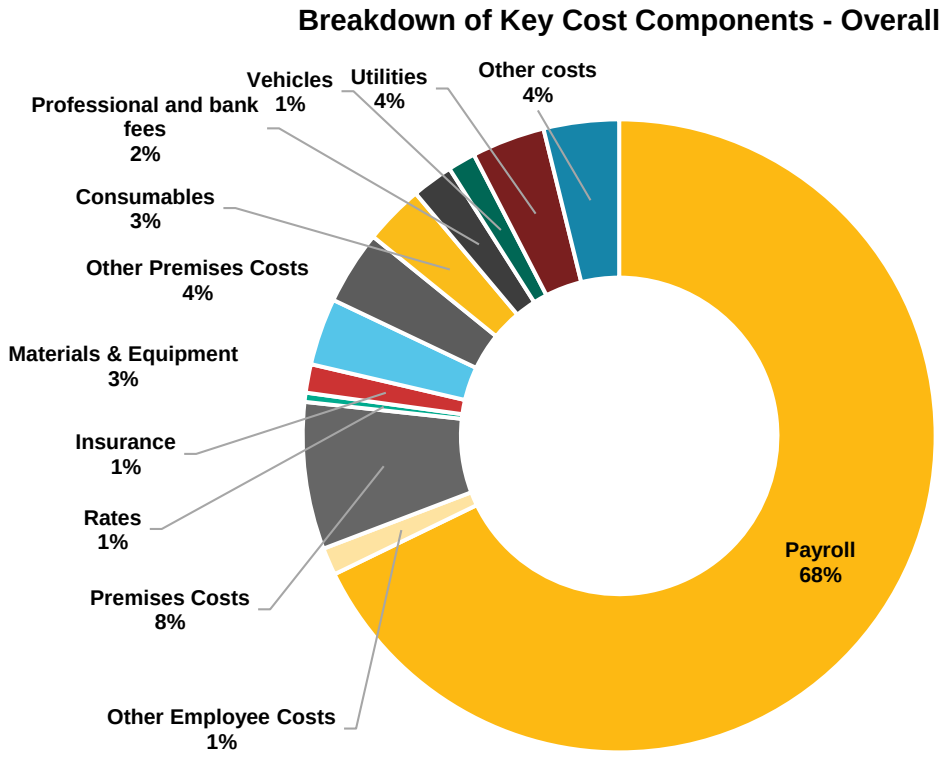
9.4 Key Components of Cost within the Cost Modelling Tool

9.4.1 Overview

We examined the principal components of cost within the cost modelling tool dataset, to identify the key cost factors within the average unit cost figures.

9.4.2 Overall Cost Breakdown

When we examine the data in the cost modelling tool from the perspective of the components of the cost, we can see a pattern consistent with those found in other jurisdictions: a dominance of staff costs in the make-up of the overall cost figures, as illustrated below:

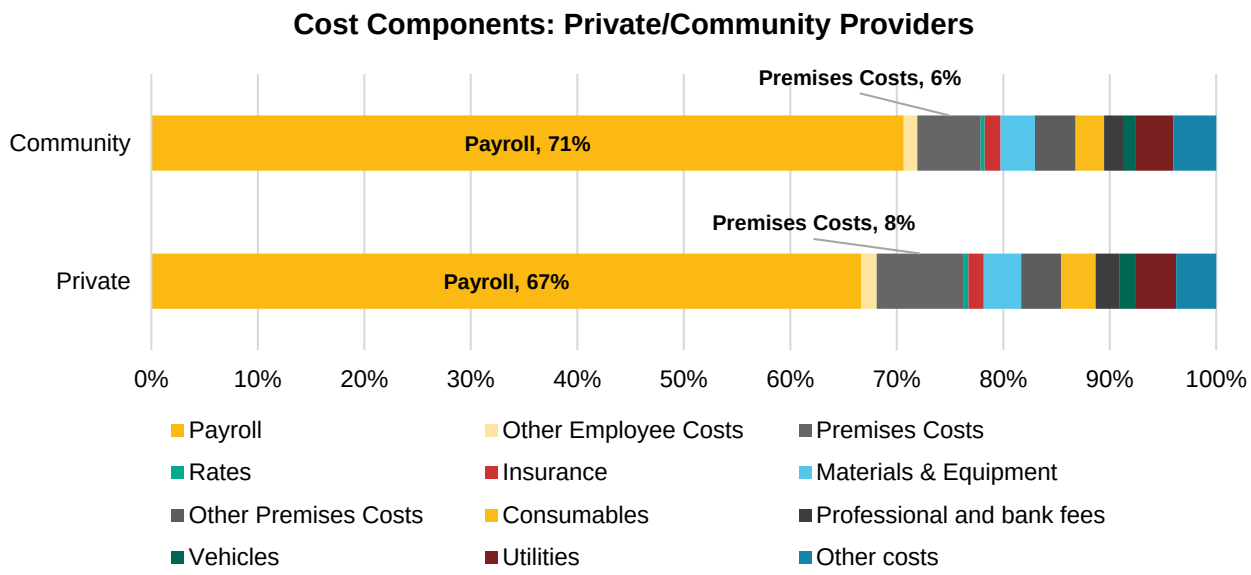


Note: 29% of these providers pay rates, ranging from 0.04% of their costs to 8.85% of their costs

At an average of 68%, the staff cost percentage as the single biggest cost component is consistent with findings from other countries, as discussed in Section 2. Likewise, the average cost for premises (i.e. rent or mortgage costs), at 8%, is not dissimilar to the averages in England, Scotland, and New Zealand.

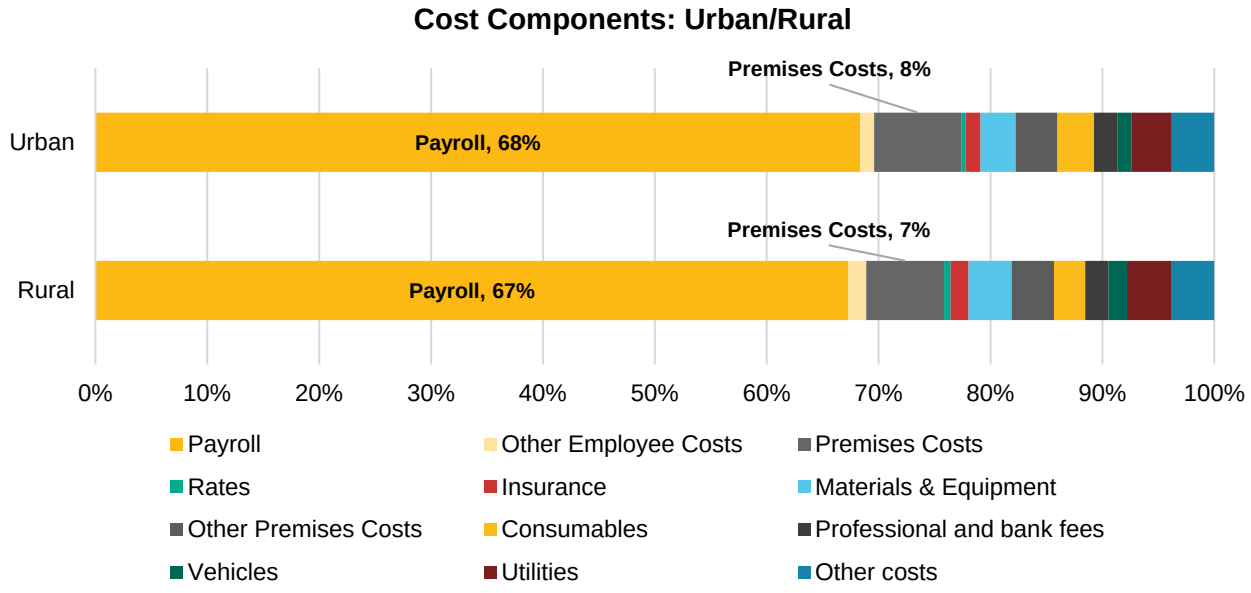
9.4.3 Cost Components: Comparison of Community and Private Providers

When we examine the cost components across a number of categories of provider, we can see some of the differences between them. For example, a comparison of private and community providers indicates that premises costs represent a much higher percentage of total costs for the former, with staff costs a higher percentage in community providers, as can be seen in the following chart:



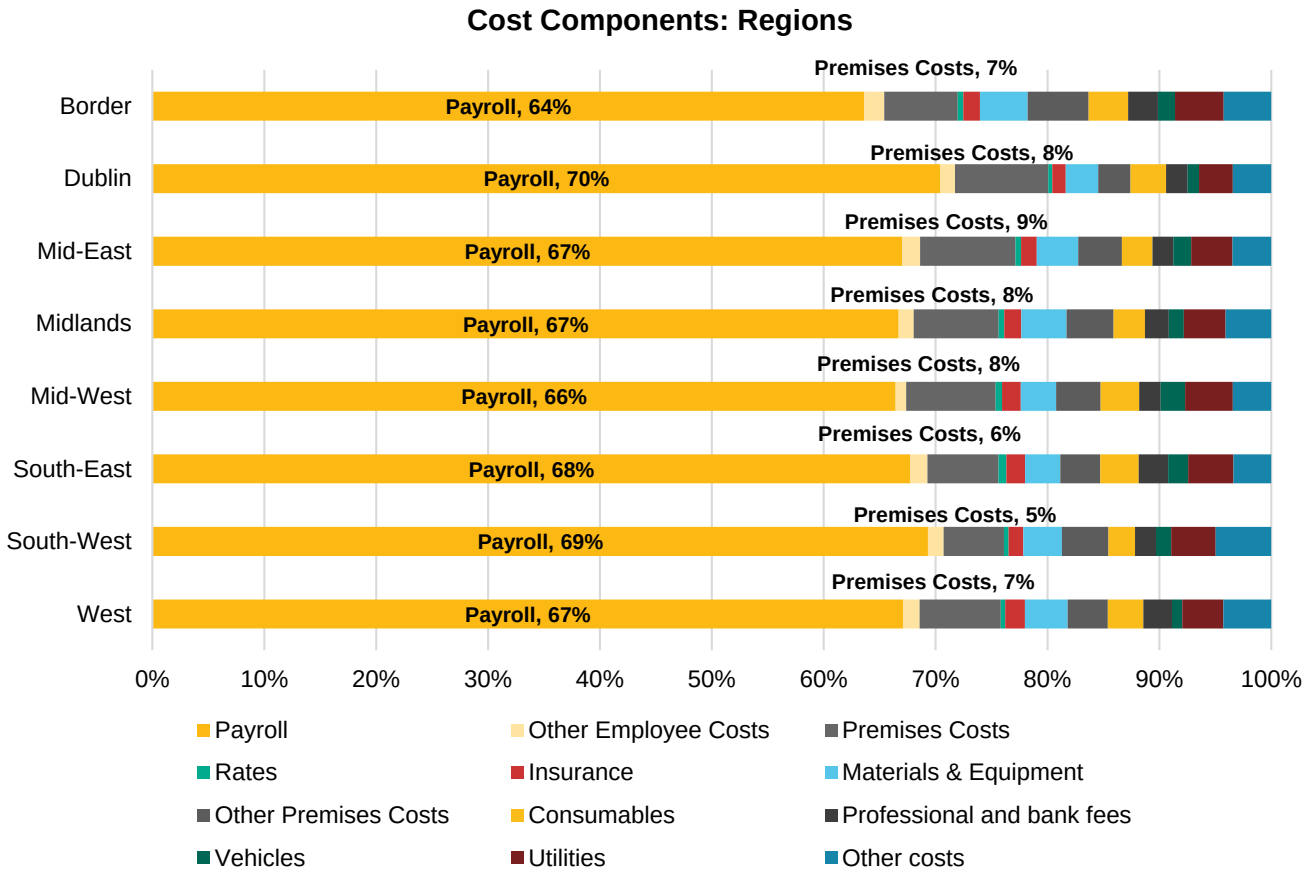
9.4.4 Cost Components: Comparison of Urban- and Rural-Based Providers

When we compare urban and rural services, we can see there is little variation in the cost breakdowns, with a slight increase in the premises cost component for urban-based providers.



9.4.5 *Cost Components: Comparison by Region*

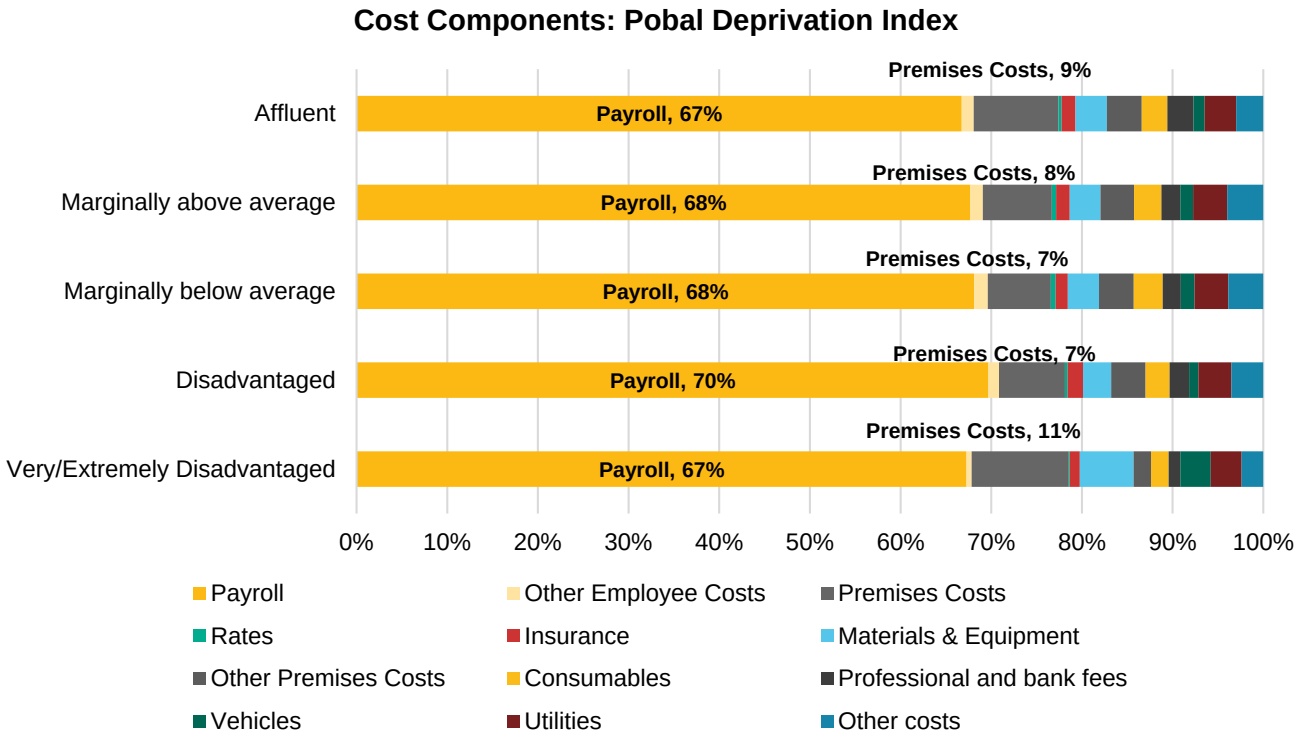
Looking at the cost components by region, there are some variations in premises cost percentages and staff cost percentages within the breakdowns, as illustrated below:



We can see that the percentage represented by staff costs is lower in some regions, generally corresponding to a higher proportional percentage taken up by premises costs.

9.4.6 *Cost Components: Comparison by Pobal Deprivation Index*

Finally, in respect of the relative deprivation of the locations in which providers are operating, we can see the cost components vary only slightly, with the proportion represented by premises costs being slightly higher in very and extremely disadvantaged areas.



9.4.7 *Comment on Cost Components*

As can be seen, the cost modelling tool outputs support the evidence that the principal cost factor across the sector as a whole and within every service type or location is staffing costs. Whilst the proportion of total cost represented by staffing costs varies, it is at a minimum more than two-thirds of the total cost regardless of different provider types, locations, and so on.

Premises costs are typically the next most significant cost component; however, in line with international examples, this represents a fraction of the staffing costs.

Conclusions

10 Concluding Comments

10.1 Project Learnings

This review has attempted to gather and analyse data in relation to the costs of the provision of quality childcare in Ireland. It has engaged with the sector, reviewed documentation and literature, conducted primary research, and used the data collected to produce findings in respect of cost factors and drivers in the delivery of childcare services.

The challenges faced over the course of this review are useful to reflect on in terms of learning for future reviews of this nature and/or other approaches to establishing and analysing the cost of childcare provision. Some of these include:

- The challenges in collecting accurate and comprehensive cost data from providers. This has a number of associated issues, including the extent to which services themselves are accurately and regularly capturing, recording, and analysing their costs; the most appropriate and effective mechanisms for cost data to be provided for the purposes of policymaking; the commercial sensitivities for private providers; and the extent to which the Department may wish to consider what data could be required to be reported on a regular basis as a condition of statutory funding schemes.
- The willingness and capacity of providers to respond to this review's detailed cost survey. The response rate to this survey was significantly lower than that for Pobal's Early Years Sector Profile, which, although not seeking the same data, is nonetheless a substantial survey and yet achieves high response rates (19% versus 85%). The DCYA may wish consider how future approaches to collecting cost data can improve the response rates.
- The accuracy and completeness of the data provided. Survey responses included issues such as respondents who failed to complete parts of the survey, interpreted questions incorrectly, and made errors in data entry. Whilst the approach to the development of the cost modelling tool was designed to mitigate these issues, future reviews will need to consider how best to ensure that the data provided is accurate and complete, in recognition that to provide such data may be burdensome on providers.

10.2 Key Findings

10.2.1 Childcare Provider Survey Findings

The survey responses were analysed and key descriptive outputs are set out in the report. This material is intended to provide context for the dataset used for the regression analysis and the development and operation of the cost modelling tool, to enable comparison with other sector profile data for validation, and to add to the body of knowledge in relation to the operation of childcare services in Ireland.

10.2.2 Regression Outputs

Some of the highlighted findings from the regression analysis include the following:

- Size played a key role in the variation in unit cost, with large services cheaper than smaller services.
- Some other observed efficiencies included occupancy and the age of children in the service.
- Non-contact hours acted as an inefficiency as these are hours which are not available for greater room capacity.
- It was not possible to explore the relationship between costs and objective measures of quality using the quality indicator available due to a low number of services in the dataset with this designation.
- There appeared to be cost savings for particular entity and premises types, and this may be due to differences in overheads.
- Service characteristics play a clear role in driving variation in unit cost.
- Unit cost was higher in services with higher capitation.
- Services that opened all year appeared to have a lower unit cost than those that did not.
- Urban services appeared to be more expensive than those in rural areas.

Future work could look at whether groups of different service types are capable of being identified with clear shared characteristics. The differences in unit costs between these groups (taking into account combinations of characteristics at once) could then be estimated.

10.2.3 Sample Cost Modelling Tool Outputs

The cost modelling tool developed for the DCYA using the data from this review is intended as a scenario modelling support alongside other inputs to considerations of policy in relation to childcare subsidies. The report sets out a small sample of outputs from the cost modelling tool.

The cost modelling tool assessed the average unit cost per hour of childcare provision as €4.14. This is averaged across all age groups, staff ratios, service types, and so on.

10.3 Next Steps

These findings should be useful to the DCYA in the consideration of future policy decisions in respect of childcare subsidy rates.

The capacity to examine further the impact of different cost drivers and scenarios within the cost modelling tool will further support the DCYA in policy formation. As outlined previously, the cost modelling tool is intended for use in the support of policymaking, and is not a decision-making process in its own right. It is most useful in the assessment of the impact of change across the modelled scenarios given the complexity of the many intersecting variables for any individual provider, service, or child.

Over time the cost modelling tool will need to be updated to reflect changes in costs through normal inflationary pressures or as a result of policy changes. These policy changes may be reflective of sector-specific initiatives but may also encompass wider governmental decisions that may impact on the cost base of providers. The frequency of updates should reflect policy changes. Considering the relationship between the timing of policy changes and cost modelling tool updates will ensure that any impacts are fully reflected.

This review has provided some key findings and useful learning for future considerations of childcare provider costs. Whilst there have been challenges within the process, the outputs from the review will be supportive of childcare subsidy policymaking for the DCYA into the future.

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Appendix 1: Survey Questionnaire

DCYA Review of the Cost of Quality Childcare Provision

Welcome to the survey of childcare and early years service providers being undertaken by Crowe Horwath on behalf of the Department of Children and Youth Affairs. Please be assured that all individual survey responses will remain confidential to Crowe Horwath and only collated, anonymised data stripped of identifying fields will be passed to the Department. The data will not be used by Crowe Horwath for any other purpose.

This survey is intended to gather a large body of comprehensive data on the cost of providing quality childcare and early years services in Ireland. Its purpose is to provide data to the Department in relation to the cost of provision in order to inform the Early Childhood Care and Education Scheme, the Affordable Childcare Scheme, and other statutory supports in relation to childcare and early years services. The accuracy and level of detail provided within this survey will be critical to fully inform future policy.

The survey is presented in groups of questions. You can move back and forth between survey pages using the appropriate buttons at the bottom of each question group. Questions comprise a mix of response formats. You can leave the survey by clicking on the “Resume Later” button at the bottom of each page. This saves your responses and allows you to return to the survey using your link with your previous answers intact. You can access the survey on different computers / laptops by using the link issued. Only one user can access the survey at a time. Your link is individual to this service provider site and ensures your survey is private. Providers with more than one site will be required to complete separate survey returns for each site.

This survey requires detailed information in respect of premises and staff, along with summary financial data on income and expenditure. Much of the information is similar to that required for the Pobal annual Early Years Sector Profile survey. After completing this survey, you will be able to print (or save as PDF) the answers you have provided, which may be helpful when completing the Pobal survey at a later date. It will be helpful to have financial accounts and personnel details to hand when completing this survey.

Should you have any queries or difficulties in accessing or using this survey, please contact Vanya Sargent (vanya.sargent@crowehorwath.ie) or Katelynne Pilcic (katelynne.pilcic@crowehorwath.ie).

Section 1: Profile

Please confirm that your DCYA reference for this site is {TOKEN}.

PLEASE NOTE: We are using the DCYA reference number as a unique identifier to enable us to combine this survey response with existing data held by the Department and Pobal. We will, however, not be sharing any details with the Department or Pobal in respect of any individual survey response or linking any response data to DCYA reference numbers in our reporting and analysis to the Department. All DCYA reference numbers, provider names, and contact data will be removed from the datasets before issuing any collated data to the Department.

- DCYA reference is correct
- DCYA reference is incorrect

If you have any queries or concerns in relation to this, please do not hesitate to contact us on 01 448 2200.

If this reference is incorrect, please DO NOT PROCEED with the survey at this time. Please contact Vanya Sargent at vanya.sargent@crowehorwath.ie or 01 448 2200 to ensure you have the correct survey link before answering any questions.

What type of legal entity describes the service provider?

- Company limited by shares
- Company limited by guarantee
- Partnership
- Sole trader
- Other

If other, please give details.

_____

What year was this service established?

_____

Is this service part of a chain or multiple-site provider that has a central or head-office function?

- Yes
- No

If yes, how are head office costs apportioned or allocated? Please give details.

_____

Please indicate the type of premises in which the service is provided.

- Commercial building owned by service provider
- Domestic building owned by service provider
- Premises with a commercial lease
- Premises with a non-commercial lease (e.g. from community or statutory organisation)
- Premises without formal lease arrangement

If leased, how long was the lease originally for and how long remains on the lease (in years)?

Length of original lease: _____ years

Remaining time on lease: _____ years

If owned, is the title freehold or leasehold?

- Freehold
- Leasehold

If leasehold, how long is the leasehold for?

_____ years

If owned, is there a mortgage on the property?

- Commercial mortgage
- Domestic mortgage
- Other mortgage
- No mortgage

How long is left on this mortgage?

_____ years

Is there any other secured lending on the property?

- Yes
- No

If so, how much time remains on the secured lending?

_____ years

If owned, was grant aid availed of for building, extending, or renovating the premises? Please tick all that apply.

☐ Grant aid for building premises

☐ Grant aid for extending premises

☐ Grant aid for renovating premises

Please indicate the total amount of any grant aid availed of for building these premises.

€_____

Please indicate the total amount of any grant aid availed of for renovating these premises.

€_____

Please indicate the total amount of any grant aid availed of for extending these premises.

€_____

If the premises are leased, where are they based?

- Premises solely for the service
- School
- Employer's premises
- Family Resource Centre
- Community centre
- Other community or voluntary agency premises
- Other organisation premises

If Other community or voluntary agency premises, please give details:

_____

If Other organisation premises, please give details.

_____

What is the overall size of the premises being used for the service, in terms of indoor floor area (in square metres)?

_____ m^2

Section 2: Services

What services are provided in this location? Please tick all that apply.

- ☐ Full-day care
- ☐ Sessional services - morning
- ☐ Sessional services - afternoon
- ☐ Breakfast club
- ☐ After-school care
- ☐ Part-time care
- ☐ Drop-in/occasional care
- ☐ Out-of-term care for school-age children
- ☐ Other childcare/early education services
- ☐ Services other than childcare/early education services

If other childcare/early education services are provided, please give details of these.

_____

If services other than childcare/early education services are provided, please give details.

_____

Please give details of the number of places available, number of places filled, and hours available per day for full-day care.

Number of places available for full-day care per week _____

Number of places filled for full-day care per week _____

Maximum number of hours per day per child for full-day care _____

Please give details of the number of places available, places filled, and hours available for sessional early education services (ECCE and non-ECCE).

	Mornings	**Afternoons**
Number of places available for ECCE sessional services	_____	_____
Number of places filled for ECCE sessional services	_____	_____
Hours available per day for ECCE sessional services	_____	_____
Number of places available for non-ECCE sessional services	_____	_____
Number of places filled for non-ECCE sessional services	_____	_____
Hours available per day for non-ECCE sessional services	_____	_____

Please give details of the number of places available, number of places filled, and hours available per day for breakfast club services.

Number of places available for breakfast club per week _____

Number of places filled for breakfast club per week _____

Maximum number of hours per day per child for breakfast club _____

Please give details of the number of places available, number of places filled, and hours available per day for afterschool care.

Number of places available for afterschool care per week _____

Number of places filled for afterschool care per week _____

Maximum number of hours per day per child for afterschool care _____

Please give details of the number of places available, number of places filled, and maximum hours per week for part-time care.

Number of places available for part-time care per week _____

Number of places filled for part-time care per week _____

Maximum number of hours per week per child for part-time care _____

Please give details of the average number of places available, average number of places filled, and average hours available per week for drop-in/occasional care.

Average number of places available for drop-in/occasional care per week _____

Average number of places filled for drop-in/occasional care per week _____

Average number of hours per week per child for drop-in/occasional care _____

Please give details of the number of places available, number of places filled, and weeks available per year for out-of-term care for school-age children.

Number of places available for out-of-term care _____

Number of places filled for out-of-term care _____

Number of weeks per year available for out-of-term care _____

Is there a waiting list for any of the services provided?

- Yes
- No

If yes, please give details on the number awaiting places in any of the services that have waiting lists.

Full-day care _____

Sessional services – morning _____

Sessional services – afternoon _____

Breakfast club _____

After-school care _____

Part-time care _____

Drop-in/occasional care _____

Out-of-term care for school-age children _____

Are there plans to change the capacity of the service?

- Plan to increase capacity/number of places available
- Plan to decrease capacity/number of places available
- No plan to change capacity

Section 3: Rooms

This section asks for information on the size and use of each room used in the service for the care and education of children. We are seeking this information to be able to assess the current capacity in the sector and the potential for expansion.

How many rooms are available, and how many are in use, for the provision of childcare and/or early education services? For each of the rooms in use, you will be asked a series of questions.

If you have more than 8 rooms at this location used for providing childcare and/or early education services, please contact us at vanya.sargent@crowehorwath.ie or 01 448 2200.

_____ rooms available

_____ rooms in use

Room 1

What size is the room?

_____ m^2

How many children are currently occupying this room, and how many staff? Please give numbers as relevant for each age group and the number of staff based in this room for both mornings and afternoons for each day of the week.

	Children under 12 months of age	Children between 12 months and 23 months of age	Children between 24 and 35 months of age	Preschool children between 3 and 5 years of age	School-age children	Number of staff
Monday morning						
Monday afternoon						
Tuesday morning						
Tuesday afternoon						
Wednesday morning						
Wednesday afternoon						
Thursday morning						
Thursday afternoon						
Friday morning						
Friday afternoon						

Are there sanitary facilities available within this room?

- Yes
- No

Section 4: Management

How many managers work in this service (at this location)? A series of questions for each manager will appear when you enter the number in question.

_____

Manager 1

Please indicate what type of manager role this person holds.

- ○ Owner-manager (owner-operator)
- ○ Manager employed by service

Is this manager paid an hourly wage or an annual salary?

- ○ Hourly wage
- ○ Annual salary
- ○ Other (e.g. drawing non-fixed income from business)

Please give details of the hourly wage for this manager.

€ _____ per hour

Please give details of the annual salary for this manager.

€ _____ per year

Please give details of the estimated annual income of the manager from the business.

€ _____ per year

Does this manager have any additional benefits as part of their remuneration? Please tick all that apply.

- ☐ Employer pension contributions
- ☐ Paid sick leave
- ☐ Additional annual leave days (above statutory)
- ☐ Maternity pay (top-up)
- ☐ Health insurance policy
- ☐ Discount on childcare/early education
- ☐ Other benefits

If there are other benefits, please give details.

_____

How many hours per week does this manager work?

Contact hours (i.e. delivering childcare/early education to children) _____

Non-contact hours _____

How many weeks per year are paid for this manager (including holidays and other leave entitlements)?

_____ weeks per year

What childcare/early education qualifications, if any, does this manager hold?

- Lower than Level 5
- Level 5
- Level 6
- Level 7
- Level 8
- Level 9/10
- Don't know
- Not applicable: manager does not work directly with children

Does this manager hold any relevant non-childcare/early education qualifications (e.g. management, business, financial, HR, etc.)?

- Yes
- No

If yes, please give details of the relevant qualifications.

_____

How many years' experience do they have?

- Less than 3 years
- 3-5 years
- 6-10 years
- More than 10 years
- Don't know

Section 5: Childcare Staff

This section asks details for each individual staff member working directly with children in the service (other than managers), including hourly pay rates, hours worked, qualifications, and experience. We will use this information to assess the current rates of pay and other terms of employment in the sector and to consider how these might be impacted by increasing levels of qualification and experience and by changes in the levels of support provided through statutory schemes.

How many staff work directly with children in this service?
(Please note: if there are more than 35 staff who work directly with children in this service, please contact us by emailing vanya.sargent@gmail.com.) When you enter the number of staff, a series of questions for each of the staff members will appear below.

No. of staff working with children _____

Please include the total number of individual staff members rather than the whole-time equivalent.

Staff Member 1

What position does this staff member have in this service?

- ECCE room leader
- Non-ECCE room leader
- Childcare/early education assistants
- Aim Level 7 Support staff
- Childcare/early years work placement staff
- Other childcare/early years staff

If other childcare/early years staff, please give details.

_____

Is this staff member paid an hourly wage or an annual salary?

- Hourly wage
- Annual salary
- Not applicable (e.g. work placement)

Please give details of the hourly wage for this staff member.

€ _____ per hour

Please give details of the annual salary for this staff member.

€ _____ per year

Does this staff member have any additional benefits as part of their remuneration? Please tick all that apply.

- ☐ Employer pension contributions
- ☐ Paid sick leave
- ☐ Additional annual leave days (above statutory)
- ☐ Maternity pay (top-up)
- ☐ Health insurance policy
- ☐ Discount on childcare/early education
- ☐ Other benefits

If there are other benefits, please give details.

_____

How many hours per week does this person work?

Contact hours (i.e. delivering childcare/early education to children) _____

Non-contact hours _____

How many weeks per year are paid for this staff member (including holidays and other leave entitlements)?

_____weeks per year

What childcare/early education qualification(s) does this staff member have?

- ○ Lower than Level 5
- ○ Level 5
- ○ Level 6
- ○ Level 7
- ○ Level 8
- ○ Level 9/10
- ○ Don't know

How many years' experience do they have?

- ○ Less than 3 years
- ○ 3-5 years
- ○ 6-10 years
- ○ More than 10 years
- ○ Don't know

Section 6: Ancillary Staff

How many ancillary staff, that is, staff that do not work directly with children, work in this service?

No. of ancillary staff _____

Ancillary staff member 1

What role does this person have in the service?

- Administration
- Cleaning/maintenance/janitorial
- Food preparation
- Community employment scheme
- Tús placement
- Rural Social Scheme placement
- Other non-childcare work placement
- Other non-childcare role

If other, please give details.

_____

Is this staff member paid an hourly wage or an annual salary?

- Hourly wage
- Annual salary
- Not applicable (e.g. work placement)

Please give details of the hourly wage for this staff member.

€ _____ per hour

Please give details of the annual salary for this staff member.

€ _____ per year

Does this staff member have any additional benefits as part of their remuneration? Please tick all that apply.

- ☐ Employer pension contributions
- ☐ Paid sick leave
- ☐ Additional annual leave days (above statutory)
- ☐ Maternity pay (top-up)
- ☐ Health insurance policy
- ☐ Discount on childcare/early education
- ☐ Other benefits

If there are other benefits, please give details.

_____

How many hours per week does this staff member work?

_____ hours/week

How many weeks per year are paid for this staff member (including holidays and other leave entitlements)?

_____ weeks per year

Section 7: Staff Development

Is CPD mandatory for employees?

- ○ Yes – for all employees
- ○ Yes – only for those who work directly with children
- ○ No

What continuing professional development (CPD) do staff undertake?

_____

Who pays for staff CPD activities? Please tick all that apply.

- ☐ Employer pays for all CPD
- ☐ Employer part-pays for CPD
- ☐ Staff member pays for all CPD
- ☐ Staff member part-pays for CPD
- ☐ CPD is fully funded by DCYA
- ☐ CPD is part-funded by DCYA
- ☐ Other

If Other, please give details.

_____

Is leave available to staff for CPD activities?

- ○ Paid leave is available for CPD
- ○ Unpaid leave is available for CPD
- ○ Paid overtime is available for CPD
- ○ CPD is undertaken outside work hours only

Is there a plan to change the staffing resources over the coming year?

	Number of staff	Hours for existing staff
Plan to increase in the coming 12 months	○	○
Plan to decrease in the coming 12 months	○	○
No change in the coming 12 months	○	○

How many staff left the service within the past 12 months, how many joined, and how many current vacancies do you have, if any?

Number of staff who left within past 12 months _____

Number of staff who joined within past 12 months _____

Number of current vacancies _____

If you have vacancies, for what roles?

_____

What are your key concerns in respect of recruiting, retaining, developing, and maximising the skills of appropriately qualified and experienced employees? Please tick all that apply.

- ☐ Difficulty of attracting suitably qualified and experienced childcare/early years staff
- ☐ Capacity to offer attractive wage/salary levels
- ☐ Capacity to offer attractive additional staff benefits
- ☐ Difficulty attracting staff with appropriate language competency
- ☐ Competition from other childcare/early years providers
- ☐ Competition from other sectors
- ☐ Capacity to fund staff training or development
- ☐ Capacity to facilitate leave for staff training and development
- ☐ Other concerns

If you have other issues or concerns in relation to attracting, recruiting, retaining, or developing staff, please give details here.

_____

Section 8: Fees

Please give details of the fees charged to parents for each service provided.

	Age <12 months	Age 12-23 months	Age 24-35 months	Age 3-5 (preschool)
Full-time care per week	€_____	€_____	€_____	€_____
Part-time care per week	€_____	€_____	€_____	€_____
Non-ECCE sessional care per week	€_____	€_____	€_____	€_____
Drop-in/occasional care per hour	€_____	€_____	€_____	€_____

Please give details of the fees for school-age care services, where relevant.

	School-age children
Breakfast club per week	€_____
After-school care per week	€_____
Drop-in/occasional care per hour	€_____

Do you offer a sibling discount?

- Yes
- No

If so, how much is the discount?

Discount for second child _____

Discount for third child _____

Discount for fourth child or more _____

Is food provided within the service?

	Food is provided and included within the fees	Food is provided at an extra cost to parents	Food is not provided
Full-day care	○	○	○
Sessional services – morning	○	○	○
Sessional services – afternoon	○	○	○
Breakfast club	○	○	○
After-school care	○	○	○
Part-time care	○	○	○
Drop-in/occasional care	○	○	○
Out-of-term care for school-age children	○	○	○

If there is an additional charge for food provision, how much is this per child per week?

€_____

Is transport provided for school-age children to drop to and collect from school?

- ○ Transport is provided and included within the fees
- ○ Transport is provided at an extra cost to parents
- ○ Transport is not provided

If there is a charge for transport in addition to the fee for school-age childcare, how much is this per week per child?

€_____

Are there additional optional services offered to families availing of ECCE only?

- ○ Yes
- ○ No

If so, please give details and costs for these.

_____

Section 9: Financial Data

This section looks for summary financial data on income and in particular costs, as this is critical information for the development of a robust dataset on the real cost of providing childcare and early years services. As with all the data collected within this survey, the individual financial data provided here will not be reported to the Department or to Pobal but will be used to develop a collated and anonymised dataset and cost modelling tool.

Please enter summary financial data relating to the last complete financial year for the childcare and/or early education services provided at this site.

If the service operates on more than one site, please enter the financial data for each site in separate survey responses.

Please ensure to include costs ***only*** for the childcare/early years service and not for any other services provided at the same site where relevant. This may involve allocating a portion of the site costs to the childcare/early years service.

Amounts should be rounded to the nearest euro.

INCOME / REVENUE

Income from fees charged to parents	€
ECCE payments	€
Payments from other schemes (CCS, etc.)	€
AIM	€
Programme Support Payment	€
Other income	€

If you have "other income", please give details of the source of this.

_____

Please give details of the following in relation to deposits:

Total value of deposits received within the last full financial year	€
Total value of deposits returned to parents within the last full financial year	€
Total value of deposits currently held	€

Are deposits held in a separate account?

- Yes
- No

COSTS

Wages/salaries	€
Employer's PRSI	€
Employer's pension contributions	€
Training costs	€
Rent	€
Mortgage	€
Rates	€
Insurance Materials & equipment	€
Premises maintenance & repairs	€
Depreciation	€
Food preparation/provision	€
Cleaning & cleaning materials	€
Bank charges	€
Accounting & legal fees	€
Outsourced services	€
Vehicle tax & insurance	€
Vehicle running costs (fuel & maintenance/ repairs)	€
Light & heat	€
Water rates	€
Telephone	€
Broadband/internet	€
Waste disposal	€
Office stationery and supplies	€
Computer & printer maintenance	€

Bad debt write-offs	€
Subscriptions & membership fees	€
Advertising	€
Recruitment	€
Head office apportioned costs (where relevant)	€
Other costs	€

Section 10: Opinion

If you have any comment in relation to the cost of providing childcare and/or early education services, please include it here.

Appendix 2: Detail on Data Cleaning

Data Cleaning Detailed Count

The table below shows a more detailed count of the corrections made, both by number of data points and at a service level. It also shows the count both by those services ultimately included in the research (573 services), and for all services.

			Services with correction type		Data points corrected	
Correction theme	**Context / correction made**	**Changed data used in unit cost calculation**	**All responses**	**Services included in final 573**	**All responses**	**Services included in final 573**
Edit number of staff in room where none have been entered and children are in the room (predicted values)	There were many cases where data had been entered to indicate there were children is a room, but no staff were indicated to be present. In these cases a predicted value based on other services was used to calculate a likely figure.	N	202	142	202	142
Filled places greater than available places	Addressing misinterpretation of "available places" where responses took "available" to be spaces not filled.	Y	140	85	170	101
Missing available places replaced with filled	Addressing misinterpretation of "available places" where respondents seem to understand available as spaces not filled.	Y	119	79	190	118
Edit zero employee weeks to median	Where the employee weeks value appeared to have been missed, this was set to the median value	Y	115	48	115	48
Edit zero manager weeks to median	Where the manager weeks field appeared to have been missed in the data completion, this was corrected to the median.	Y	87	45	87	45
Edit zero ECCE session hours to median	Where the ECCE session hours value appeared to have been missed, the median value was entered.	Y	59	40	68	45
Missing filled places	Where the filled places field was not provided, this was replaced with an imputed value.	Y	56	33	56	33

			Services with correction type		Data points corrected	
Correction theme	**Context / correction made**	**Changed data used in unit cost calculation**	**All responses**	**Services included in final 573**	**All responses**	**Services included in final 573**
Edit high after school hour values to median	There appeared to be confusion amongst some respondents as to how After School club hours should be entered, as there were some values between 6 and 20, when it was meant to be per day. Excessively high outliers were changed to the median.	Y	35	20	35	20
Edit high ECCE session hours to median	ECCE session length should be 3 and whilst some variation was considered reasonable, some values varied considerably with some as high as 300. Excessively high values were set to the median.	Y	28	19	33	21
Edit high non-ECCE session hours to median	All provision hours are included in the calculations. Some respondents put in daily hours here rather than sessional hours (e.g. 8 to 10, though max was 30) These were edited to be set to the median.	Y	30	18	38	23
Edit zero ancillary staff weeks to median	Where the ancillary staff weeks field appeared to have been missed, this was corrected to the median	N	33	18	33	18
Edit zero non-ECCE session hours to median	Where the non-ECCE session hours value appeared to have been missed, the median value was entered.	Y	21	16	23	18
Edit high out-of-term weeks values to median	It appears that this is a misinterpretation of the question about care for school children during holidays. Outliers were corrected to the median.	Y	15	12	15	12
Move manager wage value to correct column (was in salary column)	Moved the manager hourly wage into the correct field when this appeared to have been entered in the salary	Y	13	11	13	11
Edit zero employee hours to median	Where the employee hours value appeared to have been missed, this was set to the median value	Y	23	11	46	22

			Services with correction type		Data points corrected	
Correction theme	**Context / correction made**	**Changed data used in unit cost calculation**	**All responses**	**Services included in final 573**	**All responses**	**Services included in final 573**
Where employee salary per hour is very high edit low weeks values (multiply by 10)	In some instances, the employee salary per hour appeared to be very high. In these cases the number of weeks also appeared to be low and therefore the low weeks values were multiplied by a factor of 10.		11	7	13	9
Edit high part time hours to median	In these cases, the hours had usually been entered as all week (40 to 50 hours, i.e. full-time not part-time with values for included data ranging from 40 to 187) These were changed to the median.	Y	7	6	7	6
Edit per week breakfast club hour values to per day	These seemed to be entered as weekly hours when the survey asked for daily hours and were divided by 5.	Y	6	5	6	5
Edit very high employee hours to median	Several employs were recorded as having excessively high weekly hours. For example, one individual was recorded as working 40,000 hours per week. In these cases, the value was set to the median. In all but 2 of the data point changed, the number of hours stated as being worked per week, was more hours than there are in a week.	Y	7	5	9	6
Edit zero employee wages to median	Where the employee wages value appeared to have been missed, this was set to the median value	Y	16	5	16	5
Where employee salary is missing, calculate from median salary per hour	Where the employee salary field appears to have been missed, this was replaced with the median.		13	5	13	5
Edit zero ancillary staff hours to median	Where the ancillary staff hours field appeared to have been missed, this was corrected to the median	N	10	5	10	5

			Services with correction type		Data points corrected	
Correction theme	**Context / correction made**	**Changed data used in unit cost calculation**	**All responses**	**Services included in final 573**	**All responses**	**Services included in final 573**
Edit zero out-of-term weeks values to median	It appears that this is a misinterpretation of the question about care for school children during holidays. Where zero was entered, this was corrected to the median.	Y	5	4	5	4
Edit number of staff in room where typo (trailing character removed)	This primarily relates to several data points which appeared to be excessively high and likely typos, with an extra digit added at the end. E.g. several with 11, 22 or 33. These were corrected to 1, 2, and 3 respectively. Trailing characters were removed.	N	8	4	9	5
Edit zero manager salary to median	Where the manager salary value appeared to have been missed, this was set to the median value	Y	13	4	13	4
Edit employee hours satisficing (divide by two)	Corrected where the employee hours figure appeared high and the contact and non-contact hours were the same and were therefore thought to be duplicated.	Y	6	4	6	4
Move employee wage from salary column to wage column	Where respondents appeared to have entered the employees wage in the salary column, this was moved to the correct field.	Y	11	4	15	8
Change employee 'salary type' from salary to wage where value has been moved	In several cases, it appeared that in the data entry the respondent had indicated they were entering a wage but had entered a figure which appeared to be a wage as it was very low to be a salary. The salary type was changed.	Y	11	4	11	4
Edit high full time hours to median	This edit was required as people appeared to have entered full-time hours in a week, when the survey asked for hours per day. Values were set to the median.	Y	5	3	5	3

			Services with correction type		Data points corrected	
Correction theme	**Context / correction made**	**Changed data used in unit cost calculation**	**All responses**	**Services included in final 573**	**All responses**	**Services included in final 573**
Edit zero manager hours to median	Where the manager hours field appeared to have been missed in the data completion, this was corrected to the median.	Y	10	3	20	6
Edit zero ancillary staff salary value to one calculated from median salary per hour	Where the ancillary staff salary value appeared to have been missed, this was calculated from the average value		5	3	5	3
Edit casual care hours with a typo zero (divide by 10)	In two instances where the casual care hours appeared excessively high, these have been divided by ten to correct a typo.	Y	2	2	2	2
Edit zero part time hours to median	Where the part time hours value appeared to have been missed, the median value was entered.	Y	4	2	4	2
Edit number of staff in room where typo (multiply decimal by 10)	There were also 2 data points where the value was entered as a decimal which were corrected by multiplying the value by 10.	N	2	2	2	2
Edit manager salary typo (divide by 10)	It appeared that there had been a typo which made the value misaligned with other data by approximately a value of 10. The existing values were divided by 10 to correct.	Y	2	2	2	2
Edit zero manager wage to median	Where the manager wage value appeared to have been missed, this was set to the median value	Y	5	2	5	2
Edit very high employee salaries due to type (divide by 10)	Several excessively high employee salaries which appeared to be outliers were removed.	Y	3	2	3	2

			Services with correction type		Data points corrected	
Correction theme	**Context / correction made**	**Changed data used in unit cost calculation**	**All responses**	**Services included in final 573**	**All responses**	**Services included in final 573**
Edit zero ancillary staff wage value to median	Where the ancillary staff average wage value appeared to have been missed, this was corrected to the median	N	7	2	7	2
Where ancillary salary per hour is very high edit low weeks values (multiply by 10)	Where ancillary staff were showing as working 4 weeks per year leading to excessively high hourly pay, the weeks were corrected to 40.	N	2	2	2	2
Edit zero breakfast club hours to median	Where the breakfast club hours value appeared to have been missed, the median value was entered.	Y	1	1	1	1
Edit zero full time hours to median	Where the full time hours value appeared to have been missed, the median value was entered.	Y	3	1	3	1
Edit children in room typo (trailing characters removed)	Edits made to specific data points where these appeared to be excessively large and likely typos. E.g. 111 was corrected to 11, 1010 to 10.	N	3	1	3	1
Edit rooms data where respondent satisficed (duplicate entries)	This change relates to where rather than put the children in the correct boxes by age, the respondent put the total number of children in all of the boxes.	N	1	1	3	3
Edit manager hours typo (trailing character removed)	One record showed a manager with an outlier in hourly wage paid. This was thought to be a typo with an extra digit at the end. This service was not included in the final dataset	Y	1	1	1	1
Edit manager hours due to satisficing	In some cases, managers' total hours were over 50. This was considered to be mostly due to satisficing in the data completion, with respondents putting in the same figure in both childcare and non-childcare hours.	Y	2	1	4	2

			Services with correction type		Data points corrected	
Correction theme	**Context / correction made**	**Changed data used in unit cost calculation**	**All responses**	**Services included in final 573**	**All responses**	**Services included in final 573**
Edit manager salary typo (multiply by 10)	It appeared that there had been a typo which made the value misaligned with other data by approximately a value of 10. The existing values were multiplied by 10 to correct.	Y	1	1	1	1
Move employee salary from wage column to salary column	Move the employee salary value from the wage column when it appeared to have been entered into the incorrect field.	Y	1	1	1	1
Edit very high employee wages to median	There were several instances where the employees' hourly wages appeared to be excessively high, with values in excess of 111. These were corrected to the median.	Y	4	1	5	1
Where ancillary salary per hour is very high edit low hours values (multiply by 10)	There were some hourly staff where their calculated hourly pay was €100 per hour or higher. In this case, the hours were edited where they were recorded working. This appeared to be because they had put 3 instead of 30 hours per week. The data was not included in the final dataset.	N	1	1	1	1
Edit zero after school hours to median	Data was added for one service where there was no data, although this service was not then included in the analysis.	Y	1	0	1	0
Remove mistaken entry in rooms data	A value of 1010 appeared to have been entered into this field in error.	N	1	0	1	0
Edit manager hours typo to median	One record showed a manager with an outlier in hourly wage paid. This was thought to be a typo with an extra 1	Y	1	0	1	0

			Services with correction type		Data points corrected	
Correction theme	**Context / correction made**	**Changed data used in unit cost calculation**	**All responses**	**Services included in final 573**	**All responses**	**Services included in final 573**
	at the beginning. This service was not included in the final dataset					
Edit error manager weeks to median	One record showed a manager working 29500 weeks. This was corrected to the median.	Y	1	0	1	0
Edit error manager wage to median	One excessively high manager wage was corrected to the median.	Y	1	0	1	0
Edit error manager drawing value to median	Corrected where the figure appeared to be a percentage rather than an absolute value.	Y	1	0	1	0
Move manager salary value to correct column (was in weeks column)	Moved the manager salary into the correct field when this appeared to have been entered in the weeks column	Y	1	0	1	0
Move manager weeks value to correct column (was in salary column)	Moved the manager weeks value into the correct field when this appeared to have been entered in the salary column	Y	1	0	1	0
Edit error employee weeks from 54 to 52	Corrected an impossible value by making a minimal reduction.	Y	1	0	1	0

Appendix 3: Detail on Regression Analysis

Table A1: Descriptive analysis of categorical variables (continues overleaf)

Variable	Category	Frequency	Percent
Size	Small	142	25.0
	Medium	143	25.2
	Large	141	24.8
	Very large	142	25.0
	Total	*568*	*100*
Organisation type	Community/Voluntary Organisation	175	30.8
	Private Enterprise	393	69.2
	Total	*568*	*100*
Premises type	Commercial building owned by service provider	95	16.7
	Domestic building owned by service provider	156	27.5
	Premises with a commercial lease	73	12.9
	Premises with a non-commercial lease	110	19.4
	Premises without formal lease arrangements	117	20.6
	(missing)	17	3.0
	Total	*568*	*100*
Entity type	Company limited by guarantee	170	29.9
	Company limited by shares	69	12.2
	Other	24	4.2
	Partnership	23	4.1
	Sole trader	271	47.7
	(missing)	11	1.9
	Total	*568*	*100*
Multisite provider	No	522	91.9
	Yes	46	8.1
	Total	*568*	*100*
ECCE only	mixed	301	53.0
	no	55	9.7
	yes	212	37.3
	Total	*568*	*100*
High capitation	No	295	51.9
	Yes	273	48.1
	Total	*568*	*100*
Local deprivation	Affluent	41	7.2
	Disadvantaged	38	6.7
	Extremely Disadvantaged	1	0.2
	Marginally below average	247	43.5
	Marginally above average	237	41.7
	Very Disadvantaged	2	0.4
	(missing)	2	0.4
	Total	*568*	*100*

Table A1 (continued): Descriptive analysis of categorical variables (continues overleaf)

Variable	Category	Frequency	Percent
Provides full day service	No	399	70.3
	Yes	169	29.8
	Total	*568*	*100*
Provides morning service	No	54	9.5
	Yes	514	90.5
	Total	*568*	*100*
Provides afternoon service	No	395	69.5
	Yes	173	30.5
	Total	*568*	*100*
Provides breakfast service	No	458	80.6
	Yes	110	19.4
	Total	*568*	*100*
Provides after school service	No	360	63.4
	Yes	208	36.6
	Total	*568*	*100*
Provides part-time service	No	403	71.0
	Yes	165	29.1
	Total	*568*	*100*
Provides out-of-term service	No	449	79.1
	Yes	119	21.0
	Total	*568*	*100*
Provides drop-in service	No	562	98.9
	Yes	6	1.1
	Total	*568*	*100*

Table A1 (continued): Descriptive analysis of categorical variables (continues overleaf)

Variable	Category	Frequency	Percent
Quality	No	551	97.0
	Yes	17	3.0
	Total	*568*	*100*
Open most of year	No (38-46 weeks)	403	71.0
	Yes (47-52 weeks)	165	29.1
	Total	*568*	*100*
Graduate led	No	224	39.4
	Yes	344	60.6
	Total	*568*	*100*
CPD mandatory	No	85	15.0
	Yes all	313	55.1
	Yes care	145	25.5
	(missing)	25	4.4
	Total	*568*	*100*
CPD leave	outside work hours	280	49.3
	paid leave	159	28.0
	paid overtime	30	5.3
	unpaid leave	62	10.9
	(missing)	37	6.5
	Total	*568*	*100*
Youngest child	Less than 12 months	99	17.4
	12-23 months	44	7.8
	24-35 months	75	13.2
	3-5 years	309	54.4
	School age	22	3.9
	(missing)	19	3.4
	Total	*568*	*100*

Table A1 (continued): Descriptive analysis of categorical variables

Variable	Category	Frequency	Percent
Rurality	Rural	238	41.9
	Urban	330	58.1
	Total	*568*	*100*
Region	Border	45	7.9
	Dublin	143	25.2
	Mid-East	88	15.5
	Mid-West	70	12.3
	Midlands	34	6.0
	South East	51	9.0
	South-West	81	14.3
	West	56	9.9
	Total	*568*	*100*
County	Carlow	6	1.1
	Cavan	13	2.3
	Clare	20	3.5
	Cork	64	11.3
	Donegal	13	2.3
	Dublin	143	25.2
	Galway	40	7.0
	Kerry	17	3.0
	Kildare	23	4.1
	Kilkenny	16	2.8
	Laois	11	1.9
	Leitrim	1	0.2
	Limerick	20	3.5
	Longford	5	0.9
	Louth	15	2.6
	Mayo	11	1.9
	Meath	28	4.9
	Monaghan	7	1.2
	Offaly	10	1.8
	Roscommon	5	0.9
	Sligo	11	1.9
	Tipperary	30	5.3
	Waterford	8	1.4
	Westmeath	8	1.4
	Wexford	21	3.7
	Wicklow	22	3.9
	Total	*568*	*100*

Figure A1: Histogram of unit cost (with outliers removed)

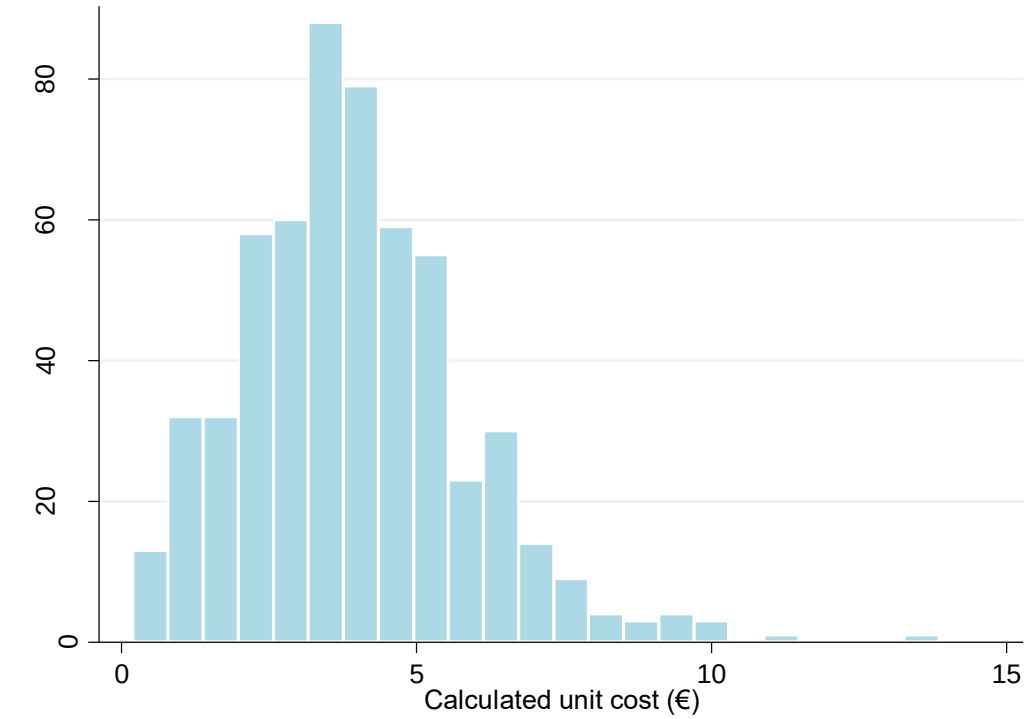

Figure A2: Histogram of percent hours filled

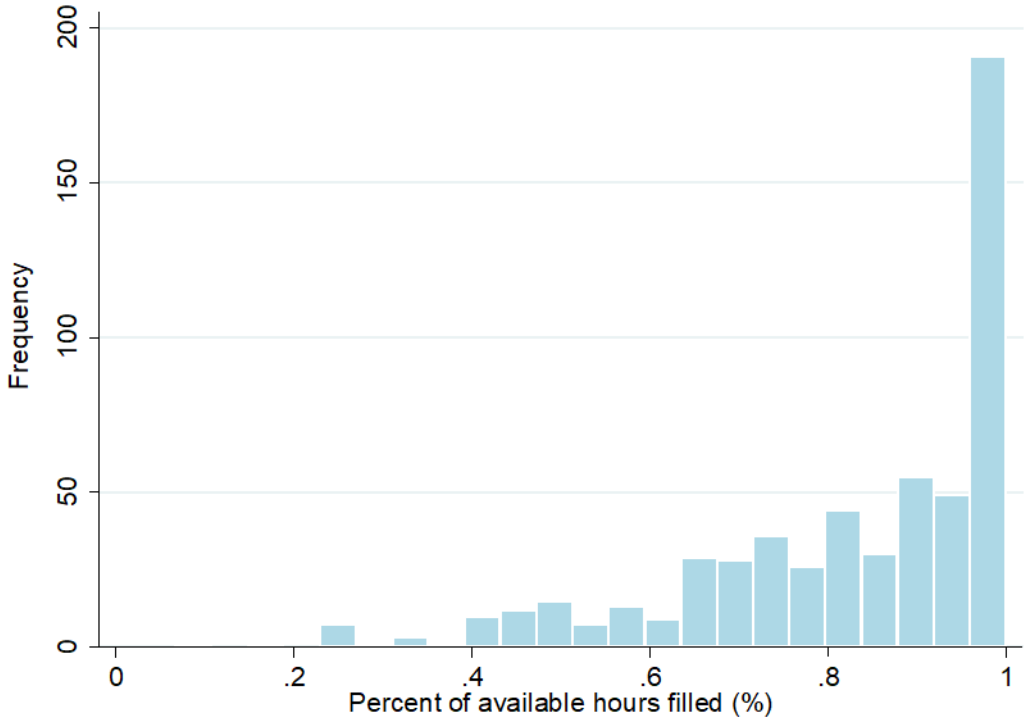

Figure A3: Histogram of percent non-contact hours

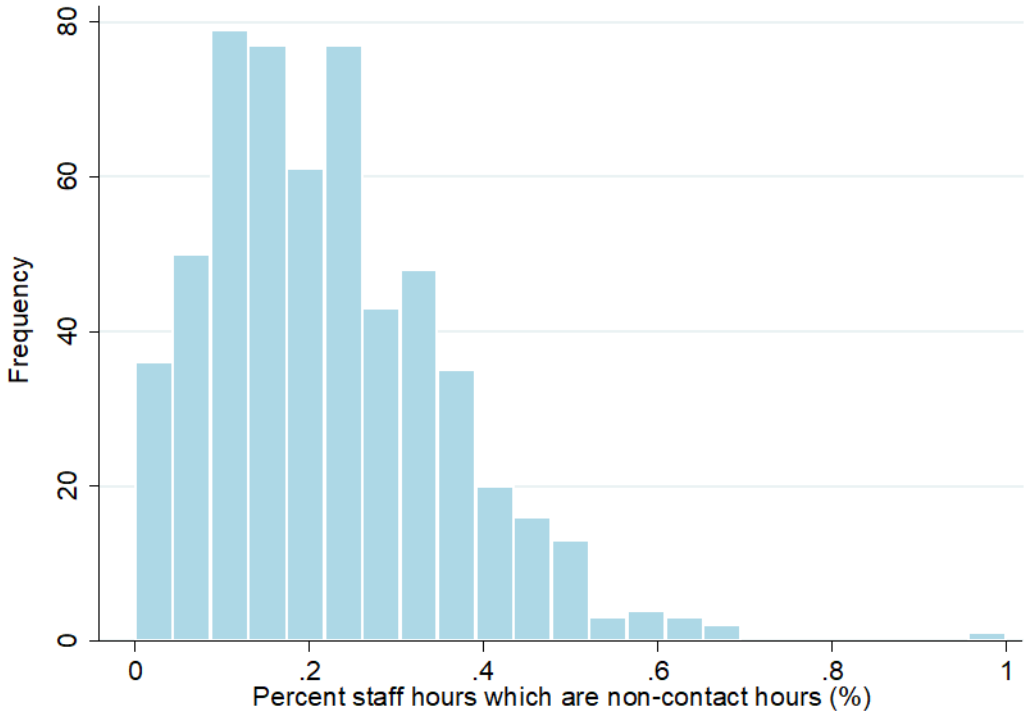

Figure A4: Histogram of weighted average staff qualification level

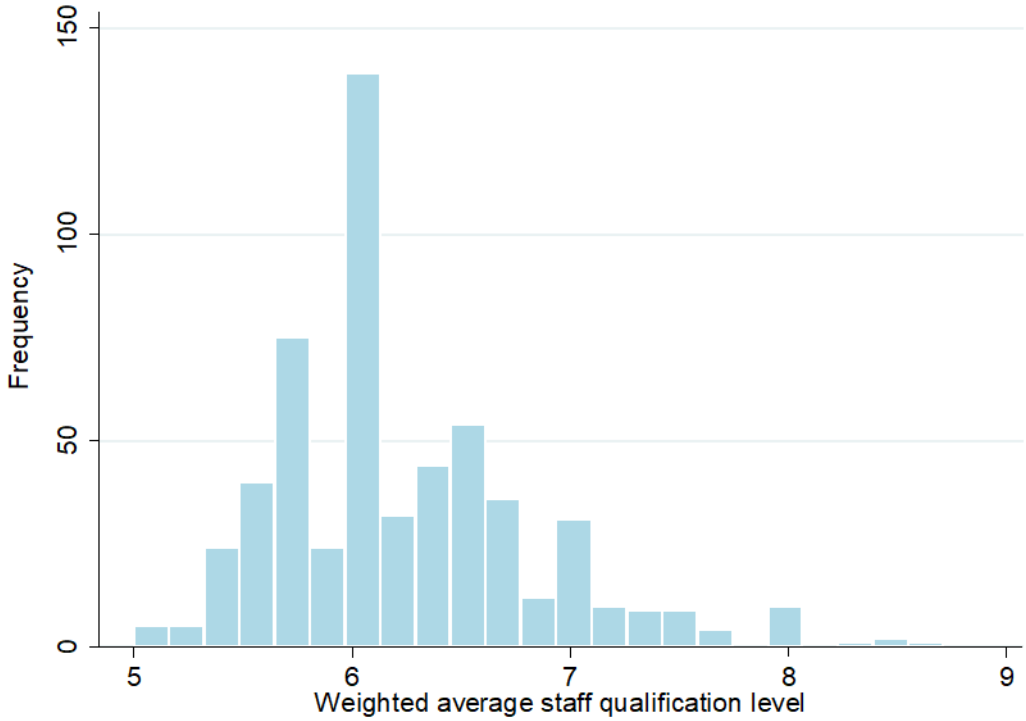

Figure A5: Histogram of staff turnover

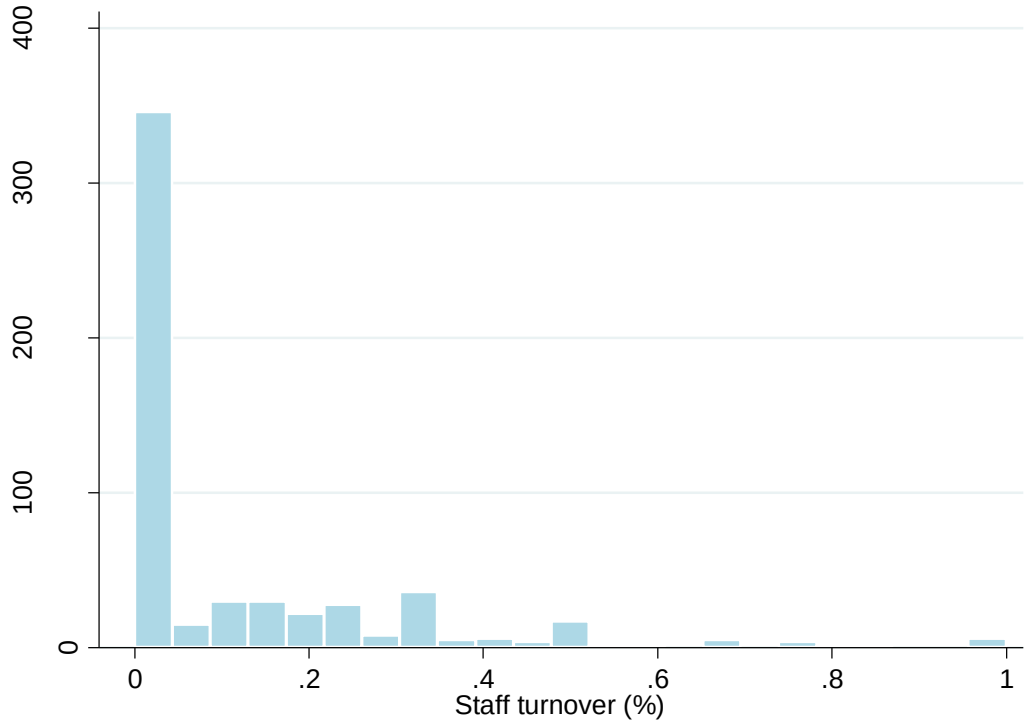

Figure A6: Histogram of average staff-child factor

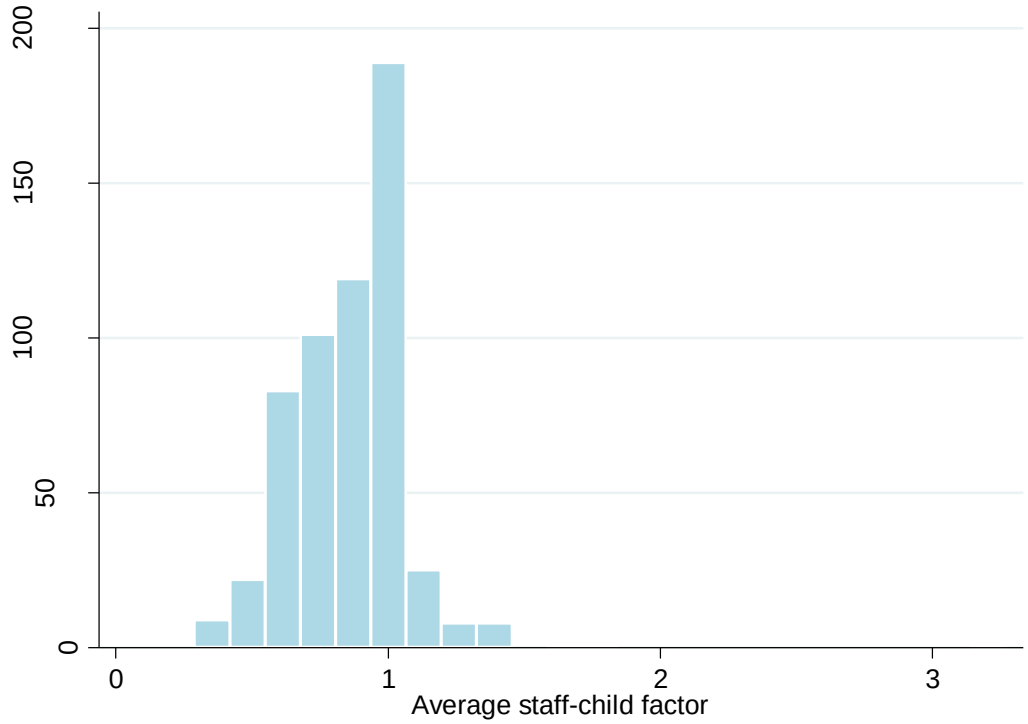

Figure A7: Histogram of average group size

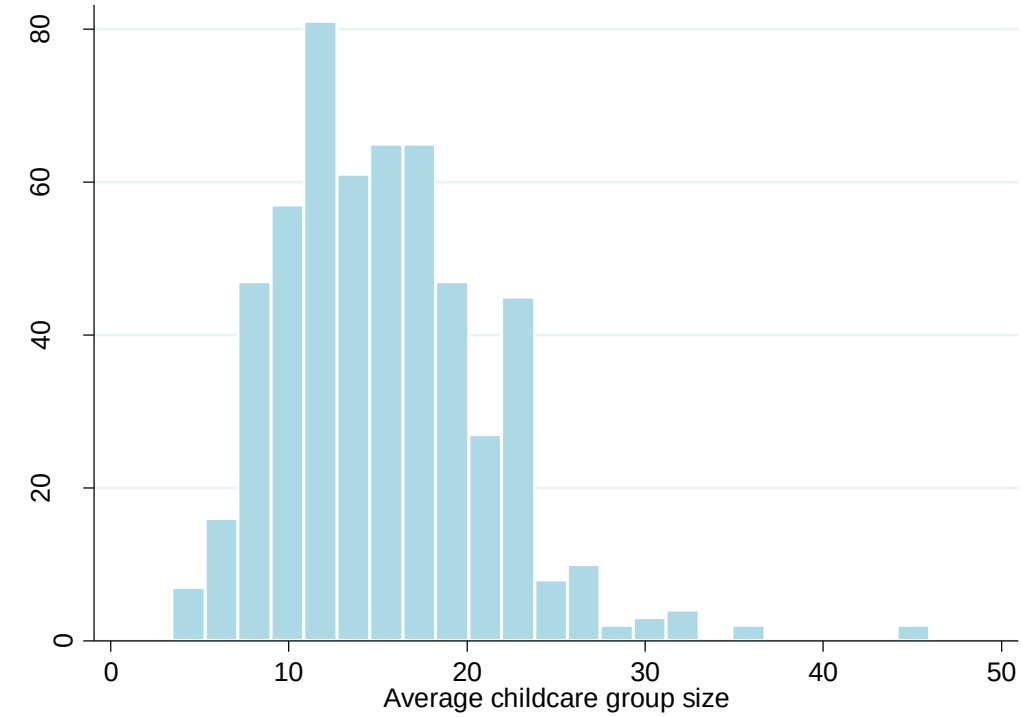

Figure A8: Histogram of percent fees income

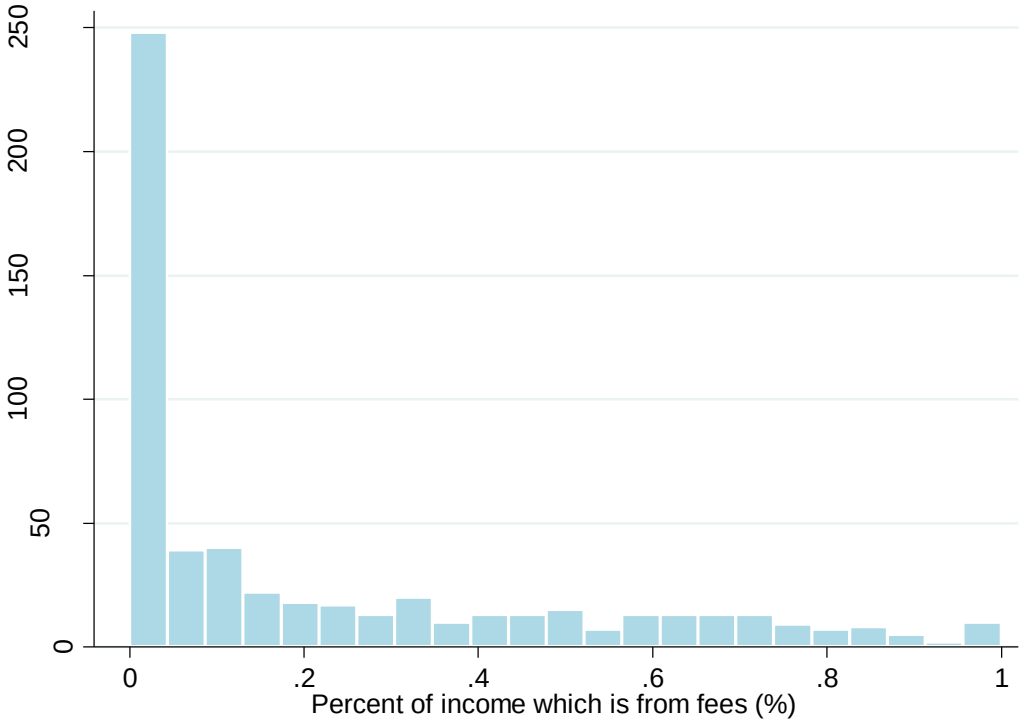

Figure A9: Histogram of percent ECCE income

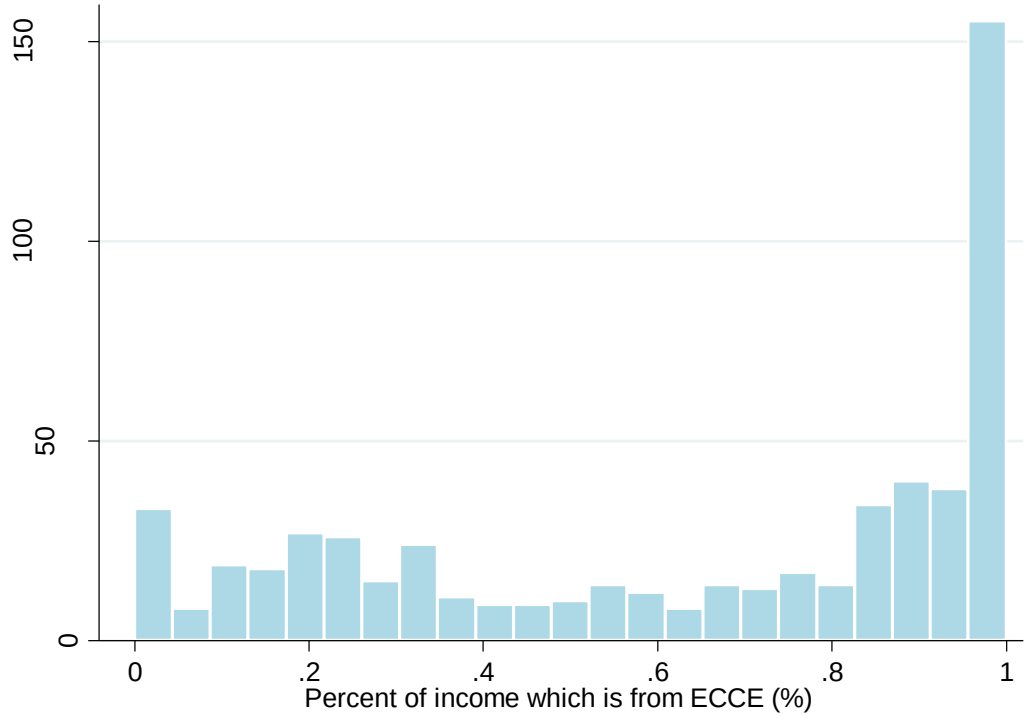

Table A2: Summary of missing cases by variable

Variable	Missing
Ave. staff-child factor	1
Ave. staff qual. level	1
Ave. group size	19
Premises type	17
Entity type	11
Local deprivation	2
CPD type	25
CPD leave	37
Youngest children	19

Table A3: Summary of missing data patterns by variables with missing data (missing = 0, present = 1)

	Patterns of missingness																								
				Local deprivation			Entity type				Premises type				Youngest children				CPD type		CPD leave		
% of missing cases	Ave. staff-child factor	Ave. staff qual. level	Ave. group size	Disadvantaged	Marginally below average	Marginally above average	Limited by shares	Other	Partnership	Sole trader	Domestic owned	Commercial lease	Non-commercial lease	No formal lease	12-23 months	24-35 months	3-5 years	School age	Yes - all staff	Yes - care staff	Paid leave	Paid overtime	Unpaid leave
86%	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4%	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
3%	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	1
3%	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
1%	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
1%	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1	1
<1%	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1
<1%	1	1	1	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1
<1%	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<1%	0	1	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	1
<1%	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<1%	1	1	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1
<1%	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	0	0	0

Table A4: Pairwise correlations for all variables except region and country (for the sake of brevity)

Col.	Variable	Categories	Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
1	Unit cost		1.00																																														
2	Size	Medium	0.19	1.00																																														
3		Large		-0.33	1.00																																												
4		Very large	-0.44	-0.33	-0.33	1.00																																											
5	Organisation type	Private enterprise			-0.10	-0.12	1.00																																										
6	Premises type	Domestic ow ned	0.13		-0.09	-0.21	0.34	1.00																																									
7		Commercial lease				0.22	0.14	-0.25	1.00																																								
8		Non-commercial lease					-0.32	-0.31	-0.20	1.00																																							
9		No formal lease		0.09		-0.12	-0.17	-0.33	-0.20	-0.26	1.00																																						
10	Entity type	Limited by shares	-0.13	-0.16	0.09	0.24	0.24	-0.13	0.21			1.00																																					
11		Other		-0.10			-0.22						1.00																																				
12		Partnership					0.14							1.00																																				
13		Sole trader		0.16	-0.12	-0.32	0.65	0.41		-0.22	-0.11	-0.37	-0.21	-0.20	1.00																																	
14	Multisite provider	Yes		-0.10		0.17		-0.13		0.10		0.32			-0.29	1.00																																	
15	ECCE only	No	0.15				-0.18				0.11				-0.18	0.12	1.00																															
16		Yes	0.30	0.17	-0.30	-0.45	0.18	0.28	-0.16			-0.21			0.33	-0.15	-0.25	1.00																															
17	High capitation	Yes				0.20	0.09				-0.12						-0.16	-0.14	1.00																														
18	Local deprivation	Disadvantaged					-0.26	-0.09			0.13	-0.08	0.11		-0.16		0.16			1.00																													
19		Marginally below average					0.20	0.13		-0.09					0.09		-0.08	0.13		-0.25	1.00																												
20		Marginally above average					-0.12	-0.09												-0.24	-0.75	1.00																											
21	Rurality	Urban	0.16				0.08		0.17			0.16				0.10	0.13	-0.10		0.11		-0.14	1.00																									
22	Services provided	Full day	-0.30	-0.36		0.74	-0.13	-0.23	0.19		-0.16	0.27			-0.33	0.12		-0.49	0.21		-0.11	0.11	1.00																								
23		Morning sessions	-0.14				0.17				-0.09		-0.08		0.18	-0.12	-0.99	0.25	0.16	-0.16			-0.13	1.00																								
24		Afternoon sessions			0.10	0.17					-0.10						-0.20	-0.12	0.17				0.17	0.13	0.21	1.00																					
25		Breakfast club	-0.34	-0.25		0.47	-0.11	-0.13				0.17			-0.22			-0.38	0.20				-0.13	0.41			1.00																				
26		After school club	-0.34	-0.29	0.16	0.53	-0.18	-0.25	0.15			0.23			-0.32	0.11		-0.59	0.13					0.49			0.59	1.00																		
27		Part-time	-0.28	-0.24		0.52	-0.22	-0.21				0.13			-0.29			-0.49	0.16	0.12	-0.14			0.54		0.12	0.30	0.39	1.00																	
28		Out of term	-0.32	-0.28		0.58	-0.13	-0.14	0.09		-0.14	0.21			-0.27			-0.40	0.19					0.57			0.53	0.64	0.39	1.00																	
29	Percent hours filled				-0.22	-0.10		0.10	-0.10									0.19				-0.09		-0.11						1.00																
30	Percent non-contact hours		0.28	0.18	-0.16	-0.35	0.18	0.23		-0.09		-0.16			0.28			0.37			0.10	-0.14		-0.38		-0.15	-0.29	-0.29	-0.31	-0.24	0.13	1.00														
31	Quality aw ard	Yes																	0.10													1.00														
32	Open most of year	Yes	-0.31	-0.34		0.71	-0.25	-0.25	0.14		-0.09	0.21			-0.39	0.15	0.13	-0.49	0.14	0.11				0.76	-0.12	0.12	0.41	0.49	0.60	0.58	-0.09	-0.36		1.00												
33	Graduate led	Yes				0.23			0.10		-0.11							-0.20	0.73		-0.09		0.09	0.22		0.15	0.16	0.20	0.18	0.18			0.10	0.22	1.00										
34	Ave. staff qual. level		0.13				0.10					-0.09			0.12		0.08		0.44				0.09	-0.08							0.19	0.10	-0.10	0.60	1.00										
35	CPD type	Yes - all staff															0.11				-0.09				-0.11											1.00									
36		Yes - care staff			-0.12													0.09		-0.10	0.16															-0.70	1.00								
37	CPD leave	Paid leave																								0.11								0.10			1.00							
38		Paid overtime							-0.09															-0.09														-0.16	1.00					
39		Unpaid leave														-0.09														-0.09								-0.24	-0.09	1.00				
40	Staff turnover					0.13			0.10			0.09			-0.13	0.10		-0.12	0.10					0.14					0.08	-0.09			0.17	0.14	0.09						1.00				
41	Youngest children	12-23 months				0.16		-0.09	0.12			0.11					0.09	-0.22					0.10	0.30	-0.09			0.15	0.29	0.18		-0.13		0.27									1.00			
42		24-35 months			0.15													-0.25						-0.09			-0.08			-0.11													-0.12	1.00		
43		3-5 years	0.19	0.21		-0.55	0.20	0.23	-0.16			-0.17			0.31	-0.11	-0.28	0.62					-0.14	-0.60	0.28	-0.12	-0.26	-0.47	-0.45	-0.41	0.13	0.32		-0.62	-0.16								-0.11	-0.33	-0.45	1.00			
44		School age		0.10			-0.10			0.09					-0.11		0.56	-0.14	-0.17					-0.13	-0.57	-0.12		0.25	-0.13					-0.13		0.13								-0.23	1.00			
45	Ave. staff-child factor		-0.10				0.17								0.12		-0.17	-0.09	0.10						0.19			-0.09																	-0.27	1.00		
46	Ave. group size			0.13		-0.13		-0.19		0.13	0.14		0.13					0.09						-0.29				-0.21	-0.10	0.19			-0.24									-0.11		-0.16		0.19	0.16	0.16	1.00		
47	Percent fees income		-0.30	-0.29		0.58		-0.16	0.21	-0.10	-0.15	0.42			-0.28	0.23	0.20	-0.51	0.08				0.10	0.64	-0.20		0.39	0.47	0.41	0.46		-0.37		0.60	0.15	-0.09						0.17	0.19		-0.54			-0.19	1.00	
48	Percent ECCE income		0.18	0.24		-0.61	0.28	0.28	-0.17			-0.28			0.44	-0.22	-0.41	0.61		-0.15	0.08		-0.16	-0.66	0.40		-0.42	-0.62	-0.47	-0.50		0.38		-0.67	-0.16							-0.12	-0.23		0.68	-0.30	0.16	0.11	-0.77	1.00

Table A5: Results of bivariate models (one model for each explanatory variable, continued overleaf)

Variable	Category	Coef.	Std. Err.	P-value	lower CI	upper CI	
Size	Size small (ref. category)						
	Size medium	-0.089	0.198	0.655	-0.478	0.301	
	Size large	-0.559	0.199	0.005	-0.950	-0.168	**
	Size v.large	-2.097	0.199	0.000	-2.487	-1.707	***
	_model_constant	4.616	0.141	0.000	4.340	4.892	***
Organisation type	Community/voluntary org. (ref. category)						
	Private enterprise	-0.096	0.170	0.573	-0.430	0.238	
	_model_constant	3.997	0.141	0.000	3.719	4.275	***
Premises type	Commercial owned (ref. category)						
	Domestic owned	1.092	0.241	0.000	0.618	1.566	***
	Commercial lease	0.547	0.289	0.059	-0.020	1.114	
	Non-commercial lease	0.786	0.260	0.003	0.276	1.296	**
	No formal lease	0.772	0.256	0.003	0.269	1.275	**
	_model_constant	3.229	0.190	0.000	2.855	3.603	***
Entity type	Limited by guarantee (ref. category)						
	Limited by shares	-0.791	0.263	0.003	-1.307	-0.274	**
	Other	-0.513	0.402	0.202	-1.302	0.276	
	Partnership	-0.345	0.409	0.399	-1.149	0.458	
	Sole trader	-0.027	0.180	0.880	-0.381	0.327	
	_model_constant	4.074	0.141	0.000	3.797	4.351	***
Multisite provider	Yes (ref. category: No)	-0.165	0.288	0.566	-0.731	0.400	
	_model_constant	3.944	0.082	0.000	3.783	4.105	***
ECCE only	Mixed (ref. category)						
	No	1.554	0.254	0.000	1.055	2.052	***
	Yes	1.405	0.155	0.000	1.100	1.710	***
	_model_constant	3.256	0.100	0.000	3.060	3.452	***
High capitation	Yes (ref. category: No)	-0.113	0.157	0.473	-0.422	0.196	
	_model_constant	3.985	0.109	0.000	3.771	4.199	***
Local deprivation	Affluent (ref. category)						
	Disadvantaged	-0.342	0.411	0.405	-1.149	0.464	
	Marginally below average	-0.289	0.314	0.357	-0.905	0.327	
	Marginally above average	-0.534	0.315	0.090	-1.152	0.084	
	_model_constant	4.297	0.290	0.000	3.727	4.868	***
Rurality	Urban (ref. category: Rural)	0.597	0.157	0.000	0.288	0.906	***
	_model_constant	3.584	0.120	0.000	3.349	3.820	***

Table A5 (continued): Results of bivariate models (continued overleaf)

Variable	Category	Coef.	Std. Err.	P-value	lower CI	upper CI	
Services provided	Full day	-1.207	0.164	0.000	-1.530	-0.885	***
	_model_constant	4.290	0.090	0.000	4.114	4.466	***
	Afternoon sessions	-0.045	0.171	0.793	-0.380	0.290	
	_model_constant	3.945	0.094	0.000	3.760	4.130	***
	Breakfast club	-1.630	0.187	0.000	-1.997	-1.263	***
	_model_constant	4.247	0.082	0.000	4.085	4.408	***
	After school club	-1.303	0.154	0.000	-1.605	-1.002	***
	_model_constant	4.408	0.093	0.000	4.226	4.591	***
	Part-time	-1.154	0.166	0.000	-1.480	-0.828	***
	_model_constant	4.266	0.090	0.000	4.090	4.442	***
	Out of term	-1.478	0.183	0.000	-1.837	-1.119	***
	_model_constant	4.241	0.084	0.000	4.076	4.405	***
Percent hours filled		0.183	0.421	0.664	-0.644	1.011	
	_model_constant	3.779	0.358	0.000	3.076	4.482	***
Percent non-cont. hours		3.777	0.552	0.000	2.692	4.862	***
	_model_constant	3.101	0.143	0.000	2.821	3.382	***
Quality award	Yes (ref. category: No)	-0.616	0.460	0.181	-1.520	0.288	
	_model_constant	3.949	0.080	0.000	3.793	4.106	***
Open most of year	Yes (ref. category: No)	-1.280	0.164	0.000	-1.603	-0.957	***
	_model_constant	4.303	0.089	0.000	4.129	4.477	***
Graduate led	Yes (ref. category: No)	-0.052	0.161	0.746	-0.368	0.264	
	_model_constant	3.963	0.125	0.000	3.717	4.208	***
Ave. staff qual. level		0.405	0.128	0.002	0.153	0.657	**
	_model_constant	1.404	0.802	0.081	-0.172	2.979	
CPD mandatory	No (ref. category)						
	Yes - all staff	0.170	0.230	0.460	-0.282	0.622	
	Yes - care staff	-0.040	0.257	0.876	-0.544	0.465	
	_model_constant	3.837	0.204	0.000	3.437	4.238	***
CPD leave	Outside work hours (ref. category)						
	Paid leave	0.028	0.188	0.880	-0.340	0.397	
	Paid overtime	-0.068	0.363	0.852	-0.781	0.646	
	Unpaid leave	0.130	0.265	0.626	-0.392	0.651	
	_model_constant	3.906	0.113	0.000	3.684	4.128	***
Staff turnover		-0.708	0.410	0.085	-1.513	0.098	
	_model_constant	4.012	0.091	0.000	3.833	4.192	***

Table A5 (continued): Results of bivariate models

Variable	Category	Coef.	Std. Err.	P-value	lower CI	upper CI	
Youngest children	Less than 12 months (ref. category)						
	12-23 months	0.962	0.329	0.004	0.315	1.609	**
	24-35 months	0.950	0.278	0.001	0.404	1.497	***
	3-5 years	1.349	0.210	0.000	0.936	1.761	***
	School age	1.517	0.428	0.000	0.676	2.359	***
	_model_constant	2.922	0.183	0.000	2.563	3.281	***
Ave. staff-child factor		-0.875	0.351	0.013	-1.564	-0.186	*
	_model_constant	4.685	0.313	0.000	4.071	5.300	***
Ave. group size		-0.015	0.014	0.278	-0.042	0.012	
	_model_constant	4.179	0.226	0.000	3.734	4.624	***
Percent fees income		-2.024	0.269	0.000	-2.552	-1.496	***
	_model_constant	4.377	0.096	0.000	4.190	4.565	***
Percent ECCE income		0.956	0.222	0.000	0.519	1.392	***
	_model_constant	3.321	0.161	0.000	3.004	3.638	***
Region	Border (ref. category)						
	Dublin	1.509	0.310	0.000	0.900	2.119	***
	Mid-East	1.148	0.333	0.001	0.495	1.802	***
	Mid-west	0.322	0.347	0.353	-0.359	1.004	
	Midlands	0.220	0.413	0.594	-0.590	1.030	
	South	0.675	0.371	0.070	-0.055	1.404	
	South-West	0.883	0.338	0.009	0.220	1.546	**
	West	0.688	0.363	0.059	-0.026	1.402	
	_model_constant	3.066	0.271	0.000	2.534	3.597	***
County	Carlow (ref. category)						
	Cavan	-1.740	0.898	0.053	-3.505	0.024	
	Clare	-1.997	0.847	0.019	-3.661	-0.333	*
	Cork	-1.268	0.777	0.103	-2.794	0.258	
	Donegal	-2.130	0.898	0.018	-3.894	-0.366	*
	Dublin	-0.679	0.758	0.371	-2.169	0.810	
	Galway	-1.630	0.797	0.041	-3.195	-0.065	*
	Kerry	-1.447	0.864	0.095	-3.144	0.251	
	Kildare	-1.037	0.834	0.215	-2.675	0.602	
	Kilkenny	-1.854	0.871	0.034	-3.565	-0.143	*
	Laois	-2.120	0.924	0.022	-3.934	-0.306	*
	Leitrim	-1.561	1.965	0.427	-5.422	2.300	
	Limerick	-1.930	0.847	0.023	-3.594	-0.266	*
	Longford	-1.462	1.102	0.185	-3.626	0.703	
	Louth	-1.016	0.879	0.248	-2.743	0.711	
	Mayo	-1.110	0.924	0.230	-2.924	0.704	
	Meath	-1.600	0.819	0.051	-3.208	0.008	
	Monaghan	-2.963	1.012	0.004	-4.952	-0.975	**
	Offaly	-1.679	0.940	0.075	-3.525	0.167	
	Roscommon	-1.325	1.102	0.230	-3.490	0.839	
	Sligo	-2.351	0.924	0.011	-4.166	-0.537	*
	Tipperary	-1.736	0.814	0.033	-3.335	-0.138	*
	Waterford	-1.644	0.983	0.095	-3.574	0.287	
	Westmeath	-2.438	0.983	0.013	-4.368	-0.507	*
	Wexford	-1.638	0.842	0.052	-3.292	0.017	
	Wicklow	-0.348	0.838	0.678	-1.995	1.298	
	_model_constant	5.254	0.743	0.000	3.795	6.714	***

Table A6: Results of saturated model (without region or county, N = 487, R^2=0.453)

Variable	Category	Coef.	Std. Err.	P-value	lower CI	upper CI	
Size	Size small (ref. category)						
	Size medium	-0.351	0.218	0.108	-0.780	0.077	
	Size large	-0.812	0.297	0.007	-1.397	-0.228	**
	Size v.large	-2.694	0.425	0.000	-3.529	-1.860	***
Organisation type	Community/voluntary org. (ref. category)						
	Private enterprise	0.332	0.369	0.368	-0.392	1.057	
Premises type	Commercial owned (ref. category)						
	Domestic owned	0.083	0.238	0.727	-0.384	0.551	
	Commercial lease	0.026	0.271	0.925	-0.507	0.558	
	Non-commercial lease	-0.116	0.248	0.641	-0.603	0.372	
	No formal lease	-0.422	0.249	0.091	-0.911	0.067	
Entity type	Limited by guarantee (ref. category)						
	Limited by shares	-0.339	0.386	0.381	-1.099	0.420	
	Other	-0.440	0.357	0.219	-1.141	0.262	
	Partnership	-0.303	0.469	0.519	-1.225	0.619	
	Sole trader	-0.813	0.358	0.023	-1.516	-0.110	*
Multisite provider	Yes (ref. category: No)	0.105	0.274	0.702	-0.433	0.642	
ECCE only	Mixed (ref. category)						
	No	1.791	0.341	0.000	1.121	2.462	***
	Yes	0.511	0.242	0.036	0.035	0.986	*
High capitation	Yes (ref. category: No)	0.323	0.215	0.134	-0.100	0.746	
Local deprivation	Affluent (ref. category)						
	Disadvantaged	-0.644	0.392	0.101	-1.413	0.126	
	Marginally below average	-0.053	0.295	0.857	-0.633	0.527	
	Marginally above average	-0.297	0.300	0.322	-0.887	0.292	
Rurality	Urban (ref. category: Rural)	0.378	0.157	0.016	0.070	0.686	*
Services provided	Full day	0.373	0.319	0.243	-0.254	1.000	
	Afternoon sessions	0.460	0.175	0.009	0.116	0.805	**
	Breakfast club	-0.165	0.235	0.483	-0.627	0.297	
	After school club	-0.002	0.257	0.993	-0.508	0.504	
	Part-time	-0.356	0.210	0.091	-0.769	0.057	
	Out of term	-0.380	0.261	0.145	-0.893	0.132	
Percent hours filled		-0.842	0.415	0.043	-1.659	-0.026	*
Percent non-cont. hours		1.675	0.612	0.006	0.471	2.878	**
Quality award	Yes (ref. category: No)	-0.667	0.385	0.084	-1.424	0.091	
Open most of year	Yes (ref. category: No)	-0.713	0.302	0.019	-1.307	-0.119	*
Graduate led	Yes (ref. category: No)	0.138	0.254	0.586	-0.360	0.637	
Ave. staff qual. level		0.141	0.152	0.355	-0.158	0.441	
CPD mandatory	No (ref. category)						
	Yes - all staff	-0.013	0.202	0.949	-0.409	0.384	
	Yes - care staff	0.028	0.226	0.903	-0.417	0.472	
CPD leave	Outside work hours (ref. category)						
	Paid leave	-0.097	0.159	0.541	-0.410	0.215	
	Paid overtime	-0.217	0.309	0.483	-0.824	0.390	
	Unpaid leave	-0.112	0.231	0.627	-0.567	0.342	
Staff turnover		-0.546	0.365	0.136	-1.263	0.171	
Youngest children	Less than 12 months (ref. category)						
	12-23 months	-0.137	0.320	0.670	-0.767	0.493	
	24-35 months	-0.662	0.368	0.073	-1.386	0.062	
	3-5 years	-0.870	0.379	0.022	-1.615	-0.124	*
	School age	-3.707	0.636	0.000	-4.956	-2.458	***
Ave. staff-child factor		-0.291	0.350	0.405	-0.979	0.396	
Ave. group size		-0.012	0.015	0.439	-0.041	0.018	
Percent fees income		-2.490	0.502	0.000	-3.478	-1.503	***
Percent ECCE income		-2.795	0.509	0.000	-3.796	-1.794	***
_model_constant		7.856	1.262	0.000	5.375	10.337	***

Table A7: Results of final model including county (N = 530, R^2=0.443, dropped variables omitted)

Variable	Category	Coef.	Std. Err.	P-value	lower CI	upper CI	
Size	Size small (ref. category)						
	Size medium	-0.450	0.207	0.030	-0.856	-0.044	*
	Size large	-0.968	0.272	0.000	-1.502	-0.434	***
	Size v.large	-2.974	0.368	0.000	-3.697	-2.251	***
Premises type	Commercial owned (ref. category)						
	Domestic owned	-0.039	0.229	0.866	-0.488	0.411	
	Commercial lease	0.114	0.249	0.647	-0.376	0.604	
	Non-commercial lease	-0.222	0.233	0.341	-0.679	0.236	
	No formal lease	-0.464	0.234	0.048	-0.924	-0.005	*
Entity type	Limited by guarantee (ref. category)						
	Limited by shares	-0.209	0.254	0.410	-0.708	0.290	
	Other	-0.350	0.349	0.316	-1.035	0.335	
	Partnership	-0.086	0.361	0.811	-0.795	0.622	
	Sole trader	-0.536	0.195	0.006	-0.919	-0.153	**
ECCE only	Mixed (ref. category)						
	No	1.789	0.314	0.000	1.173	2.406	***
	Yes	0.660	0.216	0.002	0.235	1.084	**
High capitation	Yes (ref. category: No)	0.507	0.147	0.001	0.219	0.795	***
Services provided	Afternoon sessions	0.440	0.168	0.009	0.110	0.770	**
Percent hours filled		-1.142	0.387	0.003	-1.901	-0.382	**
Percent non-cont. hours		1.531	0.575	0.008	0.401	2.660	**
Open most of year	Yes (ref. category: No)	-0.612	0.286	0.033	-1.174	-0.050	*
Youngest children	Less than 12 months (ref. category)						
	12-23 months	-0.212	0.314	0.500	-0.828	0.405	
	24-35 months	-0.723	0.326	0.027	-1.363	-0.082	*
	3-5 years	-0.890	0.330	0.007	-1.539	-0.241	**
	School age	-2.965	0.549	0.000	-4.044	-1.885	***
Percent fees income		-2.060	0.452	0.000	-2.947	-1.172	***
Percent ECCE income		-2.423	0.460	0.000	-3.326	-1.519	***
County	Carlow (ref. category)						
	Cavan	-0.832	0.762	0.276	-2.329	0.666	
	Clare	-0.960	0.715	0.180	-2.365	0.445	
	Cork	-0.794	0.654	0.225	-2.079	0.491	
	Donegal	-0.963	0.749	0.199	-2.436	0.509	
	Dublin	-0.313	0.641	0.626	-1.571	0.946	
	Galway	-1.186	0.673	0.079	-2.509	0.137	
	Kerry	-0.952	0.727	0.191	-2.379	0.476	
	Kildare	-0.292	0.696	0.675	-1.660	1.076	
	Kilkenny	-1.154	0.731	0.115	-2.591	0.282	
	Laois	-1.301	0.766	0.090	-2.806	0.204	
	Leitrim	0.552	1.636	0.736	-2.663	3.766	
	Limerick	-0.997	0.714	0.163	-2.400	0.405	
	Longford	-0.850	0.908	0.350	-2.634	0.935	
	Louth	0.109	0.740	0.883	-1.344	1.562	
	Mayo	-0.858	0.799	0.283	-2.428	0.712	
	Meath	-0.973	0.691	0.160	-2.331	0.385	
	Monaghan	-2.427	0.921	0.009	-4.237	-0.618	**
	Offaly	-1.266	0.795	0.112	-2.827	0.296	
	Roscommon	-0.261	0.930	0.779	-2.090	1.567	
	Sligo	-1.268	0.799	0.113	-2.837	0.301	
	Tipperary	-0.892	0.687	0.195	-2.241	0.457	
	Waterford	-1.418	0.817	0.083	-3.023	0.186	
	Westmeath	-1.188	0.817	0.146	-2.793	0.417	
	Wexford	-1.203	0.711	0.091	-2.600	0.194	
	Wicklow	-0.258	0.708	0.716	-1.648	1.133	
_model_constant		8.939	0.905	0.000	7.161	10.716	***

Table A8: Results of final model including region (N = 530, R^2=0.422, dropped variables omitted)

Variable	Category	Coef.	Std. Err.	P-value	lower CI	upper CI	
Size	Size small (ref. category)						
	Size medium	-0.421	0.203	0.039	-0.821	-0.021	*
	Size large	-0.932	0.267	0.001	-1.456	-0.409	***
	Size v.large	-2.912	0.360	0.000	-3.618	-2.205	***
Premises type	Commercial owned (ref. category)						
	Domestic owned	0.009	0.225	0.967	-0.433	0.452	
	Commercial lease	0.168	0.248	0.498	-0.318	0.654	
	Non-commercial lease	-0.166	0.231	0.471	-0.619	0.287	
	No formal lease	-0.411	0.231	0.077	-0.865	0.044	
Entity type	Limited by guarantee (ref. category)						
	Limited by shares	-0.212	0.249	0.397	-0.702	0.279	
	Other	-0.431	0.344	0.210	-1.107	0.244	
	Partnership	-0.104	0.354	0.769	-0.798	0.591	
	Sole trader	-0.506	0.189	0.008	-0.876	-0.135	**
ECCE only	Mixed (ref. category)						
	No	1.791	0.311	0.000	1.179	2.402	***
	Yes	0.664	0.213	0.002	0.246	1.082	**
High capitation	Yes (ref. category: No)	0.539	0.141	0.000	0.263	0.816	***
Services provided	Afternoon sessions	0.420	0.164	0.011	0.098	0.743	*
Percent hours filled		-1.233	0.373	0.001	-1.966	-0.500	***
Percent non-cont. hours		1.695	0.555	0.002	0.605	2.786	**
Open most of year	Yes (ref. category: No)	-0.639	0.279	0.022	-1.186	-0.091	*
Youngest children	Less than 12 months (ref. category)						
	12-23 months	-0.171	0.304	0.574	-0.769	0.426	
	24-35 months	-0.771	0.315	0.015	-1.390	-0.151	*
	3-5 years	-0.919	0.321	0.004	-1.549	-0.289	**
	School age	-3.014	0.532	0.000	-4.060	-1.967	***
Percent fees income		-2.110	0.441	0.000	-2.976	-1.244	***
Percent ECCE income		-2.496	0.452	0.000	-3.385	-1.608	***
Region	Border (ref. category)						
	Dublin	0.817	0.279	0.004	0.268	1.365	**
	Mid-East	0.701	0.289	0.016	0.133	1.269	*
	Mid-west	0.183	0.302	0.544	-0.411	0.778	
	Midlands	-0.078	0.350	0.824	-0.766	0.610	
	South	0.062	0.324	0.850	-0.576	0.699	
	South-West	0.308	0.293	0.293	-0.267	0.883	
	West	0.109	0.314	0.728	-0.508	0.727	
_model_constant		7.838	0.713	0.000	6.437	9.238	***

Figure A10: Plot of final model residuals against fitted values

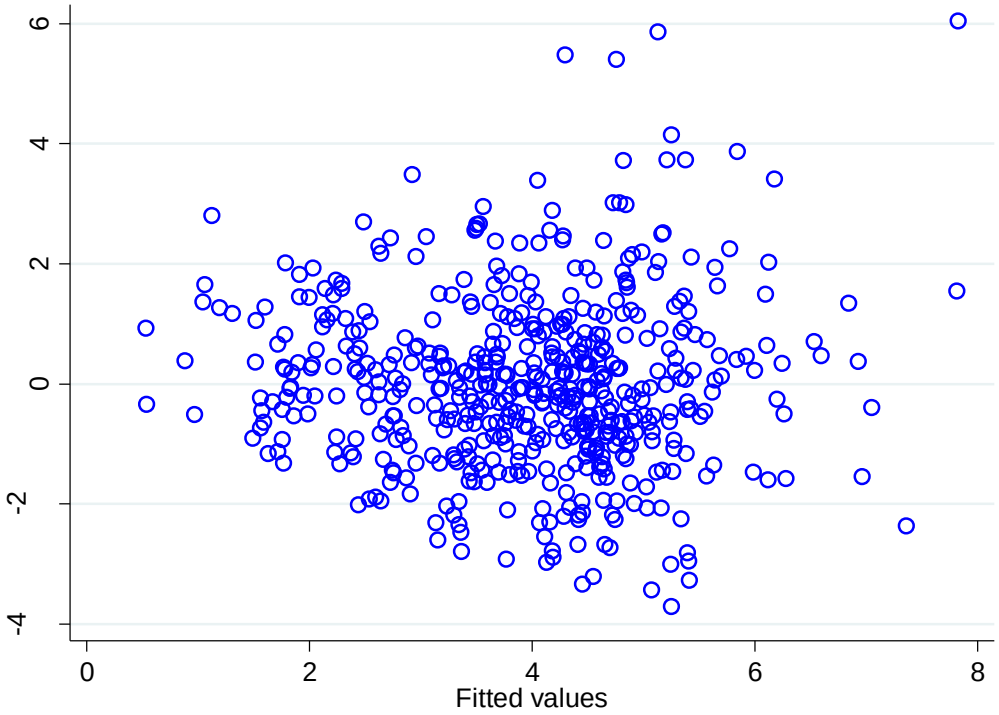

Figure A11: Plot of final model residuals against quantiles of the normal distribution

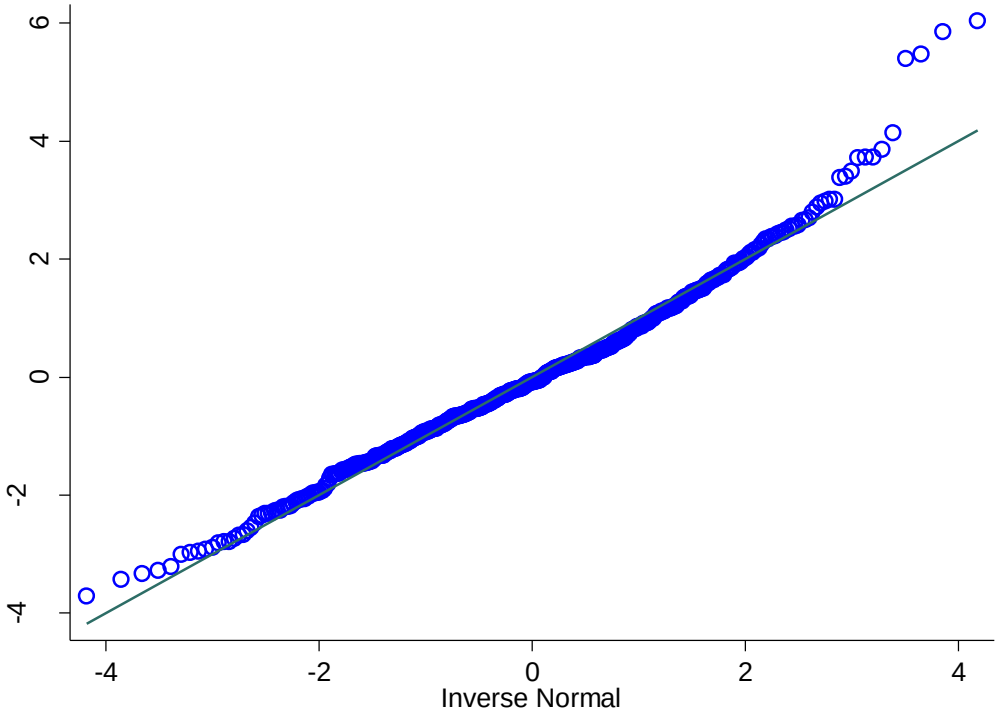

Figure A12: Plot of final model leverage values against residuals

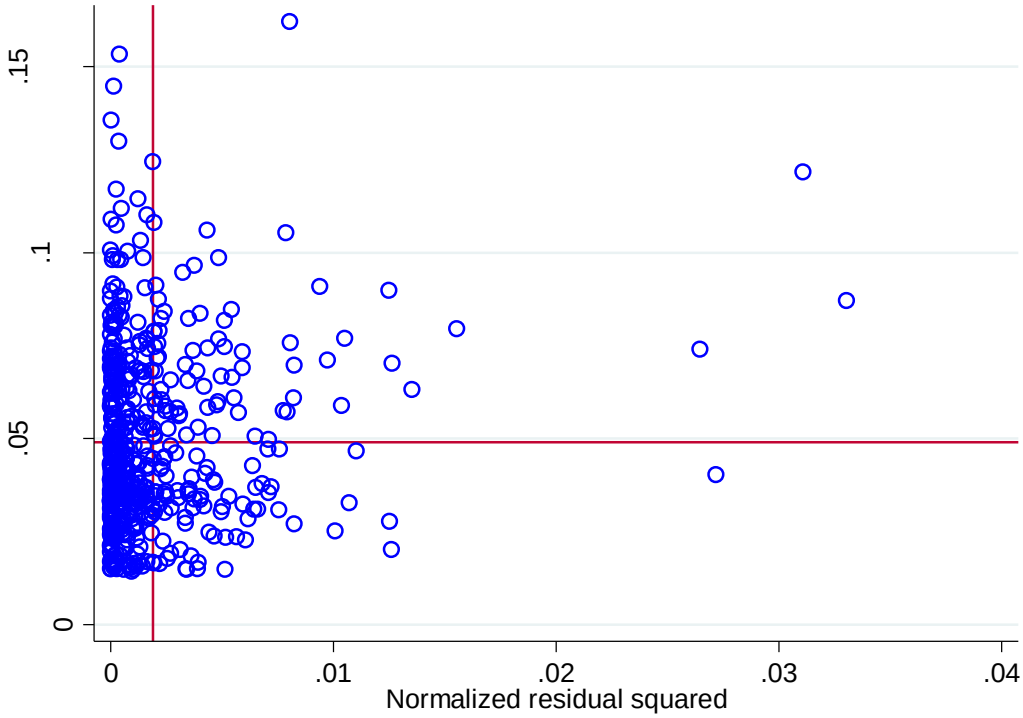

Figure A13: Plot of Cook's distance against fitted values

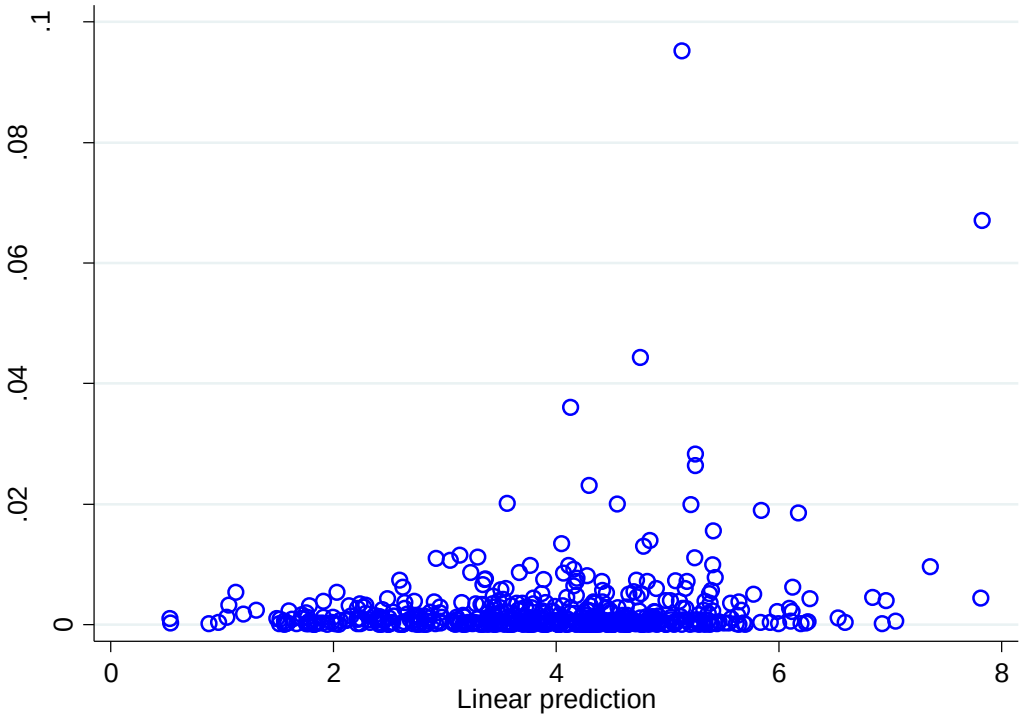

Table A9: Variance inflation factors (above 1) for explanatory variables

Variable	Category	VIF
Youngest children	3-5 years	6.15
Percent ECCE income		6.08
Size	Size v.large	5.70
Open most of year	Yes	3.73
Percent fees income		3.65
Size	Size large	3.21
Youngest children	24-35 months	2.84
Youngest children	School age	2.71
ECCE only	Yes	2.60
Premises type	Domestic owned	2.50
Premises type	No formal lease	2.21
Entity type	Sole trader	2.11
Premises type	Non-commercial lease	2.08
ECCE only	No	1.92
Size	Size medium	1.90
Premises type	Commercial lease	1.71
Entity type	Limited by shares	1.63
Youngest children	12-23 months	1.53
Services provided	Afternoon sessions	1.38
Percent non-contact hours		1.38
Entity type	Partnership	1.25
Rurality	Urban	1.22
Percent hours filled		1.18
High capitation	Yes	1.17
Entity type	Other	1.14

Table A10: Driver identification and potential operationalisation

Driver group	Potential driver	Sources	Causal pathway	Operationalisation considered
Service efficiency	Occupancy rates	F: 9, 10, 32, 34, 36, 39, 47, 48,	Less complete occupancy is likely to introduce an inefficiency which is likely to affect unit costs. For example, overhead costs are likely to be fixed and but with lower occupancy rates and fewer children income is lower. The service therefore operates and a financially less efficient level when there not full occupancy. This potential driver is likely to be related to the child to staff ratio. Note that occupancy rates are likely to have a seasonal impact as they are higher in the summer term and therefore unit costs are at their lowest.	Percentage of places that are filled. Note that the measurement at a specific point in time is used as a proxy for the general occupancy of the service, but that occupancy rates vary over the course of the year.
	Child to staff ratio	F: 5, 12,14, 15, 25, 50, 51, 53, 54, 56, 59, 60, 68, 69, 70, 99, 100, 101, 108, 109, 112, 114, 116, 117, 118	For all except school-age children there are legal requirements for the number of children that can be supervised by a single member of appropriate staff. There are different requirements depending on the age of the children in the room. The most financially efficient service would therefore have the maximum level of children to staff. In the Frontier paper the child to staff ratio had a substantial effect on unit costs, with lower costs where the ratio is high. As staff costs are generally the among the highest component of total costs, it would not be surprising to see these have a substantial affect. This potential driver is likely to be linked to occupancy rates and to group size in each room.	The Frontier research used a continuous variable for the ratio as they had a different model for the different age bands. In a model that combines the age band, this is less likely to be realistic. An alternative approach is to use a proxy measure. This might be the percentage of sessions with a related legal requirement that were at the maximum child-staff ratio.
Service characteristics	Service provider type (e.g. private / community / voluntary)	F: 12, 34, 36, 37, 38, 41, 46, 50 52, 54, 55, 56, 72, 74, 83, 92, 96, 99, 100, 102, 104, 105, 106, 107, 108, 110, 111, 115,	The purpose and remit and the associated behavioural incentives (particularly financial constraints) vary by the service provider type. In turn this may impact on delivery choices and costs even controlling for all other characteristics. Provider type is likely to be strongly related to the provider size and also to total opening hours. Research also shows some relationship between the provider type and the parent fee to cost ratio.	Type of provider variable
	Ownership type (e.g. company limited by shares, sole trader etc)	F: 12, 34, 36, 37, 38, 41, 46, 50 52, 54, 55, 56, 72, 74, 83, 92, 96, 99, 100, 102, 104, 105, 106, 107, 108, 110, 111, 115,	As above	Type of ownership / grouped type of ownership variable

Driver group	Potential driver	Sources	Causal pathway	Operationalisation considered
	Premises type	NA	The type of premises (e.g. owned by the service provider, commercial or non commercial lease) etc. influence the total cost of running the service. This is likely to have a direct influence. It may be moderated by other factors such as the rurality / location of the service as costs are likely to be higher in more urban areas. It may also be affected by the ownership type and the size of the setting as these may influence the venues available to the service.	Individual types of premises, but could be grouped. Categories which look at premises type in combination with region may be useful to check for small sample sizes.
	Provider size	F: 10, 36, 37, 50, 60, 77, 94	The provider's size is likely to have an impact on overall costs, with larger providers benefiting from buying at scale etc. It may also affect staff recruitment and staff retention. This relates to other potential drivers such as whether the service is multi-site or not, the type of provider, the average group size and the ownership type. Frontier found that middle-sized settings have the highest costs controlling for the other factors, but it could reflect some discrete increases in core costs as settings initially grow followed by falling costs as size increases sufficiently to benefit from larger economies of scale.	Defined by the number of hours and split into 4 roughly even groups
	Services offered (e.g. full day care, sessional services)		This is likely to be related to other potential drivers such as the type of provider, the age profile of the children, opening hours and whether the service is open all year etc.	It is unlikely that this would feature as a variable in the regression model given the number and combinations of the session types offered. However, it would be useful to explore how this relates to the other potential drivers that may be directly related.
	Multi-site setting	F: 13, 50, 94, 116, 117	Whether the service is part of a chain or a single site. Multi-site services may be able to make some efficiencies that are not possible in single sites, such as administrative burden, buying services at scale. The Frontier research found weak evidence of multi-site services having lower costs.	A dichotomous variable - either single site or chain
	Venue profile (no of rooms, total space, proportion the space is used by the setting, time space is used for the service)	F: 9, 12, 26, 27, 28, 29, 30, 31, 33, 36, 37, 41, 42, 47, 55, 58, 59, 79	The greater the space / time the space is used for, the higher the likely costs. This may be compensated for by the fact the service may be able to accommodate larger numbers of children. This is likely to be highly related to the premises type. It may also vary by other drivers, such as there may be more staff where there are a higher number of rooms. Some services may also have use of free space which might help to reduce the total costs and therefore reduce unit cost. Venue costs are likely to be linked to the area and may therefore be impacted by deprivation, geography.	Likely to be hard to include in the model given the data available

Driver group	Potential driver	Sources	Causal pathway	Operationalisation considered
Area characteristics	Region	F: 13, 34, 50, 52, 56, 57, 85, 91, 93, 109, 110, 111, 113, 115, 116	There are a number of reasons why costs of running the service may vary at a regional level. This may include the ease of attracting staff, the cost and ease of finding appropriate premises and differing levels of demand / ability of the parents to pay for childcare because of different levels of affluence. This driver is likely to be related to other potential drivers such as average staff qualification and turnover and the premises type. It may also be related to the occupancy rates as these vary as a result of demand. However, this will also depend on the supply (number of services and number of places) within the region. The Frontier research found that region did explain some of the variation, with London having higher costs. There may be some more common types of combinations of provider types and regions.	It may be useful to consider two alternatives; each individual NUTS 3 region or aggregating up to the 5 provinces to see if this shows any difference.
	Deprivation	F: 21, 23, 52, 57, 58, 59, 60, 85, 93, 94, 115	As with other area characteristics, there are a number of reasons why costs of running the service may vary based on the level of deprivation. For example, deprivation could be higher in areas where parents are less likely to be working and therefore demand is lower. Similarly, deprivation may have an impact on the cost of resources, for example more deprived areas may have a lower demand for childcare. This is likely to be an important factor as it was found to be statistically significant in the Frontier research. This also found there were higher staff costs in more deprived areas. However, there were some less clear conclusions about the associations, for example, "Being located in an average deprivation area (Q3) and least deprived area (Q5) is associated with higher hourly costs than being located in a less deprived area (Q4)." There is potentially some link with the proportion of children with EYPP, although the Frontier research found that "Having no children in receipt of EYPP is associated with a higher hourly cost than having low or high proportions of children in receipt of EYPP.", and generally mixed and inconsistent patterns across deprivation quintiles.	The best measure of deprivation available is the Pobal HP deprivation index which has the categories: Extremely affluent / very affluent / affluent / marginally above average / marginally below average / disadvantaged / very disadvantaged / extremely disadvantaged. The disadvantaged categories were grouped in the final model to ensure more consistent sized categories.
	Rurality	F: 13, 23, 50, 52, 57, 85, 93, 111, 113, 115, 116, 117	As above, rurality is likely to affect demand, It seems likely that the other area characteristics noted already are likely to have a greater impact on unit cost, as the Frontier research found no significant difference between rural and urban areas.	Rural or urban indicator
	Income sources (profile of income sources, e.g. income from parents vs free entitlement)	F: 11 26, 74, 79	Frontier report highlights variations in the unit cost depending on the level of funding that comes from parent funding. This is related to the level of fees for funded places.	ECCE income / parental fees

Driver group	Potential driver	Sources	Causal pathway	Operationalisation considered
	Quality of care	F: 11, 53	The Frontier paper noted that staff, child-to-staff ratios and group sizes are commonly used to assess the structural quality of childcare settings, and identified Gambaro et al (2013) or Munton et al. (2002) as sources of this. It also noted that these structural quality indicators have been shown to be correlated with measures of process quality, which in turn have been shown to affect child development (for example, see Melhuish and Gardiner (2017) and (2018)).	No direct measure for quality available. May consider some of the other staffing variables such as graduate led service, average staff qualification or the level of the owner / managers or room leaders.
Staff profile	Graduate led service	F: 65, 66, 67, 99, 108	This is likely to increase the average unit cost as it is likely to increase wages for staff if they are better educated. The Frontier paper excluded this because it was not found to be statistically significant in any of the regressions.	Highest level of room leaders and managers and owners as used in the model.
	Average staff qualification	F: 14, 15, 24, 25, 26, 28, 51, 53, 63, 65, 66, 67, 85, 97, 98, 99, 110, 112, 114, 115, 116, 117	The Frontier research found that services with higher average staff qualifications had higher unit costs.	Mean of levels of qualification across all staff. Would have to make some assumptions about lower than 5 and level 9/10. Could alternatively set levels grouping the levels into 3 or 4 groups.
	Staff turnover	F: 25, 53, 65, 66, 67, 68, 98, 99, 108,	There are higher costs associated with retaining and training new staff. This is likely to be linked with geographical factors and the local economy as these will drive how easy it is for staff to find alternative roles. This may also be related to quality, as high turnover is generally perceived to give a less consistent service with highly trained staff who know the service well. It may also impact on staff wages and on training costs. It is unlikely to have a strong link as the Frontier research did not find a statistically significant link.	Percentage turnover rate as a continuous variable or categorical variable with grouped percentages.
	Frequency of CPD	F: 25, 65, 67, 68, 98, 99, 108	CPD could potentially increased costs as more cover is needed, although there are several different models for this and in some cases this is done outside of normal work hours and it varies whether this is paid for by the service or not (which may add additional costs). It potentially creates a workforce with less turnover and a more skilled workforce which may impact on staff retention.	Not possible within the data collected
	Profile of CPD	NA	There may be different costs associated with whether CPD is paid for or not and whether it is conducted during work time or outside of usual hours, as this impacts on whether the service is required to also cover for the individuals childcare hours time. This may be a proxy for some of the other CPD fields indicated within the research that are not captured within the Ireland dataset.	Use the four different CPD categories - paid leave, paid overtime, unpaid leave, outside work hours
	Frequency of staff supervision	F: 25, 65, 67, 68, 98, 99, 108	Average cost is higher in services where there is less monthly supervision. This may be linked to higher turnover of staff,	Not possible within the data collected

Driver group	Potential driver	Sources	Causal pathway	Operationalisation considered
	Training plan	F: 25, 67, 68, 98, 99, 108	Frontier found the average unit cost is higher in services where there is a training plan in place. This may be because of the cost of paying for training and for covering the cost of staff who are being trained. This may be linked to staff turnover.	Not possible within the data collected
	Staff time attributed to session time		The greater the level of staff time attributed to childcare time, potentially the more staff required in order to maintain adult to child ratios.	Percentage of time spent on direct contact with children (as opposed to development time etc)
Opening	Continuous opening throughout the year or term time	F: 53, 64, 65, 96, 97, 116, 117,	Continuous opening throughout the year may allow for service efficiencies. It may also impact on staff recruitment and associated costs (e.g. staff who are parents preferring a term time opening) but other staff preferring to work all year. The geography and other factors impacting on local employment may influence this. The driver was considered significant enough to be included in the regression models in the Frontier paper, which found that all year opening was associated with a higher cost than term only.	All year or term time only dichotomous variable based on 52 or 38 weeks opening
	Continuous opening throughout the day (not closing for lunch)	F: 14, 53, 64, 65, 96, 97, 116, 118	The Frontier research found that the average unit cost is slightly higher for those which are not continuously open through the day. Where the service is not open all year, there are few hours available to receive income, but there may be some fixed costs which cannot be reduced at times when the service is not open. For example, premises costs may apply throughout the year. It may be necessary to pay staff slightly higher wages to compensate for them not having a full year role. This may be correlated with the number of daily opening hours.	Continuous or not continuous opening dichotomous variable
	Daily opening hours	F: 11, 14, 25, 53, 64, 96, 97, 108, 109, 110, 115, 116, 117	The Frontier research found that settings with a low number of opening hours (6 or under) each day have a lower mean unit cost than settings opening for longer hours. However, those with a middle number of opening hours (7 to 10) have a higher cost than for settings with longer opening hours. In the 2 year old model there was found to be a statistically significant relationship with the (ungrouped) number of daily open hours: on average, the hourly cost increases by £0.20 for each additional hour that the setting is open. All the potential drivers in relation to opening hours may indicate the level of flexibility offered to parent which in turn may affect the hourly cost.	Average hours open per day *In the Frontier research this was used as continuous variables as the grouped variable did not produce different results and the linear specification provides a clearer interpretation of size of association.*

Driver group	Potential driver	Sources	Causal pathway	Operationalisation considered
Child profile	Proportion of children with SEND statement or EHC plan	F: 9, 14, 47, 51, 62, 63, 95, 96, 113, 115, 116, 117,	Data from the Frontier research shows that there is a likely link between the proportion of children with a SEND statement or EHC plan. However, there were some mixed and counter-intuitive findings which varied across the different age based models. The hourly cost is higher for settings with no children with SEND than for settings with a low proportion of children with SEND. Overall, the hourly cost is higher for settings with a higher proportion of children with SEND.	A continuous variable of the percentage of children with SEND would be ideal. This data is not available to model and no reasonable proxy measures are available.
	Proportion of children with EYPP (Early Years Pupil Premium)	F: 51, 53, 62, 63, 64, 95, 96, 110, 111, 115, 116, 117	Across all services there is a variation in the number of children that are in receipt of EYPP. The types of children that a service caters for is likely to influence the amount or the type of resources required (especially staffing) driving variation in hourly cost. The Frontier research found that for settings with no children in receipt of the Early Years Pupil Premium the unit cost is higher. The research also found that settings with proportions of children in receipt of EYPP in the middle (low) group have the lowest mean hourly cost and all differences across the three categories are statistically significant. This potential driver may be related to deprivation indicators and may also be influenced by the location of the service as these can impact the cost of resources and parental ability to pay fees as well as demand for services.	Not possible / relevant
	Levels of siblings		Where there are higher levels of siblings there may be greater discounts applied.	Not used
	Average group size	F: 12, 14, 15, 50, 51, 64, 68, 69, 70, 100, 101, 108, 109, 112, 114, 115, 116, 117,	Smaller group sizes are likely to have higher costs as there is potentially a higher child to staff ratio (these potential drivers are likely to be related) and therefore have higher staff costs. There may also be an impact of economies of scale in relation to larger services with larger rooms. The Frontier research found some statistically significant findings in relation to group size.	Average number of children by age band. It may be appropriate to also create a grouped variable similar to that used by Frontier, of low, middle and high or similar, with thresholds chosen to give similar group sizes instead of using a continuous variable.
	Age of the youngest child	F: 13, 14, 62, 63, 76, 89, 90, , 95, 96, 105, 108, 111, 113, 116, 116, 117	Evidence from the Frontier research shows that having children under 2 is associated with having a lower hourly delivery cost for 3 and 4 year olds. This may be more of a function of other factors, such as those services where there are 2 year olds being larger than the services that do not include them. The research did not identify any obvious reason why this was the case. The Frontier research showed multicollinearity between the age of the youngest child and whether the service is open all year round.	A single age figure for the youngest child in the service's care, or could be grouped variables - e.g., under 2, 2, 3 or 4, school age

Table A1: Descriptive analysis of categorical variables (continues overleaf)

Variable	Category	Frequency	Percent
Size	Small	142	25.0
	Medium	143	25.2
	Large	141	24.8
	Very large	142	25.0
	Total	*568*	*100*
Organisation type	Community/Voluntary Organisation	175	30.8
	Private Enterprise	393	69.2
	Total	*568*	*100*
Premises type	Commercial building owned by service provider	95	16.7
	Domestic building owned by service provider	156	27.5
	Premises with a commercial lease	73	12.9
	Premises with a non-commercial lease	110	19.4
	Premises without formal lease arrangements	117	20.6
	(missing)	17	3.0
	Total	*568*	*100*
Entity type	Company limited by guarantee	170	29.9
	Company limited by shares	69	12.2
	Other	24	4.2
	Partnership	23	4.1
	Sole trader	271	47.7
	(missing)	11	1.9
	Total	*568*	*100*
Multisite provider	No	522	91.9
	Yes	46	8.1
	Total	*568*	*100*
ECCE only	mixed	301	53.0
	no	55	9.7
	yes	212	37.3
	Total	*568*	*100*
High capitation	No	295	51.9
	Yes	273	48.1
	Total	*568*	*100*
Local deprivation	Affluent	41	7.2
	Disadvantaged	38	6.7
	Extremely Disadvantaged	1	0.2
	Marginally below average	247	43.5
	Marginally above average	237	41.7
	Very Disadvantaged	2	0.4
	(missing)	2	0.4
	Total	*568*	*100*

Table A1 (continued): Descriptive analysis of categorical variables (continues overleaf)

Variable	Category	Frequency	Percent
Provides full day service	No	399	70.3
	Yes	169	29.8
	Total	*568*	*100*
Provides morning service	No	54	9.5
	Yes	514	90.5
	Total	*568*	*100*
Provides afternoon service	No	395	69.5
	Yes	173	30.5
	Total	*568*	*100*
Provides breakfast service	No	458	80.6
	Yes	110	19.4
	Total	*568*	*100*
Provides after school service	No	360	63.4
	Yes	208	36.6
	Total	*568*	*100*
Provides part-time service	No	403	71.0
	Yes	165	29.1
	Total	*568*	*100*
Provides out-of-term service	No	449	79.1
	Yes	119	21.0
	Total	*568*	*100*

Table A1 (continued): Descriptive analysis of categorical variables (continues overleaf)

Variable	Category	Frequency	Percent
Quality	No	551	97.0
	Yes	17	3.0
	Total	*568*	*100*
Open most of year	No (38-46 weeks)	403	71.0
	Yes (47-52 weeks)	165	29.1
	Total	*568*	*100*
Graduate led	No	224	39.4
	Yes	344	60.6
	Total	*568*	*100*
CPD mandatory	No	85	15.0
	Yes all	313	55.1
	Yes care	145	25.5
	(missing)	25	4.4
	Total	*568*	*100*
CPD leave	outside work hours	280	49.3
	paid leave	159	28.0
	paid overtime	30	5.3
	unpaid leave	62	10.9
	(missing)	37	6.5
	Total	*568*	*100*
Youngest child	Less than 12 months	99	17.4
	12-23 months	44	7.8
	24-35 months	75	13.2
	3-5 years	309	54.4
	School age	22	3.9
	(missing)	19	3.4
	Total	*568*	*100*

Table A1 (continued): Descriptive analysis of categorical variables

Variable	Category	Frequency	Percent
Rurality	Rural	238	41.9
	Urban	330	58.1
	Total	*568*	*100*
Region	Border	45	7.9
	Dublin	143	25.2
	Mid-East	88	15.5
	Mid-West	70	12.3
	Midlands	34	6.0
	South East	51	9.0
	South-West	81	14.3
	West	56	9.9
	Total	*568*	*100*
County	Carlow	6	1.1
	Cavan	13	2.3
	Clare	20	3.5
	Cork	64	11.3
	Donegal	13	2.3
	Dublin	143	25.2
	Galway	40	7.0
	Kerry	17	3.0
	Kildare	23	4.1
	Kilkenny	16	2.8
	Laois	11	1.9
	Leitrim	1	0.2
	Limerick	20	3.5
	Longford	5	0.9
	Louth	15	2.6
	Mayo	11	1.9
	Meath	28	4.9
	Monaghan	7	1.2
	Offaly	10	1.8
	Roscommon	5	0.9
	Sligo	11	1.9
	Tipperary	30	5.3
	Waterford	8	1.4
	Westmeath	8	1.4
	Wexford	21	3.7
	Wicklow	22	3.9
	Total	*568*	*100*

Figure A1: Histogram of percent hours filled

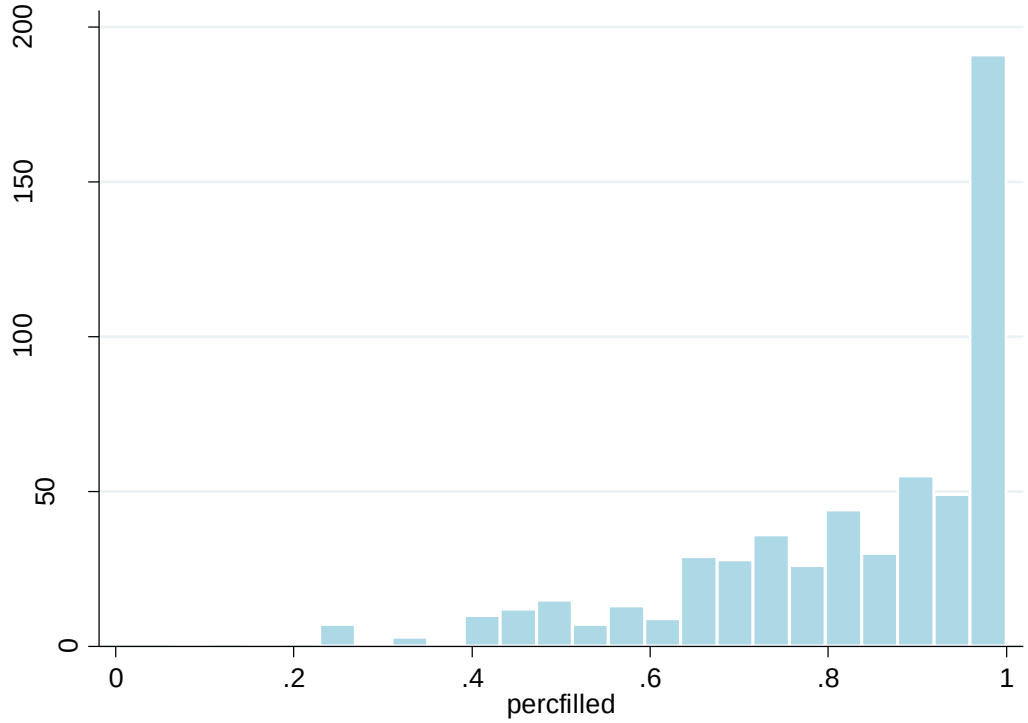

Figure A2: Histogram of average staff-child factor

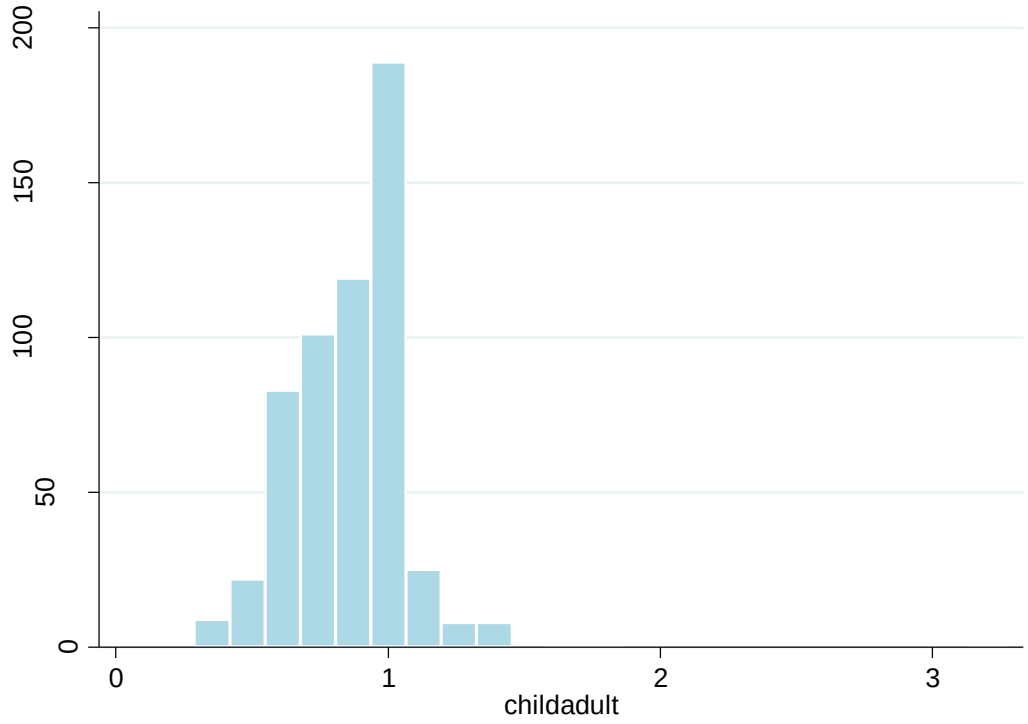

Figure A3: Histogram of average group size

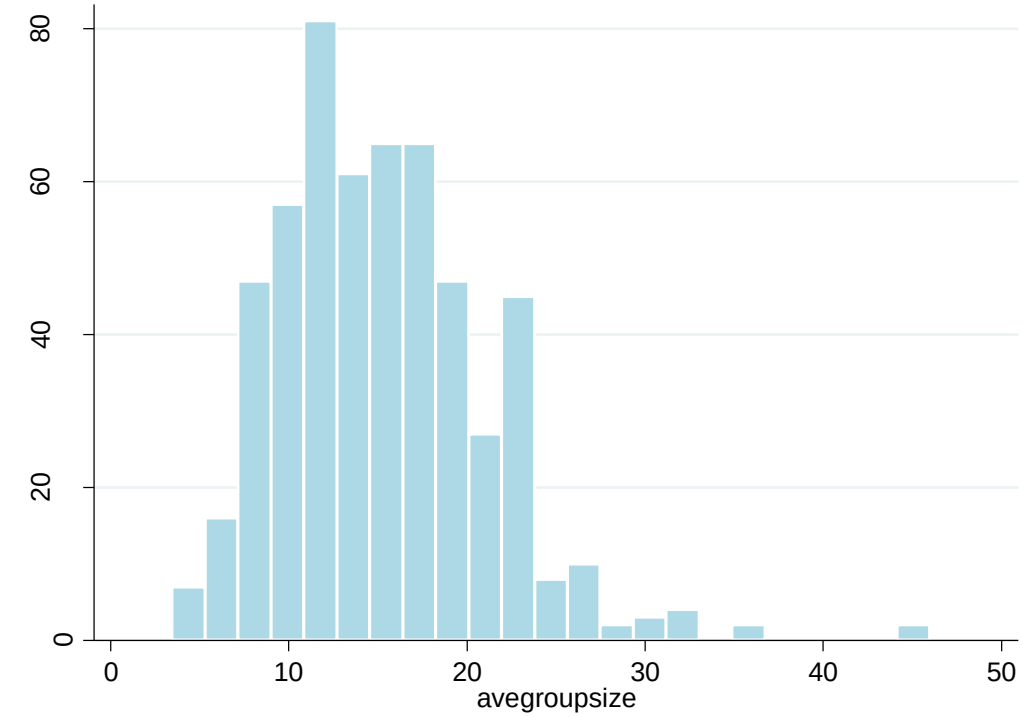

Figure A4: Histogram of average staff qualification level

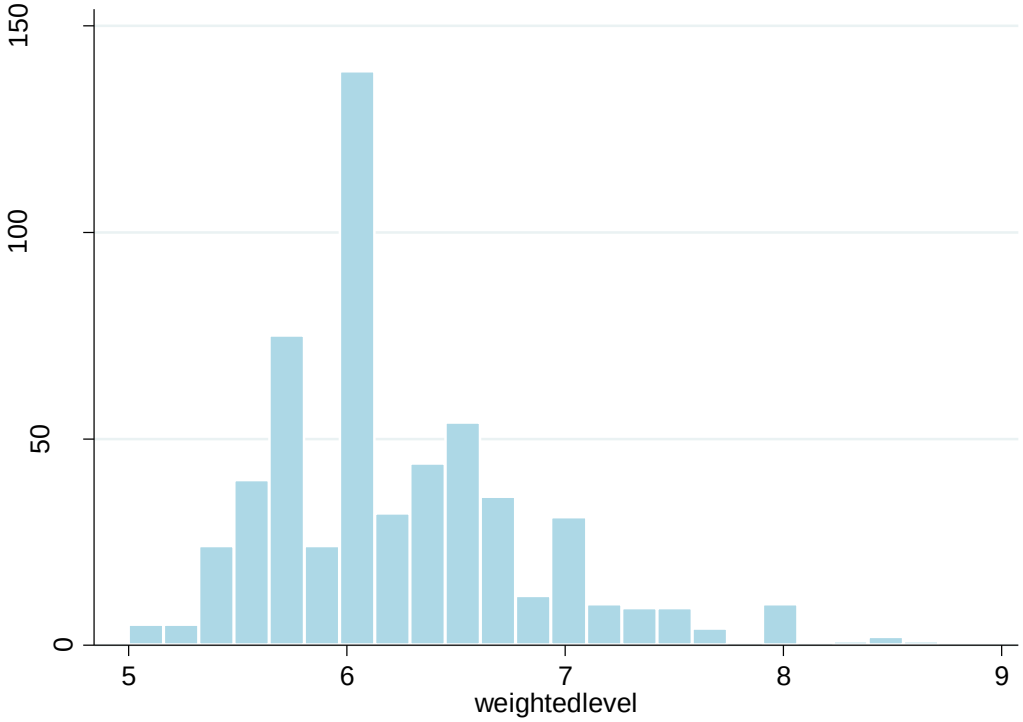

Figure A5: Histogram of percent non-contact hours

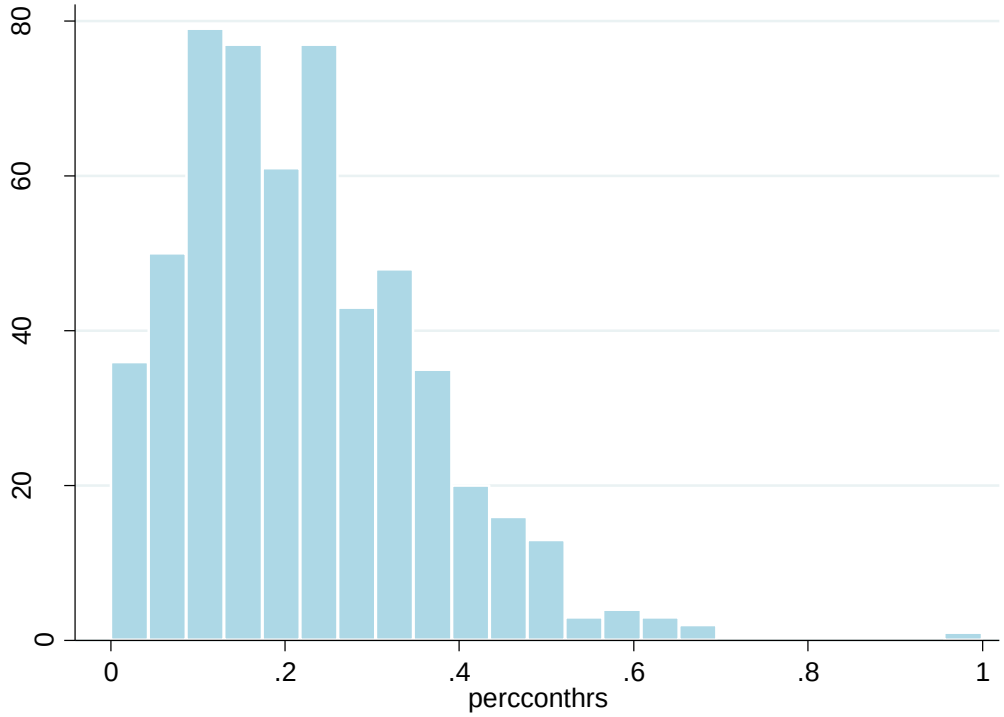

Figure A6: Histogram of staff turnover (percent)

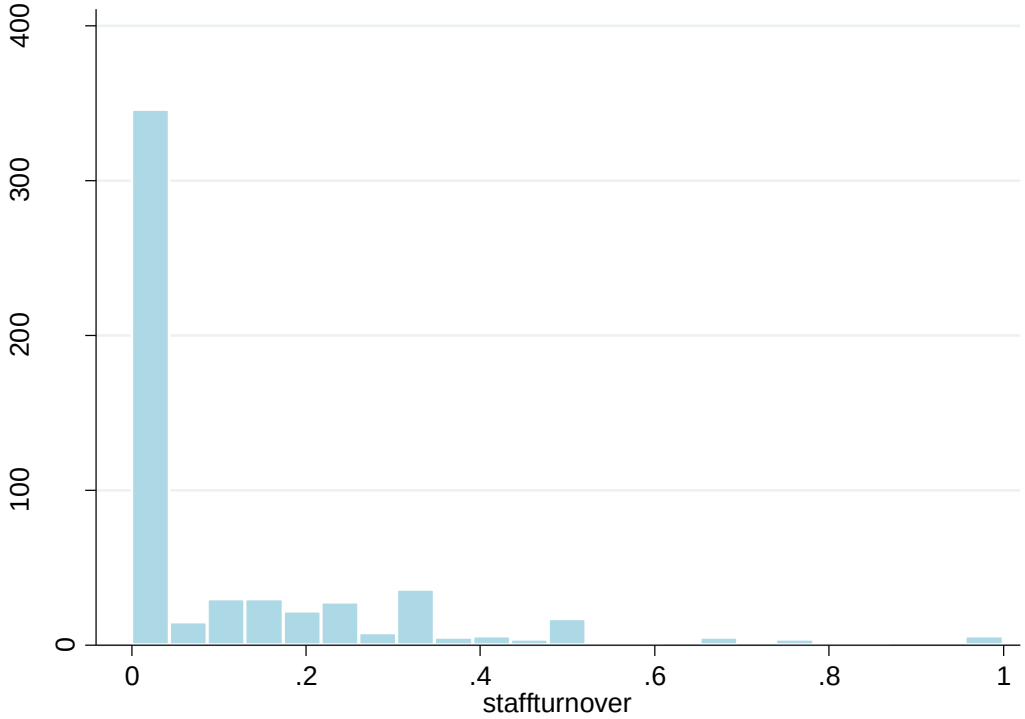

Figure A7: Histogram of unit cost

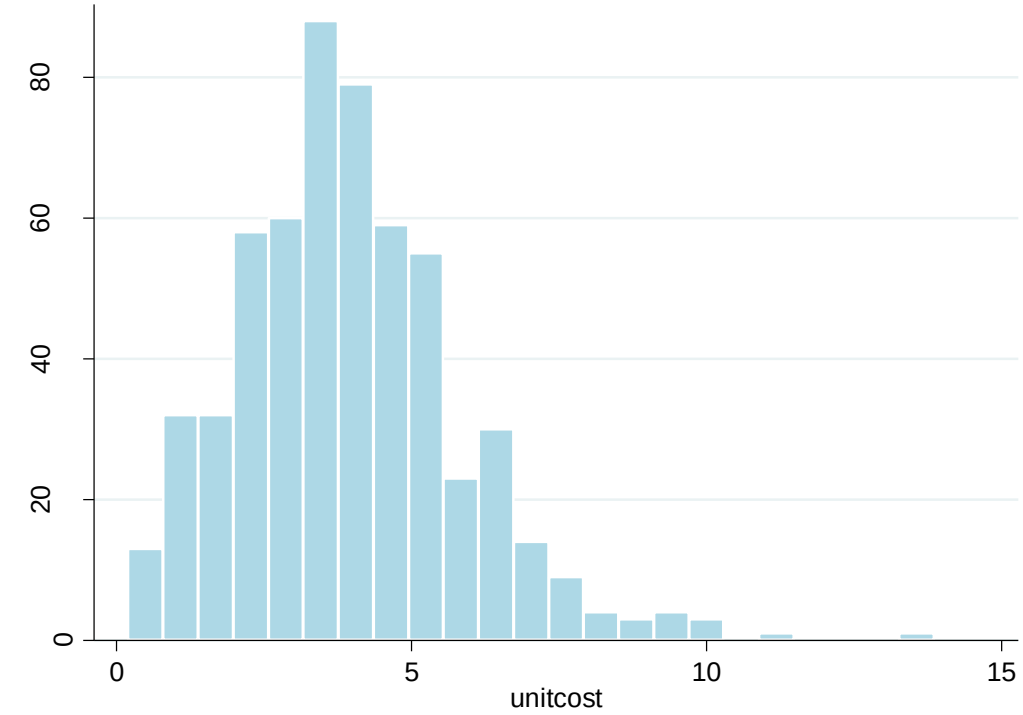

Figure A8: Histogram of percent fees income

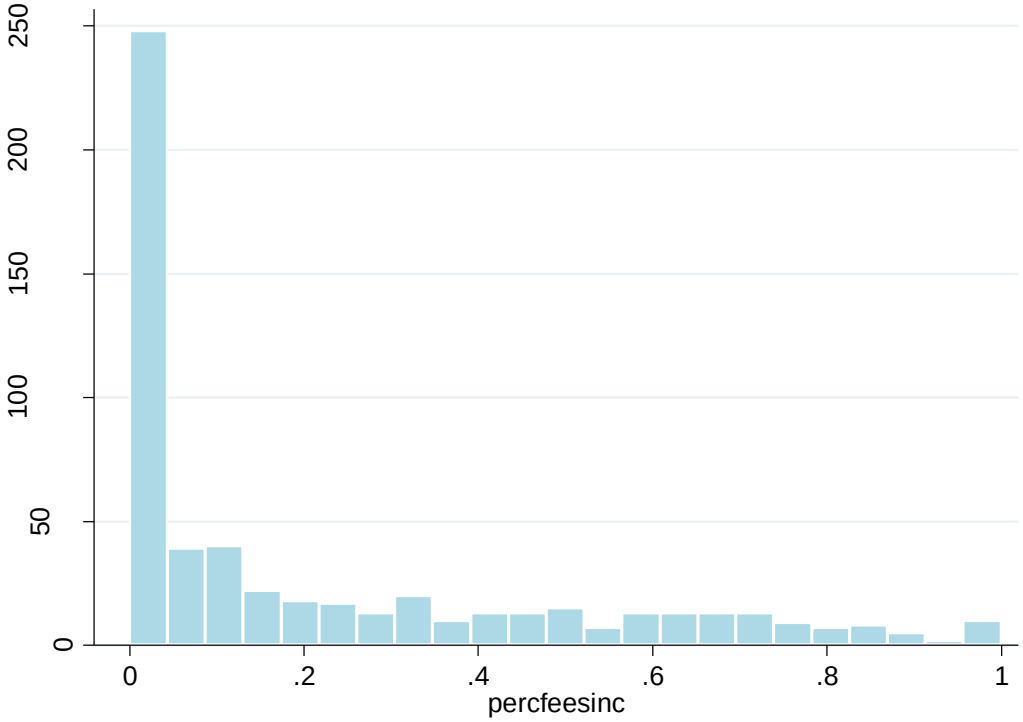

Figure A9: Histogram of percent ECCE income

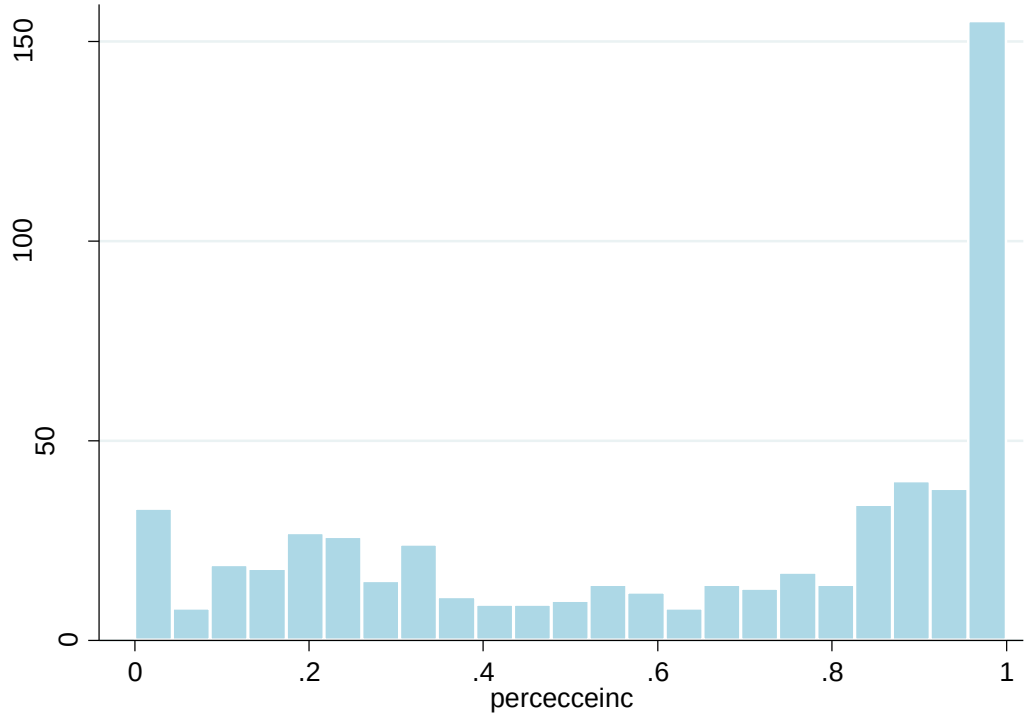

Table A2: Summary of missing cases by variable

Variable	Missing
Ave. staff-child factor	1
Ave. staff qual. level	1
Ave. group size	19
Premises type	17
Entity type	11
Local deprivation	2
CPD type	25
CPD leave	37
Youngest children	19

Table A3: Summary of missing data patterns by variables with missing data (missing = 0)

	Patterns of missingness																								
				Local deprivation			Entity type				Premises type				Youngest children				CPD type		CPD leave		
% of missing cases	Ave. staff-child factor	Ave. staff qual. level	Ave. group size	Disadvantaged	Marginally below average	Marginally above average	Limited by shares	Other	Partnership	Sole trader	Domestic owned	Commercial lease	Non-commercial lease	No formal lease	12-23 months	24-35 months	3-5 years	School age	Yes - all staff	Yes - care staff	Paid leave	Paid overtime	Unpaid leave
86%	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4%	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
3%	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	1
3%	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
1%	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
1%	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1	1
<1%	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1
<1%	1	1	1	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1
<1%	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<1%	0	1	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	1
<1%	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<1%	1	1	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1
<1%	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	0	0	0

Table A4: Pairwise correlations for all variables except region and county (continued overleaf)

Col.	Variable	Categories	Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	Unit cost		1.00																							
2	Percent hours filled			1.00																						
3	Ave. staff-child factor		-0.10		1.00																					
4	Ave. staff qual. level		0.13			1.00																				
5	Percent non-contact hours		0.28	0.13		0.19	1.00																			
6	Percent fees income		-0.30			-0.09	-0.37	1.00																		
7	Percent ECCE income		0.18		0.16		0.38	-0.77	1.00																	
8	Staff turnover			-0.09		0.09		0.17	-0.12	1.00																
9	Ave. group size			0.19	0.16			-0.19	0.11		1.00															
10	Size	Medium	0.19				0.18	-0.29	0.24		0.13	1.00														
11		Large		-0.22			-0.16					-0.33	1.00													
12		Very large	-0.44	-0.10			-0.35	0.58	-0.61	0.13	-0.13	-0.33	-0.33	1.00												
13	Premises type	Domestic ow ned	0.13	0.10			0.23	-0.16	0.28		-0.19		-0.09	-0.21	1.00											
14		Commercial lease		-0.10				0.21	-0.17	0.10				0.22	-0.25	1.00										
15		Non-commercial lease					-0.09	-0.10			0.13				-0.31	-0.20	1.00									
16		No formal lease						-0.15			0.14	0.09		-0.12	-0.33	-0.20	-0.26	1.00								
17	Entity type	Limited by shares	-0.13			-0.09	-0.16	0.42	-0.28	0.09		-0.16	0.09	0.24	-0.13	0.21			1.00							
18		Other									0.13	-0.10								1.00						
19		Partnership																			1.00					
20		Sole trader			0.12	0.12	0.28	-0.28	0.44	-0.13		0.16	-0.12	-0.32	0.41		-0.22	-0.11	-0.37	-0.21	-0.20	1.00				
21	Multisite provider	Yes						0.23	-0.22	0.10		-0.10		0.17	-0.13		0.10		0.32			-0.29	1.00			
22	Services provided	Full day	-0.30	-0.11		-0.08	-0.38	0.64	-0.66	0.14	-0.29	-0.36		0.74	-0.23	0.19		-0.16	0.27			-0.33	0.12	1.00		
23		Morning sessions	-0.14		0.19			-0.20	0.40									-0.09		-0.08		0.18	-0.12		1.00	
24		Afternoon sessions		-0.19			-0.15						0.10	0.17				-0.10						0.13	0.21	1.00
25		Breakfast club	-0.34				-0.29	0.39	-0.42			-0.25		0.47	-0.13				0.17			-0.22		0.41		
26		After school club	-0.34	-0.13	-0.09		-0.29	0.47	-0.62			-0.29	0.16	0.53	-0.25	0.15			0.23			-0.32	0.11	0.49		
27		Part-time	-0.28	-0.11			-0.31	0.41	-0.47		-0.21	-0.24		0.52	-0.21				0.13			-0.29		0.54		0.12
28		Out of term	-0.32				-0.24	0.46	-0.50	0.08	-0.10	-0.28		0.58	-0.14	0.09		-0.14	0.21			-0.27		0.57		
29	Rurality	Urban	0.16			0.09		0.10	-0.16							0.17			0.16				0.10		-0.13	0.17
30	Local deprivation	Disadvantaged							-0.15						-0.09			0.13	-0.08	0.11		-0.16			-0.16	
31		Marginally below average					0.10		0.08						0.13		-0.09					0.09		-0.11		
32		Marginally above average		-0.09			-0.14								-0.09									0.11		
33	Quality aw ard	Yes				0.10																				
34	High capitation	Yes			0.10	0.44		0.08		0.10				0.20				-0.12						0.21	0.16	0.17
35	ECCE only	No	0.15		-0.17	0.08		0.20	-0.41									0.11				-0.18	0.12		-0.99	-0.20
36		Yes	0.30	0.19	-0.09		0.37	-0.51	0.61	-0.12	0.09	0.17	-0.30	-0.45	0.28	-0.16			-0.21			0.33	-0.15	-0.49	0.25	-0.12
37	Graduate led	Yes				0.60		0.15	-0.16	0.14				0.23		0.10		-0.11						0.22		0.15
38	Open most of year	Yes	-0.31	-0.09		-0.10	-0.36	0.60	-0.67	0.17	-0.24	-0.34		0.71	-0.25	0.14		-0.09	0.21			-0.39	0.15	0.76	-0.12	0.12
39	CPD type	Yes - all staff																							-0.11	
40		Yes - care staff											-0.12													
41	CPD leave	Paid leave																								0.11
42		Paid overtime														-0.09								-0.09		
43		Unpaid leave		-0.09							-0.11												-0.09			
44	Youngest children	12-23 months					-0.13	0.19	-0.23		-0.16			0.16	-0.09	0.12			0.11					0.30	-0.09	
45		24-35 months		-0.11									0.15											-0.09		
46		3-5 years	0.19	0.13			0.32	-0.54	0.68	-0.11	0.19	0.21		-0.55	0.23	-0.16			-0.17			0.31	-0.11	-0.60	0.28	-0.12
47		School age			-0.27	0.13			-0.30		0.16	0.10					0.09					-0.11		-0.13	-0.57	-0.12
48	Organisation type	Private enterprise			0.17	0.10	0.18		0.28				-0.10	-0.12	0.34	0.14	-0.32	-0.17	0.24	-0.22	0.14	0.65		-0.13	0.17	

Table A4 (continued): Pairwise correlations for all variables except region and county

Col.	Variable	Categories	Column 25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
25		Breakfast club	1.00																							
26		After school club	0.59	1.00																						
27		Part-time	0.30	0.39	1.00																					
28		Out of term	0.53	0.64	0.39	1.00																				
29	Rurality	Urban	-0.13				1.00																			
30	Local deprivation	Disadvantaged			0.12		0.11	1.00																		
31		Marginally below average			-0.14			-0.25	1.00																	
32		Marginally above average					-0.14	-0.24	-0.75	1.00																
33	Quality award	Yes									1.00															
34	High capitation	Yes	0.20	0.13	0.16	0.19					0.10	1.00														
35	ECCE only	No					0.13	0.16	-0.08			-0.16	1.00													
36		Yes	-0.38	-0.59	-0.49	-0.40	-0.10		0.13			-0.14	-0.25	1.00												
37	Graduate led	Yes	0.16	0.20	0.18	0.18	0.09		-0.09		0.10	0.73		-0.20	1.00											
38	Open most of year	Yes	0.41	0.49	0.60	0.58		0.11				0.14	0.13	-0.49	0.22	1.00										
39	CPD type	Yes - all staff							-0.09				0.11				1.00									
40		Yes - care staff						-0.10	0.16					0.09			-0.70	1.00								
41	CPD leave	Paid leave													0.10				1.00							
42		Paid overtime																	-0.16	1.00						
43		Unpaid leave																	-0.24	-0.09	1.00					
44	Youngest children	12-23 months		0.15	0.29	0.18	0.10						0.09	-0.22		0.27						1.00				
45		24-35 months	-0.08											-0.25								-0.12	1.00			
46		3-5 years	-0.26	-0.47	-0.45	-0.41	-0.14						-0.28	0.62	-0.16	-0.62						-0.33	-0.45	1.00		
47		School age		0.25	-0.13							-0.17	0.56	-0.14		-0.13								-0.23	1.00	
48	Organisation type	Private enterprise	-0.11	-0.18	-0.22	-0.13	0.08	-0.26	0.20	-0.12		0.09	-0.18	0.18		-0.25								0.20	-0.10	1.00

Table A5: Results of saturated model (without region or county, N = 487)

Variable	Category	Coef.	Std. Err.	P-value	lower CI	upper CI	
Size	Medium	-0.351	0.218	0.108	-0.780	0.077	
	Large	-0.812	0.297	0.007	-1.397	-0.228	**
	Very large	-2.694	0.425	0.000	-3.529	-1.860	***
Percent hours filled		-0.842	0.415	0.043	-1.659	-0.026	*
Ave. staff-child factor		-0.291	0.350	0.405	-0.979	0.396	
Premises type	Domestic owned	0.083	0.238	0.727	-0.384	0.551	
	Commercial lease	0.026	0.271	0.925	-0.507	0.558	
	Non-commercial lease	-0.116	0.248	0.641	-0.603	0.372	
	No formal lease	-0.422	0.249	0.091	-0.911	0.067	
Entity type	Limited by shares	-0.339	0.386	0.381	-1.099	0.420	
	Other	-0.440	0.357	0.219	-1.141	0.262	
	Partnership	-0.303	0.469	0.519	-1.225	0.619	
	Sole trader	-0.813	0.358	0.023	-1.516	-0.110	*
Multisite provider	Yes	0.105	0.274	0.702	-0.433	0.642	
Services provided	Full day	0.373	0.319	0.243	-0.254	1.000	
	Afternoon sessions	0.460	0.175	0.009	0.116	0.805	**
	Breakfast club	-0.165	0.235	0.483	-0.627	0.297	
	After school club	-0.002	0.257	0.993	-0.508	0.504	
	Part-time	-0.356	0.210	0.091	-0.769	0.057	
	Out of term	-0.380	0.261	0.145	-0.893	0.132	
Rurality	Urban	0.378	0.157	0.016	0.070	0.686	*
Local deprivation	Disadvantaged	-0.644	0.392	0.101	-1.413	0.126	
	Marginally below average	-0.053	0.295	0.857	-0.633	0.527	
	Marginally above average	-0.297	0.300	0.322	-0.887	0.292	
Quality award	Yes	-0.667	0.385	0.084	-1.424	0.091	
High capitation	Yes	0.323	0.215	0.134	-0.100	0.746	
ECCE only	No	1.791	0.341	0.000	1.121	2.462	***
	Yes	0.511	0.242	0.036	0.035	0.986	*
Ave. staff qual. level		0.141	0.152	0.355	-0.158	0.441	
Graduate led	Yes	0.138	0.254	0.586	-0.360	0.637	
CPD type	Yes - all staff	-0.013	0.202	0.949	-0.409	0.384	
	Yes - care staff	0.028	0.226	0.903	-0.417	0.472	
CPD leave	Paid leave	-0.097	0.159	0.541	-0.410	0.215	
	Paid overtime	-0.217	0.309	0.483	-0.824	0.390	
	Unpaid leave	-0.112	0.231	0.627	-0.567	0.342	
Youngest children	12-23 months	-0.137	0.320	0.670	-0.767	0.493	
	24-35 months	-0.662	0.368	0.073	-1.386	0.062	
	3-5 years	-0.870	0.379	0.022	-1.615	-0.124	*
	School age	-3.707	0.636	0.000	-4.956	-2.458	***
Percent non-contact hours		1.675	0.612	0.006	0.471	2.878	**
Percent fees income		-2.490	0.502	0.000	-3.478	-1.503	***
Percent ECCE income		-2.795	0.509	0.000	-3.796	-1.794	***
Staff turnover		-0.546	0.365	0.136	-1.263	0.171	
Ave. group size		-0.012	0.015	0.439	-0.041	0.018	
Organisation type	Private enterprise	0.332	0.369	0.368	-0.392	1.057	
Open most of year	Yes	-0.713	0.302	0.019	-1.307	-0.119	*
_model_constant		7.856	1.262	0.000	5.375	10.337	***

Table A6: Results of final model with added fixed effects for county (N = 530)

Variable	Category	Coef.	Std. Err.	P-value	lower CI	upper CI	
Size	Size medium	-0.456	0.206	0.028	-0.862	-0.051	*
	Size large	-0.958	0.272	0.000	-1.492	-0.425	***
	Size v.large	-2.961	0.368	0.000	-3.684	-2.239	***
Percent hours filled		-1.161	0.387	0.003	-1.921	-0.401	**
Premises type	Domestic owned	-0.077	0.230	0.737	-0.530	0.375	
	Commercial lease	0.055	0.253	0.829	-0.443	0.552	
	Non-commercial lease	-0.245	0.233	0.294	-0.703	0.213	
	No formal lease	-0.497	0.235	0.035	-0.959	-0.035	*
Entity type	Limited by shares	-0.241	0.255	0.345	-0.741	0.260	
	Other	-0.348	0.348	0.319	-1.032	0.337	
	Partnership	-0.080	0.360	0.824	-0.788	0.628	
	Sole trader	-0.540	0.195	0.006	-0.923	-0.158	**
Services provided	Afternoon sessions	0.413	0.169	0.015	0.082	0.745	*
Rurality	Urban	0.220	0.163	0.178	-0.100	0.539	
High capitation	Yes	0.504	0.146	0.001	0.216	0.791	***
ECCE only	No	1.795	0.313	0.000	1.179	2.411	***
	Yes	0.661	0.216	0.002	0.237	1.085	**
Youngest children	12-23 months	-0.232	0.314	0.459	-0.849	0.384	
	24-35 months	-0.724	0.326	0.027	-1.363	-0.084	*
	3-5 years	-0.874	0.330	0.008	-1.523	-0.225	**
	School age	-2.943	0.549	0.000	-4.022	-1.864	***
Percent non-contact hours		1.527	0.574	0.008	0.398	2.656	**
Percent fees income		-1.989	0.454	0.000	-2.882	-1.096	***
Percent ECCE income		-2.349	0.462	0.000	-3.258	-1.441	***
Open most of year	Yes	-0.620	0.286	0.030	-1.182	-0.059	*
County	Cavan	-0.749	0.764	0.327	-2.250	0.752	
	Clare	-0.924	0.715	0.197	-2.328	0.481	
	Cork	-0.743	0.655	0.257	-2.029	0.543	
	Donegal	-0.893	0.751	0.235	-2.368	0.581	
	Dublin	-0.364	0.641	0.570	-1.624	0.896	
	Galway	-1.123	0.674	0.097	-2.448	0.202	
	Kerry	-0.896	0.727	0.218	-2.325	0.533	
	Kildare	-0.331	0.696	0.634	-1.700	1.037	
	Kilkenny	-1.118	0.731	0.127	-2.554	0.318	
	Laois	-1.257	0.766	0.101	-2.762	0.248	
	Leitrim	0.679	1.637	0.679	-2.538	3.896	
	Limerick	-0.934	0.715	0.192	-2.338	0.470	
	Longford	-0.704	0.914	0.441	-2.500	1.092	
	Louth	0.126	0.739	0.865	-1.327	1.578	
	Mayo	-0.766	0.801	0.340	-2.340	0.808	
	Meath	-0.930	0.691	0.179	-2.288	0.428	
	Monaghan	-2.343	0.922	0.011	-4.155	-0.531	*
	Offaly	-1.250	0.794	0.116	-2.810	0.310	
	Roscommon	-0.147	0.934	0.875	-1.981	1.687	
	Sligo	-1.186	0.800	0.139	-2.758	0.387	
	Tipperary	-0.819	0.688	0.235	-2.171	0.533	
	Waterford	-1.348	0.818	0.100	-2.954	0.259	
	Westmeath	-1.223	0.816	0.135	-2.827	0.382	
	Wexford	-1.122	0.713	0.116	-2.523	0.279	
	Wicklow	-0.263	0.707	0.711	-1.652	1.127	
_model_constant		8.781	0.912	0.000	6.989	10.572	***

Table A7: Results of final model with added fixed effects for region (N = 530)

Variable	Category	Coef.	Std. Err.	P-value	lower CI	upper CI	
Size	Size medium	-0.434	0.203	0.033	-0.833	-0.034	*
	Size large	-0.926	0.266	0.001	-1.449	-0.402	***
	Size v.large	-2.902	0.359	0.000	-3.608	-2.196	***
Percent hours filled		-1.247	0.373	0.001	-1.979	-0.515	***
Premises type	Domestic owned	-0.027	0.226	0.904	-0.472	0.417	
	Commercial lease	0.099	0.252	0.694	-0.395	0.593	
	Non-commercial lease	-0.189	0.231	0.412	-0.643	0.264	
	No formal lease	-0.446	0.232	0.056	-0.902	0.011	
Entity type	Limited by shares	-0.250	0.250	0.319	-0.742	0.242	
	Other	-0.428	0.344	0.214	-1.102	0.247	
	Partnership	-0.099	0.353	0.778	-0.793	0.594	
	Sole trader	-0.513	0.188	0.007	-0.883	-0.143	**
Services provided	Afternoon sessions	0.391	0.165	0.018	0.067	0.716	*
Rurality	Urban	0.235	0.158	0.137	-0.075	0.545	
High capitation	Yes	0.530	0.141	0.000	0.254	0.807	***
ECCE only	No	1.792	0.311	0.000	1.182	2.403	***
	Yes	0.664	0.213	0.002	0.247	1.082	**
Youngest children	12-23 months	-0.189	0.304	0.534	-0.786	0.408	
	24-35 months	-0.774	0.315	0.014	-1.393	-0.155	*
	3-5 years	-0.904	0.321	0.005	-1.534	-0.274	**
	School age	-3.000	0.532	0.000	-4.045	-1.955	***
Percent non-contact hours		1.673	0.555	0.003	0.584	2.763	**
Percent fees income		-2.049	0.442	0.000	-2.918	-1.179	***
Percent ECCE income		-2.425	0.454	0.000	-3.317	-1.533	***
		-0.648	0.278	0.020	-1.195	-0.101	
Region	Dublin	0.676	0.294	0.022	0.098	1.254	*
	Mid-East	0.621	0.294	0.035	0.044	1.198	*
	Mid-west	0.161	0.302	0.595	-0.433	0.755	
	Midlands	-0.128	0.351	0.715	-0.819	0.562	
	South	0.035	0.324	0.914	-0.602	0.673	
	South-West	0.277	0.293	0.345	-0.299	0.853	
	West	0.100	0.314	0.750	-0.517	0.717	
_model_constant		7.769	0.713	0.000	6.367	9.170	***

Figure A10: Plot of final model residuals against fitted values

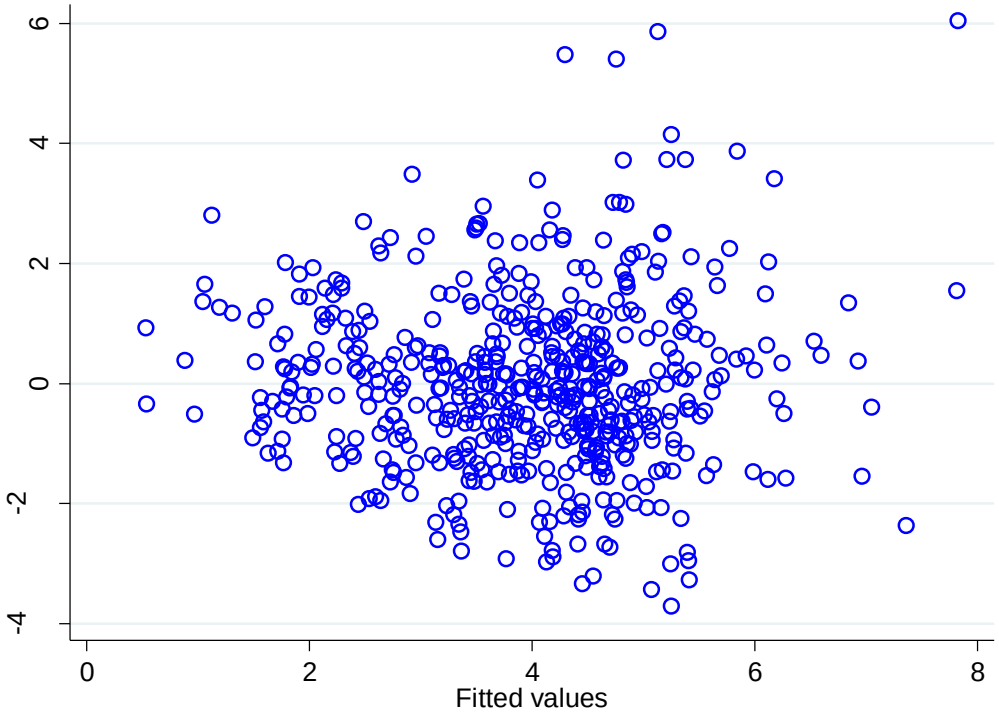

Figure A11: Plot of final model residuals against quantiles of the normal distribution

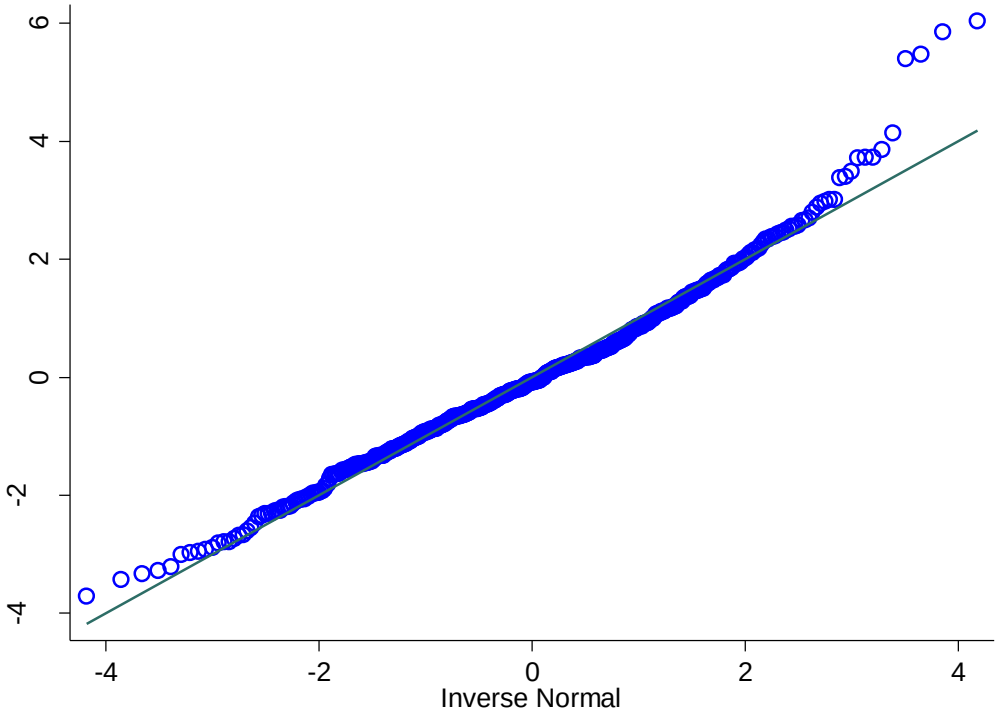

Figure A12: Plot of final model leverage values against residuals

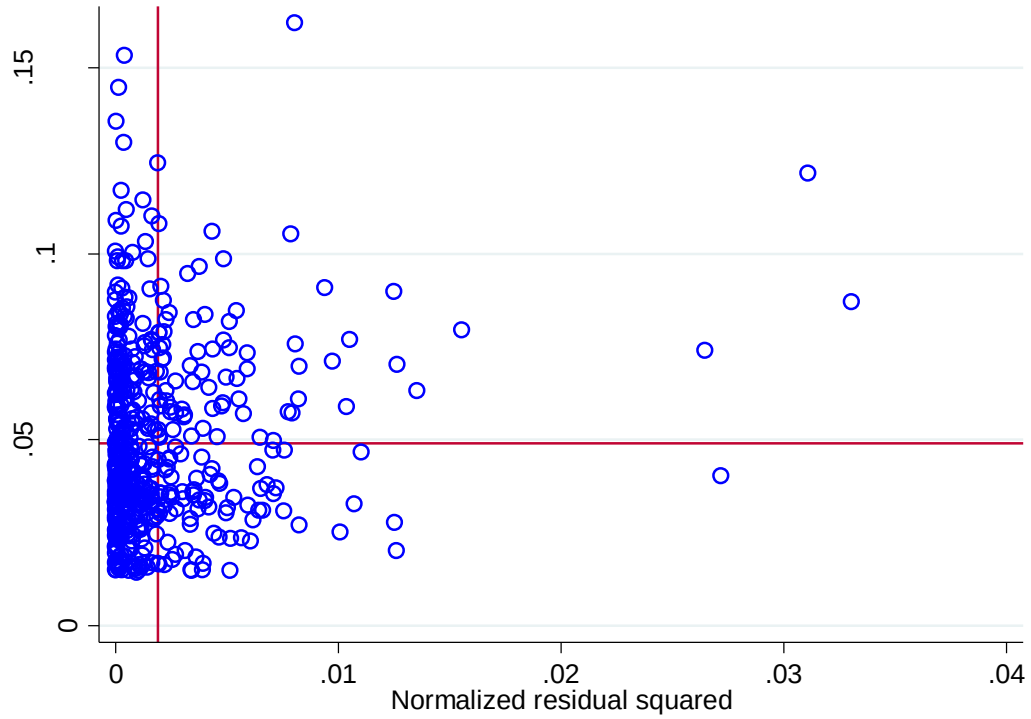

Figure A13: Plot of Cook's distance against fitted values

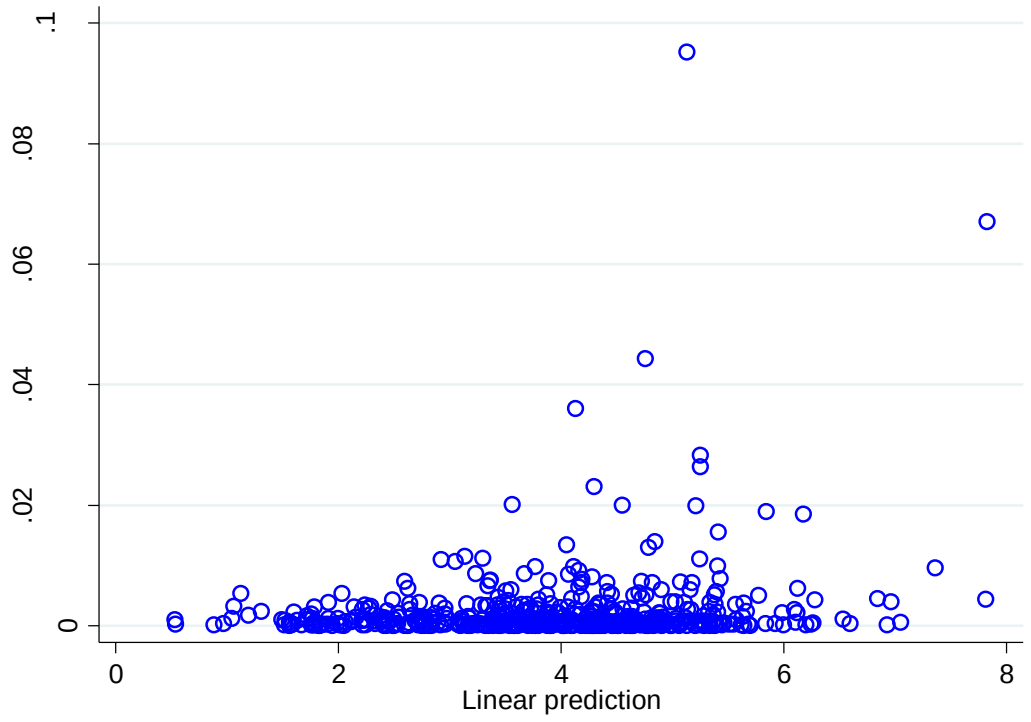

Table A14: Variance inflation factors (above 1) for explanatory variables

Variable	Category	VIF
Youngest children	3-5 years	6.15
Percent ECCE income		6.08
Size	Size v.large	5.70
Open most of year	Yes	3.73
Percent fees income		3.65
Size	Size large	3.21
Youngest children	24-35 months	2.84
Youngest children	School age	2.71
ECCE only	Yes	2.60
Premises type	Domestic owned	2.50
Premises type	No formal lease	2.21
Entity type	Sole trader	2.11
Premises type	Non-commercial lease	2.08
ECCE only	No	1.92
Size	Size medium	1.90
Premises type	Commercial lease	1.71
Entity type	Limited by shares	1.63
Youngest children	12-23 months	1.53
Services provided	Afternoon sessions	1.38
Percent non-contact hours		1.38
Entity type	Partnership	1.25
Rurality	Urban	1.22
Percent hours filled		1.18
High capitation	Yes	1.17
Entity type	Other	1.14