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Research Report

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Vermont Early Care and Education Financing Study

Estimated Costs, Financing Options, and Economic Impacts

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About This Report

With the deepening understanding of the importance of the early years for preparing children to enter and then succeed in school, federal, state, and local policymakers in the United States have been increasing the public-sector investment in early care and education (ECE) programs, both on a targeted and a universal basis. The state of Vermont is no exception, as it has expanded access to and funding for subsidies to make child care more affordable for families with lower incomes, gradually expanded a universal preschool program for three- and four-year-olds that has one of the highest enrollment rates in the country, and deployed a quality recognition and improvement system that has improved ECE programs in the public and private sectors. As part of Act 45 passed in 2021, the Vermont legislature and governor signaled their interest in further exploration of options for continued expansion of ECE subsidies, with the goal of capping the share of family income that goes toward ECE cost at 10 percent while also substantially increasing the compensation for the ECE workforce to levels that are commensurate with skills and job requirements.

Act 45 requested a "financing study" to estimate the cost of achieving a high-quality ECE system with a well-compensated workforce, accompanied by a sliding-scale subsidy system capping family out-of-pocket cost at 10 percent of family income. The Vermont legislature further charged the study to identify sources of stable long-term funding to cover the added cost of the expanded subsidies and further shift toward high-quality care. Another goal was to model the economic and fiscal impacts of the policy changes. Through a competitive bidding process, RAND was selected to conduct the ECE finance study under contract with the Vermont Joint Fiscal Office. This report is the final report from the study. The results of this study should be helpful to stakeholders in the public and private sectors interested in the cost and financing of a high-quality ECE system with a well-compensated workforce and stable sources of funding.

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Overview

As part of Vermont's investments in high-quality early care and education (ECE) programs for children not yet in kindergarten, the state is addressing how to expand families' subsidies to make ECE more affordable and to increase compensation for the ECE workforce. This report estimates the costs of a high-quality ECE system, considers alternative sliding-scale subsidy options and the resulting family contributions, and estimates the fiscal and economic impacts of stable state revenue sources to fill the funding gap. Key findings include the following:

- **Federal and state funding for subsidized ECE programs in Vermont in state fiscal year 2018–2019 totaled approximately $109 million.**
  - About 60 percent of Vermont's population of pre–school-age children has family income below 3.5 times the federal poverty level, the maximum income that currently qualifies for ECE subsidies.
  - Subsidies in the current ECE system reach a greater proportion of children ages 3 and 4 than children ages 0 through 2.

- **The annual cost across all of Vermont's pre–school-age children for high-quality ECE with a well-compensated workforce is estimated to total about $645 million in 2022 dollars. These costs would be paid for by a combination of family contributions and public funding at the federal, state, and local levels.**

- **The study considers five potential sliding-scale subsidy schedules for families to contribute toward the cost of the ECE they use.**
  - All schedules maintain the current policy of requiring zero family contribution when family income is below 1.5 times the poverty level.
  - Contributions from families between 1.5 and 3.5 times the poverty level are capped at 10 percent or 7 percent of income, depending on the schedule.
  - Families with incomes of more than 5.0 times the poverty level would not be subsidized under the subsidy schedules considered in the study.

- **Corresponding to the five sliding-scale subsidy schedules, there are five estimates of the size of the annual funding gap after accounting for the current public funding and the family contribution.**
  - The smallest gap estimates are $179 million to $193 million per year and retain the status quo of limiting subsidies to families making 3.5 times the poverty level or less.
  - The larger gap estimates of $256 million to $279 million per year extend subsidies to higher-income families.

- **Funding the smallest gap estimate could be accomplished with single sources of new revenue or a bundle of several taxes.**
  - The single source options that would fill an annual $194 million gap are a new 0.9 percent payroll tax, a 2.0-percentage-point increase in the sales tax, a new limited services tax of 9.9 percent, or a new expanded services tax of 7.1 percent.
  - Tax bundles would allow for a smaller increase in the payroll or general sales taxes on top of soda or hospitality taxes.
  - The larger gaps generated by expanding subsidies to higher-income families cannot be funded by a single revenue source without increasing the magnitude of the tax to a rate not typically seen in other states.

- **The other economic and fiscal impacts associated with funding the larger gap estimates are modest.**
  - The larger gap estimates generated by extending subsidies to families below 5.0 times the poverty level represent approximately 0.6 percent of gross state product and approximately 2.8 percent of appropriations.
  - The taxes required to fill these larger estimates are expected to have a small impact on household economic well-being.
  - The expansion of ECE subsidies has the potential to expand the labor force in a range of 600 to 2,800 new workers, an increase of less than 1 percent of the current labor force.
  - Annual gross state product could expand between $59 million and $283 million, depending on assumptions. The estimated effect on annual government revenues would be between $1.5 million and $11.5 million.

Summary

Stakeholders in the public and private sectors in Vermont have been increasing the state's investments in high-quality early care and education (ECE) programs prior to children entering kindergarten. These investments are motivated, at least in part, by the evidence of the potential benefits to (1) participating children in terms of a more favorable developmental trajectory, enhanced school readiness, and improved education outcomes; (2) to parents in supporting their ability to work knowing that their pre–school-age children are in safe and supportive early learning environments; and (3) to employers in having a workforce with access to stable ECE environments that allow parents in the workforce to be productive during the workday. These investments have taken the form of expanding the amount and reach of ECE subsidies to offset the high cost of ECE, especially for infants and toddlers; continued expansion of the state-funded universal prekindergarten (UPK) program established with Act 166, and greater resources devoted to quality improvement for the state's regulated ECE home-, center-, and school-based providers.

Yet many families are not reached by the funds currently available, especially to afford care for infants and toddlers. Additionally, the ECE workforce has long been underpaid, both in terms of cash wages and benefits, given the increased emphasis on higher-education degrees for early educators. Further expansion of public funds to ensure that young children can participate in high-quality ECE in the mixed-delivery system (both public and private providers) requires an understanding of the cost of high-quality ECE, the contribution families can be expected to make toward the cost of the ECE they consume, and the potential public-sector revenue options to fill the gap.

Study Objective, Approach, and Limitations

Vermont Act 45, passed in 2021, expressed a need to support Vermont's economy by providing access to high-quality ECE and ensuring that the state's early educators are fairly compensated and well supported. The act signaled interest on the part of the Vermont legislature and governor to explore the economic implication of further expanding ECE subsidies, with the goal of capping the share of family income that goes toward ECE cost at 10 percent while also substantially increasing the compensation for the ECE workforce to levels that are commensurate with skills and job requirements. The act included a requirement for a financing study defined in terms of two objectives:

- Project the costs of expanding the state's ECE benefit to more families, requiring commensurate pay for providers, and utilizing cost of care in the reimbursement of

providers under the state's ECE subsidy program known as Child Care Financial Assistance Program (CCFAP).
- Identify and determine the feasibility of implementing stable, long-term funding sources to finance an affordable, high-quality ECE system for children from birth to kindergarten entry.

Fundamentally, this study seeks to answer two questions about a high-quality ECE system with a well-compensated workforce in Vermont: What will it cost, and how can it be paid for?

Several policy parameters for the system of interest are defined in Act 45. These include the following:

- The cost of care should be based on high-quality standards and assume commensurate pay for the workforce.
- Families are expected to make contributions to the cost of care on a sliding-scale basis, building from the current CCFAP subsidy system.
- Providers are reimbursed according to the cost of care rather than the market prices that they charge.

We focus on regulated providers—namely, licensed centers, Head Start programs, public school prekindergarten (pre-K) programs, and licensed and registered family child care homes (FCCHs). Our interest is in ECE for pre–school-age children, defined as those ages 0 until kindergarten entry.

Our approach to the first question involves estimating a model of the cost for high-quality ECE in Vermont using a mixed-delivery system, with both public and private providers. We use state fiscal year 2018–2019 as the baseline year for our estimates of key parameters—such as the demographics and income distribution of families in the state with pre–school-age children (which is based on U.S. Census data)—so as not to confound our results with the effects of the COVID-19 pandemic on the ECE system. With that baseline, we assume commensurate compensation in the form of cash salary and nonwage benefits, consistent with efforts in Vermont to define an ECE workforce salary scale. We make assumptions about the resources required in regulated centers and FCCHs to achieve high standards for quality, consistent with Vermont's licensing and quality recognition and improvement system. Drawing on existing cost models and estimates of the expected hours of care with expanded ECE subsidies, we calculate the total expected cost of ECE for the state.

To understand the size of the funding gap that must be filled to expand subsidies to more families, we consider several designs for a sliding-scale subsidy schedule. In each case, lower-income families make no contribution and the highest-income families pay most or all of their cost of care. These subsidy schedules determine the amount that families would contribute toward the cost of care. Finally, using an inventory of existing public funding to directly deliver ECE or subsidize the cost for families, we net out the family contribution and existing public funding to estimate the funding gap that must be filled with new sources of revenue.

To address the second objective, our approach involves (1) identifying a set of feasible and stable revenue streams that can be used alone or in combination to fill the funding gap and (2) employing a series of economic models to estimate the net fiscal and economic impact of the effects of the increased subsidies and the identified revenue. These models take into account how these policy changes might affect the behavior of people in Vermont (e.g., changes in workforce participation). After considering a range of revenue sources, both expanded revenue from existing taxes (sales and hospitality taxes) and consideration of potentially new sources of revenue (e.g., taxes on services, a soda tax), we develop six funding options, either single-source revenue options or options that bundle multiple revenue sources.

There are several limitations of our analysis that should be kept in mind when viewing and interpreting our findings:

- The study provides state-level estimates and does not attempt to disaggregate findings to include a regional analysis or to differentiate findings along the rural-to-urban continuum. Such variation is expected to exist, but the data are too limited to support such disaggregation. We do account for features that have implications for the cost of high-quality ECE, such as the high prevalence of small centers, given the rural nature of the state.
- In using 2018–2019 as a baseline—the last complete year prior to the COVID-19 pandemic—we are not seeking to model the effects of the pandemic on the ECE system. More specifically, we do not model what the long-term ECE system might look like as Vermont and the nation adjust to a context in which COVID-19 may become endemic to the population or to model changes in telework that have occurred during this period, which could influence demand for ECE in the state. We do report estimates of the cost of high-quality ECE and the funding gap in 2022 dollars.
- Our approach starts from the noted baseline and generates estimates of what a new, stable ECE system would look like after changes to the ECE system are made. We do not explicitly model the transition from the status quo. Additional resources may be needed to support transition costs, depending on the pace of implementation over time.
- Our approach does not account for the additional cost of ECE for children with special needs, above and beyond the cost for their typically developing peers. Our approach includes these children in our overall population estimates, but the added cost to meet their needs is not included. For this reason, we also do not count current funding for ECE specifically for children with special needs as part of the current funding that is available for an expanded system of subsidies and higher-quality ECE. However, existing information suggests that accounting for these costs would raise our overall estimate of ECE cost by about 1 percent.

Key Findings

We organize our findings around six themes.

Current ECE System in Vermont

- Vermont's population of pre–school-age children consists of annual cohorts of about 5,800 children, on average. About 60 percent of that population has family income below 3.5 times the federal poverty level, the maximum income that currently qualifies for CCFAP subsidies.
- Federal and state funding for subsidized ECE programs in Vermont in 2018–2019 totaled approximately $109 million. Funding came through three main sources: federal Head Start and Early Head Start grants, Vermont's state-funded UPK under Act 166, and federal and state funds for subsidized child care under CCFAP.
- The current ECE subsidy system reaches a greater proportion of children ages 3 and 4 than children ages 0 through 2. We estimate that potentially 75 percent or more of children ages 3 and 4 are served by the current system, while at most 25 percent of children ages 0 through 2 are served. UPK is one reason why more three- and four-year-olds are served; however, with state funding for UPK at ten hours per week, it is not clear whether families are able to access and afford the total ECE hours that they need at these ages.

Cost of a High-Quality ECE System with a Well-Compensated Workforce

- We estimate that the cost for high-quality ECE in Vermont across all pre–school-age children would total about $645 million per year in 2022 dollars. This estimate takes into account our definition of what constitutes high-quality ECE, a compensation schedule for the ECE workforce that is commensurate with education and skills, and estimates of hours of care.
- Approximately 25 percent of this figure (about $162 million) would be paid by families with incomes of more than 5.0 times the poverty level, a group that would not be subsidized under any subsidy schedule we consider. The remainder would be paid for by a combination of family contributions and state subsidies under the various subsidy schedules we consider.

What Families Would Contribute Under a Subsidy System

- We consider five sliding-scale schedules for families to contribute toward the cost of the ECE they use.
  - Under all schedules, we maintain the current policy of requiring zero family contribution when family income is below 1.5 times the poverty level.
  - Contributions from families between 1.5 and 3.5 times the poverty level are capped at 10 percent or 7 percent of income, depending on the subsidy schedule.
- Under a schedule closest to the current CCFAP family-contribution sliding scale with an added 10 percent cap, families with incomes up to 3.5 times the poverty line would contribute about $38 million annually toward the cost of ECE. Under the most generous schedule considered, their contributions would fall to about $27 million.

Size of the Funding Gap to Expand ECE Subsidies

- With five schedules for the family-contribution, our results produce five estimates of the size of the gap, after accounting for the current public-sector funding in the system and the family contribution.
- The smallest gap estimates are $179–$193 million per year and retain the status quo, limiting subsidies to families making 3.5 times the poverty level or less.
- The larger annual gap estimates of $256–$279 million progressively extend subsidies to higher-income families, with the largest gap resulting from extending subsidies to families with incomes up to 5.0 times the poverty level.

Potential Revenue Sources to the Fill the Gap and Their Economic Consequences

- Funding the smallest gap estimates that limit subsidies to families currently covered by CCFAP (3.5 times the poverty level or less) could be accomplished by any of the below single sources of new revenue:
  - a new 0.9 percent payroll tax
  - a 2.0-percentage-point increase in the sales tax
  - a new limited services tax of 9.9 percent
  - a new expanded services tax of 7.1 percent.
- Tax bundles would allow for a smaller increase in the payroll or general sales taxes on top of soda or hospitality taxes.
- The larger gaps generated by expanding subsidies to higher-income families cannot be funded by a single revenue source without increasing the magnitude of the tax to a rate not typically seen in other states. This suggests that if these more-generous policy options are adopted, it would be advisable to use the sales tax in combination with other revenue options.

Other Estimated Economic and Fiscal Impacts

- The larger gap estimates generated by extending subsidies to families below 5.0 times the poverty level represent approximately 0.6 percent of gross state product and approximately 2.8 percent of appropriations.
- The taxes required to fill these larger estimates are expected to have a small impact on household economic well-being.
- The model confirms that reliance on a payroll tax is a progressive tax policy and results in higher-income households in the state bearing a disproportionate share of the cost. A sales tax is regressive and results in lower-income households bearing a disproportionate share of the costs.
- The expansion of ECE subsidies has the potential to expand the labor force in a range of 600 to 2,900 new workers, an increase of less than 1 percent of the current labor force.
- The economic analysis suggests that annual gross state product could expand between $59 million and $283 million, depending on assumptions. The estimated effect on annual government revenues would be between $1.5 million and $11.5 million, not enough to cover the cost of expanded subsidies.

Additional Considerations

There are several additional considerations regarding the estimates in the report. First, in considering further expansion of ECE subsidies, it will be important to account for the pace and direction of the postpandemic recovery in the ECE sector and to make the short-term adjustments to stabilize the ECE workforce. Second, although the prospects for a federal investment in ECE access and quality, as envisioned in the Build Back Better plan, have dimmed, future federal policymakers may propose an expanded role for federal funding that would reduce the need for state funds to fill the funding gap. Third, although this report has not addressed provider reimbursement mechanisms and the implementation of family contributions, those features of an expanded subsidy system will need to be addressed. On the provider side, options include contracting with providers for their reimbursement rate based on their cost structure. Administering family contributions could consider the use of the tax code to reconcile family income in the prior year with family ECE contributions to account for over- or underpayment. Fourth, our analyses have not incorporated the cost or potential subsidy structure for school-age care. For the 20 percent of families with both pre–school-age and school-age children, there will be a need to coordinate the subsidy for ECE across the two age groups. The approach taken in this study could be extended to include child care from birth through age 12, although there may be a more limited basis for assumptions of program quality and cost structures for school-age care programs. Finally, we recognize the potential for downstream benefits from further state investments in access to and the quality of ECE. Although there may well be eventual benefits to the public sector in Vermont from expanding access to subsidized ECE, the magnitude and timing of those benefits are not likely to be a source of savings in the near term to offset the cost.

Policy Implications

As Vermont considers further expansion of ECE subsidies, we note several implications for policy. First, how high up the income ladder should subsidies go? Vermont already has one of the highest income thresholds for subsidy eligibility. Especially if funds are limited, it may be feasible to fully fund subsidies for the lowest-income families first and ensure that those eligible families access the benefit. Subsequent expansions could move the income threshold upward once the subsidy need is fully met at lower income levels.

Second, how generous should the subsidy schedule be? In recent years, policies have centered on a 10 percent cap on the share of family income devoted to child care costs or even a 7 percent cap. Although there is uncertainty about how big the family contribution could be, any effort to increase the family contribution at lower income levels may be counterproductive in discouraging the use of formal care options because they still remain unaffordable.

Third, the fiscal and economic analyses in this report demonstrate that there are feasible sources of stable revenue to fill the gap with an expansion of ECE subsidies to cover the cost of care for families with incomes up to 3.5 times the poverty level. Further expansion of subsidies

to higher income levels raises the size of the gap to be filled and is likely to require a more complex portfolio of revenue sources. Further, reliance on regressive sources of revenue may be less desirable when the policy is designed to benefit the lower-income population.

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Chapter 1. Introduction

A rich line of research has detailed the substantial short- and long-term benefits of providing high-quality early care and education (ECE) before children enter kindergarten. The multitude of benefits observed during the school-age years and into adulthood have led researchers to estimate that investing in early education experiences can provide a high return on investment (Karoly, 2016, 2017). Yet the cost of ECE is prohibitive for many families, especially those with limited financial resources. These costs can remain prohibitively high for families even after taking into account current subsidy and reimbursement programs (Whitehurst, 2017).[1] These costs make care unaffordable even though members of the ECE workforce are often undercompensated, in both their salaries and their nonwage benefits (National Academies of Sciences, Engineering, and Medicine, 2018). If staff were compensated consistent with their qualifications and competencies, the cost of ECE would be even higher.

The high cost of ECE, combined with our growing understanding of the science of child development (Center on the Developing Child, Harvard University, undated), has motivated parents, educators, and policymakers to investigate how to expand access to quality early learning experiences for all young children, regardless of financial means. Ultimately, public funding is key for closing the gap between the cost of high-quality ECE and what families can pay. Yet that gap is far from closed across the United States, including in Vermont. In recent years, Vermont policymakers have expanded the amount and reach of ECE subsidies, continued expansion of the state-funded universal prekindergarten (UPK) program established with Act 166 (Vermont General Assembly, 2014), and invested in quality improvement for its regulated ECE home-, center-, and school-based providers. Many families, however, are not reached by the funds currently available, especially to afford care for infants and toddlers. Further expansion of public funds to ensure that young children can participate in high-quality ECE in the mixed-delivery system (both public and private providers) requires an understanding of the cost of high-quality ECE, what a reasonable contribution families can make to the cost of the ECE they consume, and the potential public-sector revenue options to fill the gap.

[1] There is no clear consensus as to what share of family income spent on ECE is affordable for families (National Academies of Sciences, Engineering, and Medicine, 2018). The U.S. Department of Health and Human Services uses a 7 percent share of family income in setting ECE subsidy policies, although a 10 percent threshold had been used previously. Data on market prices for Vermont as of 2019 indicate that the average annual cost of care for an infant was about $14,000 (Child Care Aware, 2020). Thus, using the 10 percent threshold, a family would need at least $140,000 in annual income for this cost of infant care to be considered affordable and about $200,000 in annual income using the 7 percent threshold.

Study Objective

Vermont's Act 45 (Vermont General Assembly, 2021) was motivated by an interest in supporting Vermont's economy, providing access to high-quality ECE, and ensuring that the state's early educators are fairly compensated and well supported. The act signaled the desire on the part of the Vermont legislature and governor to further explore expansion of ECE subsidies, with the goal of capping the share of family income that goes toward ECE cost at 10 percent while also substantially increasing the compensation for the ECE workforce to levels that are commensurate with skills and job requirements. The required financing study was defined in terms of two objectives:

- Project the costs of expanding the state's ECE benefit to more families, requiring commensurate pay for providers, and utilizing cost of care in the reimbursement of providers under the state's ECE subsidy program known as Child Care Financial Assistance Program (CCFAP).
- Identify and determine the feasibility of implementing stable, long-term funding sources to finance an affordable, high-quality ECE system for children from birth to kindergarten entry.

In sum, this study seeks to answer two questions about a high-quality ECE system with a well-compensated workforce: What will it cost, and how can it be paid for?

Several policy parameters for the system of interest are defined in the act:

- The cost of care should be based on high-quality standards and assume commensurate pay for the workforce, particularly classroom staff in centers and family child care providers. We focus on regulated providers—namely, licensed centers, Head Start programs, public school prekindergarten (pre-K) programs, and licensed and registered family child care homes (FCCHs).
- Families are expected to make contributions to the cost of care on a sliding-scale basis, building from the current CCFAP subsidy system. Families with income below 1.5 times the federal poverty guidelines (*1.5 times poverty*) would make no contribution. As incomes rise to 3.5 times poverty, the family contribution would increase but be capped at 10 percent of income. Our analyses consider the option of further expanding the subsidies to families with income between 3.5 and 5.0 times poverty.
- Providers are reimbursed according to the cost of care rather than the market prices that they charge.

Although not explicitly referenced in the act, we assume that eligibility for ECE subsidies under CCFAP would not be tied to employment—i.e., there is no work requirement.

Key Terms Used in This Report

For purposes of this report, we focus on *regulated ECE providers* (or programs), which, in Vermont, consist of licensed centers (including Head Start and public pre-K programs) and licensed and registered FCCHs. We do not include a category of license-exempt centers and nonrecurring centers (discussed in Chapter 2). We also do not consider informal family, friend, and neighbor care providers.

ECE providers employ one or more members of the *ECE workforce* in regulated settings. In licensed *center-based settings*, our primary interest is in staff who work directly with children as teachers, assistant teachers, or aides. We also include the site director, who is the *lead administrator* but who also might have a pedagogical role by working in a classroom. Licensed and registered FCCH providers are also included in our definition of the ECE workforce. We also refer to the ECE workforce as *early educators* to highlight their pedagogical role.

Our main interest is in children from birth until they are age-eligible for kindergarten, a group we refer to as *pre–school-age children*. We also define *kindergarten-entry cohorts* as the group of children who are age-eligible to enter kindergarten in the same year. We approximate these cohorts as children with birth dates running from September to August, consistent with a September 1 kindergarten entry cutoff date (i.e., turning age 5 by September 1).

Approach

Addressing the first objective—cost projection—necessitates an understanding of the demographics and economic status of the population of families with pre–school-age children, knowledge of the current system of ECE subsidies in the state, and a model to estimate the cost of high-quality ECE with a well-compensated and supported workforce. More specifically, we undertake several analytic steps, including (1) defining a ECE workforce compensation scale to achieve commensurate pay and (2) defining a set of features consistent with high-quality center- and home-based providers. Given these parameters and other assumptions, we (3) use a cost model to estimate the hourly cost of ECE for infants, toddlers, and preschoolers in center- and home-based settings. Drawing on information about current patterns of nonparental care use and the demographics of Vermont families with pre–school-age children, we then (4) apply the cost-per-hour estimates to the expected demand for child care hours, accounting for an expected increase in care use because of the expanded subsidies. Next, on the basis of several designs for a sliding-scale subsidy schedule in which lower-income families make no contribution and the highest-income families pay most or all of the cost for the care they use, we (5) estimate the total contributions from families toward the cost of care. Using an inventory of existing public funding to directly deliver ECE or subsidize the cost for families, we (6) net out the family contribution and existing public funding to estimate the funding gap that must be filled with new sources of revenue. These analyses are based on family demographics, provider cost, care-use patterns, and public-sector ECE spending as of 2018–2019, the last complete federal or state fiscal year before the COVID-19 pandemic had an effect on all of these parameters.[2] Thus, we start from a prepandemic baseline to generate our estimates.

[2] For example, U.S. Census data show an unanticipated increase in Vermont's total population in 2021 of about 0.5 percent because of positive net in-migration to the state during the pandemic (U.S. Census Bureau, Population

A thoughtful economic evaluation of the expansion of ECE services requires an assessment of possible funding sources—the second objective—to provide feasible avenues of standing and maintaining a stable expanded ECE system. These calculations require understanding the overall effect of the expanded system on the economy, including governmental revenues and outlays. Our approach involves (1) identifying a set of feasible and stable revenue streams that can be used alone or in combination to fill the funding gap and (2) employing a combination of an input-output model calibrated to Vermont data with a computable general equilibrium model to estimate the effects of the increased subsidies and the identified revenue streams in terms of the net fiscal and economic impact of the policy changes.

Our approach to the first objective builds from prior research of the cost of a high-quality ECE system and how to share the cost between family contributions and the public sector. In particular, our approach is closest to that adopted by the National Academies of Sciences, Engineering, and Medicine (2018), which generated an estimate of the nationwide cost of a high-quality ECE system with a well-compensated workforce and considered alternative scenarios for how to pay for the cost through a combination of family contributions based on sliding-scale subsidies and public funding. Our approach replicates a similar modeling strategy at the state level. In addressing the second question, we draw on prior RAND Corporation research using similar economic modeling strategies to estimate the impact of social-distancing policy on economic outcomes (Strong and Welburn, 2020) and the economic impacts of large-scale recovery investments in Puerto Rico (Strong et al., 2022), among others.

Limitations of the Analysis

There are several limitations for this study that frame the analysis. First, the study provides state-level estimates and does not attempt to disaggregate findings to include a regional analysis or to differentiate findings along the rural-to-urban continuum. How the population of families with young children is distributed across the state, differentials in the cost of living across communities, and other factors mean that there will likely be variation across the state in the estimates we provide at the state level. However, our statewide estimates do account for features specific to Vermont, such as the distribution of licensed centers by size and the implications for cost estimates. Notably, given the more rural nature of the state, Vermont has relatively more small centers, which are estimated to cost more per child-hour than larger centers. Thus, our statewide estimates account for important regional variation relevant for cost estimation.

Second, our analysis adopts a baseline of 2018–2019—the last complete year prior to the COVID-19 pandemic—to obtain demographic estimates of the population of young children and their families, spending on ECE programs, and program enrollments. This means that we are not

Division, 2021), while the number of births increased slightly in that same year (Henderson, 2022). It is not yet clear whether the pandemic will result in permanent shifts in migration patterns or fertility rates.

seeking to model the dynamic effects of the pandemic on the demand or supply of ECE, the ECE workforce, or the economy more generally, nor the process of the eventual recovery, which is challenging to predict. Furthermore, the data used in our analysis do not reflect any potentially long-term or structural changes to the Vermont economy that may occur as a result of the pandemic or as a result of changes in telework that accompanied the pandemic, although there are no clear shifts evident to date that would have major implications for our estimates (e.g., the demographic shifts are modest and may be short-lived). Although we use 2018–2019 parameters as our baseline, key estimates of cost, the size of the gap in funding, and other estimates are presented in 2022 dollars.[3] If the policy changes examined in this report were to occur after 2022, the estimates presented here would need to be further inflated to reflect changes in the cost of living between 2022 and the relevant implementation year.

Third, our approach starts from the noted baseline and generates estimates of a new equilibrium for ECE with higher compensation for the workforce, greater public subsidies for ECE, higher-quality ECE programs, and public revenue sources to fill the gap from the current system. Again, we do not explicitly model the transition from the status quo to the new equilibrium in terms of such factors as the increase in the workforce in the field or the increased qualifications of the workforce as a result of changes to ECE programs. Our approach does allow for a gradual transition to an expanded subsidy system by expanding over time the share of families eligible for ECE subsidies. Depending on the policy change adopted and the planned phase-in period for the transition from the status quo to the new equilibrium, there would be a need to estimate and potentially fund the transition costs related to workforce development, facility expansion, and other changes in infrastructure that are not already included in the cost estimates as part of the equilibrium system-level infrastructure costs. The model used for this analysis is an approximation of the steady-state economic effect, which is to say that it is not looking at the effects at the peak or trough of economic activity. In boom years, the revenues are likely to be higher (the labor costs may also be a little higher) than modeled; in recessions, the revenues are likely to be lower (the labor costs may also be a little lower).

Finally, we note that our approach does not account for the additional cost of ECE for children with special needs, above and beyond the cost for their typically developing peers. Our approach includes these children in our overall population estimates, but the added cost of their needs to support a high-quality child care and early learning environment is not included in our estimates. Given this limitation, we also do not count current funding for ECE specifically for children with special needs as part of the current funding that is available for an expanded system of subsidies and higher-quality ECE. Estimates based on the literature, presented in the report, suggest that accounting for the incremental cost for special education ECE beyond the high-

[3] To convert 2019 dollars to 2022 dollars, we use the Consumer Price Index for All Urban Consumers, all items, for the Northeast region between January 2019 and October 2022, an inflation factor of 1.157 (U.S. Bureau of Labor Statistics, undated).

quality ECE features we already assume would increase our statewide cost estimate by about 1 percent. These added costs could be met with current dedicated federal funding for children with special needs, funds that we do not count in our estimate of current public-sector spending for ECE.

Organization of This Report

We begin in Chapter 2 with relevant background for understanding the ECE landscape in Vermont, covering the demographics and family context of children who have not yet entered kindergarten, the number and characteristics of the child care and early learning providers and the associated cost of care, and the array of federal, state, and local funding streams that fully or partially subsidize the cost of care for families with young children. Chapter 3 first describes our approach to estimating the cost of a high-quality system of ECE for children in the state, the expected contribution of families toward the cost of care under alternative sliding-scale subsidy schedules, and the size of the funding gap after accounting for family fees and current funding. The results from these analyses are then detailed. Chapter 4 follows a similar approach to our analysis of the potential sources of funding to cover the gap in costs and the economic implications of the sources of revenue and the shift to more-expansive subsidies and high-quality ECE. For each of these chapters, a corresponding appendix provides additional documentation and technical detail. The final chapter summarizes our key findings, discusses additional considerations for the analyses, and draws out the implications of our findings for policymakers.

Chapter 2. Background on Early Care and Education in Vermont

Our goal in this chapter is to provide important contextual information for the ECE system in Vermont, starting with the demographics of the state's population of young children and their families, the provider landscape, and the array of existing funding streams that directly deliver ECE to young children or subsidize the provision of care in private or public settings. As noted in Chapter 1, estimates are from 2019 (or 2018–2019), the most recent year prior to COVID-19. See Appendix A for additional documentation for this chapter.

Demographics and Labor Force Participation of Families with Young Children

Number of Children Ages Birth Through 5

The number of births in Vermont, after remaining fairly stable during the 1990s, has been gradually declining for the past two decades. In 2019, 5,361 children were born to residents in the state (Vermont Department of Health, 2021). Because of net in-migration of families with young children, each annual cohort starts with about 5,500 infants who are age 0 and reaches about 6,200 children by age 5 (Table A.1). Notably, about 43 percent of the five-year-olds in each calendar year have already entered kindergarten (Table A.2).

For some of the estimates in this report, rather than categorizing children by their current age, we refer to *kindergarten entry cohorts*—i.e., the group of children who are age-eligible to enter kindergarten in the same year. Because Vermont does not have a statewide kindergarten-entry cutoff date but one that is determined by each school district,[4] we approximate these cohorts as children born during each annual 365-day period starting with September 1 and ending with August 31. For example, the kindergarten-entry cohort eligible to start kindergarten in fall 2022 had turned age 5 by August 31, and thus the cohort was born between September 1, 2016, and August 31, 2017. In the year before a cohort enters kindergarten, some children will already be age 5, while others will be age 4. Two years before kindergarten entry, the cohort will be a combination of three- and four-year-olds, and so on.

For the analyses that follow in this chapter, we focus on children ages 0 through 4 as representing the five kindergarten-entry cohorts that would potentially be enrolled in nonparental care through ECE. We refer to this group as the *pre–school-age* population in the state. This group is about 29,000 children, about 5,800 children on average in each single-year age group.

[4] A school district may require children to have turned five by any date between August 31 and January 1 (16 Vermont Statute Sec. 1073[a]). The three largest school districts in the state—Champlain Valley, Essex Westford, and Burlington—all use September 1 as the birth date cutoff for kindergarten entry.

Distribution of Pre–School-Age Children by Family Income

To compare the economic status of pre–school-age children, we measure family income relative to the federal poverty guidelines published each year by the U.S. Department of Health and Human Services (undated). Similar to the federal poverty line defined each year by the U.S. Bureau of the Census to measure official poverty, the federal poverty guidelines are adjusted each year based on inflation to define a threshold for determining income eligibility for various federal programs, with the threshold varying by family size.[5]

As of 2019, about 22 percent of Vermont children ages 0 through 4 had family income up to 1.5 times poverty (Table 2.1).[6] As discussed later in the context of child care subsidies, this population is eligible for fully subsidized ECE through Vermont's CCFAP. Subsidized ECE extends to families with income up to 3.5 times poverty, which encompasses another 38 percent of the population of pre–school-age children in Vermont. Thus, about 60 percent of the state's pre–school-age children are potentially eligible for at least partially subsidized ECE. Of the remaining children, about 21 percent live in families with income between 3.5 and 5.0 times poverty, or an income as high as $103,000 for a family of four. The remaining 19 percent of pre–school-age children are in families with income that exceeds 5.0 times poverty for their family size.

To place these distribution estimates in context (Table 2.1), for an annual cohort of about 5,800 children, about 1,300 would be eligible for fully subsidized ECE through CCFAP, with another 2,200 children eligible for a partial subsidy on a sliding-scale basis. About 2,300 of the children in the cohort would not currently be eligible through CCFAP for a subsidy. These demographic and family income figures provide a foundation for our estimates of the cost of ECE presented in Chapter 3.

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[5] The federal poverty guidelines, established by the U.S. Department of Health and Human Services annually, vary by total family size and are used to determine eligibility for federal programs. The federal poverty line income cutoffs defined by the U.S. Census Bureau (2022a) are used to estimate the official poverty rate and vary by the number of adults and children in the family. For 2019, the federal poverty guideline was $21,330 for a family of three and $25,750 for a family of four. The federal poverty guideline and line cutoffs are within a few hundred dollars in any given year for a given family size.

[6] Family income, as measured in the American Community Survey data, is pretax and includes earned income, income from business and financial assets, private transfer payments (e.g., alimony or child support), and the value of government cash transfers (e.g., income from Social Security, disability payments, unemployment insurance) but excludes the value of any noncash government transfers, such as subsidized housing, food, or health care.

Table 2.1. Estimated Distribution of Children Ages 0 Through 4 in Vermont by Income Relative to the Federal Poverty Guidelines, 2019

	Percentage Distribution of Children Ages 0 Through 4		Numerical Distribution of Single-Year Cohort of 5,800 Children[a]	
Indicator	Percentage	Cumulative Percentage	Number	Cumulative Number
Family income relative to the federal poverty guidelines				
Up to 1.5 times poverty	22.2	22.2	1,290	1,290
1.5 to 3.5 times poverty	37.5	59.7	2,170	3,460
3.5 to 5.0 times poverty	21.4	81.1	1,240	4,700
Over 5.0 times poverty	18.9	100.0	1,100	5,800
Total	100.0	—	5,800	—

SOURCE: Authors' analysis of 2015–2019 American Community Survey Public Use Microdata Sample file for children in families (U.S. Census Bureau, 2022b).
NOTE: Percentage distributions might not total 100 percent because of rounding. — = not applicable.
[a] Imputed estimate rounded to nearest 10.

Distribution of Families with Pre–School-Age Children

As of 2019, of Vermont's nearly 62,000 families with at least one dependent child under age 18, about 22,700 families (37 percent) had at least one pre–school-age child, with an almost even split between families with only pre–school-age children and those with at least one additional school-age child (Table 2.2, top panel). Compared with all families with dependent children, families with both pre–school-age and school-age children were most likely to have income below 1.5 times poverty and least likely to have income over 5.0 times poverty. The reverse is true for families with only school-age children.

For Vermont families with at least one pre–school-age child, the vast majority are two-parent families (71 percent) (Table 2.2, middle panel). As would be expected, compared with their two-parent counterparts, one-parent families have considerably lower income, whether female or male headed but especially for the female-headed families. For these families with pre–school-age children, it is also worth noting that most families have just one pre–school-age child (71 percent) (Table 2.2, bottom panel). On average, there are 1.3 pre–school-age children in families with at least one such child. Income relative to the poverty level is lower among families with three or four pre–school-age children compared with those with one or two children in the age range.

Table 2.2. Number of Families in Vermont with Dependent Children and Distribution by Family Income Relative to the Federal Poverty Guidelines, 2019

Indicator	Number	Percentage Distribution			
		Up 1.5x Poverty	1.5x to 3.5x Poverty	3.5x to 5x Poverty	Over 5x Poverty
Families with children under age 18	61,828	19.7	36.0	20.9	23.5
Only children under age 5	11,562	18.9	36.4	23.5	21.2
Children under age 5 and 5 to 17	11,110	28.8	36.4	19.8	15.0
Only children age 5 and older	39,156	17.3	35.7	20.4	26.6
Families with at least one child under age 5	22,672	23.7	36.4	21.7	18.1
Two parents	16,050	11.2	37.2	27.5	24.0
One parent—female head	4,830	58.2	34.6	4.0	3.3
One parent—male head	1,792	43.0	34.4	17.4	5.2
Families with at least one child under age 5	22,672	23.7	36.4	21.7	18.1
One child under age 5	17,571	23.4	36.8	21.2	18.7
Two children under age 5	4,697	24.5	34.8	24.0	16.7
Three or four children under age 5	404	30.7	40.8	17.1	11.4

SOURCE: Authors' analysis of 2015–2019 American Community Survey Public Use Microdata Sample file for children in families (U.S. Census Bureau, 2022b).
NOTE: Percentage distributions might not total 100 percent because of rounding.

Parental Labor Force Participation

With the long-term trend toward increased women's labor force participation, it has become common for women with pre–school-age children to be employed or actively looking for work, albeit at a lower rate compared with their male counterparts. As of 2019, about 79 percent of mothers with at least one pre–school-age child were in the labor force, compared with about 91 percent of fathers (Table 2.3). The maternal labor force participation rate reached 90 percent for mothers in families with income exceeding 3.5 times poverty, in contrast to 71 percent for women with family income below that threshold. The labor force participation rate for men was also lower for those with lower family income, about 87 percent, compared with their counterparts with higher income of about 96 percent.

Table 2.3. Labor Force Participation Status of Parents with Pre–School-Age Children, 2019

Indicator	Total (*N*)	In the Labor Force (*n*)	Not in the Labor Force (*n*)	Labor Force Participation Rate (%)
Parents with at least one pre–school-age child				
All parents	38,722	32,637	6,085	84.3
Fathers	17,779	16,157	1,622	90.9
Mothers	20,943	16,480	4,463	78.7
Parents with family income up to 3.5 times poverty	21,416	16,611	4,805	77.6
Fathers	9,158	7,918	1,240	86.5
Mothers	12,258	8,693	3,565	70.9
Parents with family income more than 3.5 times poverty	17,306	16,026	1,280	92.6
Fathers	8,621	8,239	382	95.6
Mothers	8,685	7,787	898	89.7

SOURCE: Authors' analysis of 2015–2019 American Community Survey Public Use Microdata Sample file for children in families (U.S. Census Bureau, 2022b).
NOTE: Percentage distributions might not total 100 percent because of rounding.

Viewed from the perspective of the labor market in Vermont, parents with pre–school-age children compose a relatively small share of the potential workforce overall. As of 2019, there were nearly 370,000 adults in Vermont ages 20 to 64, with just under 300,000 or 81 percent in the labor force (see Table A.3). The 39,000 parents with pre–school-age children represent about 10 percent of that potential workforce. With 84 percent of those parents already in the labor force, even if the remaining 6,100 parents not in the labor force were to join the workforce, the state's working-age labor force would increase by at most 2 percent. In Chapter 3, we provide an estimate of the expected increase in the labor force as a result of increased subsidies for ECE and consider the potential economic impact of that increase in Chapter 4.

English Learners

Compared with states such as California or Texas (with large immigrant populations), Vermont has a relatively small share of children who are English learners. As of 2019, less than 5 percent of Vermont children ages 5 to 17 were estimated in Census data to speak a language other than English at home (Annie E. Casey Foundation, undated) and less than 3 percent of Vermont school-age children are classified as English learners (National Center for Education Statistics, 2022a). Although such estimates are not available for the pre–school-age population, a similar small share is expected to apply. In the estimates of cost for ECE, we do not make any special allowances for cost differentials for serving English learners, beyond the assumptions that classroom staff are well prepared, supported, and compensated in their role as early educators, with ongoing professional development opportunities—including training in

supporting English learners as early learners—and sufficient resources for curricula and other learning materials for the same purpose.

Children with Special Needs

As noted in Chapter 1, our analyses exclude considerations of the additional cost of ECE for children with special health or learning needs beyond the costs assumed for high-quality ECE. Accurate estimates of the size of this population for the country as a whole and for Vermont specifically are not readily available. National data indicate that about 17 percent of children ages 3 to 17 have one or more developmental disabilities (Cogswell et al., 2022). Many of these conditions are diagnosed before children enter kindergarten, such that the prevalence of special needs gradually increases during the pre–school-age years. Indeed, national estimates suggest that about one in ten children under age six has a special health care need (Forry et al., 2013). In the education system, an estimated 15 percent of children receive special education services during the kindergarten through grade 12 (K–12) years (National Center for Education Statistics, 2022b). Applying the 10 percent prevalence estimate to Vermont's population of young children suggests that as many as 2,900 children might require additional supports when in ECE settings, whether home-, center-, or school-based, compared with their typically developing peers.

Under the Individuals with Disabilities Education Act (Pub. L. 101-476, 1990), federal funds through Part C of the act support early intervention services for children up to age 3 (although these are not necessarily funds to pay for child care or early learning programs), while federal Part B funds support the incremental costs of special education preschool for children with an individualized education plan starting at age 3, which is tailored to the specific needs of the child and their family. Given the uncertainties about the additional costs of providing supports for pre–school-age children with special needs, such costs are not included in the estimates of the cost of care presented in Chapter 3. However, because we focus on the pre–school-age population as a whole, the baseline cost of high-quality care with a well-compensated workforce will be included as if children with special needs were typically developing children. At the same time, we do not count the federal Individuals with Disabilities Education Act funds that flow to Vermont for this purpose, nor any other state or local special education funding as part of the existing pool of public funds available to support ECE. An estimate of the amount of these funds is detailed later in this chapter.

ECE Providers and the Price of Care

As with most states, families in Vermont with pre–school-age children rely on a mixed-delivery system of private and public providers both in formal (i.e., regulated or licensed) care settings and with informal providers that offer care in the child's home or the caregiver's home, sometimes called *family, friend, and neighbor care*. In our analysis, we focus on the former, the

regulated segment of ECE market, consisting of licensed centers, Head Start programs, public school pre-K programs, licensed FCCHs, and registered FCCHs.[7]

Number of Providers and Their Desired Capacity

As of September 2022, Vermont's database of regulated providers listed 428 FCCHs (94 percent of which were registered rather than licensed) and slightly more licensed centers (including Head Start programs and public pre-K school-based sites): 496 in total (Table 2.4).[8] FCCHs can serve up to 6 children (depending on the age mix) with one adult present and as many as 12 children (depending on the age mix) with two adults, but most do not have a desired capacity by age in the database. Centers list their desired ECE capacity, which we define as the sum of their desired capacity for infants, toddlers, and preschoolers.[9] Vermont is notable for the relatively high share of small centers and school-based sites, which we define as those with a desired capacity of 6 to 40 pre–school-age children. Nearly 80 percent of these sites fall in that desired capacity range and represent just over half of all center- or school-based slots. Just about 5 percent of centers and schools (or 27 sites) aim to serve more than 70 children, but those sites represent about 17 percent of the slots. The medium-size centers and schools, with desired enrollment of 41 to 70 pre–school-age children, offer about 27 percent of the slots. We will account for this mix of center and public pre-K sizes in our analysis of the cost of high-quality ECE in the state.

[7] Several types of care settings are exempt from licensing (e.g., programs in religious establishments operating during services or other religious activities, part-day summer programs, and part-day recreation programs for fewer than 13 weeks per year) and are excluded because they are less relevant for our purposes. We also exclude nonrecurring centers, such as those that provide short-term, temporary care services related to such activities as tourism, recreation, or shopping. For additional details on child care licensing in Vermont, see Vermont Agency of Human Services (2022a, 2022b).

[8] To be consistent with other indicators presented in this chapter, we would have a database of regulated providers as of 2019 with information on their desired capacity, quality rating, accreditation status, and so on. In the absence of such data, a snapshot for 2019 indicates that Vermont had 506 regulated child care centers and 510 FCCHs, indicating a stable number of licensed centers but a shrinking number of FCCH providers through the pandemic (Child Care Aware, 2020).

[9] Some of these centers also serve school-age children, but desired capacity for that age group is excluded from our totals. We have also excluded licensed school-age centers, which is another category of licensed centers.

Table 2.4. Number and Distribution of Regulated ECE Providers and Their Desired Capacity, 2022

Indicator	Number of Sites	Percentage Distribution of Sites	Total Desired Enrollment[a]	Percentage Distribution of Desired Enrollment[a]
FCCH	428	100.0	—	—
Licensed FCCH	25	5.8	—	—
Registered FCCH	403	94.2	—	—
Licensed centers and public pre-K sites	496	100.0	15,021	100.0
6–40 desired capacity	394	79.4	8,464	56.3
41–70 desired capacity	75	15.1	4,027	26.8
71–150 desired capacity	27	5.4	2,530	16.8

SOURCE: Authors' analysis of Vermont Child Care Provider Data as of September 2022 (Vermont Data Portal, undated).
NOTE: These tabulations exclude nonrecurring center-based programs. Percentage distributions might not total 100 percent because of rounding. — = not available.
[a] Desired enrollment is the sum of desired enrollment of infants, toddlers, and preschoolers.

Provider Quality

These regulated FCCHs, centers, and public pre-K sites are required to participate in the Vermont STep Ahead Recognition System (STARS), the state's quality recognition and improvement system (Vermont Agency of Human Services, undated-a). The system has five quality tiers, an entry level called Star 1, followed by four more levels up to Star 5. At each step, additional requirements must be met to attain that tier. As of 2022, the database of providers shows that just about 28 percent of FCCHs and 80 percent of centers had attained a Star 4 or Star 5 rating, the level required to be an approved UPK provider (Table 2.5). Achieving accreditation also qualifies for a Star 5 rating and being considered as an approved UPK provider, a status reached by four FCCHs and 30 centers as of 2022.

Table 2.5. Number and Distribution of Regulated ECE Providers by STARS Rating, 2022

Indicator	FCCHs		Centers and Public Pre-K	
	Number of Sites	Percentage Distribution of Sites	Number of Sites	Percentage Distribution of Sites
Total	424	100.0	490	100.0
Star 1	176	41.5	14	2.9
Star 2	31	7.3	35	7.1
Star 3	99	23.3	43	8.8
Star 4	92	21.7	188	38.4
Star 5	26	6.1	210	42.9

SOURCE: Authors' analysis of Vermont Child Care Provider Data as of September 2022 (Vermont Data Portal, undated).
NOTE: The STARS rating was missing for 4 FCCHs and 6 centers. Percentage distributions might not total 100 percent because of rounding.

Prices for Care for Pre-School-Age Children

The price of child care typically varies by the child's age and number of hours in care. Reliable data collected on the prices that Vermont providers charge show that, in 2019, prior to the onset of the pandemic, the average full-time annual price for care for infants, toddlers, and preschoolers in centers was $13,915, $13,672, and $12,835, respectively (Child Care Aware, 2020). The equivalent prices for FCCH-based care were $9,428, $9,061, and $8,885, again for infants, toddlers, and preschoolers, respectively. Such price estimates, however, do not necessarily capture the cost of providing care for children in each of these age groups, as providers do not necessarily set their prices equal to the average or marginal cost. Indeed, given the substantial difference in the staff-child ratios across the three age groups—a major cost driver—it is striking that the price of care for the three age groups is so similar. This reflects a tendency for providers to narrow the price gap between infant care and preschool-age care, thereby potentially undercharging for infant care relative to the true cost of care and overcharging for preschool-age care relative to the true cost (Workman, 2021).

ECE Workforce Compensation

As with other states, the ECE workforce in Vermont is relatively low paid in terms of cash compensation and typically receives few or only minimal fringe benefits (Rodriguez et al., 2021). As of May 2019, occupational wage data from the U.S. Bureau of Labor Statistics (undated) show that the median child care worker was paid less than $14 per hour or about $28,500 in annual earnings (Table 2.6). Preschool teachers had somewhat higher cash compensation, about $16.50 per hour or about $34,300 in annual earnings. This compares with a median annual compensation of about $56,000 and nearly $60,000 for kindergarten and

elementary school teachers, respectively. Preschool special education teachers, who typically have a bachelor's degree in special education, have average annual earnings that are similar to kindergarten teachers, who also generally hold a bachelor's degree. Keeping in mind the differential in annual hours for child care and preschool teachers who typically work year-round versus an academic year, the contrast between early educators and their early elementary teacher counterparts is even more striking.

Table 2.6. Vermont Cash Earnings for Child Care Workers, Preschool Teachers, and Elementary Grade Classroom Teachers (2019 dollars)

Occupation (Bureau of Labor Statistics code)	Mean	10th	50th (median)	90th
Hourly Wage				
Child care workers (39-9011)	14.85	11.35	13.72	19.91
Preschool teachers, except special ed. (25-2011)	17.27	11.76	16.48	24.17
Preschool teachers, special ed. (25-2051)	—	—	—	—
Kindergarten teachers, except special ed. (25-2012)	—	—	—	—
Elementary school teachers, except special ed. (25-2021)	—	—	—	—
Annual Earnings				
Child care workers (39-9011)	30,880	23,620	28,540	41,410
Preschool teachers, except special ed. (25-2011)	35,920	24,470	34,290	50,270
Preschool teachers, special ed. (25-2051)	58,920	33,440	55,610	95,410
Kindergarten teachers, except special ed. (25-2012)	57,340	41,360	56,090	77,360
Elementary school teachers, except special ed. (25-2021)	63,480	41,180	59,850	95,770

SOURCE: U.S. Bureau of Labor Statistics, undated.
NOTE: U.S. Bureau of Labor Statistics data for Vermont are for May 2019. — = not applicable.

Publicly Subsidized ECE Programs and Total Funding

Public-sector subsidies for child care and early learning programs have their origins in two objectives. First, as part of the "war on poverty," federally funded Head Start (and later Early Head Start) programs were established to promote school readiness, especially among children in families with income below the federal poverty line (Bitler and Karoly, 2015). Subsequent federal funding streams with this motivation include Title I compensatory education spending through the Every Student Succeeds Act (Pub. L. 114-95, 2015), which can be used for pre-K programming and Individuals with Disabilities Education Act funding for pre–school-age children with special needs. The growth of state-funded pre-K programs for one or two years before kindergarten entry further promoted school readiness on a targeted or universal basis (Friedman-Krauss et al., 2022). Second, as welfare reforms starting in the 1970s promoted greater work effort on the part of aid recipients, including mothers with young children, there was a recognition that subsidized child care was essential for facilitating maternal employment among low-earning parents, especially in single-parent families (Grogger and Karoly, 2005). The

Child Care and Development Fund block grants to states, along with child care subsidies in the Temporary Assistance for Needy Families program, aim to make child care affordable so that parents with low incomes can work and achieve greater self-sufficiency. Federal and state tax credits for spending on dependent care also serve to subsidize the cost of ECE, but typically the credits benefit somewhat higher-income families, especially when they are not refundable.

These two motivations for publicly subsidized ECE and the associated funding streams are reflected in the programs available in Vermont that provide direct ECE programming (e.g., Early Head Start, Head State, Vermont UPK): streams that supplement the cost of ECE provision by public or private providers (e.g., Title I of the Individuals with Disabilities Education Act) and subsidies for ECE targeted to low-income working parents (e.g., CCFAP and tax credits) (Table 2.7).[10] (Funding streams for administration or other infrastructure support are not included in the table.) These funding streams in Vermont provide a mix of targeted and universal subsidies, all directed to ECE prior to kindergarten entry, with the exception of CCFAP and the tax credits, which extend subsidies to school-age care up through age 12.

As of the 2018–2019 state or federal fiscal years, an estimated $109 million in annual funds were associated with the sources of direct ECE subsidies, excluding funds for children with special needs (Table 2.8).[11] This total also does not include the share of federal Title I funds that are allocated by Title I districts and schools for preschool education, a local option for Title I use (Mendoza, 2021). Further, Table 2.8 also does not account for local funds allocated to support child care subsidies or UPK. For those funding streams that extend to school-age children, ready estimates of the share of spending on pre–school-age children are not always available. In the case of CCFAP spending, the estimate in the table is based on our analysis of administrative records for the program (discussed in the next section) and captures the value of subsidies for pre–school-age children not yet age-eligible for kindergarten. For the Child and Adult Care Food Program, which subsidizes meals in child and adult care settings, the estimate includes spending for meals for after-school programs (but excludes an estimate of the share for adult care programs). In the case of the federal and state child and dependent care tax credits, it is also not possible to separate out the share of the tax credits received that derived from spending on

[10] See Brouillette and Horwitz (2018) for additional information about the publicly funded child care and early learning programs in Vermont.

[11] As noted earlier, we exclude funding for special education services from our estimate of the current funding in Vermont for direct ECE services for pre–school-age children. At the federal level, U.S. Department of Education (2020) data for 2018–2019 indicate that Vermont received $31.299 million in Individuals with Disabilities Education Act funding under Part B Section 611 grants for special education for children and young adults from ages 3 to 21 and an additional $0.898 million in Part B Section 619 grants for special education specifically for three- and four-year-olds. Information on the spending of the Part B Section 611 funds by child age are not readily available. Data from the National Institute for Early Education Research indicate that Vermont public schools served 1,262 three- and four-year-old children with special needs in the 2018–2019 school year, about 10 percent of children in those two age cohorts (Friedman-Krauss et al., 2020).

school-age care.[12] These potential overestimates of funding amounts for CCFAP and the tax credits are for smaller funding streams that might add up to a few million dollars. On net, the estimate in Table 2.8 is likely to be an underestimate.

Overall, there are three major funding streams that support subsidized ECE in Vermont: federally funded Early Head Start and Head Start, which together serve infants and toddlers but at lower numbers compared with three- and four-year-olds, at no cost to the enrolled families, and almost exclusively children living in families with income below the poverty level; Vermont Act 166 for UPK for three- and four-year-olds, subsidizing ten hours of pre-K per week for the school year; and CCFAP, which provides subsidies for care of children from birth through age 12 in families with incomes up to 3.5 times poverty and no family contribution for those with income below 1.5 times poverty. The Child and Adult Care Food Program provides a small amount of funding to subsidize meal costs at eligible program sites and helps providers defray those costs, especially when subsidy reimbursement under CCFAP does not cover the provider's full cost. The direct subsidies to parents through the federal and state child care tax credits are another modest funding stream relative to the three major sources of subsidized ECE, with average tax credits of a few hundred dollars per tax filing unit.

[12] The estimated expenditure for the federal Child and Dependent Care Credit is imputed from estimates for Vermont based on expenditures for the state tax credit, which is a share of the federal tax credit. The estimate in Table 2.8 is consistent with Internal Revenue Service data that show a total federal tax expenditure in federal fiscal year 2019 for the credit of $4.790 million (U.S. Department of the Treasury, Office of Tax Analysis, 2017). Multiplying this number by Vermont's share of U.S. children ages 0 to 11 (0.15 percent) gives an estimate of $7.281 million, compared with $7.148 million in Table 2.8. We prefer the estimate that builds from Vermont's tax expenditure estimate, which is based on the federal tax credits claimed.

Table 2.7. Features of Publicly Funded Child Care and Early Education Programs in Vermont as of 2022

Feature	Early Head Start	Head Start	IDEA Part B Sections 611 and 619	State UPK	Title I, Part A (ESSA)	CCFAP	Dependent Care Tax Credits
Program type	Home visiting, early learning	Preschool	Special education preschool	Preschool	Preschool	Subsidies for ECE and school-age care	Tax credits for ECE and school-age care
Funding source (administrator)	Federal (U.S. Department of Health and Human Services)	Federal (U.S. Department of Health and Human Services)	Federal (Vermont Agency of Education)	Federal IDEA and state/local (Vermont Agency of Education, VAHS)	Federal (school; districts) (Vermont Agency of Education)	Federal and state Child Care and Development Fund and Temporary Assistance for Needy Families program (VAHS)	Federal and state tax expenditures (Internal Revenue Service and Vermont Department of Taxes)
Funding type	Slots	Slots	Flexible	Slots	Flexible	Child care subsidy	Child care subsidy
Ages of children served	Birth through age 2	1 or 2 years before kindergarten	1 or 2 years before kindergarten	1 or 2 years before kindergarten	1 or 2 years before kindergarten	Birth to age 13	Birth to age 13
Maximum income for family of three, dollars	23,030[a]	23,030[a]	Not applicable	Not applicable; universal	Not applicable	80,605	Not applicable
Maximum income	1x poverty	1x poverty[a]	Not applicable	Not applicable	Not applicable	3.5x poverty	Not applicable
Other eligibility criteria	None	None	Child has an individualized education plan	None	None	Parent(s) employed, attending school, or in a job-training program	Parent(s) employed, documentation of expenditures and tax ID of provider
Delivery settings	Child's home and centers	Centers and schools	Public schools	Public and public charter schools; state-approved public and private providers with Star 4 or 5 rating on Vermont STARS or NAEYC accreditation	Public schools with high share of low-income students	Registered or licensed FCCHs, licensed child care centers, approved-relative child care providers, after-school programs	Providers with tax ID
Part-, school-, or full-day program	Part, school, or full day	Part, school, or full day	Part or school day	Part or school day (max 10 hours/day)	Part or school day	Part, school, or full day	Not applicable
School year versus calendar year	Both	Both	School year	School year (35 weeks)	School year	Both	Not applicable
Program standards beyond licensing	Yes	Yes	Yes	Yes	Yes	Yes	Not applicable

SOURCES: Authors' analysis of program documentation provided by the U.S. Department of Health and Human Services, VAHS, the Vermont Agency of Education, and the Vermont Department of Taxes.
NOTE: ESSA = Every Student Succeeds Act; IDEA = Individuals with Disabilities Education Act; NAEYC = National Association for the Education of Young Children; VAHS = Vermont Agency of Human Services. Program features are as of July 1, 2020. Part-day programs are typically three to four hours per day, school-day programs are about six hours, and full-day programs are typically more than six hours.
[a] Under federal rules, up to 10 percent of enrolled children are allowed to be over the maximum income threshold.

Table 2.8. Public Funding and Service Levels for Child Care and Early Childhood Education Programs in Vermont, 2018–2019

Program (funding)	Fiscal Year	Funding (millions)	Families or Children Served	Funding per Child Served (unless otherwise indicated)
Early Head Start (federal)	2018–2019	$22.364 (combined)	482 children under 3	$15,453 (combined)
Head Start (federal)	2018–2019		965 3- and 4-year-olds	
State UPK (state)	2018–2019	$41.146	8,962 3- and 4-year-olds	$4,591
Title I, Part A (federal)	2018–2019	—	—	—
CCFAP (federal and state)	2018–2019	$31.452	4,044 children (monthly average)	$5,353[a]
Child and Adult Care Food Program (federal)	2018–2019	$5.472[b, c]	3,797,228 home and center meals served[c]	$1.50 (per meal)
Federal child and dependent care tax credit (federal)	2018–2019	$7.148[b]	14,069	$508 (per tax filer)
Vermont child and dependent care tax credit (state)	2018–2019	$1.694[b]	13,820 (tax filers)	$123 (per tax filer)
Vermont low-income child and dependent care tax credit (state)	2018–2019	$0.044[b]	249 (tax filers)	$213 (per tax filer)
Total	—	At least $109.320	—[d]	—

SOURCES: Head Start and Early Head Start: authors tabulations of the Head Start Program Information Reports (Head Start Early Childhood Learning and Knowledge Center, 2022). State preschool: Friedman-Krauss et al., 2020. CCFAP: authors' estimates based on CCFAP administrative data provided to RAND. Child and Adult Care Food Program: U.S. Department of Education, 2020. Federal child and dependent care tax credit: imputed based on Vermont tax credits. Vermont tax credits: Legislative Joint Fiscal Office and Vermont Department of Taxes, 2021.
NOTE: — = not available or not applicable.
[a] This is the average subsidy amount per child based on average monthly enrollment. The subsidy amount for any given child will be based on the child's age, the hours of care, and the provider selected by the parent.
[b] Funding and/or enrollment figures also include school-age children.
[c] The funding amount shown and number of meals served are prorated for the national share of all Child and Adult Care Food Program participants in adult programs (estimated to be 4 percent) versus center and home programs that provide subsidized meals for children in subsidized care (the other 96 percent). The 4 precent share is applied to deduct spending and meals served in adult programs to arrive at the estimate specific to spending and meals served specific to home and center settings. Some of this spending is for meals or snacks served in school-age care programs.
[d] The enrollment counts are not unduplicated, and thus a total cannot be produced. For example, some children in Early Head Start and Head Start also receive subsidies through CCFAP.

Structure of CCFAP Subsidy and Subsidy Outcomes

The analysis in Chapter 3 of an expanded ECE subsidy system builds from Vermont's CCFAP subsidy program. This section provides relevant background on what is currently one of the major sources of funding for ECE subsidies in the state (Table 2.8).

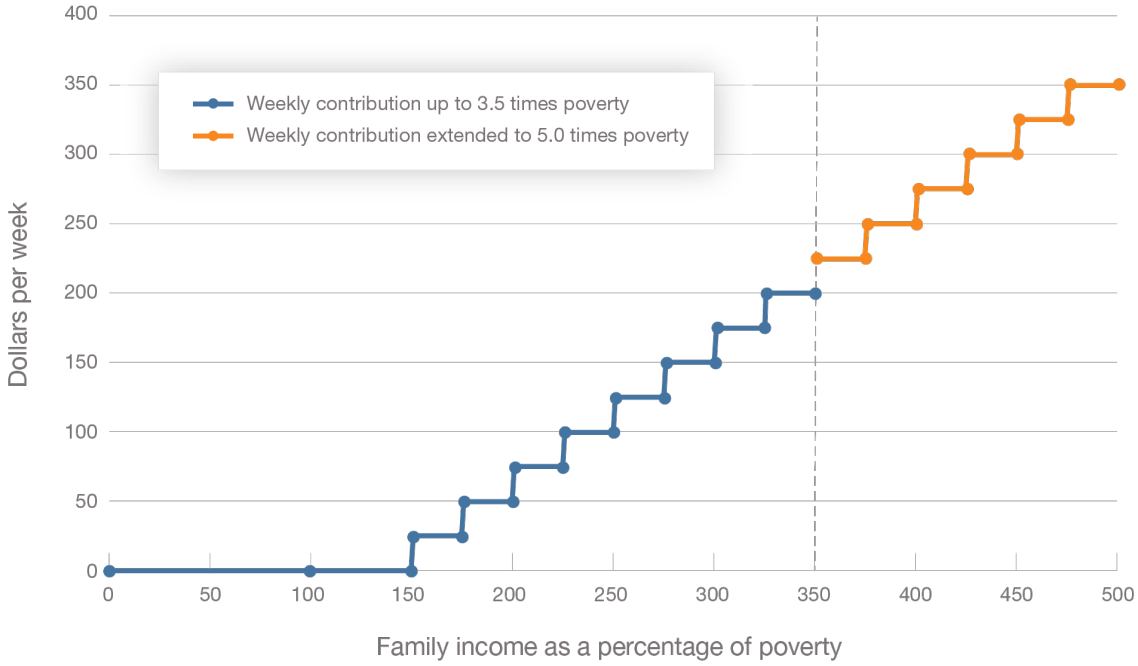
Background on CCFAP in Vermont

As of 2019, Vermont's CCFAP eligibility extended up to 3.0 times poverty, the highest in the country, with the exception of California, at 3.26 times poverty (Urban Institute, undated-a, Table B-1). With the expanded subsidies under Act 45, income eligibility currently extends to 3.5 times poverty. Families with income below 1.5 times poverty make no contribution toward the cost of care and are thus fully subsidized. As income rises, families have a sliding-scale weekly co-pay, starting at $25 per week for families with incomes between 1.5 and 1.75 times poverty and increasing thereafter by $25 per week for each 25-percentage-point increase in the income-to-poverty threshold (see Figure 2.1 for a graphical representation of the sliding-scale fee structure; the blue line shows the current scale for family incomes up to 3.5 times poverty, and the orange line extends the same pattern of contributions up to 5.0 times poverty).

The CCFAP family contribution schedule is a family-level payment and does not increase as more children in the family receive subsidies. Thus, when measured as a percentage of family income, larger-size families in a given income-to-poverty range contribute a smaller share of their income compared with smaller-size families (see Figure 2.2 for a graphical representation). For example, for families with income between 2.0 and 2.25 times poverty, a family of three will contribute about 8 percent of their family income toward their subsidized child care, while a family of six will pay about 5 percent of their family income. Further, starting at 2.5 times poverty, families of three will pay 10 percent of their family income, reaching about 13 percent to 14 percent at the end of the current subsidy schedule (3.5 times poverty). The share of family income represented by the family contribution also exceeds 10 percent for families of four when income exceeds 3.5 times poverty. For families of five or six, the family contribution as a share of family income remains below 10 percent through the income range.

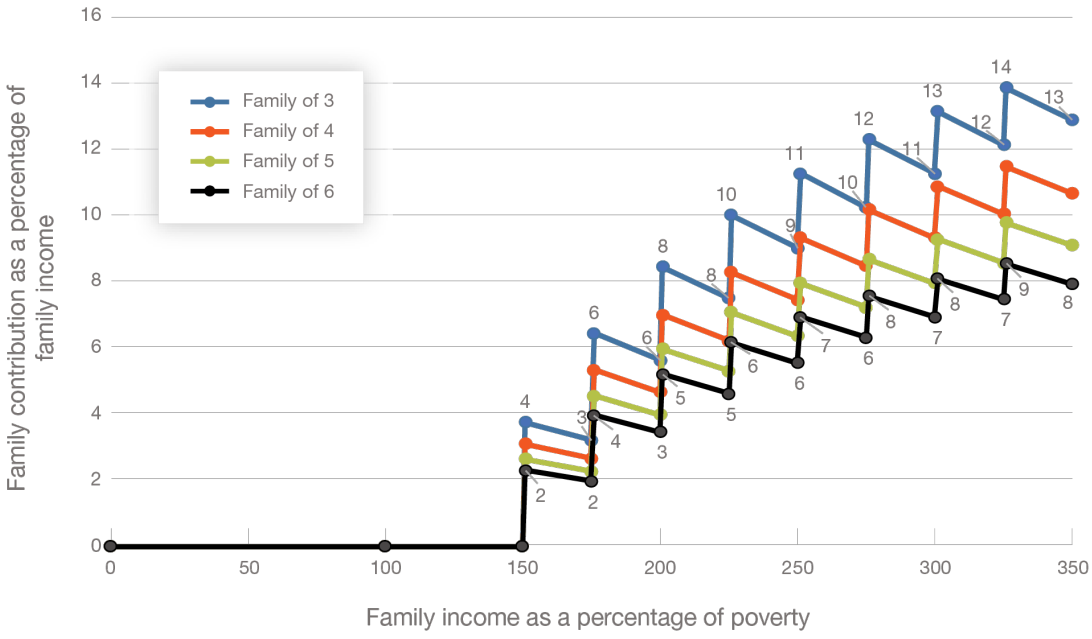
Vermont's use of a flat family contribution is the approach adopted in 34 other states (Urban Institute, undated-a, Table 31). Retaining the same family contribution independent of the number of children is a feature in 27 other states, in contrast to 13 states that apply a per-child family contribution. As an alternative, 12 states calculate the family co-payment as a share of family income, and that share increases when moving up the income ladder. We consider this alternative approach in the family contribution schedules examined in the Chapter 3 analysis.

Figure 2.1. CCFAP Weekly Family Contribution



SOURCE: CCFAP subsidy schedule (Vermont Department of Children and Families, 2022).
NOTE: The blue line shows the current scale for family incomes up to 3.5 times poverty, and the orange line extends the same pattern of contributions up to 5.0 times poverty.

Figure 2.2. CCFAP Family Contribution as a Percentage of Family Income



SOURCE: CCFAP subsidy schedule (Vermont Department of Children and Families, 2022).
NOTE: The data point labels are rounded to whole numbers.

Patterns of CCFAP Subsidy Receipt in Vermont

The Vermont Child Development Division provided us with deidentified, monthly, child-level data on all recipients of CCFAP subsidies from state fiscal year 2017–2018 through state fiscal year 2021–2022. Data included monthly family income, the amount of subsidy received, the type of ECE service provided, the STARS rating of the ECE provider, family size, and child's birth date. We use these data to characterize the use of the CCFAP in state fiscal year 2018–2019.[13] Further, the data include subsidy use for after-school services for school-age children. In Tables 2.9 through 2.12, we provide statistics on all families and children receiving subsidies, the focal population of families with at least one child who is not yet kindergarten-eligible, or both populations.

Number of Families and Children Receiving CCFAP

The first panel of Table 2.9 presents the number of unique families and children that received CCFAP subsidies at any point during Vermont's state fiscal year 2018–2019. Overall, 8,472 families obtained CCFAP subsidies for 11,152 children. These numbers imply that, on average, each family received subsidies for 1.3 children. When disaggregating by income, we see that the vast majority of subsidy recipients are from the lowest income category. As we move up each income category, children and families make up a progressively smaller proportion of enrollees. These patterns reflect both the structure of the subsidy schedule and the behavior of families in Vermont with pre–school-age children.[14] The higher level of subsidies for lower-income families makes the system more generous for lower-income families, thus encouraging more lower-income families to apply for the subsidy.

The second panel of Table 2.9 presents the number of unique families receiving subsidies that had a least one child who is not yet in kindergarten and the number of unique children not yet in kindergarten receiving subsidies at any point during Vermont's state fiscal year 2018–2019. Overall, 6,014 families with 6,970 children received subsidies, implying that on average each family had 1.2 children not yet in kindergarten receiving subsidies. The smaller number of families, children, and average children per family are expected given that we restrict the sample to families with young children. However, the distribution of individuals by family income relative to the federal poverty guidelines for this sample is similar to the overall sample.

The above analyses consider the total number of children or families who ever receive a CCFAP subsidy. These analyses overstate the number of families and children receiving a subsidy in any given month because families and children may move out of (or into) the subsidy system throughout the year. The third panel in Table 2.9 calculates the number of families and

[13] For statistics on enrollment trends over time, see Appendix A

[14] Although the CCFAP subsidies are limited to families with incomes up to 3.5 times poverty, higher-income families can receive subsidies under certain circumstances that are unrelated to income, such as paying for care for a child in Child Protective Services.

children not yet in kindergarten receiving a subsidy in every month of the state fiscal year and averages the enrollment across months to provide a monthly average enrollment. The average enrollment of families and children are considerably lower, at 3,497 and 4,044, respectively. The ratio of children to families is slightly lower, at 1.2. However, the distribution of families and children across the income levels remains relatively the same, with low-income families making up the bulk of enrollees.

Table 2.9. Number of CCFAP Recipients in Vermont in Total and by Family Income Relative to the Federal Poverty Guidelines, State Fiscal Year 2018–2019

		Disaggregated by Family Income Relative to the Federal Poverty Guidelines (percentage distribution)		
Indicator	**Total**	**Up to 1.5x Poverty**	**1.5x to 3.5x Poverty**	**Over 3.5x Poverty**
Annual: all families receiving CCFAP, all children under age 13				
Number of unique families	8,472	74.5	23.1	2.5
Number of unique children	11,152	75.3	22.6	2.1
Annual: all families receiving CCFAP with at least one child not yet in kindergarten, children not yet in kindergarten only				
Number of unique families	6,014	76.8	21.2	2.0
Number of unique children	6,970	77.7	20.6	1.7
Monthly average: all families receiving CCFAP with at least one child not yet in kindergarten, children not yet in kindergarten only				
Average number of families per month	3,497	78.6	19.6	1.8
Average number of children per month	4,044	79.9	18.7	1.5

SOURCE: Authors' tabulations from Vermont Child Development Division CCFAP monthly records of subsidy receipt provided to RAND.
NOTE: Calculations are for Vermont state fiscal year 2018–2019, which runs from July 2018 through June 2019. In that year, the 2018 federal poverty guidelines were applied. Percentage distributions in a row might not add to 100 because of rounding.

Amount of CCFAP Received by Families and Children

The first panel of Table 2.10 shows that, across all recipients, Vermont paid about $44.5 million in subsidies for children under age 13 during state fiscal year 2018–2019 (in 2018–2019 dollars). Of those funds, 82 percent ($36.4 million) were dispersed to families in the lowest-income category. We again observe a pattern in which the amount of subsidy disbursement progressively decreases as we go to higher-income categories. On a per-family basis, families received $5,248 on average. The lowest-income families received the most per family (about

$6,050), compared with families in the next income bracket of 1.5 to 3.5 times poverty (about $2,650 per family). The small number of families with income over 3.5 times poverty, that qualify for subsidies for reasons other than income, received an average benefit somewhat above the average ($5,400 per family)

The second panel in Table 2.10 calculates the same statistics but focuses only on children who are not yet in kindergarten and therefore only on families with at least one child not yet in kindergarten. Vermont dispersed about $31.1 million of subsidies to this subsample of families and children; however, the distribution of these funds across income levels once again closely mirrors the distribution of the full sample. The average per-family and per-child subsidy outlays are slightly higher than the full sample. For example, the average per-family subsidy outlay was about $6,239, about $991 more than the full sample. This higher amount is expected as ECE care is generally more expensive than the after-school care that school-age children may require.

Table 2.10. Amount of CCFAP Subsidies in Vermont in Total and by Family Income Relative to the Federal Poverty Guidelines, State Fiscal Year 2018–2019

		Disaggregated by Family Income Relative to Federal Poverty Guidelines		
Indicator	**Total**	**Up to 1.5x Poverty**	**1.5x to 3.5x Poverty**	**Over 3.5x Poverty**
All families receiving CCFAP, all children under age 13				
Total subsidies received (1,000 $)	44,460.3	36,427.9	6,743.3	1,289.1
Average subsidy per family ($)	5,248	6,046	2,654	5,415
Average subsidy per child ($)	3,987	4,576	1,986	4,344
All families receiving CCFAP with at least one child not yet in kindergarten, children not yet in kindergarten only				
Total subsidies received (1,000 $)	31,451.7	26,320.3	4,445.0	$686.4
Average subsidy per family ($)	6,239	7,066	3,098	6,716
Average subsidy per child ($)	5,353	6,078	2,580	6,146

SOURCE: Authors' tabulations from Vermont Child Development Division CCFAP monthly records of subsidy receipt provided to RAND.
NOTE: Calculations are for Vermont state fiscal Year 2018–2019, which runs from July 2018 through June 2019. In that year, the 2018 federal poverty guidelines were applied. Average subsidies are not expressed in percentages across federal poverty guidelines. Average subsidies are in 2019 dollars.

CCFAP Receipt by Provider Type: Children Not Yet Enrolled in Kindergarten

As noted earlier, the regulated component of the ECE sector in Vermont is composed of three main categories of care providers: licensed centers, licensed FCCHs, and registered FCCHs. A fourth category of providers—known as *approved child-care provided by relatives* (also referred to as *approved-relative child care* and formerly known as *licensed-exempt child care*)—is also

eligible to provide subsidized care. Table 2.11 shows how children not yet enrolled in kindergarten are distributed across these types of ECE providers. In these analyses we provide the monthly average number of children in each setting and their sum to produce the total number of children. When looking at the distribution by income level, we calculate the percentage in each setting within an income category. This analysis will help us understand whether families from different income categories make different choices among the types of providers. Note that because we calculate the average monthly enrollment in each child care setting and sum to provide the total, the total monthly average does not match that in panel 3 of Table 2.10 because of rounding.

Table 2.11. Receipt of CCFAP in Vermont for Children Not Yet in Kindergarten by Provider Type, in Total and by Family Income Relative to the Federal Poverty Guidelines, State Fiscal Year 2018–2019

		Percentage Distribution			
			Disaggregated by Family Income Relative to Federal Poverty Guidelines		
Indicator	Average Monthly Enrollment	All Children Not Yet in Kindergarten	Up to 1.5x Poverty	1.5x to 3.5x Poverty	Over 3.5x Poverty
Type of setting					
Licensed center	2,920	72.2	72.1	72.0	75.4
Licensed FCCH	77	1.9	2.0	1.7	0.1
Registered FCCH	962	23.8	23.5	24.9	24.4
Approved-relative child care	88	2.2	2.4	1.4	0.0
Total (*N*)	4,047	4,047	3,235	753	58

SOURCE: Authors' tabulations from Vermont Child Development Division CCFAP monthly records of subsidy receipt provided to RAND.
NOTE: Calculations are for Vermont state fiscal year 2018–2019, which runs from July 2018 through June 2019. In that year, the 2018 federal poverty guidelines were applied. Each cell in the "Average Monthly Enrollment" column represents the monthly child enrollment averaged across the state fiscal year in total or by setting type, as indicated by row headers. Total average monthly enrollment might not match across the table due to rounding. Percentage distributions in a column might not sum to 100 and counts by federal poverty guidelines might not sum to the average due to rounding.

Most children are located in licensed child care centers and registered FCCHs, with few children in licensed FCCHs (77 children) or in approved-relative child care (88 children).[15] This pattern is evident across the income distribution. There is some evidence that higher-income families choose licensed center care and registered FCCHs at slightly higher rates and licensed

[15] Recall from Table 2.4 that over 90 percent of FCCHs are registered rather than licensed.

FCCHs and relative care at lower rates compared with families with incomes below 1.5 times poverty.[16]

CCFAP Receipt by STARS Rating: Children Not Yet Enrolled in Kindergarten

Our last analysis investigates how children not yet eligible for kindergarten are distributed across ECE provider-setting quality, as measured by Vermont STARS. Table 2.12 shows how monthly average enrollments of children are distributed across centers rated at the Star 1 through Star 5 level, as well as centers that are ineligible for ratings.[17] Again, because enrollments were calculated within rating level and summed, the total number of children in the system will not match those in Tables 2.10 and 2.11. We also calculate the percentage enrollment across ratings within an income category to compare the distribution of children across ratings from different income categories.

Overall, more children are found in higher-rated providers. Between 131 and 722 children are found in providers rated Star 3 or below. The largest number of children, 1,272 children, are found in providers rated Star 4, closely followed by providers rated Star 5 (1,217 children). Across the income categories, Star 4 and Star 5 providers capture the majority of children. As income increases, fewer parents choose lower-rated providers (Star 3 or lower), indicating a positive relationship between income and rating.

[16] Families consider several factors in choosing an ECE provider aside from cost, including proximity to the home and family. Thus, these choices reflect constraints beyond what a family can afford with or without subsidies. This point also applies to the discussion, in the next section, of the distribution of families across providers of differing quality, as measured by Vermont STARS.

[17] Providers can be ineligible for STARS rating for several reasons. Unrated providers include approved-relative care providers, programs operating under a provisional license, and out-of-state providers. Out-of-state providers are child care providers in a different state but providing care to Vermont residents. For example, a Vermont resident working in New Hampshire may choose a New Hampshire provider.

Table 2.12. Receipt of CCFAP in Vermont for Children Not Yet in Kindergarten by STARS Rating, in Total and by Family Income Relative to the Federal Poverty Guidelines, State Fiscal Year 2018–2019

		Percentage Distribution			
			Disaggregated by Family Income Relative to Federal Poverty Guidelines		
Indicator	Average Monthly Enrollment	All Children Not Yet in Kindergarten	Up to 1.5x Poverty	1.5x to 3.5x Poverty	Over 3.5x Poverty
STARS rating					
Star 1	131	3.3	3.3	3.6	1.9
Star 2	261	6.6	6.5	7.4	3.1
Star 3	722	18.4	18.6	17.7	16.0
Star 4	1,272	32.3	31.4	35.7	37.5
Star 5	1,217	30.9	31.9	26.4	34.7
Not rated	332	8.4	8.3	9.2	6.8
Total (*N*)	3,934	3,934	3,149	728	57

SOURCE: Authors' tabulations from Vermont Child Development Division CCFAP monthly records of subsidy receipt provided to RAND.
NOTE: Calculations are for Vermont state fiscal year 2018–2019, which runs from July 2018 through June 2019. In that year, the 2018 federal poverty guidelines were applied. Each cell in the "Average Monthly Enrollment" column represents the monthly child enrollment averaged across the state fiscal year in total or by setting type, as indicated by row headers. Total average monthly enrollment might not match across the table due to rounding. Percentage distributions in a column might not sum to 100 and counts by federal poverty guidelines might not sum to the average due to rounding.

Potential Reach of Head Start, CCFAP, and UPK

The combination of the main ECE funding streams in Vermont can be viewed in terms the percentage of their target population of pre–school-age children that they reach: children with income below poverty in the case of Early Head Start and Head Start, children in families with income up to 2.5 times poverty in the case of CCFAP, and all children in the case of UPK. Early Head Start and CCFAP apply to children ages 0 through 2, while Head Start, CCFAP, and UPK apply to three- and four-year-olds.

From this perspective, for example, Early Head Start enrollment of 482 children would reach about 21 percent of its target population of infants and toddlers with family income below poverty (482 of 2,339 infants and toddlers in families with income below poverty) (Table 2.13). Viewed in terms of infants and toddlers with family income up to 3.5 times poverty, Early Head Start would reach about 5 percent of that population and just 3 percent of the population of all infants and toddlers. CCFAP, which serves a larger number of infants and toddlers and in families with income up to 3.5 times poverty, would reach approximately 86 percent of infants and toddlers in poverty, about 20 percent of its target population with incomes up to 3.5 times

poverty, and 12 percent of all children. Assuming no overlap in coverage by these two programs (which is unlikely given the braiding and blending of funds), at most about 25 percent of infants and toddlers with incomes up to 3.5 times poverty and 15 percent of all infants and toddlers would be reached by these two ECE subsidy programs.

Table 2.13. Potential Reach of Publicly Funded ECE Programs in Vermont, by Age Group

		Number or Percentage Served[a]		
Measure	Number of Children Served in 2018–2019	Family Income Up to 1x Poverty	Family Income Up to 3.5x Poverty	All
Infants and Toddlers (ages 0, 1, 2)				
Target population	—	2,339	10,328	16,575
Program				
Early Head Start	482	20.6%	4.7%	2.9%
CCFAP	2,015[b]	86.1%	19.5%	12.2%
Preschoolers (ages 3, 4)				
Target population	—	1,291	6,777	12,090
Program				
Head Start	965	74.7%	14.2%	8.0%
CCFAP	1,948[b]	150.9%	28.7%	16.1%
Act 166 UPK	8,962	694.2%	132.2%	74.1%

NOTE: — = not applicable.
[a] Defined as the number of slots divided by the number of children.
[b] Estimated based on the number of children in the age group served per month in families with incomes up to 3.5 times poverty.

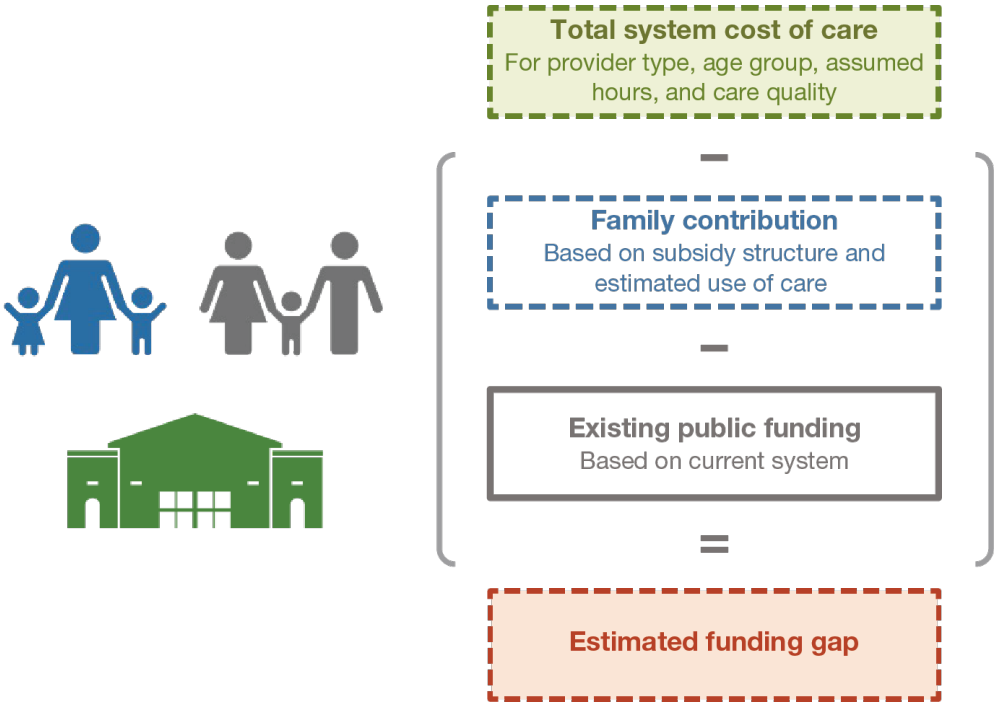
With three funding streams covering three- and four-year-olds one or two years before entering kindergarten, the reach of the subsidy programs is even further for the preschool-age group. For example, Head Start enrollment potentially reaches about 75 percent of its target population of children in families with income below poverty, with CCFAP reaching 29 percent of its target of families with income up to 3.5 times poverty. Finally, UPK reaches 74 percent of all three- and four-year-olds, its universal target.[18] Again, we know that there is overlapping enrollment, with CCFAP used to extend the hours of subsidized care for children in part-day Head Start programs and the part-day UPK program, but just the combination of Head Start and UPK would reach about 82 percent of all three- and four-year-olds. However, without more information on the hours of ECE participation across these programs, it is not clear whether families are able to access and afford the total ECE hours that they need.

[18] Note that UPK, with enrollment of nearly 9,000 three- and four-year-olds as of state fiscal year 2018–2019, has nearly 7.0 times the enrollment needed to reach all preschool-age children with family income below poverty and about 1.3 times the enrollment to reach all preschool-age children with family income up to 3.5 times poverty.

Chapter 3. Estimating the Cost of High-Quality Early Care Education for Vermont

This chapter presents our approach to and results from addressing the first study objective: estimating the cost of high-quality ECE for Vermont families with pre–school-age children when ECE classroom staff are compensated commensurate with the knowledge, skills, and competencies required to be effective in their roles and when family contributions toward the cost of care does not exceed 10 percent of family income. We proceed in four steps (see Figure 3.1). First, we estimate the total cost of care for high-quality ECE for Vermont based on assumptions about care quality, the types of providers and their distribution, the estimated cost of care by provider type, and the hours of care by child age that parents would choose to use. Second, we make assumptions about the subsidy scale that would determine how much families are expected to contribute to the cost of the care that their young children receive. Third, we draw on the estimates, presented in Chapter 2, of the total funding in the current system. The final step is to take the total estimated cost and subtract the expected family contribution and the current public funding. The resulting residual is the estimated funding gap that needs to be filled.

Figure 3.1. Approach to Estimating the ECE Funding Gap



We begin by highlighting key assumptions that represent the major drivers of the cost estimates. Other aspects of the methodology are summarized as well. The chapter then presents four sets of results from these analyses: (1) the estimated total cost for high-quality ECE in Vermont, (2) the estimated family contribution based on several subsidy schedules, (3) the estimate gap in funding to fill with additional public sources, and (4) the estimated effects on the labor supply of parents affected by the expanded subsidies. We also consider the implications of accounting for the cost of ECE for children with special needs and of extending the subsidy system to include school-age care. All estimates presented in this chapter are in 2022 dollars. See Appendix B for additional details on the assumptions and methodology.

Key Assumptions

Estimating the cost for Vermont of high-quality ECE requires a set of key assumptions in three areas: (1) the nature of the provider settings in which ECE will be delivered and the associated quality standards, (2) the compensation of the workforce in those settings, and (3) the hours of care that families will consume. These assumptions represent major cost drivers in our estimates of ECE cost. Other assumptions are required as well, which are documented in Appendix B.[19]

ECE Settings and Quality Standards

We assume that care is provided in regulated settings; for Vermont, that includes centers (private, Head Start, and public school pre-K sites), licensed FCCHs, and registered FCCHs. As noted in Chapter 2, center-based settings in Vermont are relatively small. Thus, our estimates of the cost of care per child-hour are estimated separately for three center size categories, and each is assumed to have a mixture of children in five age groups: zero-year-olds (0 through 11 months), one-year-olds (12 through 23 months), two-year-olds (24 through 35 months), three-year-olds (36 through 47 months), and four-year-olds (48 through 59 months).[20] Small centers have enrollment of 38 children in five single-year age groups across three rooms, medium centers have enrollment of each age group totaling 76 children across five rooms, and large centers are assumed to enroll 116 children across all age groups configured in eight rooms (see

[19] The estimation of provider cost captures all relevant operating costs, as well as needs for shorter-lived equipment (e.g., laptops or tablets), classroom furniture and durable materials, and for ongoing facilities maintenance and repairs. As noted in the limitations discussion in Chapter 1, we do not include more substantial capital costs for new construction or major retrofitting.

[20] These five age groups can be viewed as kindergarten entry cohorts. At the start of September, all children will be the same age in years, but as the year progress members of each cohort will turn another year older until the entire cohort is a year older by the end of the next August. Thus, for example, the four-year-olds will all be eligible to enter kindergarten in the following fall as five-year-olds. During the year, the cohort will be a mixture of ages 4 and 5. While providers may not follow this exact allocation of children to classrooms, this approach allows us to apply the appropriate group size and staff-child ratio for each classroom or group of children.

Table B.1). The current distribution of slots (see Table 2.4) is used to create a weighted average for the center-based cost per child-hour for each of the five age groups. For FCCHs, we assume two sizes: small FCCHs that enroll up to 6 children and large FCCHs that enroll up to 12 children.

The cost model requires assumptions about program staffing and the combination of other resources that will be used to provide ECE. Given our goal of modeling the cost of high-quality ECE, our model assumes that all centers and FCCH providers are at high quality, consistent with Vermont licensing standards and a Star 5 rating on the state's quality recognition and improvement system (STARS). In particular, the following key features in center-based settings are assumed (see Table 3.1):

- **Ratios and group sizes.** Children ages 0 and 1 are in classrooms with up to 8 children and two staff, children age 2 are in rooms with up to 10 children and two staff, and children ages 3 and 4 are in rooms with up to 20 children and two staff.
- **Lead-teacher qualifications.** The lead teacher in each classroom is assumed to have a bachelor's degree in a relevant early childhood field or the equivalent coursework.
- **Assistant-teacher qualifications.** The assistant teacher has at least an associate's degree in the relevant field or equivalent field.
- **Annual professional development hours.** The professional development hours are compensated through release time and a per-staff budget for related costs.
- **Curriculum.** Programs use an approved evidence-based curriculum with funds to cover curricular materials, training, and other supports. Large centers are assumed to have an associate curriculum director.
- **Developmental screener.** Programs conduct an annual developmental screener, with appropriate supports for the purchasing the tool and professional development for use of the tool.
- **Child formative assessment.** Staff perform periodic assessments of each child to inform tailored teaching and learning.
- **Independent classroom quality assessment.** As part of ongoing quality improvement, classrooms are independently assessed on at least an annual basis, and assessments are used to develop and update a quality improvement plan.
- **Other features.** Resources are included for centers to attain accreditation and undergo an annual financial audit.

Equivalent features apply to FCCHs, with a ratio of at least one staff for every six children, depending on the ages of children being served. These assumed program features are consistent with the proposed revisions to Vermont STARS, including the use of an evidence-based curriculum, child developmental screenings, and child developmental assessments to inform teaching and learning (Vermont Agency of Human Services, undated-b).

Table 3.1. Assumed Quality Features for Center-Based Programs

Program Feature	Detail
Staff-child ratio and maximum group size	Birth to 24 months 1:4 and 8 24 to 36 months 1:5 and 10 36 months to K 1:10 and 20
Lead-teacher education	Bachelor's degree in early childhood fields or relevant coursework
Assistant-teacher education	Associate's degree in early childhood fields or relevant coursework
Required annual professional development hours	Resources for noncontact time, floater staff, and staff professional development budget
Required approved curricula	Resources for curricula and curriculum lead
Required developmental screener	Resources for developmental screener, noncontact time to administer
Required child formative assessment	Resources for developmental screener, noncontact time to administer
Required independently assessed classroom quality tool with minimum score and improvement plan	Captured in system-level cost
Other	Resources for accreditation and annual audit

Workforce Compensation

As noted in Chapter 2 and widely documented elsewhere, the ECE workforce in Vermont, as in almost every part of the country, receives low compensation in the form of cash wages and salaries and noncash benefits, especially in non–public school settings (McLean et al., 2021). For classroom staff with a bachelor's degree, the gap in compensation in a private ECE setting relative to public school pre-K or kindergarten teachers with the same degree requirement can reach up to $30,000 annually (Table 2.6). One strategy being pursued across multiple states and localities is a salary scale for the ECE workforce that providers are required to use, with per-child reimbursement rates sufficient to cover the higher salary and compensation (Child Care Services Association, 2021; Dichter and LiBetti, 2021). We assume that approach is followed in Vermont and assume a salary schedule consistent with efforts in Vermont to develop such a scale and building from a scale being implemented in Washington, D.C. (Early Childhood Educator Equitable Compensation Task Force, 2022).

In particular, the salary schedule assumes four staff levels with differing qualifications, consistent with *Transforming the Workforce for Children Birth Through Age 8* (Institute of Medicine and National Research Council, 2015) and the *Unifying Framework for the Early Childhood Education Profession* (American Federation of State, County and Municipal Employees et al., 2020): uncredentialed staff, ECE level I staff with a child development associate credential, ECE level II staff with an associate's degree, and ECE level III staff with a bachelor's degree (see Table 3.2). Staff in the three lower levels are assumed to qualify as

assistant teachers (i.e., uncredentialed staff up to ECE level II staff), and staff in the three higher levels qualify as lead teachers (i.e., ECE level I, II, or III staff).[21]

A starting point for the scale is the proposed minimum scale developed for Vermont for use starting in 2024 (Advancing ECE as a Profession Task Force, 2021). This schedule was modified based on two features of the scale developed for Washington, D.C.: first, differentiating salary by classroom role, with higher compensation for lead teachers with a given credential relative to an assistant teacher at the same level and second, allowing for both minimum and maximum ends of the scale range so that we could make an assumption about the median salary that would apply for the workforce as a whole. The resulting annual median salary used in the cost model, measured in 2022 dollars (see the last two columns of Table 3.2 for annual and hourly salary values), exceeds the proposed minimum salary for Vermont for 2024 (first column of Table 3.2) with the exception of ECE II staff in an assistant teacher role, an artifact of our differentiation of salary by role in the classroom.[22]

Table 3.2. Salary Scale for ECE Workforce Used in Cost Model

		Modified Salary Scale			
Qualifications	Proposed Minimum Annual Salary (2024 $)	Annual Starting Salary (2022 $)	Annual Maximum Salary (2022 $)	Annual Median Salary (2022 $)	Hourly Median Salary (2022 $)
Assistant teacher					
Without credential	31,200	34,735	44,523	37,998	18.27
ECE level I (credentialed with child development associate)	35,880	40,220	51,202	43,881	21.10
ECE level II (associate's degree)	44,850	42,670	54,319	46,553	22.38
Lead teacher					
ECE level I (credentialed with child development associate)	35,880	42,670	65,128	50,156	24.11
ECE level II (associate's degree)	44,850	50,200	76,622	59,007	28.37
ECE level III (bachelor's degree)	56,063	59,058	90,143	69,420	33.38

SOURCES: Column 1 is from Vermont Association for the Education of Young Children's Advancing ECE as a Profession Task Force, 2021. All other columns are author assumptions.

[21] Although the salary schedule in Table 3.2 allows for the possibility that an assistant teacher may be uncredentialed or have a child development associate credential, the quality assumptions in Table 3.1 mean that we assume all assistant teachers are ECE level II for purposes of the cost model. Likewise, we assume all lead teachers are ECE level III.

[22] The annual starting salary in the scale also exceeds the proposed minimum salary for Vermont for 2024 (the first column of Table 3.2), with the exception of ECE level II staff in an assistant teacher role, an artifact of our differentiation of salary by role in the classroom. In particular, we assume a starting annual salary of $42,670 for ECE level II staff in an assistant teacher role and $50,200 in a lead teacher role, a range that includes the proposed ECE level II staff salary for Vermont of $44,850, which is not differentiated by role.

The cost model also assumes a commensurate package of fringe benefits, consistent with the Vermont Association for the Education of Young Children's Advancing ECE as a Profession Task Force (2021) recommendations. This includes employer contributions, shared with the employee, for health, dental, and vision insurance; employer contributions for retirement and short- and long-term disability; and paid time off for 30 days of combined vacation, illness, and personal time off, all as documented in the task force report. For the employer, this package of fringe benefits plus other employer-paid taxes is modeled as a 26 percent fringe-benefit rate.

Hours of Care

The assumed hours of care use are based on estimates of current care-use patterns from the National Household Education Surveys Program (National Center for Education Statistics, undated), weighted to match the population of families with pre–school-age children in Vermont and then increased to reflect the expected increase in demand with the expanded subsidies, drawing on the available elasticities in the literature that estimate the expected increase in ECE use as the price families face for care declines. These changes in care use are assumed to apply primarily to the population of families with pre–school-age children in Vermont with family income below 3.5 times poverty, the target population for the expanded subsidies. Overall, relative to the status quo, there is an estimated increase in the hours of care use overall and a relative shift toward more use of center-based care relative to home-based care. Appendix B provides additional information about the computation of the hours estimates.

System-Level Costs

In addition to estimating cost per child-hour at the provider level, the cost model accounts for system-level costs. These costs primarily consist of the personnel time to administer the system overall, including the mechanism for reimbursing providers to cover their costs of care for families receiving subsidies and the collection of family contributions.[23] Other system-level costs are provider licensing, resource and referral services, operation of the quality recognition and improvement system, and state-level provision of workforce professional development supports.

Estimated Cost of High-Quality ECE for Vermont

Provider Cost of Care by Child Age and Setting

The assumptions about provider cost structures, including compensation for classroom staff and program quality features, result in estimates of the cost of resources required by providers to deliver high-quality ECE by setting type and child age. Although our modeling of the overall

[23] Provider administrative costs for the subsidy system are assumed to be borne by program administrative staff in center-based settings, such as the director, curriculum director, business manager, and administrative assistant, either staffed within the larger centers or using a shared services approach for smaller centers and FCCHs.

ECE system cost of care is based on costs per child-hour, we present the cost estimates on an annual basis, assuming 40 hours of care per week over 52 weeks per year (see Table 3.3).[24] As expected, the cost of care is highest for the zero- and one-year-olds; the ratios are one staff member to four children. The cost of care is lower for three- and four-year-olds; the ratios are one staff member for ten children. Given that these children are assumed to be in the same center with equally qualified and compensated lead teachers, the same overhead structure, and other care costs, these differences are due almost entirely to the effect of the staff-child ratio and group size. The differences in per-child cost by center size indicates that our assumptions imply some economies of scale in larger centers. Similar economies of scale are implied for the large FCCHs relative to their small counterparts. As noted in Chapter 2, our overall estimates for Vermont of the cost of center-based care will give more weight to the small centers, given their high prevalence in the state.

Table 3.3. Annual Per-Child Full-Time Cost of Care by Setting and Child Age (2022 dollars)

Setting	0-Year-Olds	1-Year-Olds	2-Year-Olds	3-Year-Olds	4-Year-Olds
Small center	39,152	39,152	33,400	22,622	22,622
Medium center	35,661	35,661	31,357	19,131	19,131
Large center	34,487	34,487	30,182	17,957	17,957
Small FCCH (all age groups)	All age groups: 23,351				
Large FCCH (all age groups)	All age groups: 17,515				

Total State-Level Cost of Care

The per-child cost of care estimates and the assumed hours of care use, plus system-level costs, are combined to produce an overall estimate of annual ECE cost (see the first row in Table 3.4). Drawing on the distribution of families across income levels relative to the federal poverty guidelines, we show the cumulative cost broken out by income levels in Table 3.4. Across all pre–school-age children, the cost of ECE per year is estimated to reach about $645 million in 2022 dollars. For the children and families currently eligible for subsidies (up to 3.5 times poverty), the estimated ECE costs reach about half the total cost, or about $321 million. Recalling that about 60 percent of pre–school-age children have family income up to 3.5 times poverty (Table 2.1), their estimated cost of care is about 50 percent of the total.

[24] Our assumption of 40 hours of care per week for 52 weeks per year is for illustrative purposes to show how our hourly cost-of-care estimates translate into an annual cost that assumes a full-time schedule.

Table 3.4. Annual Cumulative Estimated Cost, Family Contribution, Current Funding, and Size of the Gap (millions of 2022 dollars)

	Cumulative Family Income						
Feature	**Up to 1.5x Poverty**	**Up to 2.5x Poverty**	**Up to 3.5x Poverty**	**Up to 4x Poverty**	**Up to 4.5x Poverty**	**Up to 5x Poverty**	**All Families**
Cost	141.8	204.9	321.3	384.4	430.2	483.2	644.9
Family contribution schedule							
1: Status quo, no cap	0.0	10.0	41.2	58.3	78.8	101.3	263.0
2: Status quo, 10% cap to 3.5x poverty	0.0	9.9	38.5	55.6	76.1	98.5	260.3
3: Status quo, 10% cap to 5x poverty	0.0	9.9	38.5	52.5	68.6	84.3	246.0
4: Percentage, 10% cap to 3.5x poverty, max 15% to 5x poverty	0.0	6.1	29.8	44.7	65.0	87.8	249.5
5: Percentage, 7% cap to 3.5x poverty, max 13% to 5x poverty	0.0	6.1	26.5	38.6	55.6	75.2	236.9
Current funding in system	73.4	88.1	101.4	106.0	111.0	126.5	126.5
Gap in schedules							
1: Status quo, no cap	68.4	106.9	178.6	220.1	240.4	255.4	255.4
2: Status quo, 10% cap to 3.5x poverty	68.4	106.9	181.4	222.9	243.2	258.2	258.2
3: Status quo, 10% cap to 5x poverty	68.4	106.9	181.4	225.9	250.6	272.4	272.4
4: Percentage, 10% cap to 3.5x poverty, max 15% to 5x poverty	68.4	110.7	190.1	233.7	254.3	269.0	269.0
5: Percentage, 7% cap to 3.5x poverty, max 13% to 5x poverty	68.4	110.7	193.4	239.9	263.7	281.5	281.5

NOTE: Gap estimates might not equal the component parts because of rounding.

Estimated Family Contribution Under Alternative Subsidy Schedules

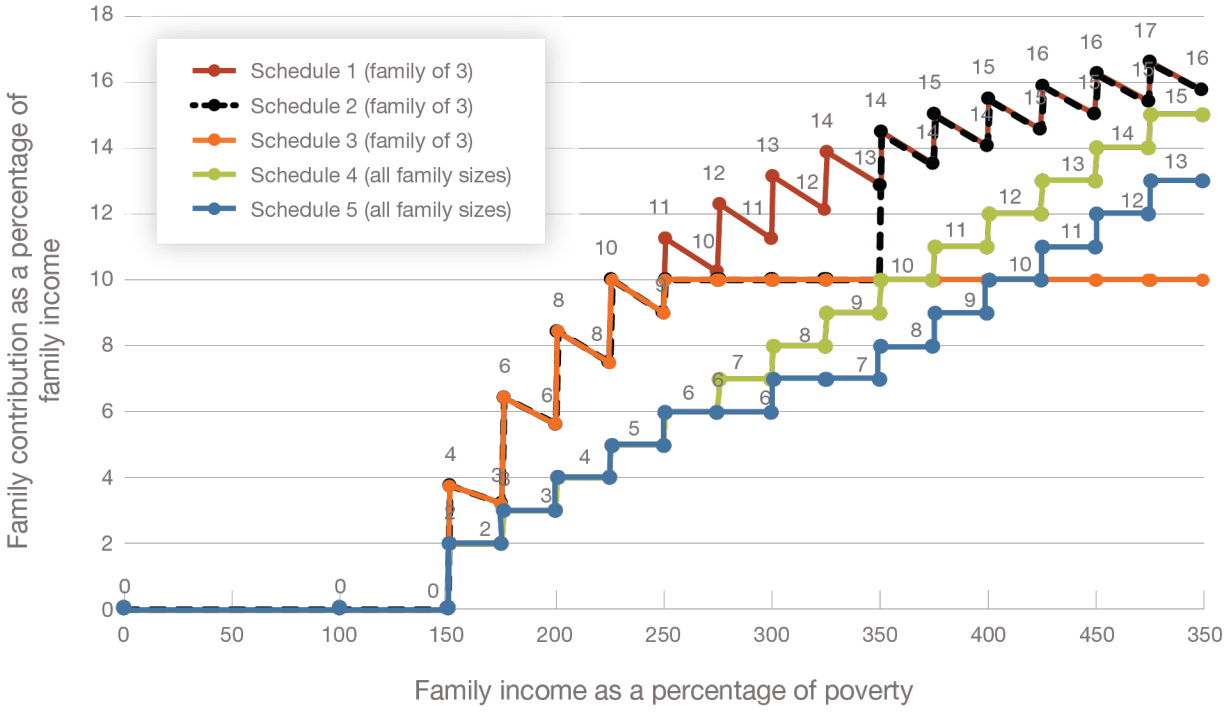
The total cost of a high-quality ECE system with a well-compensated workforce is assumed to be shared through a combination of family contributions using a sliding scale and public funds to fill the remaining gap, both funds in the current ECE subsidy system and new funds needed to fill any remaining gap.

In terms of the family contribution, we consider five subsidy schedules (illustrated graphically in Figure 3.2). These alternatives vary in terms of three features of the subsidy schedule: what the percentage contribution is from families at any given income level (i.e., the family share), whether there is a cap on the family share, and how high up the income distribution that the subsidies apply:

- **Schedule 1: status quo, no cap.** This schedule consists of the current CCFAP family contribution schedule (see Figure 2.1 and the red line in Figure 3.2, illustrated for a family size of three), with a flat family contribution that increases with family income relative to poverty. This schedule retains the feature that some three- and four-person families will contribute somewhat more than 10 percent of their income. For incomes above 3.5 times poverty, we assume the continuation of the existing schedule (the orange segment in Figure 2.1), which also means contributions above 10 percent of family income in some cases.
- **Schedule 2: status quo, 10 percent cap up to 3.5 times poverty.** This schedule is the same as schedule 1, except a 10 percent family contribution cap is imposed for families with income up to 3.5 times poverty (see the black dashed line in Figure 3.2, illustrated for a family size of three). We view this schedule as closest to the schedule requested in Act 45 in that it is based on the current CCFAP schedule, with the addition of the 10 percent cap. If subsidies were to be extended past 3.5 times poverty, the cap does not apply.
- **Schedule 3: status quo, 10 percent cap up to 5.0 times poverty.** This schedule is the same as schedule 2, except that the 10 percent cap is now applied for families with income up to 5.0 times poverty (see the orange line in Figure 3.2, illustrated for a family size of three).
- **Schedule 4: percentage, 10 percent cap up to 3.5 times poverty.** This schedule assumes a fixed-percentage family contribution as a share of family income rather than a flat dollar amount, as under the status quo. Beyond 1.5 times poverty, the percentage starts at 2 percent of family income and increases gradually to a 10 percent maximum at 3.5 times poverty. Beyond 3.5 times poverty, the contribution rate increases further, to a maximum rate of 15 percent of family income at 5.0 times poverty (see the green line in Figure 3.2, which applies to all family sizes).
- **Schedule 5: percentage, 7 percent cap up to 3.5 times poverty.** This schedule is similar to schedule 4, except that the maximum family contribution as a share of income is 7 percent at 3.5 times poverty. Beyond 3.5 times poverty, the contribution rate increases further, to a maximum rate of 13 percent of family income at 5.0 times poverty (see the blue line in Figure 3.2, which applies to all family sizes).

Under all schedules, families with incomes above 5.0 times poverty are assumed to receive no subsidies.

Figure 3.2. Family Contribution as a Percentage of Family Income Under Five Assumed Subsidy Schedules



NOTE: The data point labels are rounded to whole numbers.

The estimated family contribution (see the middle rows of Table 3.4), reported as a cumulative total by family income level relative to federal poverty guidelines, shows that the total family contribution for incomes up to 3.5 times poverty reaches about $41 million under schedule 1, the status quo. Under schedule 2, imposing a 10 percent cap for the cases in the current schedule in which the family contributions exceed 10 percent of family income reduces the total by about $2.7 million, reflecting the relatively small number of cases affected. The most generous schedule, as expected, is schedule 5, in which family contributions up to 3.5 times poverty fall to about $27 million.

Although CCFAP currently does not extend to families beyond 3.5 times poverty, our estimates show the family contribution based on the assumed schedules for those higher-income families, up to 5.0 times poverty. Overall, the contributions from these families are higher because the cap exceeds the 10 percent level, with the exception of schedule 3. By design, schedules 4 and 5 are also more generous for these higher-income families compared with schedules 1 to 3.

Estimated Gap to Fill with Public Funding

Given the estimated total cost, the estimated family contributions under alternative schedules, and the estimate of about $126 million per year in the current system (the total from Table 2.8 converted to 2022 dollars), we can estimate the size of the remaining gap to fill with public funding. Given the five subsidy schedules, there are also five estimates of the gap (see the bottom rows of Table 3.4).

Focusing first on the gap to expand subsidies to all families with income up to 3.5 times poverty, the annual estimates range from $179 million under schedule 1, the status quo CCFAP family contribution schedule, to $193 million under schedule 5, the most generous family contribution schedule from the perspective of families. If subsidies were extended higher along the income scale, the size of the annual gap would increase, as the added cost for the care families consume is not offset by the assumed contributions from these now-included families. Under schedule 5, in which families make the lowest contribution, the size of the gap reaches $240 million, $264 million, and $282 million for thresholds of 4.0 times, 4.5 times, and 5 times poverty, respectively. The gaps are smaller under schedule 2 by about $16 million to $20 million, depending on the income threshold.

Estimated Effect on Labor Supply of Expanded Subsidies

The discussion in Chapter 2 of the current labor force participation of parents with pre–school-age children in Vermont indicated that although there was room to increase labor force participation, especially among lower-income mothers with young children, these parents' share of the overall workforce is relatively small. After applying a range of elasticities in the literature (i.e., the percentage change in labor force participation that we expect for a percentage change in the out-of-pocket cost that families pay for ECE; see the review in Appendix B) and assumptions about the reduction in the cost of care to families implied by the expanded subsidies, we find very modest additions to the workforce (see Table 3.5). When applied to all parents with pre–school-age children (top panel), we estimate a maximum increase in the size of the workforce of about 2,850 workers (fourth row). Assuming larger elasticities (i.e., that families increase labor supply by a greater percentage for a given reduction in the out-of-pocket costs that families pay for ECE) and cost reductions for the current CCFAP-targeted group of families (i.e., those with income below 3.5 times poverty; see the second panel), we find a maximum potential labor force increase of about 2,800 workers (row 2).

Table 3.5. Estimated Effects on the Labor Force of Expanded ECE Subsidies

Indicator	Baseline Labor Force Participation Rate (%)	Forecast Labor Force Participation Rate (%)	Additional Number of Labor Force Members
Assumptions applied to all parents with children under age 5			
Lower elasticity (0.0015), lower cost reduction (13%)	84.3	85.9	612
Lower elasticity (0.0015), higher cost reduction (25%)	84.3	87.4	1,224
Higher elasticity (0.0035), lower cost reduction (13%)	84.3	88.0	1,428
Higher elasticity (0.0035), higher cost reduction (25%)	84.3	91.7	2,856
Assumptions applied to all parents with children under age 5 and income below 3.5x poverty			
Lower elasticity (0.0035), lower cost reduction (25%)	77.6	84.1	1,453
Lower elasticity (0.0035), higher cost reduction (50%)	77.6	91.1	2,761
Higher elasticity (0.0060), lower cost reduction (25%)	77.6	89.2	2,492
Higher elasticity (0.0060), higher cost reduction (50%)	77.6	—	—

NOTE: — = not relevant because the prediction of the labor force participation rate exceeds 100 percent.

Accounting for the Cost of ECE for Children with Special Needs

As noted in Chapter 1, our estimates of the cost of ECE for Vermont do not include the additional resources required to provide high-quality ECE for pre–school-aged children with special needs. There are several challenges to generating this estimate. First, there is a paucity of information about the number or percentage of children with special needs among pre–school-age children and the specific conditions that may require staff with specialized training (e.g., early educators with training in special education) or other types of supports, whether provided in inclusive settings (where children with special needs are in integrated classrooms with their typically developing peers) or in specialized classrooms designed to meet the unique needs of a group of children with special needs. Second, there are no agreed-upon standards for what constitutes high-quality ECE for students with special needs (National Academies of Sciences, Engineering, and Medicine, 2018).

As noted earlier, our cost estimates already assume that all classrooms have a lead teacher with a bachelor's degree, with compensation that exceeds what is typically received even by special education preschool teachers (compare Tables 2.4 and 3.2). Estimates provided by Brandon et al. (2004) indicate that the incremental cost for a high-quality early learning experience for children with special needs is about 10 percent above the cost of high-quality ECE for their typically developing peers. Thus, if about 10 percent of pre–school-age children have special needs and the added cost for that population is 10 percent, our cost estimate would increase by about 1 percent if the additional cost for special education services is included. This is the equivalent of about $6.5 million in 2022 dollars. Further, federal special education funding through the Individuals with Disabilities Education Act (not included in Table 3.4) could

potentially cover those costs between the Part B Section 619 grant (about $0.9 million for Vermont in federal fiscal year 2019) for special education for three- and four-year-olds and a portion of the Part B Section 611 grant (about $31.5 million in federal fiscal year 2019) for special education services for children ages 3 to 21.

Accounting for the Cost of After-School Care

Our analysis in this chapter focused on the cost for high-quality ECE for pre–school-age care but did not account for the cost of care for school-age children starting in kindergarten up through age 12, both before and after the school day and during the summer months or other school holidays. In general, the subsidy approach assumed for schedule 1 to schedule 5 could apply to the combination of care use needed by families for their children from birth through age 12. In some cases, families will have both children under age 5 and school-age children, while others will have only pre–school-age children or only school-age children. The estimated gap would be expected to increase beyond what was reported in Table 3.4. How much that gap increases depends on assumptions about the features of the out-of-school-time programs (e.g., ratios, group sizes, teacher qualifications, the nature of the activities supported by the programs, and so on), the hours of care that families would choose to consume, and the current public sector funding available to help fill the gap.

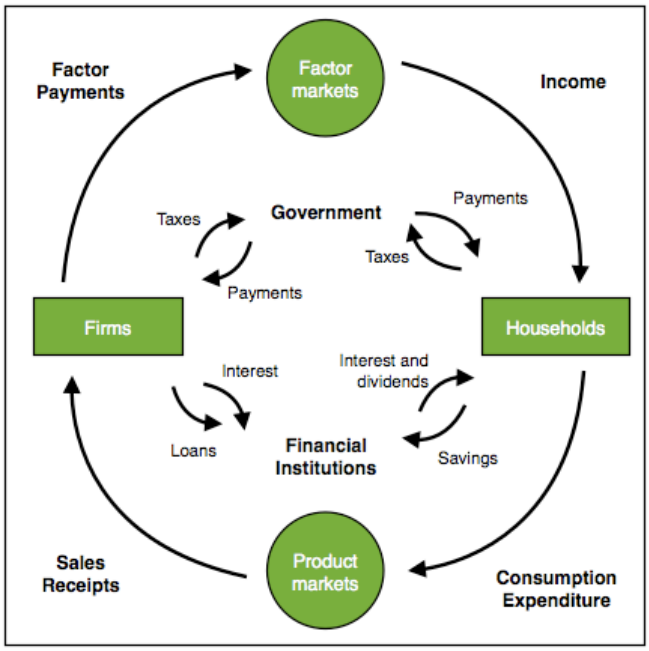
The final report of Vermont's Taskforce for Universal Afterschool Access (2021) conservatively estimated that $22 to $28 million in additional funding would be required if about one-third of school-age children participated in high-quality programs and if no family fees were charged. The cost of care would be partially subsidized by CCFAP (an estimated $13 million in fiscal year 2019 dollars; see Table 2.10) and federal funding through the 21st Century Community Learning Centers Program, which reached nearly $6 million in 2019 (U.S. Department of Education, 2020). The additional funding needed represents about 10 percent of the gap estimate for ECE (see Table 3.4).

Chapter 4. Financing the Cost of High-Quality Early Care and Education for Vermont

To estimate the impact of changes in fiscal policy to cover the gap between current funding and projected funding, we develop a model of the entire economy of Vermont. Our first goal is to be able to estimate the tax rates across a variety of different taxation instruments that could be used to finance ECE expansion. That is, we use the estimates from Chapter 3 for the five subsidy schedules and develop a menu of financing options to consider. We then model the optimal tax bundle under each subsidy schedule that would just cover the funding gap. Our second goal is to be able to understand the impact of increased labor force participation on the fiscal and economic outcomes in Vermont based on the labor force estimates in Chapter 3.

Our approach allows us to consider not only the ECE sector but also all other sectors in the economy and how policy changes percolate through the economy. We are able to capture not just the changes in revenue to the state but also how households and firms change behavior to respond to the changing economic landscape. We can think of the economy as a circular flow from households to firms in terms of labor, capital, land, entrepreneurship, and other factors of production that firms employ (factor markets) and from firms to households in term of final consumption (product markets). In addition, there is trade between different firms for inputs to production. At each point along the way, there may be government intervention in terms of taxes on labor (payroll taxes), taxes on final consumption (sales or excise taxes), or the provision of public goods that go into production, such as roads and infrastructure. By using this approach, we are able to analyze the economic and fiscal impact of changes in ECE policy on the entire economy, including how they affect households. Figure 4.1 provides an overview of an economy-wide model.

Figure 4.1. Circular Flow Model of an Economy



SOURCE: Le0t, 2009 (CC BY-SA 3.0, https://creativecommons.org/licenses/by-sa/3.0/deed.en).

Within economics, there are generally two models employed to estimate the economic impact of policy changes in an economy-wide approach: input-output models and computable general equilibrium models. Essentially, input-output models view firms and households as having recipes by which they consume or produce, and there is very little impact of price changes on behavior. When making a recipe in the kitchen, to double the amount of cookies, we have to double the amount of all the ingredients. This is how input-output models view the world. They were first developed by Wassily Leontief, and he was awarded the Nobel Memorial Prize in Economic Sciences in 1973 ("The Official Announcement of the Royal Academy of Sciences," 1973). The second approach commonly used to estimate regional economic impacts, computable general equilibrium models, generalizes the ideas of input-output models to allow households and firms to respond to prices. For example, if apples become relatively more expensive, households may choose to consume more bananas. Similarly, if wages increase, firms may hire less labor and substitute toward more capital to minimize the cost of production. As compared with input-output models, the ability to consider changes in relative prices is very important when considering fiscal impacts, as changes in tax rates on goods or services or production have an impact on input and output prices. As discussed in Appendix C, we use both of these approaches because they have different strengths and weaknesses. We use the computable general equilibrium model to estimate optimal fiscal policy and the input-output model to estimate the impact of labor force participation on the economy and government revenue.

Our approach for the development of a computable general equilibrium model of the economy of Vermont builds off the work of Strong and Welburn (2020), Strong et al. (2022), Sue Wing (2007), Rausch and Rutherford (2008), and Nadreau (2015). Our approach is to calibrate a model of the economy of Vermont that incorporates different taxing mechanisms that can be used to augment state revenue to cover the gap between current funding levels and estimated funding levels for a high-quality system. According to the estimates from Chapter 3, we are likely to see significant changes to the tax structure to fund the ECE subsidies. These nonmarginal changes will have behavioral consequences for both households and firms outside the ECE sector. These general equilibrium effects are important to capture, as they allow us to better understand the welfare impacts on households of fiscal changes. If we to focus on a sector-by-sector approach, we would lose these interactions and substitution effects.

In this chapter, we first describe the set of financing instruments that we consider for the gap between current funding and future needs with a high-quality ECE sector. We provide a menu of options and explain how they could potentially be phased in over a five-year period. This menu should be seen as a means to consider the trade-offs across different instruments. We next use the suite of funding options, together with the five subsidy schedules used to develop the funding gap estimates, to estimate the tax rates necessary to cover the additional costs to the ECE sector. We then turn to the impact of the labor force on potential increases in gross state product. Finally, we offer some concluding remarks and caveats to the analysis.

Financing Options

The setup of the computable general equilibrium model relies on how it will be used for policy analysis. In particular, our focus with the computable general equilibrium model is to estimate the changes in state revenue from a variety of financing options. To ensure that the sectoring of the economy matches the policy analysis, we begin our discussion of the model by focusing on the financing options. One of the key aspects to consider regarding funding options is the need for the source to be sustainable. Therefore, we will not consider federal interventions, since those are outside the control of the legislature in Vermont. Our focus is on how the state can raise revenue that can be used to finance the movement to high-quality ECE. That is, we are concerned with the source of funding rather than the mechanism used to finance the measures. For example, if a social impact bond were used, there would still have to be additional revenue to finance the payments, although the risk of success would be partially covered by the mechanism.

We initially focus our attention on sources of funding that have previously been used to fund the Education Fund in Vermont. At present, there are five main sources of funding for the Education Fund:

- property tax
- lottery
- sales and use tax

- meals and room tax (hospitality tax)
- purchase and use tax (shared with transportation fund).

For our analysis, we do not consider increases in the property tax or adding more lotteries. We do this for a few reasons. First, given the complexity of property taxes in Vermont, as well as time and data constraints, it is not feasible for our team to consider a property tax for this study, and it would be better for a team of assessors to perform such an analysis if this is an option moving forward. Second, adding an additional lottery would likely not raise considerable funds, because there are already lotteries in Vermont, and a new one would act as a substitute revenue source instead of increasing revenue (Grote and Matheson, 2006). In other words, adding a lottery would likely not induce more people to play the lottery; rather, those who already play would likely split their current habits between all available lotteries. Because of the shared nature of the purchase and use tax with the Transportation Fund, we do not focus on changes in that tax, and the data requirements are outside of the scope of this study. Our focus on increasing existing taxes will solely examine increases in the sales and use tax and the meals and rooms tax.

In addition to the two taxes, we consider options that have been discussed by different groups within Vermont, as well as options that have been used in other jurisdictions outside Vermont (BUILD Initiative et al., 2019). The potential options that we consider for this analysis are

- adding a bottle and canned soft drink tax
- adding a payroll tax
- adding a service tax (two approaches).

Jurisdictions such as Philadelphia have used a sweetened-beverage tax as a source of funding for different education programs and other purposes. The tax is based on the volume of the drink and applies to both sugar-sweetened and artificially sweetened drinks, such as diet soda. Philadelphia has imposed a $0.015 per ounce tax on all sweetened beverages (City of Philadelphia, 2021). At present in Vermont, soft drinks are taxed at the same sales tax rate as other goods, 6 percent. Following Philadelphia's lead, a sweetened-beverage tax would involve an excise tax. Given the data that will underlie the models are unable to distinguish between sweetened and unsweetened beverages, or their size, we alternatively apply an additional sales tax for the bottled- and canned-beverage sector that would function as an excise tax in practice. A 20-ounce soda is approximately $2.00.[25] Using Philadelphia's tax as a benchmark, this would result in a $0.30 tax, or 15 percent. Importantly, according to the Urban Institute (undated-b), sweetened beverage taxes tend to be regressive (i.e., lower-income individuals tend to consume more sweetened beverages as a share of income than higher-income individuals).

There has been some discussion within the stakeholder groups and Joint Finance Office that a payroll tax may be considered as part of the funding for ECE. Therefore, we have incorporated a

[25] We searched Walmart prices in Burlington, Vermont, using the Walmart.com site.

labor tax on all sectors that corresponds to a payroll tax. We use a uniform tax across all labor income.

The addition of a tax on services has received some attention from stakeholders and the Vermont Joint Finance Office. *Services* is a broad category of the economy; therefore, we consider a few approaches for which sets of services are taxed. Importantly, we consider only final demand for services as being taxed rather than all transactions that involve services. This is similar to how sales taxes are done. We segment the broad category of services into

- business
- health
- legal
- financial
- personal
- publication
- broadcast
- entertainment.

Our aim is to find services that are mostly final demand and would likely be considered as approaches to funding ECE. We do not include business services, as they are focused on supporting businesses as intermediate rather than final demand. Since health services are meant to be encouraged rather than discouraged, we do not include health services in any specifications. Similarly, we do not include legal or financial services, as these are mainly supporting businesses rather than households. The two approaches that we adopt for this analysis are roughly consistent with how other states have taxed services.

We include personal, publication, broadcast, and entertainment services because these are likely to be associated with significant household consumption. This list of examples demonstrates what types of services are included in the categories:

- personal services, such as
  - auto mechanics
  - personal and household repair
  - dry cleaning
- publication services, such as
  - newspapers
  - magazines
  - books
  - greeting cards
- broadcast services, such as
  - motion pictures
  - radio
  - cable TV

  - telecommunication services
  - internet publishing
- entertainment services, such as
  - performing art companies
  - museums
  - amusement parks
  - fitness centers
  - bowling centers.

In the analysis, we use a variety of combinations of these to see how much revenue could be available from different service industries, assuming the current sales tax rate of 6 percent. It is difficult to say whether taxes on services are regressive, progressive, or neutral, since those with higher incomes are more likely to consume more services than lower income but may spend a smaller proportion of their income.

Drawing on the set of potential funding sources, we posit a menu of funding sources to cover the gap between currently available funding and needed funding for high-quality ECE programs. Previously, we discussed the use of different taxes to cover the cost of the gap. Our menu is built to reflect a suite of potential options that can be used to compare trade-offs of different funding approaches based on the Vermont-specific context, as well as taxation levels in other jurisdictions.

Using this set of funding instruments, we develop six funding options to examine how Vermont could fund high-quality ECE programs. Our approach for building the funding options was to first consider single-source options and from there develop a set of multisource options. Our single-source options are to

- add a payroll tax
- increase the current sales tax
- add a tax on services (limited and extended).

There are two ways to add taxes on services. First, we use a limited set of services corresponding to the personal services and entertainment categories. Second, we extend the set of services to include broadcasting and publishing.

Our set of multisource options builds up a portfolio of funding instruments depending on the funding gap estimated. First, we start with the soda tax, then add a 1 percent addition to the hospitality tax. Finally, we fill in the gap either with an additional payroll tax or with an increase in the sales tax on the current set of taxed goods. This gives us two options of mixed instruments, options 5 and 6. Our portfolios consist of six options:

- Option 1: add payroll tax
- Option 2: increase sales tax
- Option 3: add service tax on limited set of services
- Option 4: add service tax on extended set of services
- Option 5:

  - add soda tax
  - increase hospitality tax
  - add payroll tax
- Option 6:
  - add soda tax
  - increase hospitality tax
  - increase sales tax.

We combine this menu of financing options with the subsidy schedules developed in Chapter 3 to construct a set of phase-in processes to move from the current state of ECE to the high-quality state (see Table 4.1). Our approach is to consider a ramping up of the financing to cover greater and greater shares of the total funding gap. We use the funding gap defined by the inclusion of up to 5.0 times poverty. We phase in the financing to first cover 25 percent of the funding gap, then 50 percent, then 75 percent, and finally 100 percent. This approach could be thought of as yearly (or more frequent) increases in the financing instruments used to fund the gap. Chapter 3 provides a means to consider the phasing in of eligibility, since some federal funding streams target different portions of the income distribution.

Table 4.1. Annual Gap Between Current and Necessary Funding (millions of dollars)

Indicator	Up to 1.5x Poverty	Up to 2.5x Poverty	Up to 3.5x Poverty	Up to 4.5x Poverty	Up to 5.0x Poverty
Schedule 1: Status quo, no cap	68	107	179	240	255
Schedule 2: Status quo, 10% cap to 3.5x poverty	68	107	181	243	258
Schedule 3: Status quo, 10% cap to 5x poverty	68	107	181	251	272
Schedule 4: Percentage, 10% cap to 3.5x poverty, max 15% to 5x poverty	68	111	190	254	269
Schedule 5: Percentage, 7% cap to 3.5x poverty, max 13% to 5x poverty	68	111	193	264	282

SOURCE: Table 3.4.
NOTE: Monetary figures are in 2022 dollars.

Sectoring of the Economy

A description of the model is provided in Appendix C, although we describe how the economy is sectored in this section. The model is built on a variant of the model developed in Strong and Welburn (2020) and Strong et al. (2022).

To be consistent with previous literature and to incorporate the core aspects of the Vermont educational and fiscal systems, we have separated the economy into 22 sectors. The first set corresponds to the core of the economy that is not directly or indirectly affected by changes in ECE funding. These sectors are

- agriculture

- construction
- utilities
- wholesale and retail trade*
- mining
- transportation
- processed foods*
- manufacturing*
- miscellaneous.*

The sectors with asterisks are used in the calculation of sales taxes that support the Education Fund. In addition to these sectors, we separate out all the potential education-related sectors:

- colleges and universities
- child day care services
- primary and secondary schools
- other education.

The main taxation instruments discussed in the previous section correspond to the following sectors:

- hospitality (meals and rooms)
- bottled and canned soft drinks
- services.

Because we are considering two broad sets of service taxes and there are some service sectors that are unlikely to be used to fund education, we break down the service sector into the following subsectors:

- business services
- health services
- finance services
- personal services
- entertainment
- broadcasting
- publishing.

Taken together, these 23 sectors span the entire economy. In addition to this sectoring of the production side of the economy, there are nine household groups that are distinguished by household income:

- less than $15,000
- $15,000–$30,000
- $30,000–$40,000
- $40,000–$50,000
- $50,000–$70,000
- $70,000–$100,000
- $100,000–$150,000

- $150,000–$200,000
- greater than $200,000.

There are also additional entities corresponding to

- federal defense
- federal nondefense
- federal investment
- state and local education
- state and local noneducation
- nonlocal consumers and factor providers (foreign and domestic).

In total, this represents all the actors in the economy that interact through market exchanges on both the consumption and production sides of the economy.

Fiscal Results

Before turning to the funding gaps and implementation plans, we provide some baseline results to show the relative magnitudes of alternative financing instruments. Since some of the options developed in the previous section are bundles of instruments, it may be helpful to see what the relative annual contribution of each instrument is likely to be. Table 4.2 provides these baseline results.

Table 4.2. Baseline Estimates of Revenue

Tax	Type of Change	Annual Revenue Generated
Payroll tax	1%	$196 million
Sales tax	1-percentage-point increase from base	$85 million
Limited services tax	6%	$105 million
Extended services tax	6%	$143 million
Soft drink tax	15%	$24 million
Meals and rooms tax	1-percentage-point increase dedicated to ECE	$14 million

NOTE: Monetary figures are in 2022 dollars.

For the new soft drink tax and increased meals and rooms tax, we consider only a single tax level rather than allow the level to adjust to cover the gap (as we do with sales, service, and payroll taxes.) We do this because the meals and rooms tax is already relatively high compared with other jurisdictions, and our soft drink tax is based on the approach Philadelphia has implemented. Our approach to building the bundles for financing options 5 and 6 is to first include the soft drink tax, then the increased meals and rooms tax, followed by closing the gap through either a payroll tax or an increased sales tax.

Although Table 4.1 presents five subsidy schedules, we focus our attention on the second, as it is the most accurate interpretation of the specifics that Act 45 lays out, and we analyze the six

funding options. We present the results for the other subsidy schedules in Appendix C. Table 4.3 provides the estimated tax rates for each of the financing options across the four phase-in periods for subsidy schedule 2. For those taxes that are already in place, such as sales and meals and rooms taxes, these should be interpreted as percentage-point increases over the base level. A given column should be read as an implementation plan for a single potential financing option. That is, each column is independent of all other columns. All of these results are based on the 2019 data that we inflate to 2022 dollars analysis using the consumer price index for the Northeast (U.S. Bureau of Labor Statistics, undated).

For perspective, the highest state sales taxes in the United States are on the order of 7 percent; thus, any sales tax increase over about 1 percent would push Vermont, currently at 6 percent, to one of the highest sales taxes in the country (Sales Tax Institute, 2023). Vermont's 9 percent rooms tax (a component of the meals and rooms tax) is one of the highest in the country, along with Maine, at 9 percent, and Hawaii at over 14 percent (Avalara, undated-b). Vermont's 9 percent meals tax (a component of the meals and rooms tax) is also one of the highest in the country (Craig, 2020). The landscape of taxes on services is complex, but, generally, if a state has a tax on services, it is the same as the tax on goods. At present, Vermont does not have a tax on services. The services that are taxed vary by state, but generally taxes on personal services and entertainment are included. Many states include taxes on tangible personal property (Avalara, undated-a), in which tangible personal property services are associated with housing and car repair. We have included these in personal services for our analysis.

Table 4.3. Estimated Additional Tax Rates Under Alternative Financing Instruments for Subsidy Schedule 2

Phase-in Stage	Annual Gap ($ millions)	Payroll Tax	Sales Tax	Limited Services Tax	Extended Services Tax	Option 5	Option 6
25%	65	0.29%	0.66%	3.09%	2.25%	Soda: 15% Hospitality: 1% Payroll: 0.09%	Soda: 15% Hospitality: 1% Sales: 0.21%
50%	129	0.57%	1.32%	6.37%	4.61%	Soda: 15% Hospitality: 1% Payroll: 0.37%	Soda: 15% Hospitality: 1% Sales: 0.86%
75%	194	0.86%	1.98%	9.87%	7.07%	Soda: 15% Hospitality: 1% Payroll: 0.66%	Soda: 15% Hospitality: 1% Sales: 1.52%
100%	258	1.14%	2.64%	13.60%	9.65%	Soda: 15% Hospitality: 1% Payroll: 0.94%	Soda: 15% Hospitality: 1% Sales: 2.18%

NOTE: Monetary figures are in 2022 dollars. For taxes that are already in place, the figures are percentage-point increases over the base level. A given column is a single potential financing option.

As subsidy schedule 2 becomes fully implemented, using a payroll tax to finance the ECE expansion means that the payroll tax increases from roughly 0.29 percent to 1.14 percent. It is

important to recognize that the implementation of the payroll tax is on all labor income and not capped like other payroll taxes, such as the federal Social Security tax, since the model uses representative households rather than actual households and aggregates those households into household groups based on household income. Thus, if wage limits were implemented as part of a payroll tax, the tax rate would be higher than the estimated tax rate. To give a sense for the magnitude, in 2019, approximately 6 percent of workers earned above the maximum income for Social Security, representing about 17 percent of total worker income (Social Security Administration, 2019, Table 4.B1). These numbers may be smaller or larger for individual states.

Under a sales tax option, we estimate that the ramp up would be to increase the sales tax from 0.66 percentage points to over 2.5 percentage points once fully implemented. Currently, Vermont has a sales tax rate of 6 percent, suggesting that the new sales tax rate would be greater than 8.5 percent, higher than any other state according to the Tax Foundation, although this does not include county or local taxes (Fritts, 2022). It may be advisable to team up a sales tax increase with some other financing instrument or expenditure reduction in another program to fund ECE program implementation.

For service taxes, both the limited and extended ones top out at 13.60 percent and 9.65 percent, respectively, with 100 percent implementation. Alternatively, if the policy were to simply include the extended list of services to the set of goods and services taxed under the current system and tax them at 6 percent, this would increase revenue by about $143 million (see Table 4.2). This is roughly two-thirds of the necessary funding for full implementation. Teaming up a services tax with another instrument may be an alternative that could be considered, since the tax rates necessary to fill the full implementation are considerably higher than sales tax rates in any other U.S. jurisdiction.

For the bundled approaches, a soft drink tax similar to Philadelphia's plus a 1-percentage-point increase in the meals and rooms tax devoted solely to ECE funding increases revenue by $38 million. We have teamed these bundled projects with increased sales taxes or the addition of a payroll tax to fully fund the gap between current and expected future needs. At full implementation, the necessary payroll tax is approximately 1 percent and the increased sales tax is approximately 2 percentage points. As an alternative, some of that gap could be filled by one of the services taxes.

Given the magnitude of funding gap at full implementation, it is unlikely that a single tax instrument can be used to fill the funding gap under subsidy schedule 2. It becomes a question of the trade-offs that Vermont is willing to make in terms of new taxes, expansion of existing taxes, or alternative program expenditure reductions. From an administrative expense, it will be less costly to either increase current tax rates or expand the inclusion of taxes to a broader set of goods, services, or factors instead of implementing new taxes. But expansion of tax bases would likely have implementation costs, since many of those newly included entities would likely not have faced that tax in the past and would now be required to.

Impact on Households

Our modeling strategy allows us to consider how households are affected by alternative fiscal instruments. We calculate each household's well-being (also referred to by economists as *utility*) compared with the baseline data. We make use of the stratification of households by income levels to consider how the different tax instruments affect the well-being of households at different income levels. At present, this does not include the labor force participation changes that were estimated in Chapter 3 and will be discussed below. We calculate the change in household well-being from the baseline case calibrated to 2019 data. That is, if the well-being level is 101 percent of the baseline well-being level, households are 1 percent better off and if it is 99 percent, they are 1 percent worse off. We calculate these well-being effects for only the full implementation. Table 4.4 provides these estimates for subsidy schedule 2 across all financing options considered.

Table 4.4. Well-Being Impacts of Full Implementation of Subsidy Schedule 2

Income Range	Payroll Tax	Sales Tax	Limited Services	Extended Services	Option 5	Option 6
Less than $15,000	1.0003	0.9970	0.9952	0.9944	0.9987	0.9959
$15,000–30,000	0.9995	0.9972	0.9938	0.9937	0.9982	0.9964
$30,000–40,000	0.9985	0.9975	0.9943	0.9944	0.9976	0.9968
$40,000–50,000	0.9979	0.9978	0.9945	0.9946	0.9972	0.9972
$50,000–70,000	0.9969	0.9980	0.9929	0.9937	0.9965	0.9974
$70,000–100,000	0.9960	0.9983	0.9941	0.9948	0.9960	0.9980
$100,000–150,000	0.9951	0.9985	0.9942	0.9951	0.9954	0.9982
$150,000–200,00	0.9941	0.9990	0.9921	0.9936	0.9949	0.9989
Greater than $200,000	0.9927	1.0001	0.9905	0.9915	0.9939	1.0000

NOTE: The color shading in the table provides a heat map in which the most-favorable outcomes in terms of well-being are in shades of green and the least favorable outcomes are in shades of red, with yellow and orange shades falling between the two extremes, respectively.

In the full implementation of subsidy schedule 2, there is a funding gap of approximately $258 million. In an economy of approximately $37 billion with state appropriations in state fiscal year 2023 of over $8 billion, the funding gap represents approximately 0.6 percent of gross state product and approximately 2.8 percent of appropriations. Thus, it is not surprising that the effects on well-being estimated in Table 4.4 are very small. A few important pieces to point out are that implementation of the payroll tax is a progressive policy, meaning that the burden measured by lost well-being increases with income, contrary to much of the economic literature, while the

sales tax increase is regressive. Similarly, when we have the bundle packages, if the gap is filled via a payroll tax, it is progressive; if it is filled with a sales tax, it is regressive. With the addition of a service tax, there are mixed results.

Labor Force Impacts

As discussed in Chapters 2 and 3, there are several labor force impacts that need to be considered. As part of the improvements to the quality of the system, there will be increased employment and increased wages in the ECE sector. These increases in the labor force and compensation are being paid for by subsidies from the state government by either the increases in taxes discussed previously or reductions in expenditures on other programs and the co-pays paid by households. Thus, the increased size of the ECE sector in terms of labor compensation can be viewed as simply transfers from households paying taxes to the state government and then transferred to households employed in the ECE sector. Importantly, expanding the ECE sector comes at the expense of reductions in spending on other sectors. Thus, the gross state product impact will be zero or small.

The more important aspect to growing the Vermont economy is the role of labor force participation by those parents who now choose to enter the labor force due to decreased costs of ECE. On the basis of the estimates in Chapter 3 (Table 3.5), there will be an increase in the labor force of between about 600 and 2,900 workers, depending on the assumptions about the responsiveness of households to changes in the cost of ECE and the change in cost. Both estimates should be regarded as maximum potential labor force expansion indirectly derived from changes in ECE policy, depending on the assumptions that underlie them. First, although these people may enter the labor force, there is no guarantee that they will be hired and may simply increase the unemployment rate. Second, they may be hired but are simply a substitute for another worker. That is, having an additional worker join the labor force may be completely offset by increases in unemployment. In October 2022, Vermont had a seasonally adjusted unemployment rate of 2.3 percent (U.S. Bureau of Labor Statistics, 2022). According to these data, there may be pent-up demand for additional workers, since the labor market is relatively tight. But there will be some substitution effects, and it is simply a matter of how big those substitution effects are. We provide the likely impact under alternative assumptions, not including these substitution effects, but recognize that the actual impact will be less than estimated due to these worker substitution effects. The low-elasticity estimate for the increase in labor force participation results from Table 3.5 results in 612 additional workers, whereas the high-elasticity estimates an additional 2,856 workers. We use these two estimates to bound the potential increases in labor income, gross state product, and state and local tax revenue.

According to estimates from the Bureau of Labor Statistics in October 2022, workers on average in the United States work approximately 34.5 hours per week (Federal Reserve Bank of St. Louis, 2022). The mean annual wage in Vermont in 2019 across all occupations was

approximately $51,000, and the median hourly wage was $19.68 (U.S. Bureau of Labor Statistics, 2019). Assuming 34.5 hours per week, the median annual wage is approximately $35,000. Using median wages, we find that the increase in labor income is likely to be between $22 million and $100 million per year. Using mean wages, we find that the increase in labor income is likely between $31 million and $146 million. These are the direct impacts of the policy in terms of labor income.

The increase in labor income would result in a corresponding increase in annual gross state product. Since we do not know where this labor income will be employed, we assume that the labor is proportionally distributed across the entire economy based on the distribution of gross state product across sectors. According to data from IMPLAN (undated), labor income made up approximately 57 percent of all compensation in Vermont.[26] Thus, the direct income increases will become $38 million to $175 million for the median wage and $54 million to $254 million for the mean wage. That is, if these workers are new workers, they need to be paid and additional production inputs need to be used, such as machines. These direct income increases will translate into indirect increases due to the spending of that income in Vermont. These are the commonly referred to *income multipliers* in regional economic analysis.

To estimate the income multipliers for Vermont, we consider the impacts by assigning the increased income to different household types. Since the changes in expenditure patterns are likely to be small across different households, we consider three income levels for increased income. The actual impact will likely be a weighted average of these three, but we would like to bound the impact and have an intermediate case. Thus, we consider all of the income going to household with income less than $15,000, income between $50,000 and $70,000, and income greater than $200,000. Table 4.5 presents the impact of labor force participation on gross state product, including the induced effects estimated using the IMPLAN input-output model. The increase in gross state product is likely to be between $51 million and $412 million, depending on assumptions about spending patterns and labor force participation responses. As stated previously, these should be viewed as maximal estimates due to the potential worker substitution effects from previous labor force participants and new entrants to the labor force. Our most likely estimate would be under the assumption of median income with the middle-income household. That is, our most likely estimate for the maximum is between $59 million and $283 million, depending on income elasticity and the income groups that experience the greatest growth following increased access to ECE.

[26] The data from both models are based on data from IMPLAN. IMPLAN downscales data available from the Bureau of Economic Analysis to allow analysis of disaggregate sectors at state, county, zip code, and congressional district levels. We use the state-level data for Vermont and employ the IMPLAN software for the input-output model. IMPLAN has been the industry standard since the 1990s for evaluating regional economic impacts. Our main use of the IMPLAN input-output model is to explore the impacts of increases in labor force participation outside the ECE sector that would directly correspond to increases in gross state product.

Table 4.5. Increase in Annual Gross State Product Under Alternative Assumptions About Household Responsiveness to Change in Labor Force Participation and Household Income (millions of dollars)

Indicator	Direct Income Increase	Less Than $15,000	$50,000–70,000	Greater Than $200,000
Mean income—low elasticity	54	88	85	74
Mean income—high elasticity	254	412	402	350
Median income—low elasticity	38	59	59	51
Median income—high elasticity	175	283	277	241

SOURCE: Authors' analysis using the IMPLAN input-output model.
NOTE: The low- and high-elasticity estimates appear in Table 3.5 and are used to construct the bounds. Monetary figures are in 2022 dollars.

Table 4.6 presents the increase in state and local tax revenue from all sources estimated using the IMPLAN input-output model and the same inputs used to create Table 4.5. The increase in state and local government revenue is likely to be between $1.5 million and $18 million with our preferred estimate, using the median income and the median income level, of $1.5 million to $11.4 million. Given the full implementation cost of subsidy schedule 2 of $223 million, the increased labor force participation is unlikely to cover much of the cost of ECE program expansion, and it would be difficult to disentangle increases in revenue indirectly flowing from the lower cost of ECE to parents from other sources, as well as the worker substitution effects discussed previously.

Table 4.6. Annual State and Local Revenue Increases Under Alternative Assumptions About Household Responsiveness to Change in Labor Force Participation and Household Income (millions of dollars)

Indicator	Less Than $15,000	$50,000–70,000	Greater Than $200,000
Mean income—low elasticity	3.8	3.5	2.2
Mean income—high elasticity	18.0	16.5	10.3
Median income—low elasticity	2.5	1.5	1.5
Median income—high elasticity	12.4	11.4	7.1

SOURCE: Authors' analysis using IMPLAN input-out model.
NOTE: Monetary figures are in 2022 dollars.

Discussion and Caveats of Fiscal and Economic Impacts

Our approach to estimating the fiscal and economic impacts of high-quality ECE expansion was to use the estimates of the gap in current funding to assess the likely tax rates across a variety of tax instruments and combinations. These estimates are based on a computable general equilibrium model calibrated to 2019 Vermont input-output tables. We phase in the ECE program based on increasing eligibility according to household income, beginning with

households that are 1.5 times percent of the federal poverty level and increasing to 5.0 times percent of the federal poverty level. This approach is consistent with Act 45 while avoiding a potential cliff of subsidies due to household income cutoff levels. Since the increases in cost in the ECE sector are covered by tax increases or rebudgeting the state budget, no new money is created. The direct results of changes to the ECE policy will have compositional rather than an expansionary impact on the economy. This is the direct result of the circular flow of money.

But there is likely to be some expansion of the Vermont economy due to the decreased cost to parents of ECE and the potential to increase labor force participation. Our estimates for the impact on gross state product and state and local government revenue should be viewed as the maximum potential impact, since there is likely to be some substitution between current labor force participants and new entrants to the labor force. Our approach was to first estimate the labor income based on varying assumptions and then inflate that labor income to total income, since the expansion will result in not just additional workers but all other inputs to production. We then use these increased income estimates in an input-output model to estimate the multiplier effects of increased income and the state and local government revenues. Our most likely estimate for the increase in gross state product is between $59 million and $277 million and would result in increases in state and local tax revenue of between $1.5 million and $11.4 million, on the basis of the median income assigned to $50,000–$70,000 households, from Tables 4.5 and 4.6, respectively.

Our results from the fiscal analysis suggest that no single instrument is likely to be feasible to cover the cost of full implementation, and decisionmakers will need to make trade-offs across different instruments or consider redirecting expenditures from other programs to cover the costs.[27] Additionally, we have not considered changes in property taxes that could provide an additional instrument that is already directed to the Education Fund in Vermont. Changes in the structure of homestead versus nonhomestead property taxes may be a source with the potential for some of the burden of ECE in Vermont to be carried by those who live outside Vermont.

Our analysis is based on data from 2019, which was chosen for a number of reasons. First, the most recent IMPLAN data at the time of the analysis was 2020. Given the COVID-19 pandemic and the implementation of Act 45 that will be sometime after 2023, we felt that using 2019 data would provide a better picture of what the Vermont economy is likely to look like moving forward as compared with 2020. The pandemic is likely to have caused a change in the composition of the economy of Vermont, and state fiscal year 2023 is likely to provide the best postpandemic data possible for what the "new normal" is likely to look like. Thus, a future analysis could be done to better understand how changes in the economy postpandemic compare with prepandemic conditions.

[27] By *feasible*, we mean that the rate necessary to cover the cost is outside what other jurisdictions have implemented for similar instruments.

Finally, our approach to the analysis was focused on the steady state and does not incorporate potential boom-and-bust cycles that arise in any business cycle. Therefore, during a recession, tax increases might not cover the full gap in funding high-quality ECE programs. This is true of all funding streams but needs to be considered when developing a financing instrument for a specific program.

Chapter 5. Conclusions and Policy Implications

In this final chapter, we first highlight the key takeaways from our analysis. We then take up several additional considerations regarding our analysis. A final section concludes with several policy implications of our work.

Key Findings

We highlight a number of the key results from our analysis. First, in terms of the current ECE landscape we found the following:

- Among pre–school-age children in Vermont, about 22 percent would qualify for fully subsidized ECE based on having family income below 1.5 times the poverty level. About 60 percent of these children have family income below 3.5 times the poverty level, the maximum income that qualifies for CCFAP subsidies.
- Current funding streams that provide direct ECE or subsidize families' use of ECE—the largest of which are Early Head Start and Head Start, UPK, and CCFAP—had funding of about $109 million as of 2019.
- At most 25 percent of children ages 0, 1, and 2 with family income below 3.5 times the poverty level are served by either Early Head Start or CCFAP. Up to 75 percent or more of pre–school-age children are served by Head Start, UPK, and CCFAP, although some double counting across these programs is possible. However, with state funding for UPK at ten hours per week, it is not clear whether families are able to access and afford the total ECE hours that they need for children these ages.

Our results with respect to the cost of high-quality ECE with a well-compensated workforce indicate the following:

- The total cost for high-quality ECE in Vermont across all pre–school-age children would total about $645 million per year in 2022 dollars.
- The cost of high-quality ECE for children in families with income up to 3.5 times the poverty level, the group subsidized in the current system, is about half of the total, or $321 million.
- Under a schedule for family contributions closest to the current CCFAP family contribution sliding scale with an added 10 percent cap, families with incomes up to 3.5 times poverty would contribute about $38 million toward the $321 million cost of care. With a subsidy schedule that requires families to pay a smaller share of their incomes toward the cost of ECE, the total family contributions for this group would fall to about $27 million.
- Focusing on the gap to expand subsidies to all families with income up to 3.5 times poverty, we estimate that the funding gap ranges from $178 million to $193 million per year, depending on the family contribution schedule.

- If subsidies were extended higher along the income scale, the size of the gap would increase as the added cost for the care that families consume is not offset by the assumed contributions from these now included families. Extending subsidies to families with up to 5.0 times the poverty level, the annual gap reaches $256 million to $279 million.

Our results with respect to revenue options to fill the gap and their fiscal and economic impacts indicate the following:

- If the goal is to fully fund subsidies for families with income up to 3.5 times poverty, filling the $181 million gap could be accomplished as follows using single sources: a new 0.9 percent payroll tax, a 2.0-percentage-point increase in the sales tax, a new limited services tax of 9.9 percent, or a new expanded services tax of 7.1 percent. Tax bundles would allow for a smaller increase in the payroll or general sales taxes on top of a soda or meals and rooms tax increase.
- Expanding subsidies to higher-income families would raise the required tax rate increases beyond rates observed in other states, particularly the sales tax. This suggests that it would be advisable, if subsidies are to be extended to higher-income levels, to use the sales tax in combination with other revenue options. More generally, given the size of the estimated gap when subsidies are expanded to cover families with higher incomes, it is unlikely that a single tax instrument can be used to fill the gap.
- The taxes required to fill the annual funding gap of $258 million when subsidies are expanded to families with income up to 5.0 times the poverty level (the family contribution schedule closest to the CCFAP status quo with a 10 percent cap on the family contribution as a share of income) are estimated to have a small impact on household well-being, with a payroll tax showing a progressive effect on well-being, while the reverse is true of a sales tax.
- The expansion of ECE subsidies has the potential to expand the labor force in a range of 600 to 2,900 new workers—an increases in the size of the labor force of less than 1 percent. Nevertheless, the economic analysis suggests that annual gross state product could expand between $59 million and $283 million depending on assumptions. The estimated effect on annual government revenues would between $1.5 million and $11.5 million, not enough to cover the cost of expanded subsidies.

Other Considerations

There are several additional points with respect to our findings that merit further consideration.

Postpandemic Recovery

By using 2018–2019 as our baseline, we do not directly address the short- or longer-term impacts that the COVID-19 pandemic has had on the Vermont economy and the ECE sector more specifically. Had we extended some of the indicators we examined into 2021 or 2022 (assuming that they were available), we would have seen reduced enrollment in ECE programs, challenges with attracting and retaining a qualified ECE workforce, and other lingering effects of the pandemic-related health crisis. The current inflationary pressures, continuing supply-chain

challenges in some sectors, and other economic challenges may forestall the expected postpandemic recovery and affect other aspects of the labor market, such as the shift toward more telework. Efforts to expand access to subsidized ECE will need to take these factors into consideration, especially to ensure that providers are able to offer the ECE slots that families with pre–school-age children are seeking. This may mean that additional funding is in place to attract and retain qualified ECE workforce members until a new salary schedule can be implemented.

Prospect for Additional Federal Funding for ECE Subsidies

While Vermont debated expanding ECE subsidies, the prospect of additional federal funding for ECE through the proposed Build Back Better package of funding raised the possibility that states would need to raise less revenue than otherwise anticipated. The influx of COVID-related recovery funds has been a temporary boost to the ECE sector, but as one-time funds, the added monies are not a sustainable source for expanding access to subsidized ECE. Although the Build Back Better proposal is no longer under consideration, future congressional bills may recognize the value of further federal investments in states' efforts to expand access to high-quality ECE.

Funding Mechanisms

Give the study objectives, our analyses have focused on estimating the cost of high-quality ECE and the additional public funds required to fill the gap between the cost estimate and either current funding or family contributions. If funding were expanded to allow more families to access subsidies for ECE, consideration of the mechanisms for both reimbursing providers and implementing the family contribution will be important. On the provider side, CCFAP sets reimbursement rates based on the prices that providers charge for unsubsidized care and additional consideration of providers' cost of care. Act 45 stipulates that providers should be reimbursed at their cost of care (an implicit assumption in our cost analysis), which potentially implies establishing reimbursements specific for each provider. Whatever reimbursement rates are established, they are unlikely to capture the diversity of cost structures that providers face and thus the true cost of high-quality care on the part of each provider. Alternatives include the use of provider contracts, which may be more feasible as a larger share of families receive subsidies. Some jurisdictions use such contracts to negotiate reimbursement rates based on a provider's actual cost structure, accounting for allowable and not allowable cost components and adding a measure of cost containment to the process.

For families, implementing a weekly family contribution presents challenges in terms of administering the payments: determining each family's payment based on income and collecting the funds. Another option would be to use the tax system to measure realized annual income and compute the family's contribution as part of the overall tax bill. Tax withholding from current wages can be adjusted to account for the expected contribution toward ECE cost, with a final reconciliation of over- or underpayments when the tax filing is submitted.

Extending Subsidies for School-Age Care

Our analysis has focused on subsidies for ECE prior to kindergarten entry. CCFAP and the federal and state tax credits also subsidize the use of out-of-school-time care for school-age children. For our purposes, we have excluded current funding that subsidizes school-age care. Thus, those funds would be available to continue those subsidies at their current level. Estimates from the American Community Survey indicate that about 18 percent of families with dependent children have both pre–school-age children and school-age children (see Table 2.2; U.S. Census Bureau, 2022b). If their contribution is already at the maximum, given their family income, according to ECE use for their pre–school-age children, they would potentially qualify for full subsidies for the care needed for their school-age children. Alternatively, the subsidy schedule could be modified for cases in which care is needed for both pre–school-age and school-age care, allowing the family contribution to increase beyond the subsidy level assumed in our analysis but still capping the total family contribution at 10 percent.

Extending subsidies to care used for children from ages 5 through 12 would almost certainly result in a positive gap between current funding for school-age care through CCFAP or other sources (e.g., 21st Century Community Learning Centers) and families' demand for care, especially if subsidies are expanded. As noted in Chapter 3, the size of the gap would depend on assumptions about the features of high-quality school-age care, including staff qualifications and compensation. In contrast to ECE, there has been less research regarding the features associated with high-quality school-age care and the associated cost. Nevertheless, the same modeling approach undertaken in this study could be extended to considering the cost of expanding subsidies for school-age care.

Potential for Downstream Economic Benefits

One of the motivations for investing in expanded access for high-quality ECE is the expected short- and longer-terms benefits for participating children in terms of education performance and subsequent life-course outcomes, with the potential for returns to the public sector in terms of reduced cost for special education services and grade retention during the school-age years and higher taxes paid when children reach adulthood and have better labor market outcomes. Although a large body of research has emerged on this topic, much of the evidence stems from a small number of programs that have been evaluated, with most of the evidence limited to high-quality pre-K programs one or two years before kindergarten entry, rather than child care per se (Karoly, 2016, 2017). Furthermore, the estimates of larger impacts and economic returns are based on studies of programs implemented in the 1960s to 1980s, when there were few other alternatives for high-quality early learning programs. Estimates of returns of $2 to $4 in benefits to society for every dollar invested are more likely for programs implemented in today's environment, in contrast to the large estimated returns for the Perry Preschool Project (Barnett, Belfield, and Nores, 2005), as one example. Nevertheless, there may well be eventual benefits to

the public sector in Vermont from expanding access to subsidized ECE, although some of those benefits may not be realized to the extent that children leave the state during the school-age years or in adulthood. But the magnitude and timing of those benefits are not likely to be a source of savings in the near term to offset the cost.

Policy Implications

Vermont has a recent history of expanding investments in the early childhood years, especially related access to high-quality ECE opportunities for children before they enter kindergarten. In terms of further expansions of access to subsidized ECE as part of CCFAP, our analysis shows that there is a sizable but not insurmountable gap in funding for subsidized ECE, especially when limited to families with incomes up to 3.5 times poverty. The cost estimates reflect assumptions that all families that meet the designated income threshold would have access to subsidized ECE for their pre–school-age children on a sliding-scale basis, with contributions from families that do not exceed 10 percent of family income. This is in contrast to the current system in which CCFAP funding is not sufficient to reach all eligible families, leaving many without the ability to afford ECE at all, much less high-quality program options. The cost estimate also reflects the cost of care for high-quality ECE delivered by a well-compensated and well-supported ECE workforce. This is a sharp departure from the current system in which the ECE workforce is poorly compensated, making it challenging to recruit and retain well-qualified staff.

When deliberating further expansion of ECE subsidies, there are several key policy considerations: First, how high up the income ladder should subsidies go? Vermont already has one of the highest income thresholds for subsidy eligibility. Especially if funds are limited, it may be feasible to fully fund subsidies for the lowest-income families first and ensure that those eligible families access the benefit. Subsequent expansions could move the income threshold upward once the subsidy need is fully met at lower income levels.

Second, how generous should the subsidy schedule be? In recent years, policies have centered on a 10 percent cap on the share of family income devoted to child care costs or even a 7 percent cap. A careful look at various ways of determining what is affordable for families does not reach a clear conclusion (National Academies of Sciences, Engineering, and Medicine, 2018). However, even if family contributions were to increase at any given income level, the amount of cost offset is relatively small. This is because the per-child cost of ECE, especially for infants and toddlers, is so large relative to family income at the low end of the income ladder. Any effort to increase the family contribution at lower income levels may be counterproductive in discouraging the use of formal care options because they still remain unaffordable.

Third, the fiscal and economic analysis in this report demonstrates that there are feasible sources of stable revenue to fill the gap from an expansion of ECE subsidies to cover the cost of care for families with income up to 3.5 times poverty. Further expansion of subsidies to higher

income levels raises the size of the gap to be filled and is likely to require a more complex portfolio of revenue sources. Further, reliance on regressive sources of revenue may be less desirable when the policy is designed to benefit the lower-income population.

Appendix A. Additional Documentation for Chapter 2

This appendix provides additional documentation for analyses presented in Chapter 2.

Number of Children by Single-Year of Age

Given Vermont's relatively small population size, estimates of the population by single-year of age vary by source. Table A.1 reports the size of each annual cohort as of 2019 for children ages 0 through 5 according to the following sources: U.S. Census Bureau estimates based on the 2010 Census as reported by the Kids Count website (Annie E. Casey Foundation, undated); vintage 2019 state population estimates from the U.S. Census Bureau, Population Division (2021); and estimates of children in families based on the 2015–2019 American Community Survey five-year microdata files (U.S. Census Bureau, 2022b). The estimates show, as of 2019, a total of about 35,000 children ages 0 through 5, starting with about 5,500 children at age 0, reaching about 6,300 children by age 5. The one outlier is the set of estimates in the American Community Survey data, which reaches nearly the same overall total but has a smaller number of zero-year-olds and a relatively larger number of three-year-olds. Our analyses of the cost of a high-quality ECE system, described in Chapter 3, are based on the estimates in the American Community Survey to account for other characteristics of children by single year of age, including family type (single or two parents), family size, and family income relative to the federal poverty guidelines.

Table A.1. Estimated Number of Children Ages 0 Through 5 in Vermont by Single Year of Age, 2019

Indicator	Children by Single Year of Age (U.S. Census estimates)	Children by Single Year of Age (U.S. Census estimates)	Children by Single Year of Age (American Community Survey estimates)
Total	35,069	35,273	34,947
Less than age 1	5,444	5,579	5,108
Age 1	5,455	5,558	5,586
Age 2	5,876	5,922	5,881
Age 3	5,970	5,935	6,222
Age 4	6,073	6,049	5,868
Age 5	6,251	6,230	6,282

SOURCES: first column: Annie E. Casey Foundation, undated; second column; U.S. Census Bureau, Population Division, 2020; third column: authors' analysis of 2015–2019 American Community Survey Public Use Microdata Sample file for children in families.

Although the single-year age estimates in any year may display some variability, the Census Bureau estimates of the population ages 0 through 5 for Vermont are clear in showing a nearly 9 percent decline from 2010 to 2019 (U.S. Census Bureau, Population Division, 2021). Unpublished population projections for the state forecast a further 4 percent decline for this age group from 2020 to 2030.[28] A dip in the number of births in 2021, attributable to the COVID-19 pandemic, diminishes the size of the group overall until the 2021 birth cohort reaches the school-age years, but it is not yet evident that birth rates will rise beyond their prepandemic levels or that Vermont will experience an influx of families with young children exceeding recent trends. For this reason, the population estimates of young children for 2019 provide a reasonable basis for estimating the likely costs of high-quality ECE for at least the next decade.

Data from the American Community Survey also show the enrollment status of children age 3 and older (Table A.2), differentiating between nursery school or preschool and kindergarten.[29] Among three-year-olds in Vermont as of 2019, about 2,700 children (44 percent) were enrolled in preschool, a rate that reached 73 percent for four-year-olds. Among five-year-olds, about 43 percent were enrolled in kindergarten, and another 41 percent were reported to be in preschool. The preschool group is expected to include members of the cohort that would be eligible to enroll in kindergarten in the fall of 2019, along with other children in the same kindergarten entry cohort who are age 4 at the time of the survey. In some cases, parents of the five-year-olds, especially those with summer birth dates who are the youngest members of their kindergarten-entry cohort, may have elected to keep them in preschool for another year rather than enroll them in kindergarten as soon as they are age-eligible.

Table A.2. Estimated Number of Children Ages 0 Through 5 in Vermont by Single Year of Age and Enrollment Status, 2019

	Number			Participation Rate	
Age	Total	Enrolled in Preschool	Enrolled in Kindergarten	Preschool	Kindergarten
Less than age 1	5,108	—	—	—	—
Age 1	5,586	—	—	—	—
Age 2	5,881	—	—	—	—
Age 3	6,222	2,722	0	43.7	0.0
Age 4	5,868	4,294	117	73.2	2.0
Age 5	6,282	2,543	2,696	40.5	42.9

SOURCE: Authors' analysis of 2015–2019 American Community Survey Public Use Microdata Sample file for children in families.
NOTE: — = not applicable. The question about school enrollment is asked regarding children age 3 and older.

[28] These are unpublished population projections for Vermont, available from the Vermont Legislature Joint Fiscal Office upon request.

[29] The American Community Survey questionnaire refers to "nursery school/preschool" in its questions about school enrollment in the past three months and grade level attendance for all persons age 3 and older.

Given that the American Community Survey data do not allow us to define kindergarten-entry cohorts,[30] our estimates of the cost of a high-quality ECE system are based on the concept of kindergarten-entry cohorts using the population ages 0 through 4 to represent the size of the population of five annual cohorts, potentially in nonparental care, prior to kindergarten entry.

Parental Labor Supply

Published tabulations for the American Community Survey report the labor force status of adults ages 20 to 64 in Vermont by the presence and ages of their children (Table A.3). Given that more than 90 percent of men with dependent children of any age are in the labor force (Women's Bureau, U.S. Department of Labor, undated, "Labor Force Participation Rate of Mothers and Fathers by Age of Youngest Child" table), the focus is on the labor force status of mothers with dependent children. Women whose children are under age 6 have a labor force participation rate similar to all women ages 20 to 64 (82 percent versus 79 percent, respectively). The labor force participation is lower, about 72 percent, for women with both children ages 0 to 5 and ages 6 to 17. The 23,583 women with at least one child ages 0 to 5 make up about 6 percent of the potential workforce ages 20 to 64. Those who are not working (about 5,600 mothers) would increase the total state labor force by about 2 percent if they joined the nearly 300,000 adults ages 20 to 64 already in the Vermont labor force. These estimates, which are based on published tabulations, are consistent with the patterns found in the 2015–2019 American Community Survey microdata files that we rely on for our analyses.

Table A.3. Labor Force Status of Working-Age Adults in Vermont, 2019

Indicator	Total (*N*)	In the Labor Force (*N*)	Not in the Labor Force (*N*)	Labor Force Participation Rate (%)
Persons ages 20 to 64	369,376	298,456	70,920	80.8
Men ages 20 to 64	183,326	151,061	32,265	82.4
Women ages 20 to 64	186,050	147,538	38,512	79.3
With own children, 0 to 17	57,062	46,677	10,385	81.8
With own children, 0 to 5 only	13,283	10,520	2,763	79.2
With own children, 0 to 5 and 6 to 17	10,300	7,426	2,874	72.1
With own children, 6 to 17 only	33,479	28,758	4,721	85.9

SOURCE: 2019 American Community Survey, five-year estimates, Table S2301 (U.S. Census Bureau, undated).

[30] We are not able to define kindergarten-entry cohorts using the American Community Survey because we do not know the birth months of children in the data.

Use of CCFAP over Time

The Child Development Division of the Agency of Human Service provided data on the use of CCFAP subsidies for Vermont state fiscal years 2017–2018 through 2021–2022. Our main analyses use data from state fiscal year 2018–2019 because some sources have not been updated since the onset of the COVID-19 pandemic. Further, patterns of usage in state fiscal years 2020–2021 and 2021–2022 are likely not representative of future CCFAP usage, as those two years saw acute disruptions to the educational system that are likely to at least be partially ameliorated by adapting to a context in which COVID-19 is endemic to the population. Nevertheless, we provide summaries of the CCFAP usage over time to understand how patterns of use changed as the pandemic arose.

CCFAP Usage over Time

Table A.4 presents CCFAP usage in terms of total subsidy outlays in a state fiscal year, the number of unique children and families receiving CCFAP subsidies, the number of unique children per family receiving subsidies, and the average subsidy received by each family and child. For each of these statistics, consider the entire population of recipients and the subgroup of families that have at least one child not yet in kindergarten and the subset of children not yet in kindergarten.

Looking at the total subsidy outlays, disbursements increased from state fiscal year 2017–2018 to 2019–2020 before decreasing in state fiscal year 2020–2021 and rebounding to pre-pandemic levels in state fiscal year 2021–2022. Among all families, the state disbursed between $41.3 million and $47.5 million before state fiscal year 2020–2021, it decreased to $34.4 million in state fiscal year 2020–2021 and rebounded to $43.5 million in state fiscal year 2021–2022. The smaller total subsidy in state fiscal year 2020–2021 may be related to the pandemic and the widespread school closures that year due to lockdown restrictions. The same pattern is seen when restricting the subsidy outlays to just children not yet in kindergarten. That subsample accounted for about 70 percent to 75 percent of the total subsidy outlays.

Table A.4. Trends in CCFAP Subsidy Receipt in Vermont over Time for All Families and Children and Families with at Least One Child Not Yet in Kindergarten, State Fiscal Years 2017–2018 Through 2021–2022

	State Fiscal Year				
Usage	**2017–2018**	**2018–2019**	**2019–2020**	**2020–2021**	**2021–2022**
Total subsidies received, children not yet in kindergarten	$29,382,840	$35,024,428	$34,581,616	$24,827,120	$32,987,074
Total subsidies received, all families	$41,348,620	$47,587,444	$46,584,192	$34,367,364	$43,550,940
Unique children not yet in kindergarten	6,162	6,970	6,136	5,025	4,908
Unique children, all children	11,466	11,152	12,509	8,724	9,003
Unique families, at least one child not yet in kindergarten	5,624	6,014	5,744	4,454	4,970
Unique families, all families	8,764	8,472	9,565	6,556	6,737
Unique children per family, families with at least one child not yet in kindergarten	1.1	1.2	1.1	1.1	1.0
Unique children per family, all families	1.3	1.3	1.3	1.3	1.3
Monthly average of children not yet in kindergarten	4,302	4,044	4,097	3,494	3,473
Monthly average of children, all children	7,267	7,128	6,957	5,623	5,644
Monthly average of families, at least one child not yet in kindergarten	3,767	3,497	3,516	2,980	2,984
Monthly average of families, all families	5,475	5,300	5,167	4,162	4,213
Average family subsidy, families with at least one child not yet in kindergarten	$4,297	$6,284	$6,023	$5,596	$7,144
Average family subsidy, all families	$3,736	$5,248	$4,568	$4,939	$6,059
Average child subsidy, children not yet in kindergarten	$4,650	$5,620	$5,184	$4,844	$6,336
Average child subsidy, all children	$3,497	$4,106	$3,568	$3,835	$4,725

SOURCE: Authors' tabulations from Vermont Child Development Division CCFAP monthly records of subsidy receipt provided to RAND.
NOTE: Calculations are by Vermont state fiscal year, which runs from July through June. Average subsidies are in dollars of the state fiscal year.

Looking at the number of unique children and families in the CCFAP system, we see steady or increasing enrollments between state fiscal year 2017–2018 and state fiscal year 2019–2020 and a decrease in enrollment in state fiscal year 2020–2021 that persists in state fiscal year 2021–2022. The total number of unique children in the system ranged between 11,466 (state fiscal year 2017–2018) and 12,509 (state fiscal year 2019–2020), before dropping about 30 percent to 8,724 children in state fiscal year 2020–2021. The same pattern is seen when restricting the sample to children who are not yet in kindergarten. However, the decrease in enrollment in state fiscal year 2020–2021 (5,025 children) is only 18 percent of the prior state fiscal year enrollment (6,136 children), which implies that there was a larger decrease in enrollment in after-school services provided to school-age children compared with ECE services for children not yet in kindergarten. The lower number of children in the subsidy system in state fiscal year 2020–2021 is commensurate with the lower amount of subsidy outlays that year.

The patterns seen in unique children in the CCFAP system are also seen in the number of unique families in the system. Enrollments stay steady or increased before seeing a decrease in state fiscal year 2020–2021 that persisted through state fiscal year 2021–2022. The decrease in enrollment that year, compared with the previous year, was about 31 percent among all families and 22 percent among families with at least one child not yet eligible for kindergarten. These patterns are commensurate with families with older children leaving the system at greater rates during the pandemic and with the lower amount of subsidy outlays in state fiscal year 2020–2021. However, the average number of children per family in the system remained stable throughout the entire period. Among all families, the average child per family remained 1.3 each state fiscal year. Among families with at least one child that is not yet in kindergarten, the ratio fluctuated between 1.2 and 1.0 children. The stability of these ratio indicates that, to the extent there was fewer enrollment in state fiscal year 2020–2021, families of different sizes were not leaving the system.

Finally, the average subsidy per family and child was fairly stable through state fiscal year 2020–2021 but increased during state fiscal year 2021–2022. For example, the average family subsidy for families with at least one child not yet in kindergarten was between $4,297 and $5,596 though state fiscal year 2020–2021. During state fiscal year 2021–2022, the average family subsidy increased to $7,144. At the child level, the analogous subsidies were between $4,650 and $5,620 prior to the pandemic and $6,336 during state fiscal year 2021–2022. The larger per-child increase implies that higher-income families may have left the system at disproportionate rates because the subsidy system is designed to provide larger subsidies to lower-income families.

Distribution of Family Size in CCFAP over Time

Table A.5 presents the distribution of family size in the CCFAP system over time. Specifically, the table presents the percentage of families with each number of children within a

state fiscal year for all families, and it restricts the sample to families with at least one child who is not yet in kindergarten. In each case the largest share of families receiving subsidies are families with one child. The share of families continuously decreases with each additional child. Families with two children or less represent about 90 percent of the sample, and families with three or more children represent only about 10 percent of the sample. Between state fiscal year 2017–2018 and state fiscal years 2010–2021, the share of families with just one child remains generally stable. However, in state fiscal year 2021–2022, the share of one-child families decreased substantially, and the share of larger families, particularly those with two children, saw a corresponding increase. This pattern implies that families with more than one child were more likely to leave the subsidy system after the pandemic.

Table A.5. Percentage of Families in CCFAP System over Time by Number of Children, State Fiscal Years 2017–2018 Through 2021–2022

	Percentage of Families by Total Number of Children					
State Fiscal Year	**1**	**2**	**3**	**4**	**5**	**6+**
Families with children not yet eligible for kindergarten						
2017–2018	68.8	23.0	6.7	1.3	0.1	0.1
2018–2019	67.2	24.4	6.7	1.3	0.2	0.1
2019–2020	60.3	27.8	8.5	2.5	0.7	0.3
2020–2021	67.7	24.2	6.2	1.5	0.2	0.2
2021–2022	28.2	46.2	14.7	7.3	2.5	1.1
All families						
2017–2018	71.0	22.1	5.7	1.0	0.1	0.0
2018–2019	70.5	22.4	5.7	1.1	0.2	0.1
2019–2020	65.4	25.1	7.0	1.8	0.5	0.2
2020–2021	70.4	22.7	5.4	1.2	0.2	0.1
2021–2022	31.7	45.6	13.5	6.3	2.0	0.9

SOURCE: Authors' tabulations from Vermont Child Development Division CCFAP monthly records of subsidy receipt provided to RAND.
NOTE: Vermont state fiscal years run from July through June. Percentage distributions in a row might not add to 100 because of rounding.

Distribution of Average CCFAP Subsidy over Time

Table A.6 presents the distribution of subsidies by size for each state fiscal year. Specifically, we present the 10th, 25th, 50th, 75th, 90th, and 99th percentiles of the average subsidy received per family and child for the overall sample and the subsample of families with children not yet in kindergarten. The *X*th percentile indicates that *X* percent of families (or children) received that

size subsidy or less. For example, the 10th percentile indicates the maximum subsidy that encompasses the bottom 10 percent of families (or children), while the 50th percentile indicates the maximum subsidy that the bottom 50 percent of families (or children) received.

Table A.6 indicates that the variation in subsidies is large, with the 99th-percentile subsidy on average about 53 times as large as the 10th-percentile subsidy. Between state fiscal years 2017–2018 and 2021–2022, the average subsidy increased at all percentiles, although larger increases in percentage terms are seen in the 10th and 25th percentiles compared with the higher percentiles. Particularly large increases for most of the distribution are also seen in state fiscal year 2021–2022, commensurate with the large increase in average subsidy seen in state fiscal year 2021–2022 in Table A.4.

Table A.6. Percentiles of Distribution of Average Subsidy per Family, State Fiscal Years 2017–2018 Through 2021–2022

	Percentile of Distribution					
State Fiscal Year	**10th**	**25th**	**50th**	**75th**	**90th**	**99th**
Average subsidy per family, families with at least one child not yet eligible for kindergarten						
2017–2018	$619	$1,648	$3,909	$6,344	$8,366	$29,293
2018–2019	$744	$2,280	$5,600	$9,176	$12,947	$45,182
2019–2020	$599	$1,922	$5,465	$9,095	$11,893	$39,749
2020–2021	$829	$2,178	$4,943	$8,016	$11,242	$36,504
2021–2022	$1,146	$2,811	$6,214	$10,450	$14,118	$52,105
Average subsidy per family, all families						
2017–2018	$477	$1,219	$2,941	$5,574	$8,066	$29,293
2018–2019	$521	$1,486	$4,016	$7,971	$11,980	$45,182
2019–2020	$286	$785	$3,264	$7,359	$10,875	$39,749
2020–2021	$693	$1,732	$3,931	$7,179	$10,709	$36,504
2021–2022	$854	$1,950	$4,704	$8,994	$13,244	$52,105
Average subsidy per child, children not yet eligible for kindergarten						
2017–2018	$594	$1,934	$4,753	$7,169	$8,781	$18,006
2018–2019	$736	$2,334	$5,516	$8,595	$10,868	$21,382
2019–2020	$388	$1,664	$5,182	$8,528	$10,220	$17,539
2020–2021	$787	$2,183	$4,804	$7,332	$9,210	$18,138
2021–2022	$1,072	$2,787	$6,112	$9,774	$12,075	$22,501
Average subsidy per child, all children						
2017–2018	$388	$1,157	$2,991	$5,419	$7,968	$18,006
2018–2019	$388	$1,200	$3,367	$6,313	$9,517	$21,382
2019–2020	$205	$639	$2,746	$5,799	$9,228	$17,539
2020–2021	$560	$1,434	$3,204	$5,932	$8,349	$18,138
2021–2022	$651	$1,529	$3,827	$7,255	$10,989	$22,501

SOURCE: Authors' tabulations from Vermont Child Development Division CCFAP monthly records of subsidy receipt provided to RAND.
NOTE: Calculations are for Vermont state fiscal year, which runs from July through June.

Appendix B. Additional Documentation for Chapter 3

This appendix provides additional documentation and methods detail for the analyses presented in Chapter 3.

Method for Estimating Hourly Cost of Care

The cost model relies on a number of assumptions regarding the staff model for an ECE program, the structure of staff compensation, and other unit prices.[31] We detail those assumptions here.

Center Configurations

Given the potential for economies of scale, we separately model centers at three sizes with different configurations of children across age groups, as shown in Table B.1. All centers are assumed to operate for ten hours per day—to allow for early drop-off and an extended day for working parents—and for 52 weeks per year.

Table B.1. Assumed Center Configurations for Cost Modeling

	Number of Children by Age Group (as of September)					
Center Size	**0-Year-Olds**	**1-Year-Olds**	**2-Year-Olds**	**3-Year-Olds**	**4-Year-Olds**	**Total**
Small	4	4	10	10	10	38
Medium	8	8	20	20	20	76
Large	8	8	20	40	40	116

NOTE: Children are assumed to be assigned to age groups by kindergarten-entry cohorts. For example, four-year-olds are all age 4 as of September 1 of the year before they are eligible for kindergarten entry, assuming a September 1 cutoff for determining kindergarten eligibility. The actual cutoff date for kindergarten entry may vary across school districts, given that there is no uniform birth date cutoff in Vermont.

Staffing Model and Staff Compensation

Table B.2 summarizes the staffing model assumed for center and FCCH settings—both staff at the classroom level and staff at the site level. Staff are shown as full-time-equivalent positions. At the classroom level within centers, we assume two full-time-equivalent staff per room, designated as a lead teacher and an assistant teacher. To allow for planning time, professional development, and other noncontact time with children (e.g., planning for and holding parent conferences), we assume 1.25 additional full-time-equivalent staff (i.e., these hours may be filled

[31] This documentation draws on similar detail provided in prior RAND studies using model-based estimates of the cost of care, including Karoly and Walsh (2020) and Karoly et al. (2021).

by several part-time staff) to fill in for the classroom staff when on a break, during their planning time, or when engaged in professional development. These staff hours would also be used to cover the early drop-off or extended-day periods. Compensation for these classroom staff follows the salary scale (using the assumed median value) presented in Table 3.2 (see the last column of Table B.2), in which we assume that high-quality programs require ECE level III staff as lead teachers and ECE level II staff for classroom assistants. These compensation amounts are the same across provider types, sizes, and classroom age groups. A similar set of assumptions applies in the small and large FCCHs, with the owner-operator serving as one staff member (ECE level III) and an assistant staff member (ECE level II) in the case of the large FCCH. A substitute 0.4 full-time-equivalent staff person is also assumed in both the small and large FCCHs.

Table B.2 also shows the assumed staffing levels and salaries for center administrative staff positions (which are not applicable for FCCHs). All centers, regardless of size, are assumed to have a full-time director. The medium and larger centers are also staffed with a part-time associate director who might have a pedagogical role—for example, as a curriculum coordinator. A part-time office manager is assumed for all centers, along with a full-time administrative assistant. The staff holding part-time administrative positions may work full-time across two or more centers in a shared-services approach. The assumed salary levels are tied to the classroom staff salary scale, with higher salaries for the director relative a lead classroom teacher, given the added responsibilities.

Table B.2. Assumed Baseline Full-Time-Equivalent Staffing Structure and Staff Annual Salary for Cost Model

	Full-Time-Equivalent Staffing Structure				Annual Salary (2022 $)
Staff Role	Small Center	Medium Center	Large Center	FCCH	
Classroom/group staff, per classroom /group					
Lead teacher/FCCH owner (ECE level III)	1	1	1	1	69,420
Assistant teacher (ECE level II)	1	1	1	1[a]	46,553
Floater/substitute/extended day (uncredentialed)	1.25	1.25	1.25	0.4	37,998
Center administrative staff, per site					
Center director	1	1	1	0	78,294
Center associate director/ curriculum coordinator	0	0.25	0.5	0	69,420
Center office manager	0.35	0.5	0.5	0	52,065
Center administrative assistant	1	1	1	0	37,998

SOURCE: Authors' assumptions. See Table 3.2 for the classroom and group staff annual salary.
[a] Not included in a small FCCH.

Unit Prices

Table B.3 displays the cost per unit beyond classroom and administrative staff. Unit prices, in 2022 dollars, are organized according to major cost categories of professional development, classroom resources, meals, transportation, occupancy, and other operating costs. In most of these categories, there are cost subcomponents. Unit costs are denominated on a per-staff, per-child, per-square foot, or per-site basis, as shown in the last column of Table B.3. These unit costs include associated staffing costs, as relevant, such as meal preparers in the case of food costs and drivers in the case of transportation costs. The cost model assumes a not-for-profit provider and does not include an allowance for a profit.

Table B.3. Assumed Unit Prices for Cost Model (2022 dollars)

Cost Component	Values	Unit
Professional development	229.88	Per staff
Classroom materials and supplies		
Education equipment, curricula	127.59	Per child
Education supplies	159.77	Per child
Meals		
Food and food preparation	1,659.80	Per child
Kitchen supplies	63.22	Per child
Transportation	469.70	Per child
Occupancy		
Rent, lease, mortgage	18.40	Per square foot
Utilities	4.63	Per square foot
Building insurance	2.30	Per square foot
Maintenance, repair, cleaning	4.71	Per square foot
Other operating costs		
Office and medical supplies	127.59	Per child
Office equipment	64.36	Per child
Insurance (e.g., liability, accident)	143.68	Per child
Curricular, assessment, screening	82.76	Per child
Advertising	26.44	Per child
Telephone and internet	5,873.66	Per site
Transportation	289.25	Per site
Audit and legal fees	3,916.16	Per site
Fees and permits, licensing, accreditation	2,781.66	Per site
Professional memberships	80.46	Per child

The unit cost estimates in Table B.3 are based on the Provider Cost of Quality Calculator estimates at the national level (Office of Child Care, undated). Unit costs for Vermont are inflated or deflated relative to the national estimates on basis of the regional price parity index (Bureau of Economic Analysis, 2021). That index shows that the price level in Vermont is about the same as the national level.

Determination of Elasticities

Review of the Literature

Three elasticities were used to estimate anticipated behavioral changes stemming from an increase in subsidies for ECE in Vermont: (1) changes in parental employment with respect to ECE cost, (2) changes in ECE care use with respect to ECE cost, and (3) changes in ECE labor force participation with respect to ECE wages. We derived estimates for each elasticity through a thorough literature review.

The literature review began with a recent and related study by Borowsky et al. (2022), which sought to estimate the effects of adopting more-generous ECE funding policies, including the policy proposed in the Build Back Better Act, which was not enacted. Borowsky et al. (2022) undertook a literature review to estimate the same three elasticities. We therefore began by reviewing the studies contained in that literature review.

Additionally, we conducted our own literature search to ensure that more-recent studies are included. We searched Google Scholar and combined a series of search terms that included a "prefix" of "early childhood," "prekindergarten," or "preschool," with a "suffix" of "elasticities," "labor force participation elasticities," "maternal labor force participation elasticities," "elasticity with respect to labor force participation," "elasticity of care choice with respect to cost," "elasticity of care type with respect to cost," "elasticity of use with respect to cost," "labor with respect to wages," or "labor supply with respect to wages." All combinations of prefixes and suffixes were searched. For each new study we found, we analyzed the references to ensure that we captured any relevant studies referenced.

We found 29 studies that provided 108 elasticity estimates, with many studies providing either several different elasticity estimates or estimates of the same elasticity for different subpopulations (e.g., single mothers versus two-adult households, elasticities by education or poverty level). Table B.4 presents the studies included in our review, the elasticity type(s) estimated in each study, and the range of elasticities from each study. Because studies used different types of policy changes or policy features to estimate elasticities, we specify whether the elasticity was derived from a change in cost, subsidy, or availability of ECE services. In addition to looking at elasticities specific to early childhood education, we looked at elasticities derived from adjacent education sectors, such as the institution of kindergarten in the United States and teacher labor elasticities in the K–12 sector.

The majority of studies combined survey data with a discrete choice model to estimate various elasticities. A minority of studies leveraged an experimental or quasi-experimental approach. We do not privilege studies based on methodology, given the relative lack of variation along this dimension. Instead, we parsed results by the year of the data analyzed and the population served. Studies using more-recent data were prioritized, as were studies that included data from the United States or disaggregated results by subgroups of interest. More detail on elasticity selection is given in the next section.

Table B.4. Studies in Literature Review of Elasticities

Authors	Year	Title	(Range of) Values
Parental Employment with Respect to ECE Cost			
Averett, Peters, and Waldman	1997	"Tax Credits, Labor Supply, and Child Care"	–0.78
Baker, Gruber, and Milligan	2008	"Universal Child Care, Maternal Labor Supply, and Family Well-Being"	–0.24
Blau and Currie	2006	"Preschool, Day Care, and Afterschool Care: Who's Minding the Kids?"	–3.6 to 0.06
Borowsky et al.	2022	"An Equilibrium Model of the Impact of Increased Public Investment in Early Childhood Education"	–0.65 to –0.35
Chaparro, Sojourner, and Wiswall	2020	"Early Childhood Care and Cognitive Development,"	–0.39
Cleveland, Gunderson, and Hyatt	1996	"Child Care Costs and the Employment Decision of Women: Canadian Evidence"	–0.388
Herbst	2010	"The Labor Supply Effects of Child Care Costs and Wages in the Presence of Subsidies and the Earned Income Tax Credit"	–0.05
Morrisey	2017	"Child Care and Parent Labor Force Participation: A Review of the Literature"	–1.1 to –0.025
Tekin	2007	"Childcare Subsidies, Wages, and Employment of Single Mothers"	–0.121 to –0.068
Parental Employment with Respect to ECE Availability			
Cascio	2007	"Maternal Labor Supply and the Introduction of Kindergartens into American Public Schools"	–0.79 to –0.22
Cascio and Schanzenbach	2013	"The Impacts of Expanding Access to High-Quality Preschool Education"	0 to 2–3 percentage points more likely to work
Dhuey, Lamontagne, and Zhang	2020	"Full-Day Kindergarten: Effects on Maternal Labor Supply"	0 and 2 hours more per week and 5.8 percentage points less absent
Fitzpatrick	2010	"Preschoolers Enrolled and Mothers at Work? The Effects of Universal Prekindergarten"	0
Fitzpatrick	2012	"Revising Our Thinking About the Relationship Between Maternal Labor Supply and Preschool"	0 to 15.8 to 19.2 percentage points more work
Illin, Shampine, and Terry	2022	"Does Access to Free Pre-Kindergarten Increase Maternal Labor Supply?"	0 to 3.2 to 4.9 percentage points more work
Sabol and Chase-Lansdale	2015	"The Influence of Low-Income Children's Participation in Head Start on Their Parents' Education and Employment"	0
Sall	2014	"Maternal Labor Supply and the Availability of Public Pre-K: Evidence from the Introduction of Prekindergarten into American Public Schools"	0.73

Authors	Year	Title	(Range of) Values
ECE Labor with Respect to Wages			
Asai and Jibiki	2021	“An Analysis of Labor Supply of Childcare Providers”	2.7
Azar, Berry, and Marinescu	2022	“Estimating Labor Market Power”	0.5
Blau	1993	"The Supply of Child Care”	1.9
Blau and Currie	2006	“Preschool, Day Care, and Afterschool Care: Who’s Minding the Kids?”	1.15
Borowsky et al.	2022	“An Equilibrium Model of the Impact of Increased Public Investment in Early Childhood Education”	2 to 4
K–12 Labor with Respect to Wages			
Ransom and Sims	2010	“Estimating the Firm’s Labor Supply Curve in a ‘New Monopsony’ Framework: Schoolteachers in Missouri”	3.03 to 4.45
Rothstein	2015	“Teacher Quality Policy When Supply Matters”	Assumes 1
Sokolova and Sorenson	2020	“Monopsony in Labor Markets: A Meta-Analysis”	3.08 to 5.07
Webber	2016	“Firm-Level Monopsony and the Gender Pay Gap”	0.9
ECE Choices with Respect to Cost			
Blau and Hagy	1998	“The Demand for Quality in Child Care”	–0.34 to –0.12
Chaparro, Sojourner, and Wiswall	2020	“Early Childhood Care and Cognitive Development”	–0.43
Cleveland, Gunderson, and Hyatt	1996	“Child Care Costs and the Employment Decision of Women: Canadian Evidence”	–1.056
Michalopoulos and Robins	2000	“Employment and Child-Care Choices in Canada and the United States”	–1
Powell	2002	“Joint Labor Supply and Childcare Choice Decisions of Married Mothers”	–3.6 to –0.8
Tekin	2007	“Childcare Subsidies, Wages, and Employment of Single Mothers”	–0.47
ECE Choices with Respect to Subsidy			
Baker, Gruber, and Milligan	2008	“Universal Child Care, Maternal Labor Supply, and Family Well-Being”	0.58
Michalopoulos and Robins	2000	“Employment and Child-Care Choices in Canada and the United States”	0.016 to 0.323

Choice of Elasticity Values

There is a robust literature estimating the elasticity of parental employment with respect to the cost of ECE services. The literature has estimated elasticities based on family structure (e.g., single mother and two-adult households), education (i.e., with and without a bachelor's degree), income level, full- or part-time work, and the age of the youngest child. A limitation of these estimates, however, is that the majority is derived from data in the early 2000s and before, and estimates using older data tend to show larger elasticities (in absolute value) than estimates using more-recent data. Further, Vermont has about 36,000 children who are less than six years old, of which 9,000 are already in pre-K. The population in Vermont that may change employment decisions based on ECE cost is relatively small, and by extension the number of families in each subgroup will be even smaller. In this context, attempting to build a more nuanced model that can account for heterogeneity in behavioral responses by household and individual characteristics will likely provide only marginal improvements to our estimates. We therefore concentrate on using an overall elasticity, with robustness checks at different values.

We take two approaches to understand the expected change in workforce participation. First, we use an elasticity of 0.15 on the full sample, as this number is the midpoint of the more recent literature. We also apply an elasticity of 0.35 to understand the sensitivity of this approach to higher elasticities. Results do not differ enough to affect inferences due to the relatively small underlying target population of adults with young children and not currently in the workforce. Second, since the population that is most likely to be affected by the policy change is low-income women (we define *low income* by the CCFAP subsidy program that reaches families earning less than 3.5 times poverty), we concentrate on this population and apply elasticities of 0.35 and 0.50. We use the larger elasticities because the literature indicates that low-income women have larger elasticities than the population as a whole.

The literature on elasticities of ECE choices with respect to costs and subsidies is less developed. Only seven studies provided estimates, with four based on estimates wholly or in part from Canada. In choosing our estimates, we privilege studies that contain at least some data from the United States and estimate elasticities with increasing costs as opposed to increasing subsidies. After accounting for different types of ECE settings, we were often left with one estimate of the elasticity. In the end, we use the elasticities found in Table B.5.

Table B.5. Elasticities Used for ECE Use with Respect to Cost

	Two-Adult Household	Single-Mother Household
All care	–0.25	–0.47
Center	–0.24	–0.45
Nonrelative	–0.12	–0.23
Relative	–0.34	–0.64

Table B.6 shows the assumptions, by child age, of the percentage of children in any nonparental care and the average hours of care use in center- and home-based settings. These assumptions draw on the estimate of care use patterns for Vermont using the 2019 National Survey of Early Care and Education (Datta et al., 2019) and the elasticities listed in Table B.5 (and are also consistent with National Academies of Sciences, Engineering, and Medicine, 2018).

Table B.6. Assumed Use of ECE by Child Age for Cost Modeling

Indicator	0-Year-Olds	1-Year-Olds	2-Year-Olds	3-Year-Olds	4-Year-Olds
Percentage using any nonparental care	70	75	80	85	90
Average number of hours of care among all children					
Center based	13	19	21	25	28
Home based	17	14	13	11	9

Appendix C. Additional Documentation for Chapter 4

Within economics, there are generally two models employed to estimate the economic impact of policy changes in an economy-wide approach: input-output models and computable general equilibrium models. Essentially, input-output models view firms and households as having recipes by which they consume or produce, and there is very little impact of price changes on behavior. When making a recipe in the kitchen, to double the amount of cookies, we have to double the amount of all the ingredients. This is how input-output models view the world. They were first developed by Wassily Leontief, for which he was awarded the Nobel Memorial Prize in Economic Sciences in 1973 ("The Official Announcement of the Royal Academy of Sciences," 1973). The second approach commonly used to estimate regional economic impacts, computable general equilibrium models, generalizes the ideas of input-output models to allow greater flexibility in both production and consumption, such that households and firms respond to prices. For example, if apples become relatively more expensive, households may choose to consume more bananas. Similarly, if wages increase, firms may substitute toward more capital to minimize the cost of production. As compared with input-output models, the ability to consider changes in relative prices in very important when considering fiscal impacts, as changes in tax rates on goods or services or factors of production have impacts on prices.

Although we use both models, we use them in very different ways. Our concentration for the fiscal impacts of ECE funding is done primarily with a computable general equilibrium model, whereas when we focus on labor force participation, we generally use an input-output model to better characterize the spending patterns across household types. The input-output model can be viewed as a special case of the computable general equilibrium model, with a specific parameterization that gives the recipe approach rather than the more flexible substitution approach found in computable general equilibrium models. Importantly, the underlying data for both models are the same.

The main underlying assumptions of both models is that Vermont is a small, open economy, meaning that the activities in Vermont are unlikely to affect world prices. That is, if local prices change, there is an outside option for entities to consider: relying on imports from either domestic or foreign sources. Given Vermont's gross state product in 2021 of approximately $37 billion and the general openness to trade of the United States, this is a grounded assumption (Bureau of Economic Analysis, 2022). Additionally, we are assuming that the Vermont economy is in an equilibrium before changes to ECE policy. Further, once the policy is fully implemented, there is a new equilibrium within the Vermont economy. The phase-in process also assumes yearly equilibrium as the ECE policy evolves to full implementation. That is, the transition dynamics are a series of annual equilibrium.

The underlying data from both models are from IMPLAN. IMPLAN downscales data available from the Bureau of Economic Analysis to allow analysis of disaggregate sectors at state, county, zip code, and congressional district levels. We use the state-level data for Vermont and employ the IMPLAN software for the input-output model. IMPLAN has been the industry standard since the 1990s for evaluating regional economic impacts. Our main use of the IMPLAN input-output model is to explore the impacts of increases in labor force participation outside the ECE sector that would directly correspond to increases in gross state product.

Our approach for the development of a computable general equilibrium model of the economy of Vermont builds off the work of Strong and Welburn (2020), Strong et al. (2022), Sue Wing (2007), Rausch and Rutherford (2008), and Nadreau (2015). Our approach is to calibrate a model of the economy of Vermont that incorporates different taxing mechanisms that can be used to augment state revenue to cover the gap between current funding levels and estimated funding levels for a high-quality system. According to the estimates from Chapter 3, we are likely to see significant changes to the tax structure to fund the ECE subsidies. These nonmarginal changes will have behavioral consequences for both households and firms outside the ECE sector. These general equilibrium effects are important to capture because they allow us to better understand the welfare impacts on households of fiscal changes. If we were to focus on a sector-by-sector approach, we would lose these interactions and substitution effects.

Model Specification

Our model description borrows heavily from Strong et al. (2022), as the underlying model assumptions are the same.

The Firm's Problem

In developing our calculation, we modeled the production in each sector as a representative firm that has chosen its output to maximize profit at a given price. In our model, firms are assumed to be perfectly competitive. The production process follows a nested, constant elasticity of substitution function. Our nesting structure combines capital and labor in one nest and intermediate inputs in another nest. At the top level, the techno-labor composite is combined with the materials composite using Leontief technology. The materials composite uses a constant elasticity of substitution technology to combine the intermediate inputs using an inelastic technology. The techno-labor composite combines capital and labor using a Cobb-Douglas technology by taking advantage of the capital-to-labor ratios that are implied by the underlying data, such that each sector has separate capital-labor shares.

The Consumer's Problem

The consumer's problem is quite similar to the firm's problem. We assumed that a representative household maximizes utility, receiving income from the factors of production

(capital and labor), net sales of exports, transfer payments from the federal, state, or local governments, and investments in inventory. We assumed that the utility function is simply a Cobb-Douglas utility function, calibrated to the consumption data in the IMPLAN data. We normalized the amount of labor and capital to the 2019 levels:

$$U_{it} = \sum_i \alpha_i \ln (D_{it}),$$

where α_i is the budget share of good *i* in the benchmark data and D_{it} is household demand for good *i* in time period *t*.

Equilibrium

We calibrate the model to the initial conditions defined by the social accounting matrix produced from the IMPLAN data. The social accounting matrix includes not only the baseline production inputs but also the consumption inputs and links between ownership of factors of production, such as capital and labor. The static model was written in the General Algebraic Modeling System using the Mathematical Programming System for General Equilibrium subsystem and uses the PATH solver. An equilibrium is characterized by a set of goods and factor prices together with market clearing levels of production and consumption. In equilibrium, there may be imported factors, and the aggregate demand shocks to the system from the recovery efforts may be too large for the factor endowments to absorb. Given the assumption of a small open economy, this does not pose a problem.

Fiscal Impacts

To model the impact of different taxes on government revenue, there are two approaches, depending on the type of tax. All of the sales taxes, including for bottled and canned soft drinks and general sales tax, hospitality tax, and services taxes, are introduced when households consume the good or service. That is, the tax affects the final price paid by the consumer and not the amount of income received by the producer. Since the price is higher than the baseline price, the utility function will induce less consumption, all else equal. For the payroll tax, it is applied to an input of production rather than on an output. Therefore, the tax will affect the level of that input and correspondingly the price in equilibrium.

Our approach is to apply each of the taxes such that the revenue from the tax goes to the state and local government education entity. We adjust the tax rates based on the subsidy schedule and time within the phase in process to achieve increased revenue equivalent to the level of the gap between current and funding need for that subsidy schedule's phase-in period. We do these as a series of comparative statics.

Results for Additional Subsidy Schedules

Tables C.1 to C.5 provide results that correspond to subsidy schedules 1 to 5. Note that the results for schedule 2 in Table C.2 were presented in Chapter 4 (see Table 4.4).

Table C.1. Estimated Tax Rates Under Alternative Financing Instruments for Subsidy Schedule 1

Phase-in Stage	Gap ($ millions, 2022)	Payroll Tax	Sales Tax	Limited Services Tax	Extended Services Tax	Option 5	Option 6
25%	64	0.28%	0.65%	3.06%	2.23%	Soda: 15% Hospitality: 1% Payroll: 0.09%	Soda: 15% Hospitality: 1% Sales: 0.20%
50%	128	0.56%	1.30%	6.31%	4.56%	Soda: 15% Hospitality: 1% Payroll: 0.37%	Soda: 15% Hospitality: 1% Sales: 0.85%
75%	192	0.84%	1.96%	9.77%	7.00%	Soda: 15% Hospitality: 1% Payroll: 0.65%	Soda: 15% Hospitality: 1% Sales: 1.50%
100%	255	1.13%	2.62%	13.50%	9.60%	Soda: 15% Hospitality: 1% Payroll: 0.93%	Soda: 15% Hospitality: 1% Sales: 2.16%

Table C.2. Estimated Tax Rates Under Alternative Financing Instruments for Subsidy Schedule 2

Phase-in Stage	Gap ($ millions, 2022)	Payroll Tax	Sales Tax	Limited Services Tax	Extended Services Tax	Option 5	Option 6
25%	65	0.29%	0.66%	3.09%	2.25%	Soda: 15% Hospitality: 1% Payroll: 0.09%	Soda: 15% Hospitality: 1% Sales: 0.21%
50%	129	0.57%	1.32%	6.37%	4.61%	Soda: 15% Hospitality: 1% Payroll: 0.37%	Soda: 15% Hospitality: 1% Sales: 0.86%
75%	194	0.86%	1.98%	9.87%	7.07%	Soda: 15% Hospitality: 1% Payroll 0.66%	Soda: 15% Hospitality: 1% Sales: 1.52%
100%	258	1.14%	2.64%	13.60%	9.65%	Soda: 15% Hospitality: 1% Payroll: 0.94%	Soda: 15% Hospitality: 1% Sales: 2.18%

Table C.3. Estimated Tax Rates Under Alternative Financing Instruments for Subsidy Schedule 3

Phase-in Stage	Gap ($ millions, 2022)	Payroll Tax	Sales Tax	Limited Services Tax	Extended Services Tax	Option 5	Option 6
25%	68	0.30%	0.70%	3.28%	2.39%	Soda: 15% Hospitality: 1% Payroll: 0.11%	Soda: 15% Hospitality: 1% Sales: 024%
50%	137	0.60%	1.39%	6.77%	4.89%	Soda: 15% Hospitality: 1% Payroll: 0.41%	Soda: 15% Hospitality: 1% Sales: 0.94%
75%	205	0.90%	2.10%	10.50%	7.51%	Soda: 15% Hospitality: 1% Payroll: 0.71%	Soda: 15% Hospitality: 1% Sales: 1.63%
100%	272	1.21%	2.80%	14.51%	10.27%	Soda: 15% Hospitality: 1% Payroll: 1.01%	Soda: 15% Hospitality: 1% Sales: 2.33%

Table C.4. Estimated Tax Rates Under Alternative Financing Instruments for Subsidy Schedule 4

Phase-in Stage	Gap ($ millions, 2022)	Payroll Tax	Sales Tax	Limited Services Tax	Extended Services Tax	Option 5	Option 6
25%	67	0.30%	0.69%	3.23%	2.36%	Soda: 15% Hospitality: 1% Payroll: 0.10%	Soda: 15% Hospitality: 1% Sales: 0.23%
50%	135	0.60%	1.38%	6.68%	4.82%	Soda: 15% Hospitality: 1% Payroll: 0.40%	Soda: 15% Hospitality: 1% Sales: 0.92%
75%	202	0.89%	2.06%	10.36%	7.41%	Soda: 15% Hospitality: 1% Payroll: 0.70%	Soda: 15% Hospitality: 1% Sales: 1.61%
100%	269	1.20%	2.76%	14.30%	10.13%	Soda: 15% Hospitality: 1% Payroll: 1.00%	Soda: 15% Hospitality: 1% Sales: 2.33%

Table C.5. Estimated Tax Rates Under Alternative Financing Instruments for Subsidy Schedule 5

Phase-in Stage	Gap ($ millions, 2022)	Payroll Tax	Sales Tax	Limited Services Tax	Extended Services Tax	Option 5	Option 6
25%	70	0.31%	0.71%	3.35%	2.44%	Soda: 15% Hospitality: 1% Payroll: 0.11%	Soda: 15% Hospitality: 1% Payroll: 0.26%
50%	139	0.62%	1.42%	6.92%	5.00%	Soda: 15% Hospitality: 1% Payroll: 0.42%	Soda: 15% Hospitality: 1% Sales: 0.97%
75%	209	0.92%	2.14%	10.75%	7.69%	Soda: 15% Hospitality: 1% Payroll: 0.73%	Soda: 15% Hospitality: 1% Sales: 1.68%
100%	282	1.24%	2.86%	14.85%	10.51%	Soda: 15% Hospitality: 1% Payroll: 1.04%	Soda: 15% Hospitality: 1% Sales: 2.39%

Abbreviations

CCFAP	Child Care Financial Assistance Program
COVID-19	coronavirus disease 2019
ECE	early care and education
FCCH	family child care home
K–12	kindergarten through grade 12
pre-K	prekindergarten
STARS	STep Ahead Recognition System
UPK	universal prekindergarten

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