THE PENNSYLVANIA STATE UNIVERSITY
SCHREYER HONORS COLLEGE

DEPARTMENT OF RISK MANAGEMENT

The Effect of a National Paid Family Leave Program on Formal Long-Term Care Spending in the U.S.

LUCAS RICHARDSEN
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Reviewed and approved* by the following:

Amanda Hammell
Professor of Practice of Risk Management
Thesis Supervisor and Honors Adviser

Zhongyi Yuan
Associate Professor of Risk Management
Faculty Reader

* Electronic approvals are on file.

ABSTRACT

This paper considers the effects of a national paid family leave program on formal long-term care spending in the U.S. Paid family leave is a benefit under which workers receive a portion of their weekly wage during a leave of absence. While paid family leave can apply in a range of situations, including child bonding and care for a seriously ill family member, we specifically focus on paid family leave to care for an ill family member aged 65+. A small number of states currently run paid family leave programs, but there is currently no national program. While much discussion of paid family leave focuses on worker and labor market outcomes, the largely unexplored impact of paid family leave on reducing formal long-term care service spending (that is, spending on services like nursing homes and in-home nurses) may be quite large and make a more compelling case for the implementation of a benefit which the majority of workers support. The basic premise of this paper is that under a national paid family care leave benefit for care recipients aged 65+, (1) if the provision of the paid family leave benefit increases the rate of leave-taking to care for people aged 65+, and (2) if when workers take leaves to care for people aged 65+, the (informal) care they provide acts as a substitute for formal care (like nursing homes, or in-home nursing), then (3) when the cost of the paid benefit for a leave is less than the cost of the formal care it acts as a substitute for, there will be a net reduction in total spending both from direct (spending on the long-term care services themselves) and indirect (spending on the paid leave benefit) sources. We estimate that the implementation of a national paid family leave program will result in an annual savings of $400 million on formal long-term care services, and we expect that the majority of this savings is due to a reduction in Medicare spending.

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Chapter 1

Introduction

Paid family care leave is a benefit for people who need to take time off from work to care for a seriously ill family member. This benefit falls under the broader set of benefits known as "paid family leave" (PFL), which typically also includes leave for child bonding and leave for the worker's own health condition ("California paid family leave", n.d.). Although this chapter does discuss broad "paid family leave" benefits, the focus of the paper is specifically on (1) paid family *care* leave – that is, leave specifically to care for a seriously ill family member – and more specifically on (2) leaves associated with care for family members aged 65+. So, unless otherwise stated, throughout this paper any usage of "national paid family leave program" or "paid family leave" refers to a program that provides paid family leaves only for care for a family member aged 65+.

As of the writing of this paper, there is not currently a federal paid family leave program (several states and individual firms, however, do offer such benefits, on which more later). The extent of federal family leave legislation is the Family and Medical Leave Act of 1993 (FMLA). Under the FMLA, eligible employees are entitled to take up to 12 workweeks of job-protected, *unpaid* leave within a 12-month period provided they meet certain eligibility criteria, which allow leaves for certain reasons and for employees who work at sufficiently large firms ("Fact sheet #28: The family and medical leave act", 2012).

While the job-protection provided by the FMLA is important for workers who need to take leaves to care for family members, the FMLA in general fails in practice to provide many

workers, especially those with low incomes, access to leaves. According to the 2018 Department of Labor FMLA Survey, low wage workers (defined as those making less than $15 per hour) are disadvantaged in their ability to take FMLA leave on a variety of measures. Low wage workers are 50% more likely to report needing but not taking leave than other workers (9% vs 6%), with 66% of employees with unmet need for leave indicating an inability to afford unpaid leave. Although many firms do provide some level of paid leave, 61% of low-wage workers received no pay for leave, compared to just 20% for other workers ("Employee and worksite perspectives: Executive summary", 2020).

In response to the lack of access to paid family leave nationally, many states have implemented their own paid family leave programs. California has the largest and longest running such program (implemented in 2004), but six other states and D.C. also offer paid family leave programs, with two additional states to begin offering programs by 2024. These programs are generally funded by employee payroll taxes; weekly leave benefits are a percentage of the worker's weekly wage, up to a maximum benefit level; and benefits last up to a maximum of between 4 and 12 weeks ("What states offer paid family leave for caregivers?", 2022).

The traditional reasons people have advocated for PFL policies include providing better economic security to people who must take time off work to care for family members, helping employees achieve better balance between work and family demands, and increasing labor force participation (by making it easier to take a leave and then return to the same job). In addition, there is evidence that the vast majority of workers support paid family leave. A 2021 poll by Global Strategy Group reports that 91% of all voters support paid leave to care for a seriously ill family member, with 53% indicating strong support. ("Global Strategy Group", 2021). A 2017 poll by Pew Research reported that 67% of those polled supported the same benefit (Horowitz,

2020). And a 2018 survey by the Cato Institute reported that 74% of Americans supported a broad national paid family leave program when cost was not mentioned. Further, 54%, 48%, and 43% said they would pay an additional $200, $450, and $1200 in taxes to support that program (Ekins, 2020). But while these are crucial points in the PFL policy discussion they are not the focus of this paper. Instead, this paper is primarily focused on evaluating the often-overlooked effect of a national paid family leave program on long-term care service spending.

Before going any further, let us briefly discuss what long-term care is. Long-term care (LTC) is the set of services involving the provision of care to people – usually elderly – who need assistance with daily living activities. These include things like getting dressed, walking, eating, or using the restroom; sometimes, additional activities like cooking, cleaning, and personal finance are also included. While the most common reason to need LTC is age-related physical or mental deterioration, people may also require temporary use of the same services after undergoing surgery or recovering from a serious injury. There are numerous types of LTC. The clearest distinction is between formal and informal care; formal care is paid professional care, while informal care is unpaid and typically provided by a family member. Within the class of formal care, common examples include nursing homes (also "skilled nursing facilities") in-home nursing (also "home health care" or "home health aide"; where the care recipient receives professional nursing care in their own home), community-based or assisted living care (where the care recipient lives in a retirement community and is provided care via the organization operating the community), and paid homemaker services (services like cooking and cleaning that do not require nursing training). In-home nursing and paid homemaker services can be jointly considered formal in-home care, with the former being "high-skilled" care and the latter being "low-skilled" care ("What is long-term care?", n.d.).

As will be discussed further in Chapter 2, the specific type of care that is most relevant to paid family leave is post-acute care. This is any care received after a care episode that involves inpatient hospitalization. Among people aged 65+, examples of common reasons for needing post-acute care are knee replacements, injuries from accidental falls, or illnesses like pneumonia. Post-acute care is generally only short-term (less than 90 days), but it is provided via the same long-term care services discussed above like nursing homes and home health care. A small percentage of elderly post-acute care cases may involve specialized rehabilitation facilities. So, although we refer to these types of services as "long-term care services", for the purposes of this paper this is something of a misnomer as we largely focus on *short-term* post-acute care that uses the same facilities.

The basic premise of this paper is that under a national paid family care leave benefit for care recipients aged 65+, (1) if the provision of the paid family leave benefit increases the rate of leave-taking to care for people aged 65+, and (2) if when workers take leaves to care for people aged 65+, the (informal) care they provide acts as a substitute for formal care (like nursing homes, or home nursing), then (3) when the cost of the paid benefit for a leave is less than the cost of the formal care it acts as a substitute for, there will be a net reduction in total spending from direct (spending on the LTC service itself) and indirect (spending on the paid leave benefit) sources. Whether there is a net savings or net cost depends on whether conditions (1) and (2) hold and, provided they do, whether the savings when (3) holds outweigh the costs when it does not hold. We will draw from a variety of academic results and data sources to model this problem, with the goal of determining whether there might be a net savings on LTC spending associated with a national paid family leave program.

It is important to clarify what is meant by "savings" and why anyone ought to care about it. Throughout most of the paper, we take an "all-payer" perspective on spending and savings, meaning that we do not differentiate between spending by one payer versus another. In Chapter 4, we examine in detail the issue of which payers receive any savings resulting from the implementation of a national paid family leave program. Possible payers include Medicare, Medicaid, and households (including workers and elderly). Disregarding the direct distribution of savings, it is always ultimately taxpayers who gain from this savings as they are the ones either directly paying for care, paying payroll taxes and Medicare premiums, or income taxes which fund Medicaid. But the main reason this savings is relevant is because it may be used to justify the implementation of a national paid family leave program in the first place, and as already discussed the vast majority of workers are in favor of it; therefore, the potential savings may prove a key factor in getting political support for what is a desirable benefit for workers, *potentially at little or no cost.*

It is worth briefly describing Medicare and Medicaid here. Medicare is a federal health insurance program in the U.S. for people aged 65+ and some younger people with disabilities. It is funded by employee and employer payroll taxes paid throughout a beneficiary's working life, and from premiums paid once the beneficiary is eligible for benefits. Medicaid is a federal-state assistance program for medical expenses for people with low incomes and limited assets, and it is funded from the general income tax revenues ("What is the difference between Medicare and Medicaid?", 2021).

The following is an overview of the remaining chapters of this paper. Chapter 2 describes the modeling framework used to perform the fundamental calculations in this paper. Chapter 3 covers the numerical assumptions-setting for all necessary variables as outlined in Chapter 2.

Chapter 4 provides the model results and discussion of those results. Chapter 5 is a conclusion which summarizes the paper's key results and offers areas for future research.

Chapter 2

Modeling Framework

The purpose of this chapter is to (1) develop a theoretical framework for modeling the change in utilization of formal care services with the implementation of a national paid family leave program; (2) develop a theoretical framework for modeling the costs of a national paid family leave program; and (3) apply modeling frameworks in concrete mathematical relationships for which numerical assumptions will be developed in Chapter 3.

Utilization Framework Assumptions

The following assumptions provide a formal theoretical framework for modeling changes in utilization of formal care services. The assumptions highlighted blue are those that require additional support, provided later in this chapter. The remaining assumptions satisfy one of the following: (a) they logically follow from previous assumptions (and are indicated as such), (b) they must be true (e.g., p or $\text{not } p$), or (c) they provide definitions. In this chapter we will frequently refer to a given assumption by indicating its number enclosed in parentheses (e.g., assumption 4. can be denoted as (4.)). The assumptions nested within higher-level assumptions (e.g., (2.1.) is under (2.)), are closely related to the higher-level assumptions, clarify the higher-level assumptions, and/or, are of secondary importance to the higher-level assumptions.

After the formal list of these assumptions, we will provide an informal summary of all the assumptions and provide support for the assumptions highlighted blue.

1. W is the set of all workers.
2. Consider the subset of W with elements w (denoting individual workers) such that (a) for each w, there exists a family member f_w aged 65+ who requires care; (b) if w takes a leave, then the care episode will be resolved by w at the conclusion of the leave in combination with some formal care; (c) w will provide care to f_w if and only if a leave is taken; and (d) w is the primary caregiver (i.e., the caregiver providing more care than any other caregiver).

   2.1. There are no w such that there exists more than one such f_w.

   2.2. It follows from (2b.) that we do not consider cases in which a worker has a family member aged 65+ who requires care that cannot be resolved by the worker during a leave in combination with some formal care.

      2.2.1. For example, we do not consider a worker with a family member suffering from severe dementia who requires permanent care because it will continue after the worker's leave.

      2.2.2. We also do not consider a worker who takes a leave at the onset of a family member's need for permanent care to co-ordinate the transfer of the family member to a permanent care site and in the process reduces the total time in formal care but does not resolve the care case during the leave.

         2.2.2.1. This is a reduction in utilization of formal care, but it is not considered due to data availability.

   2.3. It follows from (2c.) that we do not consider cases in which w provides care without taking a leave. These cases are excluded from consideration because leave-taking in these cases has no additional effect on utilization of formal care services, the variable of interest.

3. The following sources of care are possible for f_w: informal care from w, nursing home (NH), home health care (HHC), or some other formal care.

    3.1. HHC is the only formal care source provided in the home and can be divided into low-skilled and high-skilled.

    3.2. The possible sources of care can be used in combination with one another.

4. For each w there are exactly two possible worlds, L_w^C and L_w.

    4.1. In L_w^C, w does not take a leave to care for f_w.

        4.1.1. It follows from (2c.) and (4.1.) that in L_w^C, f_w *never* uses w (as a source of care).

    4.2. In L_w, w does take a leave to care for f_w.

        4.2.1. It follows from (2c.) and (4.2.) that in L_w, f_w *always* uses w.

5. We say a possible world (L_w^C or L_w) is *realized* if it corresponds to what w did.

    5.1. For each w, exactly one of L_w^C or L_w is realized.

6. The spending on formal care for f_w depends on whether L_w^C or L_w is realized. In other words, the spending on formal care for f_w is equal to the spending on formal care for f_w in whichever world is realized. The total national spending is the sum of the spending for all f_w.

7. The duration of care f_w receives in L_w^C and the duration of care provided by other formal care received by f_w in L_w are both less than or equal to the duration of care provided by w in L_w.

8. The spending on formal care for f_w in L_w is less than or equal to the spending on formal care for f_w in L_w^C.

9. w only provides care to f_w at home.

    9.1. It follows from (9.) that if f_w uses w (which is the case if and only if L_w is realized), then f_w will only additionally use formal care provided in the home.

        9.1.1. The additional formal home care is always high-skilled home health care.

10. Consider the case where f_w uses NH only in L_w^C. It follows from (4.2) and (9.) that in this case (and in all cases), in L_w, f_w will use only some combination of w and formal care provided in the home.

    10.1. For the case in (10.), the most common type of care for f_w to require is post-acute care– that is, care after an acute (not chronic) health issue.

        10.1.1. For the case in (10.), another possible, but less common type of care for f_w to require is end-of-life care.

    10.2. For the case in (10.), we say that a leave taken by w causes an "averted nursing home stay."

11. It follows from (8.) that if f_w uses any other formal care arrangement in L_w^C than (10.), then the spending on formal care for f_w in L_w will be at most equal to the spending in L_w^C.

12. If a national paid family leave program is implemented, then the number of workers w for whom L_w is realized will increase.

    12.1. It follows from (10.), (11.) and (12.) that modeling only the case in (10.) will result in a lower bound estimate on the magnitude of the reduction in total spending on formal care (i.e., across all workers w), as calculated using (6.).

    12.2. We will refer to these workers whom the national paid leave program caused to take leaves as "new leave-takers."

    12.3. It follows from (6.) and (12.) that the change in formal care spending attributable to the national paid family leave program is calculated as the sum of the difference in spending between L_w^C and L_w for new leave-takers.

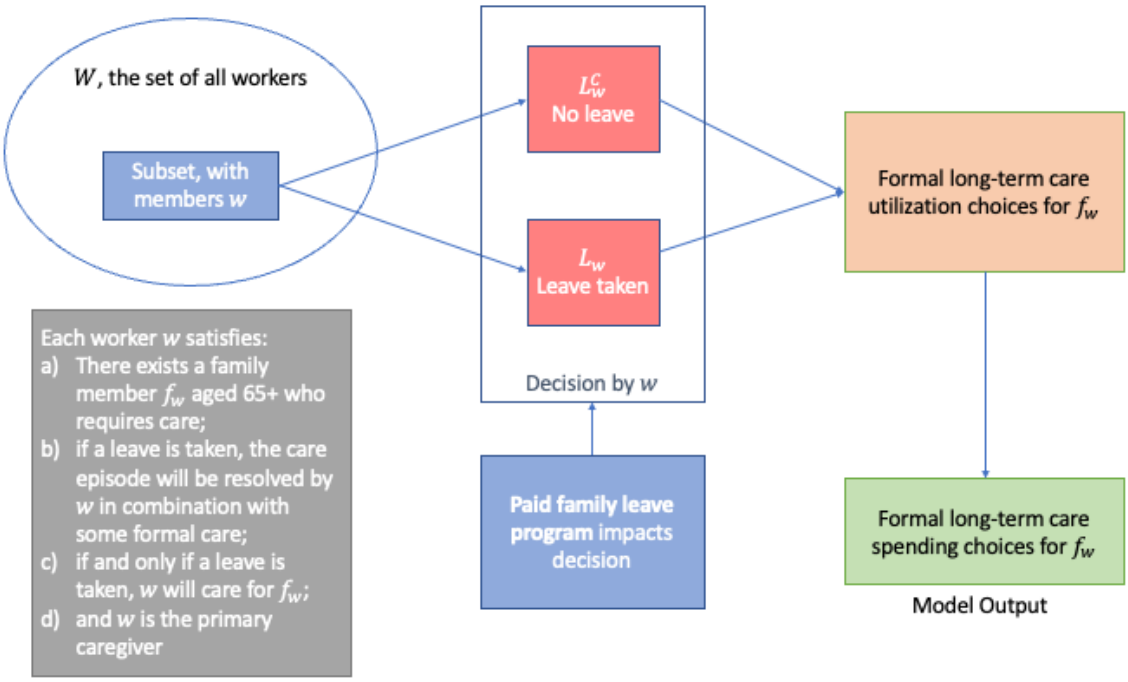

Figure 1: Utilization framework diagram

Informal Summary of Utilization Framework Assumptions

At a high level, what we do in the preceding subchapter is the following: (1) develop precise language to describe workers, family members requiring care, the types of care the family members use, the spending on that care, and the workers' decisions to take or not take leaves [assumptions 1-6]; (2) establish rules for how the utilization of and spending on formal care changes depending on the workers' decision to take or not take leaves [assumptions 7-9]; (3) narrow the cases (of care utilization) we need to consider in our model to make modeling more manageable [assumptions 10-11]; and (4) connect the implementation of a national paid family leave program to changes in workers' decisions to take or not take leaves, and by extension to changes in spending on formal care, which is what we are ultimately interested in studying [assumption 12].

Let's start by taking a closer look at assumptions 1-6, focusing on the top-level assumptions only. We start by focusing on all workers (1.), and we are only interested in workers for whom it would make sense to take a leave to care for a family member aged 65+ (2.). Paid leaves can realistically last for up to two months, and a worker will only take a leave to care for a family member if they are fully replacing some alternative care arrangement. For instance, if a family member has severe dementia and needs permanent care, a worker is unlikely to take a leave because they aren't fully replacing the care, which would need to continue by some other arrangement after the leave is over; on the other hand, if a family member has a knee replacement and needs care for 1-2 months, a worker is much more likely to take a leave because they can fully replace some alternative care arrangement. We also develop language to talk about types of formal care and define the landscape of possible formal care options (3.).

In assumption (4.) we develop language to talk about the option workers have to take (L_w) or not take (L_w^C) a leave. We then connect this option to what decision is actually made (i.e., which world is realized) in assumption (5.). We then see why this is important in assumption (6.) when we connect the leave-taking decision to spending outcomes. In simple terms, workers decide to take a leave or not (world L_w or L_w^C is realized), the utilization of formal care for the workers' family members depends on their leave-taking decisions, and as a result the total spending on formal care depends on their leave-taking decisions. We calculate this total spending by adding up the spending that occurs for each worker's family member.

Let's now look at assumptions 7-9. Assumption (7.) says that the duration of the worker's leave can't be shorter than the duration of the care that they are replacing (if the worker doesn't take a leave) and can't be shorter than the duration of any other formal care used in combination with their leave. This makes intuitive sense: a nursing home stay lasting a year shouldn't be

replaced by a leave lasting two months, and since the worker is assumed to be the primary caregiver throughout the leave and the care episode is resolved at the conclusion of the leave, the leave duration must not be shorter than any other care that is used in addition to the worker's. Assumption (8.) says that spending on formal care when a leave is taken should always be less than or equal to spending on formal care when a leave isn't taken. If the same total "amount" of care is provided in either case, then adding the worker's care during a leave should replace at least some of the formal care, reducing total spending on formal care. Assumption (9.) says that a worker taking a leave only provides care at home; in other words, a worker won't provide care in an institution like a nursing home, because these care settings provide comprehensive care.

Let's now look at assumptions 10-12. These assumptions are crucial because they narrow the cases that we need to consider in our model while still providing acceptable estimates. Assumption (10.) says that if a worker's family member would be in a nursing home without the worker taking a leave, then the family member will use some combination of the worker's care and other home health care in the case that the worker takes a leave. This must be the case because we already said that a worker taking a leave only provides care at home, so if the worker takes a leave, the family member will not use the nursing home, and the only other type of formal care that the family member may use is home health care. This case is the only one that we will explicitly model due to lack of data and research on other cases. Assumption (11.) helps explain why our model will provide acceptable estimates even if we only consider this one case: it says that because we already know spending on formal care can only decrease if a leave is taken, we can say that in all the other cases than (10.) that we aren't considering, the worst case is that spending stays the same when a leave is taken. As long as a national paid family leave program doesn't decrease the number of workers taking leaves, modeling only the

case in (10.) will result in a lower bound on the resultant net savings. This condition is provided by assumption (12.) which says that if we implement a national paid family leave program, the number of workers taking leaves will increase.

So, to summarize, we now have precise language; we use that language to connect workers, family members, formal care utilization, formal care spending, and leave-taking decisions; we provide rules for how formal care utilization changes when leave-taking decisions change; we provide a rule for how leave-taking decisions change when we introduce the national paid family leave program; and we create a framework for narrowing the number of cases (subsets of the population of workers and family members) we will implement in our model.

Support for Selected Utilization Assumptions

In this subchapter, we will provide support for each of the blue-highlighted assumptions listed in the "Utilization Framework Assumptions" subchapter. The assumptions are addressed in order of importance, not sequentially. Each assumption will be repeated below, followed by material supporting it.

12. If a national paid family leave program is implemented, then the number of workers w for whom L_w is realized will increase.

    12.1. It follows from (10.), (11.) and (12.) that modeling only the case in (10.) will result in a lower bound estimate on the magnitude of the reduction in total spending on formal care (i.e., across all workers w), as calculated using (6.).

First, what is the causal mechanism at play in (12.)? Quite simply, a national paid leave program in principle increases access to leave-taking among workers, and as a result, more workers are able to take a leave (to care for a family member).

An initial objection might be that paid family leave programs don't increase workers' access to paid leave. According to the 2018 FMLA Surveys (surveys conducted by the Department of Labor on leave-taking), in states with paid family leave programs 79% of workers who took a leave within 12 months prior to the survey reported receiving partial or full pay, compared to 64% in non-paid family leave states. The surveys also found that the single most common reason in all states for not taking a needed leave was "could not afford to take an unpaid leave," but the percentage who indicated this is higher in non-paid leave states (68%) than in paid leave states (60%). Moreover, the percentage of people who took leaves and received full or partial pay was 15% points higher in paid leave states, and the percent reporting that an unmet leave need was due to not being able to afford an unpaid leave was 8% points lower in paid leave states. So, there is reasonable evidence to support that paid family leave increases access to leaves and thus the supply of informal care ("Employee and worksite perspectives: Results", 2020).

The discussion of leave-taking and provision of informal care has so far in this section been general, and it should be noted that (12.) does not indicate the specific formal care arrangements used by any of the new w for whom L_w is now realized. Of course, the space of possible care arrangements in these cases is large and would be difficult to comprehensively model. That is why we include assumption (12.1.) as well: we can model only a subset of the possible cases of care arrangements and still calculate a useful estimate, a lower bound on the magnitude of the reduction in total spending on formal care. In fact, we will indeed only model

one case, assumption (10.), where f_w uses only NH in L_w^C. To our knowledge this is the only case for which there is existing research explicitly studying the relationship between a state paid family leave program and formal care utilization.

A journal article published in 2017 by Arora & Wolf finds via a statistical analysis that a 10% reduction in the annual number of people who were nursing home residents was attributable to the implementation of California's paid family leave program (the longest-running state program, implemented in 2004). Without additional scrutiny, this seems to be clear support for assumption (12.): if the paid family leave program caused a decrease in the annual number of people who were nursing home residents (i.e., a decrease in utilization), then the only apparent reason is that more workers took leaves to provide care in place of the nursing homes. This result is central to the argument presented in this paper and the quantitative and statistical aspects will be addressed in detail in Chapter 3. For now, we will accept this result as support for (12.) and move on to another issue: nursing home utilization involves both frequency and duration, and the result cited in this paragraph only addresses the former.

7. The duration of care f_w receives in L_w^C and the duration of care provided by other formal care received by f in L_w are both less than or equal to the duration of care provided by w in L_w.

Assumption (7.) makes two claims. For now, let's ignore the one that is highlighted gray above, more on which later. The remaining claim is about the duration of care that f_w receives in L_w^C compared to the duration of care the f_w receives from w in L_w. In the context of the case from (10.), the question becomes how long are the nursing home stays that are averted from paid family leaves, and how does this compare to the duration of care provided in their place? We

begin to address this by returning to the Arora and Wolf paper and examining why duration of care is relevant in the first place.

Recall that the paper reported a 10% reduction in the annual number of people who were nursing home residents that was attributable to California's paid family leave program. What does this result actually mean? The measure for the annual nursing home population that the paper uses is the number of people who resided in a nursing home at any point during the year. In other words, this is not a point-in-time, or "snapshot," measure; instead, we will call the paper's measure a "comprehensive" measure (this term is idiosyncratic to this thesis, we are unaware of a generally accepted term). The distinction matters for our analysis because the paper's result does not therefore imply a 10% reduction in spending as might seem intuitive. An example may be illuminating. Consider a single nursing home and suppose at any point in time during a year, its "snapshot" population is 1,000. It is possible that the 1,000 people counted at the start of the year are the same 1,000 people counted at the end of the year; in this case, the comprehensive measure is also 1,000, since 1,000 people resided in the nursing home at any time during the year. It is also possible that some residents were discharged during the year and new residents arrived during the year; if all the stays are 3 months, then there will be an entirely new group of 1,000 residents in the nursing home every 3 months, which happens 4 times per year, leading to a comprehensive measure of 4,000. So, it makes a huge difference how we count the nursing home population in our calculations.

Now, the preceding example seems to suggest that using the comprehensive measure might lead to a bigger policy effect – after all, 10% of 4,000 is four times larger than 10% of 1,000! One issue with the comprehensive measure is that it doesn't account for length of stay. Following the previous example, suppose the average stay in the nursing home is still 3 months,

but that there are 400 people who stay for 0.5 months, and 3600 people who stay for 3.3 months (this distribution produces an average stay of 3 months), adding up to the 4,000 resident comprehensive measure we calculated above. It matters which 10% of the residents' stays are averted: if it is 400 0.5-month stays, there is a 200-month reduction in nursing home utilization, and if it is 400 of the 3600 3.3-month stays, there is a 1,320-month reduction in nursing home utilization. This is a difference of a factor of 6.6.

So, now we know that while it is important for our final calculations how long the averted nursing home stays last, the answer is not found in the Arora and Wolf paper. However, there are general arguments that can get us to (7.).

First, consider that the typical paid family leave is relatively short: in California, workers are currently allowed up to 6 weeks' leave in a 12-month period to care for a seriously ill family member. Second, it is intuitively clear that, because the leave is in theory replacing the (averted) formal care, the length of the averted formal care use should be comparable to the length of the leave. If this is not true, then we admit illogical cases such as a year-long nursing home stay averted by a 6-week leave. The conclusion is that we assume the length of the averted formal care use is less than or equal to the length of the leave. Finally, (7.) is in part a modeling convenience which provides a clear upper bound on the length of the nursing home stay that avoids the use of ambiguous language like "comparable length." And, specifically in the case of (10.), if it is the case that the duration of averted nursing home stays exceeds the leave length, we will find out in Chapter 3 while setting the numerical assumptions.

The second claim in assumption (7.) that we grayed out is the same as the one just addressed, except it applies to formal care provided *in addition to* the informal care provided by w in L_w. As will be discussed in detail with respect to assumption (9.), in L_w, it is possible that w

may hire some additional formal care during the leave. We argue that since by assumption (2b.) if a leave is taken then w will resolve the related care episode at the conclusion of the leave, and since by assumption (2d.) w is the primary caregiver for the entire leave (meaning w provides more care than any other caregiver for the entire leave), it follows that there is no time other than during the leave in which additional formal care can be hired and that w provides at least as much care as any additional formal care hired during this time. Therefore, the duration for which the additional formal care is hired must be less than or equal to the duration of w's leave. If it is the case that formal home care is hired after w's leave ends in L_w, then we argue that this is also the case after f_w's nursing home stay ends in L_w^C, and there is therefore no net change in spending (between L_w^C and L_w) due to any formal care hired after w's leave ends in L_w and after f_w's nursing home stay ends in L_w^C. Finally, as with the first claim from assumption (7.), we will address this second claim numerically in Chapter 3.

10.1. The most common type of care for f_w to require is post-acute care – that is, care after an acute (not chronic) health issue.

10.1.1. Another possible, but less common types of care for f_w to require is end-of-life care.

Continuing our focus on the case in (10.), it is helpful to enhance our understanding of the problem by studying the types of care f_w is likely to require: post-acute care and, to a lesser extent, end-of-life care. This knowledge is useful for two reasons: (1) it provides a reasonability check of the theoretical framework we are developing (for instance, if there are not plausible types of care that our hypothetical f_w might require, then the case we are considering may not be

significant), and (2) it will provide direction for setting the numerical assumptions for length of nursing home stay averted in Chapter 3.

First, following from our discussion in (7.), note that the nursing home stays averted due to paid family leave must be short (less than two months) because they must be shorter than their associated leave lengths; therefore, we only consider types of care provided in nursing homes for short durations.

What evidence exists on the possible factors associated with short-term nursing home stays? There are multiple papers that analyze length of nursing home stays, but it appears that these papers often only focus on either stays that terminate in death or that terminate in community discharge. One study from 2013 by Gassoumis et al. studied 3,762 episodes of nursing home care in Southern California with the goal of understanding what factors were associated with short-term (< 90 days) and long-term (>90 days) stays terminating in community discharge. Relevant variables associated with short-term stays include coming from an acute care setting (150% greater odds than those coming from another facility and 92% greater odds than those coming from a community setting) and having cancer (39% greater odds). So, those coming from an acute care setting (typically due to a surgery or injury) are significantly more likely to be discharged to the community. Those with potentially terminal conditions like cancer are also more likely to be discharged to the community (perhaps for end-of-life care), though the evidence for end-of-life care is less compelling than the evidence for post-acute care because the former includes only an indirect connection to discharge reason and has a smaller quantitative relationship.

Though we already believe that stays associated with end-of-life care are less likely to be of interest than post-acute care, we will still examine the evidence on factors associated with

nursing home stays ending in death. A systematic review of literature on the subject by Moore et al. from 2019 found that the three factors most strongly associated with shorter care-home (they include residential-only and nursing homes) stays are (1) admission to a facility providing nursing services, (2) requiring oxygen therapy, and (3) presenting with shortness of breath. Particularly the second and third factors are indicative of patients in terminal health condition. Additional factors with moderate associations with shorter stays include, among other things, age and cancer diagnosis. These are both also associated with higher mortality rates. Additionally, this review finds that admission from a hospital (i.e., for post-acute care) has only weak association with short-term stays that end in death. While this seems to contradict our main assumption, a good explanation is that those who are otherwise healthy and enter a facility after an acute care incident do not typically die during their stays.

A final paper focused on post-acute care discharge location shows that in 2019 about 20% of a sample of 975,179 aged 65+ hospital discharges (January 2019 through October 2020) use home health care afterwards, another 20% use skilled nursing facilities (nursing homes), 55% go straight home, and the remaining 5% enter inpatient rehabilitation facilities (Werner & Bressman, 2021). Therefore, a not insignificant minority of elderly hospital discharges result in the use of nursing homes, and we expect based on Gassoumis et al. that these stays are quite likely to be short in length.

One more relevant piece of evidence regarding post-acute care is that there are a large number of cases: in the seven-year period between 2010 and 2016, more than 17 million Medicare beneficiaries were discharged to post-acute care (Werner et al., 2019). Given that 45% of hospital discharges require post-acute care (100% minus 55% who go straight home) and 20% of hospital discharges are to nursing homes, that amounts to just over 1 million nursing home

stays associated with post-acute care annually. This is quite large relative to the number of people who use nursing homes each year. According to the Arora and Wolf paper, as of 2008, about 7.2% of those aged 65+ in the U.S. spent any time in a nursing home each year, and according to the US Census Bureau there are about 50 million people aged 65+ in the U.S. as of 2019 ("National Senior Citizens Day", 2021). This means that about 3.9 million people spend any time in a nursing home each year. So, about 25% (1 million/3.9 million) of people aged 65+ who spend any time in a nursing home are there for post-acute care (which are almost always short-term stays), and the denominator includes short-term and long-term stays, so the percentage of short-term stays (i.e., the ones we are interested in) is likely much greater. Comparing this to deaths in nursing homes, about 20% of all deaths in the U.S. occur in nursing homes and there were about 2.8 million deaths in 2019 in the U.S., which implies about 560,000 deaths in nursing homes in the U.S.; so, about 14% of people aged 65+ who spend any time in a nursing home die there each year ("Where do Americans die?", 2013; "US data: Total deaths", n.d.). While as before the denominator includes both short-term and long-term nursing home stays, so does the numerator in this case, so it is possible that this overestimates the percentage out of the group we are interested in. So, the percent of all short-term nursing home stays due to post-acute care is large in absolute terms and is also large relative to the percent of all short-term nursing home stays due to end-of-life care (probably at least twice as large).

To sum up, there are a number of data points to support post-acute care as the most common reason for averted nursing home stays due to paid family leave. (1) Of the reasons cited in Gassoumis et al. for short-term nursing home stays with discharge to the community, post-acute care had the most compelling support. (2) The approximate percentage of short-term nursing home stays for post-acute care is large in absolute terms (likely much greater than 25%)

and also much larger than the percentage due to end-of-life care (at least twice as large). (3) The narrative for leave-taking and post-acute care makes intuitive sense. For post-acute care (perhaps a recovery from surgery, broken bone, heart attack, etc.), there is generally a good estimate of duration of care required, this duration is generally short, the level of care required is likely manageable for an untrained informal care provider (whereas in end-of-life care, for example, the care recipient may need constant high-skilled nursing care), and the care recipient is generally expected to return to independent community living after the care is complete; this is essentially a perfect recipe for the effective use of a family care leave to provide informal care.

While it is possible that end-of-life care is also a reason for averted nursing home stays due to paid family leave, there is much less evidence to support it and several not yet discussed arguments against it. (1) Gassoumis et al. provided only indirect support for end-of-life short-term nursing home stays with discharge to the community and smaller quantitative results, though Moore et al. did provide evidence the short nursing home stays ending in death were associated with a terminal health condition. (2) The number of short-term nursing home stays involving end-of-life care is much smaller than the number of stays involving post-acute care (less than 14% of total short-term stays and likely less than half as likely as post-acute care). (3) The only situation in which it would make sense for a worker to take a leave for end-of-life family care is if it is clear that the situation is indeed an end-of-life one. This is likely only apparent once the family member has entered hospice, and although a small number of hospice cases are provided in nursing homes, the majority are provided elsewhere (80% in patient's home), so in these cases a nursing home stay will not be averted. Further, in cases where hospice is provided in a nursing home, many of these cases will involve long-term residents, so in many of these cases a nursing home stay won't be averted either ("What is hospice?", n.d.).

We therefore confirm assumptions (10.1.) and (10.1.1.). Post-acute care is the most common reason for averted nursing home stays due to paid family leave, and end-of-life care is a possible but much less likely second reason. We are not aware of any other valid reasons.

3.2. The possible sources of care can be used in combination with one another.

This assumption is straightforward. It is possible to combine, for example, informal care from a worker with home health care. This does not imply that any combination is possible. In particular, assumption (9.1.), which we will discuss next, provides a restriction on combinations, stating that informal care from a worker can only be combined with home health care.

9. w only provides care to f_w at home.

9.1. It follows from (9) that if f_w uses w (which is the case if and only if L_w is realized), then f_w will only additionally use formal care provided in the home.

9.1.1. The additional formal home care is always high-skilled home health care.

As a basic justification for assumption (9.), it makes intuitive sense that a worker will only provide informal care to a family member in a home setting, as opposed to an institutional setting, such as a nursing home. Institutional settings by definition assume total care of a patient, so there is little opportunity for the worker to add value in the care process and therefore little reason to take a leave in the first place. By contrast, formal care provided in a home setting is often not 24-hour care and likely requires the patient to either have an additional source of care (such as an informal care provider) or have a much higher level of autonomy than a patient in an

institutional setting requires. In addition to this intuitive argument, there is also a body of research on the relationships between the use of informal care and various types of formal care that points to a similar conclusion.

Assumption (9.) makes two claims that we will evaluate using existing research. First, (9.) directly states that workers do not provide informal care with institutional care, so we are interested in what is the relationship between informal and institutional care. Second, (9.) implies that workers may provide informal care with home-based formal care, so we are interested in what is the relationship between informal and home-based care.

A 2004 paper by Van Houtven & Norton, studying a U.S. population, finds that informal care is a substitute for nursing home care and home health care (people who receive informal care have a lower probability of using these services), but it is a complement for outpatient surgery (people who receive informal care have a higher probability of using this service). A natural question is the direction of causality; while the authors do test and adjust for endogeneity (correlation of informal care use with the unexplained variation in service utilization), this does not address the problem of reverse causality (they found endogeneity in the nursing home and home health care cases but not the outpatient surgery case; most likely the former two cases exhibit endogeneity because there is a third variable that influences both the provision of informal and formal care). In the cases of nursing home and home health care utilization, there is probably an unobservable decision mechanism that allocates care between informal and formal services; in the case of outpatient surgery, however, there is a clearer causal explanation: incidence of surgery causes informal caregivers to step in. It wouldn't make much sense the other way around. While the relationship between surgery and informal care is not one directly

connected with assumption (9.), it does provide additional support for the argument that it is common for workers to provide post-acute care to family members.

Another paper by Bolin et al. from 2008 studied substitutability of formal and informal care in Europe and confirmed the Van Houtven & Norton result for home health care, also finding that informal care was a substitute for home health care. This paper did not study the relationships for nursing home care or outpatient surgery.

A 2009 paper by Bonsang, also studying a European population, again confirmed the overall relationship for home health care. However, the paper extended the previous analyses by additionally modeling low-skilled formal home health care and high-skilled home health care separately (the prior works discuss this distinction but do not test it). Recall that low-skilled care is typically tasks performed by a homemaker (cooking, cleaning, laundry, etc.), while high-skilled care can involve any tasks performed by a professional nurse. The paper finds that informal care is a substitute for low-skilled formal care, while it is a complement for high-skilled formal care. So, there is an overall negative relationship between the amount of informal care and formal home care a person uses, but when you separately study low-skilled and high-skilled formal home care, the relationship is still negative for informal and low-skilled care, but it becomes positive for informal care and high-skilled care.

A more recent (2019) paper by Sun et al. performed a similar analysis to Bonsang using Canadian data and focused specifically on end-of-life patients. The results yet again were consistent with the other analyses on informal care and formal home care. Sun et al. found that informal care was a substitute for low-skilled formal home care for the population that used any low-skilled formal care. They also found that there was a positive relationship between informal care utilization and the probability of using high-skilled formal care.

Let's return to the two claims from (9.) that we set out to address. First, what is the relationship between informal care and institutional care? Since assumption (9.) says that workers will only provide care in a home-setting, we would expect that the relationship between informal care and nursing home use is negative. The support for this comes from Van Houtven & Norton, who showed that informal care is a substitute (negative relationship) for nursing home care. It should be noted that the research we cite here does not say that patients who receive informal care never use institutional care; this analysis includes a much broader population of care recipients than we are considering (i.e., not only short-term care episodes involving informal care associated with paid leaves) and over a broader time horizon (i.e., a patient may initially use informal care before later entering a nursing home); so, this evidence, along with the other papers we cite, is by no means proof of assumption (9.), but rather a general source of support to back up the intuitive argument we started with. Combining the intuition with academic research, we argue that the direct statement of assumption (9.) has general support and workers will not provide care in combination with institutional formal care.

Second, what is the relationship between informal care and home-based formal care? All four papers indicated that in general, informal care is a substitute for formal home care, but the latter two papers further indicated that when we separately analyze low-skilled and high-skilled formal home care, we find that informal care is still a substitute for low-skilled care but is a complement for high-skilled care. The reason that the combined finding says that informal care is a substitute for formal home care is because the magnitude of the relationship between informal care and low-skilled care was larger than the magnitude of the relationship between informal care and high-skilled care. For the purposes of this paper, the direction is relevant while the magnitude is not. This is because there is no reason for the direction to differ within cases

where high-skilled care is necessary: whether patients need high-skilled care due to post-acute care, end-of-life care, dementia, etc., we would expect the same complementary relationship between formal and informal care to hold (likewise for low-skilled care). On the other hand, it is quite possible that the amount of formal care differs between these separate cases and within a care level. So, based on this research, we do not yet have a clear conclusion on the relationship between informal care and home-based care in the context of this paper. In our model, what we can say right now is that (a) if f_w requires low-skilled care, then w only will provide care in L_w, but (b) if f_w requires high-skilled care, then w will provide care with high-skilled formal home care in L_w (reflected in assumption (9.1.1.)), and we need to determine the amount of formal care provided in this case. This will be addressed in Chapter 3 in the subchapter titled "Formal Home Care Utilization." Since by assumption (10.1.) we argue that the most common type of care required in the cases we consider is post-acute care, the issue will be framed in Chapter 3 as numerically estimating what the average amount (hours/week) of high-skilled formal home care provided during a given post-acute care case is.

8. The spending on formal care for f_w in L_w is less than or equal to the spending on formal care for f_w in L_w^C.

The argument for assumption (8.) starts with (a) the idea that we can quantify all care provided to f_w in some common "care currency" (i.e., there is a way to compare informal care to nursing home care to home health care all on the same basis or currency) and (b) that the same total care will be provided regardless of the specific services used; some types of care may have a maximum level they can contribute to the total, and different types of care may have different levels of effectiveness (measured in something like "care currency per hour"). In addition, we

assume that (c) the prices of formal care correspond at least ordinally to their care currency values (i.e., if the care currency value for nursing homes is greater than for home health care, then the dollar cost will be greater). Now, given these assumptions, if in L_w^C all care is formal care and in L_w there is a mix of formal and informal care, then as long as the care currency value of the informal care provided by w in L_w is positive, it will replace some of the formal care otherwise used in L_w^C. Therefore, the total spending on formal care in L_w is less than or equal to the total spending on formal care in L_w^C. This intuitively makes sense, if all we change is the addition of informal care from w, why would that ever cause the spending on formal care to go up?

2.1. There are no w such that there exists more than one such f_w.

This assumption is justified for two reasons: (1) it makes modeling simpler because it creates a one-to-one correspondence between a family member receiving care and a worker taking a leave, and (2) it is realistic because it is unlikely that a worker will take more than one leave in a calendar year to care for a family member and it is unlikely that a worker will care for multiple family members during one leave. It should be noted that, as will become clear shortly, our model will have an annual basis, so we only need this one-to-one correspondence within a calendar year.

Cost Calculations Framework

The preceding discussion has focused on the theoretical framework for modeling changes in utilization of formal care services; we now shift our attention to the theoretical framework for

modeling costs. There are two costs to be modeled: (1) the cost of operating a national paid family leave program, including primarily the paid leave benefits cost, along with administrative costs; and (2) the costs of formal care that are reduced for nursing homes and increased for high-skilled home health care as a result of leave-taking. This subchapter will present the basic cost formulas that will be implemented in the model (for model results, see Chapter 4); this subchapter also serves as an introduction to the variables for which we will develop numerical assumptions in Chapter 3.

We start with the annual program cost formula, given by

$$Total\ Annual\ Program\ Cost = \sum_{s} PC_s = \sum_{s} (WFP)_s * (LR) * (AWW)_s * (AWW\ B\%) * \left(\frac{1}{1 - ACR}\right)$$

The following table defines the variables:

Variable	Description
PC_s	Program cost for state s
$(WFP)_s$	Workforce population for state s
(LR)	Leave-taking rate: the percent of the workforce population that takes a leave each year
$(AWW)_s$	Average weekly wage in state s
$(AWW\ B\%)$	The average percent of the state average weekly wage that is paid as a paid leave benefit
ACR	Administrative cost ratio: the percent of the program cost that is administrative costs

Table 1: Program cost variable definitions

This total program cost (annual) is the sum of the individual state program costs. The state program cost formula comes from a logical deconstruction of the program into smaller components. There are three basic components: (1) the number of leaves taken per year, (2) the average benefit amount per leave, and (3) the administrative costs factor.

The first component, number of leaves taken, is calculated as $(WFP)_s * (LR)$. This is motivated from the assumption that the population eligible for paid leaves under a national program is roughly the workforce population, $(WFP)_s$. Not all workers will be eligible due to minimum earnings requirements, but it should be a reasonably close approximation. A discussion of program specification assumptions is provided in Chapter 3, but it should be noted here that we assume a program with mandatory participation funded via an employee payroll tax; this justifies the workforce population as the basis population. Given this basis, there must be some percentage (LR) of $(WFP)_s$ such that $(WFP)_s * (LR)$ is equal to the number of leaves taken in a year in state s.

The second component, average benefit amount per leave, is calculated as $(AWW)_s * (AWW\ B\%)$. This is motivated by the assumption that $(AWW)_s$ is a good measure of overall differences in wages in different states; if the wage distributions in each state have similarly shaped distributions, we expect this will be the case. As will be discussed in Chapter 3, the paid leave benefits in an actual national program would be defined as some percentage of each individual leave-taker's wage, but it is impractical to estimate costs at this level due to data constraints. Therefore, we use some $(AWW\ B\%)$ such that $(AWW)_s * (AWW\ B\%)$ is equal to the average amount per leave in state s; if the relationship between leave-taking behavior and income quantile is similar across states, then we expect this structure to effectively capture average benefit amounts across all states.

The third component, the administrative costs factor, is calculated as $\left(\frac{1}{1-ACR}\right)$. The only possible point of confusion is why this factor has the form it does. Recall from Table 1 above that (ACR) is the percentage of total program costs that are administrative costs. Therefore $(1 - ACR)$ is the percentage of costs that are not administrative costs. Multiplying both sides of the total program cost formula yields $(1 - ACR) * (Total\ Program\ Costs) = \sum_s (WFP)_s * (LR) * (AWW)_s * (AWW\ B\%) = \sum_s (Benefit\ Costs)$. From this it is clear that the percentage of total program costs that are administrative costs must be (ACR).

It is straightforward to see that the total program costs are simply calculated as the sum of all state program costs, which are each calculated as the product of the three components: annual number of leaves taken, average benefit amount per leave, and administrative cost factor.

Now, let's move on to the formal care cost formula. The overall formula is given by

$$Total\ Formal\ Care\ Cost = \sum_s \Delta NH_s + \Delta HHC_s$$

The components are given by

$$\Delta NH_s = (\geq 65\ Pop)_s * (NHR\%) * C(NH)_s * LOS_{NH} = (NH\ Leaves)_s * C(NH)_s * LOS_{NH}$$

$$\Delta HHC_s = (NH\ Leaves)_s * U_{HHC} * C(HHC)_s * LOS_{HHC}$$

The following table defines the variables:

Variable	Description
ΔNH_s	Change in annual spending on nursing homes in state s for new leave-takers (i.e., due to paid leaves, see assumption (12.2))
ΔHHC_s	Change in annual spending on home health care in state s for new leave-takers
$(\geq 65\ Pop)_s$	Population over age 65 in state s
$NHR\%$	Percentage reduction in the population over age 65 spending any time in a nursing home in a year in state s due to paid family leaves
$C(\cdot)_s$	Function for the monthly cost of formal care type $(\cdot)$ in state s. In all cases this is the "full-time" rate.
$LOS_{(\cdot)}$	Function for the length of stay for formal care type $(\cdot)$ associated with a paid family leave
$(NH\ Leaves)_s = (\geq 65\ Pop)_s * (NHR\%)$	Number of annual paid leaves in state s associated with nursing home stays averted; also, the number of averted nursing home stays in state s due to paid family leaves.
U_{HHC}	Average utilization of home health care per leave taken, as a percentage of the full-time rate

Table 2: Formal care cost variable definitions

The structure of the formal care cost formulas is derived from two sources: (1) the logical deconstruction of the quantities into smaller components, much like the program costs; and (2) the application of the utilization framework discussed in the beginning of this chapter.

To understand the total formal care cost formula, first recall our discussion about worker leave-taking decisions. By assumption (12.3.) the change in formal care spending associated with a national paid leave program is the difference in formal care spending between L_w^C and L_w for new leave-takers (i.e., those workers whom the program caused to take leaves). The Δs in the total formal care cost formula represents differences in spending on types of formal care between L_w^C and L_w for new leave-takers. Now further recall that assumption (10.) describes the only case we will be modeling, where f_w uses NH only in L_w^C and uses some combination of w and home-based formal care in L_w. Therefore, for new leave-takers there will be a decrease in spending on nursing homes in L_w (the world that is realized) and a non-negative change in spending on home health care in L_w. There are no other types of care considered. The reason that we only model this one case is because we lack the data and research to develop assumptions for other cases, and this methodology is supported by assumption (11.) which states that under this methodology our model will produce a lower bound on the magnitude of the change in formal care spending, an acceptable output. Now, to put the pieces together, it should be clear to see that the total formal care cost is the sum for each state of the change in nursing home and home health care spending associated with new leave-takers.

Now we shift to the individual formulas for the changes in nursing home spending and in home health care spending. Let's start with the formula for the change in nursing home spending. There are three components: (1) the number of nursing home stays averted due to paid family leaves (in other words, associated with new leave-takers), $(NH\ Leaves)_s = (\geq 65\ Pop)_s * (NHR\%)$; (2) the nursing home cost per time unit, $C(NH)_s$; and (3) the average length of stay for averted nursing home stays LOS_{NH}.

The first component, the annual number of nursing home stays averted due to paid family leaves or equivalently the number of new leave-takers, is represented as $(NH\ Leaves)_s = (\geq 65\ Pop)_s * (NHR\%)$. This structure is motivated by the methods of the Arora & Wolf paper discussed earlier that estimates the impact of paid family leave programs on nursing home utilization; in the paper, they estimate the effect as the reduction in the percentage of people over age 65 who spend any time in nursing homes. Therefore, we multiply the state population aged 65+ $(\geq 65\ Pop)_s$ by the reduction in the percentage of this population that spends any time in a nursing home in a year $(NHR\%)$. The result is the annual number of nursing home stays averted or number of new leave-takers in state s, $(NH\ Leaves)_s$.

The second component, the nursing home cost per time unit, is represented as $C(NH)_s$. The time unit must match the one used in the third component, length of stay. All nursing home costs are "full-time"; there is no lower-cost, lower care level within a nursing home. When setting the cost assumption in Chapter 3, the details of the numerical estimates will be fully explained.

The third component, length of averted nursing home stay, is represented as LOS_{NH}. This is self-explanatory.

Let's now move on to the formula for the change in home health care spending. Here, there are four components: (1) the number of nursing home stays averted due to paid family leaves, $(NH\ Leaves)_s$; (2) the average utilization rate of home health care per leave taken, U_{HHC}; (3) the home health care cost per time unit, $C(HHC)_s$; and (4) the average length of stay (or use length) for leaves in which a nursing home stay was averted, LOS_{HHC}.

Components (1), (3), and (4) here are generally analogous to components (1), (2), and (3) in the nursing home cost formula. The two component (1)s are identical; this is because for each

new leave-taker, there is both a decrease in nursing home spending and an increase in home health care spending. In component (3), home health care costs per unit time, it should be noted that this cost is the rate for full-time (roughly 40 hours per week) high-skilled home nursing. In component (4), it should be noted that this is the total time interval for which high-skilled home health care is hired in L_w; for example, if w hires the home health care for 4 weeks, then $LOS_{HHC} = 4\ weeks$.

Component (2) comes from our discussion of assumption (9.), which specifies that some high-skilled home-health care may be used in addition to informal care provided by w in L_w. It is simply defined as the average amount of high-skilled home nursing used in addition to w per leave taken, expressed as a percentage of full-time hours per week; for example, if the average new leave-taker hires 10 hours/week of home nursing during the leave, then $U_{HHC} = 25\%$.

For both the nursing home cost and home health care cost formulas, we multiply the components together at the state level and calculate the sum over all states to determine the total for each care type. For the nursing home cost formula, for each state, we multiply the number of averted NH stays, the average cost per NH stay, and the average length per NH stay. For the home health care cost formula, for each state, we multiply the number of averted NH stays, the average utilization rate of HHC, the average cost per HHC use, and the average length of HHC use. As previously stated, we add the NH cost and HHC cost changes together and sum across all states to determine the total change in formal care spending (for new leave-takers).

In this subchapter, we have developed the two cost formulas, the total program cost and the total formal care cost, which will be implemented in the model as described Chapter 4. In the course of our explanation of the cost formulas, we have also introduced the variables for which we will develop numerical assumptions in the next chapter.

Chapter 3

Assumptions Setting

In this chapter, we will develop numerical assumptions necessary to establish an estimate for the net change in spending on formal care as a result of a national paid family care leave benefit for family members aged 65+.

Assumption Confidence Level Methodology

The quality of data available for use in setting the assumptions necessary for this analysis varies from assumption to assumption. The extent of this variability is difficult to quantify except through individual judgement, as the data quality and the mechanisms producing the data do not lend themselves to easy application of common statistical procedures (and more complex statistical procedures are outside the scope of this paper). For this reason, we will use a three-level confidence rating system for each assumption (high, medium, and low), which will determine the relative width of the confidence interval. We use a three-level confidence rating system because we would like some amount of discrimination between confidence levels but do not believe we can accurately estimate confidence levels with more fidelity than we are using. The confidence level for each assumption will be determined separately, considering the amount of data, any apparent reliability issues, and rough measures of variability in the data. The widths used for high, medium, and low confidence intervals will be +/- 10%, 30%, and 50%, respectively. The specific width values were selected to provide levels that we expect will be able to capture the uncertainty in the various assumption estimates (these values were determined after setting the point assumptions and reviewing all assumptions). It should finally be noted that

the concept of "confidence level" used here is slightly different from the traditional statistical notion: the rating of low/medium/high is a reference to the point estimate, not the final calculated interval. All the intervals calculated are intended to capture the range of reasonable estimates for the true population values with the same "confidence", which is accomplished by appropriately rating the uncertainty in the point estimate via the confidence level and setting the interval width accordingly.

Program Specifications

In the following subsections, we will use data from several state-level paid family leave programs (California, New Jersey, and Rhode Island), so it is important to address the structure, level of benefits, and eligibility criteria for the proposed national program. The short answer is that we will assume that the structure, benefit level, and eligibility criteria for the national program will be broadly similar to those within the states from which we took claims data, and therefore, this state data is generalizable to the national setting. First, all three state programs have mandatory participation and are funded through an employee payroll tax; therefore, we assume the same. The other program specifications do vary somewhat by state, but these differences are not significant enough to clearly suggest the assumption of generalizability is implausible (for a summary of the differences in the state program benefit level and eligibility, see Appendix A); we will take this fact of the data into account in developing confidence levels for the associated assumptions. Further, it should be noted that the specific benefit level and eligibility requirements chosen for the national program will certainly impact the associated

assumptions, but the economic modeling and data required to account for these effects is well outside the scope of this paper. This is a potential area of future study.

Leave Cost

We will now develop an assumption for the average cost per leave taken. Since income levels depend heavily on the state cost of living, the assumption will be relative to the statewide average weekly wage (AWW). Note that we will set a national level assumption for the cost relative to the statewide AWW, but the actual costs will differ for each state since each state has a different AWW. Recall that we will use state paid family leave program data from California, New Jersey, and Rhode Island throughout this chapter. Let us now look at leave cost data from California and New Jersey (there is no cost data for Rhode Island). California's average weekly benefit amount for all PFL claims was $734.96 in June 2020 ("Paid family leave monthly data", 2022). New Jersey's average weekly benefit amount was $515 in 2018 for "other family care" (not spouse or child), though it barely differs from the other family care categories, at $506 and $504; it seems that the California number may be an overestimate since the New Jersey family leave claims for child bonding had an average weekly benefit of $548 (versus $515 for other family care) and make up about 80% of the total leaves, and California does not break out its claim data by reason for leave, meaning that the cost estimate for California will be skewed upward due to the higher cost child bonding leaves also included in that estimate ("Annual report for 2019 family leave insurance", 2019). According to Bureau of Labor Statistics (BLS) data, the 2020 AWW in California was $1,469 and the 2018 AWW for New Jersey was $1,264 ("Percent change in average wages", 2022; "Quarterly census of employment", 2022). These result in leave

cost to AWW ratios of 50% and 43%, respectively. **We will set the leave cost ratio assumption at 45%** since we believe the California data is an overestimate. Our confidence level should be limited by only having a small data set (two states) and some uncertainty surrounding data generalizability, although we do see that the leave cost to AWW ratios in both states are close in value. We will set the confidence level to medium (+/- 30%), for a **confidence interval of (31.5%, 58.5%).**

Leave Length

We now determine the expected length of leave taken due to family care for a family member aged 65+. We again reference California, Rhode Island, and New Jersey. The average leave length in California for all reasons was 5.5 weeks in 2018 ("Paid family leave monthly data", 2022). The average leave length for all family care in Rhode Island was 3.6 weeks ("Rhode Island paid family leave", 2020). The average leave length for "other family" (not child or spouse) in New Jersey was 4.1 weeks. As with the leave cost, the California number is likely an overestimate as average leave length for child bonding in New Jersey was 5.4 weeks ("Annual report for 2019 family leave insurance", 2019). We will set the leave length assumption to the arithmetic average of the three, which is **4.4 weeks.** Although we believe the California data is an overestimate, we will not adjust the estimate down since the additional Rhode Island data should already mostly balance this out. As with the leave cost assumption, we still have limited data (3 states) and generalizability concerns, but the data points we do have are close. We will therefore set the confidence level to medium (+/- 30%), for a **confidence interval of (3.1, 5.7).**

Paid Leave-Taking Rate

We now determine the expected rate of leave taking due to family care for a family member aged 65+. We yet again reference the same California, Rhode Island, and New Jersey data. In 2018 (the most recent year for which there is full data in all three states), and as reported by each state, family care leave claims totaled 34,698 for California, 1,370 for Rhode Island, and 5,444 for New Jersey ("Paid family leave monthly data", 2022; "Rhode Island paid family leave", 2020; "Annual report for 2019 family leave insurance", 2019). Note that in this case, the California data is separated by child bonding claims and family care claims.

The population from which leaves are taken is the workforce population, so it is a reasonable choice for the basis (denominator) of the leave taking rate calculation. One caveat of this choice is that it doesn't account for differences in the composition of the workforce population: variables such as the proportion of workers eligible for PFL benefits or the proportion of workers with family members of the appropriate age to need to use benefits may vary between states and likely have considerable effects on the true leave taking rates. For the purposes of simplicity and data availability, we will not introduce more sophisticated calculations here. According to the BLS, average annual employment in 2018 was 17,355,855 for California, 481,569 for Rhode Island, and 4,043,517 for New Jersey ("Quarterly census of employment", 2022). This produces care claims to total working population rates of 0.199% for California, 0.284% for Rhode Island, and 0.135% for New Jersey. If we take an arithmetic average of the three rates, this yields a rate of 0.2%.

One consideration is that "family care" includes more than just care for family members aged 65+ people who are potential users of formal LTC. While neither California nor Rhode Island break out the reasons for family care leaves in their reports, New Jersey does. New

Jersey's family care claims are classified as "child", "spouse" or "other family". "Other family" claims were 2,495 of a total 5,444, for 46%. We expect that this category will contain mostly care for elderly family members, although it is possible that it could include a small number of claims for a non-elderly sibling. A spouse is also a potential user of LTC services, so it is likely that this is an underestimate. Since leave taking rate is positively related to program cost, we will adjust this measure upwards to 60%. This yields a **point estimate of 0.2%*0.6 = 0.12%.**

An objection to applying a single estimate to all states is that leave-taking behavior may differ between states within a national program due to macroeconomic and social differences between states. This is indeed a valid objection but addressing it would introduce a significant amount of additional complexity, and the available data would likely not be of high enough quality or volume to meaningfully reduce the error in our estimates. Therefore, we will proceed without state-level estimates, though we take this into account below in establishing the confidence level.

There is significant variation in the pre-adjustment leave-taking rates, there is limited data (3 states), there are generalizability concerns, and we are unable to develop state-level estimates, so we rate this estimate at low confidence (+/- 50%), for a **confidence interval of (0.06%, 0.18%).**

Administrative Costs

In addition to the costs of funding the benefits of the paid family leave program, there will also be administrative costs. According to the Congressional Budget Office, about 13% of government spending is on costs associated with administration (Hall, 2017). Medicare

administrative costs have been estimated at 1-5%, and the average health insurer's overhead is reportedly 12-18% (Kessler, 2021). PFL programs may be administered through state disability insurance, as in California, which would suggest a relatively low marginal cost of running the program if it were likewise administered through an existing national program like the Social Security Disability Insurance program ("State disability insurance – types of claims", n.d.). We will therefore set the administrative cost ratio (the percent of costs that are attributable to administrative costs) in the range of the estimated Medicare costs, **at 3%.** The use of an existing program, in combination with the Medicare cost estimates, provides a solid basis for the point estimate, and the contrary data points for overall government costs and health insurer overhead should not be given significant credibility as they are not as directly applicable to the given situation. We will therefore set the confidence level at high (+/- 10%) for a **confidence interval of (2.7%, 3.3%).**

Nursing Home Utilization

When we introduced a key result in chapter 2, that of Arora & Wolf, which in 2017 reported findings on the relationship between PFL in California and nursing home utilization, we did not discuss the specific numerical findings, only the general result. At a high level, the authors performed an "experiment" using statistical controls to study the level of the cumulative measure of nursing home utilization before and after the introduction of paid family leave in California in 2004 (when no other states had yet introduced their own programs). They compared California's nursing home utilization to that of the rest of the states (here they used multiple comparison groups of other states to test the robustness of the result, more on which later) and

accounted for relevant economic, regulatory, and demographic variables. The result of the analysis was that the reduction in the cumulative measure of nursing home residents was equal to 0.5% of the population of people over age 65. This will serve as our initial estimate. It should be noted that the analysis produced a range of values between -0.5% and -0.72%, so we opted for the low end of the range for conservatism.

One clear change since 2004 that deserves some discussion is that many firms in states that have not passed their own PFL legislation have started offering their own separate paid family leave benefits. A 2020 study from the Society for Human Resource Management reports that 35% of the 1,000 society members surveyed reported that their firm offered paid family care leave to at least some of their employees ("New SHRM research", 2020). If this is the case and it is not accounted for in our initial estimate, then the initial estimate will overstate the true impact of a national paid family leave program, since some of the effect will already have been realized via the firm provided benefits. In other words, prior to any national PFL program, if a worker in a non-PFL state already has access to paid family care leave and takes a leave that causes a reduction in nursing home utilization, then the reduction has already occurred, and introducing the national PFL program will not cause any further decrease in nursing home utilization.

Based on the Arora & Wolf analysis, we have reason to believe that the initial estimate does account for firm-provided paid family leave benefits and therefore that the initial estimate does not need an adjustment. The evidence comes from intermediate results in their paper. In the paper, the main result comes from assuming that, after controlling for relevant economic and demographic variables, there is a parallel linear trend in California and the (non-PFL) states it is being compared to leading up to the implementation of its PFL program in 2004 (the "treatment"). To test whether the parallel trend used in the model was accurate, they created a

version of their model that included terms ("pre-treatment leads") to identify differences from the parallel trend for California in the four years leading up to the implementation of the PFL program in California (2004). They found small but statistically significant effects in 2001, 2002, and 2003. This means that there were effects in California specifically that, assuming the parallel trend assumption is correct, suggest changes in nursing home utilization not attributable directly to the PFL program since it was not yet implemented in those years. The authors hypothesize that the effects in 2002 and 2003, which occurred after the program was signed into law in 2002, could be "anticipatory" firm behavior, where firms begin providing their own paid family leave benefits in advance of the implementation of the program. Although the authors do not suggest that this explanation holds for 2001, before the program was signed into law, it seems plausible that even the discussion of such a program in the state legislative system could have the same effect. Now, in the model that included the pre-treatment leads, these replace the linear trend applied to California, so the result is relative to the trend from the group of states used as a comparison; in this case, the effect calculated in California in 2003 was -0.7% and the overall effect from 2004 and later was -1.4%, leading to a net effect from the implementation of the PFL program of -1.4%-(-0.7%) = -0.7%, which is similar to the result without the pre-treatment leads of -0.5%. This seems to suggest that even when potential firm-related effects are more directly accounted for through the pre-treatment leads, the net effect attributable to the implementation of the paid family leave program remains significant. Therefore, we will set the nursing home utilization assumption at the initial **-0.5%.** That is, the expected reduction in the cumulative measure of annual nursing home stays, as a percentage of the population aged 65+, is 0.5%.

Additional Support for Nursing Home Utilization Assumption

As of the writing of this paper, Arora & Wolf is the only published result that studies the relationship between paid family leave programs and long-term care service utilization. And the argument within this paper relies heavily on that result – without it, there is no research to directly establish a change in long-term care service utilization resulting from paid family leave programs. So, one might naturally be skeptical. However, there is in fact quite a bit of research that indirectly supports the findings in Arora & Wolf.

In the paper, recall that they find that the implementation of paid family leave in California was associated with a decrease in the number of people who spent any time in a nursing home annually. Since the data used was observational, the authors could not establish a causal link between the paid family leave program and the change in nursing home utilization, though they indicate they are unable to come up with another explanation. Indeed, there is a highly plausible causal mechanism by which paid family leave would change nursing home utilization, as will now be discussed. For the result to be directionally correct, (1) the paid family leave program must increase the number of people receiving informal long-term care, and (2) the provision of informal long-term care must cause a substitution away from nursing home care. In Chapter 2, we already argued both that (1) is true (see discussion of assumption (12.) and that (2) is true (see discussion of assumption (9.)).

The support of the directional claims from Arora & Wolf provided in Chapter 2 does not address the separate issue of the claimed magnitude of the effect of the paid family leave program on nursing home utilization. Firstly, we used the low-end estimate from the paper (-0.5%) as our basis for the reduction in nursing home utilization. Secondly, in the paper they suggest that their chosen measure of nursing home population (the “cumulative” measure)

systematically underestimates the total reduction in utilization. This measure isn't sensitive to reductions in lengths of stays within a calendar year. The only ways for a reduction in the comprehensive measure to occur are (1) a shortened stay that now ends in the preceding year rather than the start of the current year, (2) a shortened stay that now starts in the following year rather than the end of the current year, or (3) an entirely averted stay. A shortened stay whose new end or start date remains within the current year is recorded the same way under the comprehensive measure before and after the effect, even though there is clearly a reduction in utilization. This means that the comprehensive measure systematically underestimates the magnitude of any potential reduction in utilization.

Secondly, multiple methods were used to test the robustness of the result. The authors checked the robustness of the result (meaning the sensitivity of the result to changes in the data or methodology) by using alternative control groups and conducting a direct placebo test. For the general analysis, the state receiving the treatment (here California) must be compared to a group of states not receiving the treatment. In the official model, the comparison group was chosen with a hierarchical clustering algorithm, which is a type of process used to identify states that are similar to one another across relevant variables. The use of alternative control groups is meant to test that the final result was not due to the comparison group used; they selected two alternative groups – a "family friendly" group with legislation exceeding the minimum requirements in the FMLA and a group of all 50 states and D.C. Using both alternative groups, the measured PFL effect was at least -0.5%. For the direct placebo test, the authors omitted the California data and repeated the analysis as if the treatment had been applied to each state to see if they found a false effect. Only in three states was a false effect found, implying a p-value of 0.06 (since there are

49 states and D.C., and there were 3 false positives, yielding 3/50 = 0.06). This suggests that the likelihood of a false effect in California is quite low.

In determining the confidence level to assign to the nursing home utilization assumption, we consider that there is a clear causal explanation for the estimated effect in California, there is an inherent amount of conservatism in the estimate, and the estimate was found to be robust on several measures. On the other hand, the study is limited by its use of observational data, and macroeconomics is by its nature highly complex and difficult to thoroughly understand. Therefore, we will set the confidence level to medium (+/- 30%) for a **confidence interval of (-0.35%, -0.65%).**

Length of Averted Nursing Home Stays

We will now develop an assumption for the expected length of averted nursing home stays. First, we expect that our estimate will be close to the expected leave length; however, because not all leaves are necessarily associated with an averted nursing home stay, the leave length and averted stay length estimates may differ. Following from the discussion in Chapter 2, we anticipate that the most likely reason for a nursing home stay averted by a paid leave is post-acute care. A study of Medicare beneficiaries discharged to institutional post-acute care (skilled nursing facilities, or inpatient rehabilitation facilities) between 2000 and 2015 finds that the mean length of stay in post-acute care has remained nearly constant at 25 days (3.57 weeks) since 2006 (Werner & Konetzka, 2018). This is indeed close to our leave length assumption of 4.4 weeks. One possible explanation for the longer leave length is that workers may begin their leave prior to when the family member would have transitioned to post-acute care to manage

their transition home. And workers may remain on leave beyond when their family member would have been discharged from post-acute care to due to greater cautiousness about their family member's ability to return to independent living. One final note is that we do not consider changes in utilization of inpatient rehabilitation facilities due to paid family leave, as there is not existing research to draw from that links the two, but we do expect the length of stay to be similar between these and skilled nursing facilities. If anything, we expect length of stay in inpatient rehabilitation facilities to be shorter than in skilled nursing facilities because skilled nursing facilities generally provide a higher degree of care and therefore likely receive more severe cases; so, the average reported above is likely an underestimate and therefore a slightly conservative estimate (since shorter length of averted stay corresponds to lower spending reductions).

We will set the length of averted nursing home stay assumption at the **3.57 weeks** reported in the study of post-acute care Medicare beneficiaries. We believe that post-acute care is by far the most plausible reason for a nursing home stay averted by paid leave, and this is estimate is a reliable indicator of institutional post-acute care length because it is based on the entire set of Medicare beneficiaries using institutional post-acute care. Further, the estimate is reasonably consistent with the leave length estimate, and there is a plausible causal explanation for the discrepancy.

Though our point estimate and the leave length estimate do generally agree, they are not the same, and it is possible that our explanation for the difference is incorrect. Additionally, while we believe the risk related to the assumption that post-acute care is the primary reason for averted stays is small, the risk remains and could in theory mean that our estimate overstates the

true average length of averted stay. For these reasons, we will set the confidence level to medium (+/- 30%) for a **confidence interval of (2.5, 4.64).**

Formal Home Care Use Length

We will now set the average formal home care use length assumption. One estimate is the average length of averted nursing home stays, set at 25 days. The use length for formal home care should be comparable to the use length for averted nursing home stays for a given care episode since the underlying care episode is the same. Another estimate is the average leave length, set at 4.4 weeks. It is reasonable that any additional formal care is hired for the duration of the leave and therefore the care episode, as the care episode is not resolved until the leave ends (see assumption (2b.)) and the additional care is most likely necessary until the care episode is resolved. According to our modeling framework, leave length is also an upper bound on the formal care use length, as stated in assumption (7.) and discussed in Chapter 2. As mentioned in addressing the difference in the leave length and averted nursing home stay length estimates, it is reasonable that any formal home care is not typically hired immediately at the start of the leave and that the formal home care use length is therefore somewhat shorter than the average leave length. We will estimate the formal home care use length as the average of the two estimates described above, **4 weeks**. The two estimates are quite close to one another, and there is little reason to assume that the errors in either estimate are correlated, so uncertainty in those estimates should not fully propagate to this estimate. And we have established the estimated leave length as an upper bound and therefore worst case, so the interval should ideally not include any values

above 4.4 weeks. Therefore, we set the confidence level to high (+/- 10%) for a **confidence interval of (3.6, 4.4).**

Formal Home Care Utilization

Formal home health care utilization is here defined as the average amount of formal home care (measured in hours per week, as a percentage of full-time 40 hours per week) hired per leave taken to complement the informal care provided by the leave-taking worker. It seems likely that the utilization rate depends greatly on the specific reason for care, even within the category of post-acute care which we have indicated as the most common type of care provided by new leave-takers; for instance, a broken arm due to accidental fall may require no formal home health care, while a knee-replacement surgery may require at the least some in-home rehabilitation provided by a professional nurse. Nonetheless, the best we are likely able to do is use post-acute care data as the basis for our estimate. A 2019 paper by Werner et al. studied patient outcomes after hospital discharge to home health care and skilled nursing facilities. The study used a database of more than 17 million Medicare beneficiary hospitalizations between 2010 and 2016. We are interested in the home health care results, and one outcome they studied was average spending on home health care. The paper finds that the average Medicare payment for home health care for post-acute care was $2,459. As will be discussed shortly in the "Cost of Care" subchapter, the median monthly cost for full-time home health care is $5,148 ("Genworth cost of care survey", 2022). While we estimated the average use length for home health care to be between the estimated length of nursing home stay and estimated leave length, it may be more appropriate for this purpose to instead use our estimated length of averted nursing home stay (25

days). This is because the leave length estimate applies to the population of patients receiving care from leave-takers, while the averted nursing home stay length estimate applies to the entire population of post-acute care patients. We do need to assume that for a given care episode the length of use of home health care is comparable to the averted length of stay in a nursing home. One may object that we previously ignored the distinction between the population of patients receiving care from leave-takers and the entire post-acute care patient population when estimating the average length of averted nursing home stay, so we should therefore do the same here. But while it is true that we did previously ignore the distinction, it was due to a lack of leave-taker-specific data; here, we have estimates for both populations, so we will opt for the more directly comparable population and use the averted nursing home stay length estimate to determine home health care utilization. Given the above data points, we can estimate the average home health care utilization as 2459/(5148*25/30) **= 57%.** In the calculation, we simply divide the average cost for post-acute home health care by the full-time home health care cost over the average post-acute care use. The data in this section is limited, there are potential concerns surrounding the distinction between the overall post-acute care and leave-taker patient populations, and there is the possibility for large variations in utilization depending on the exact reasons for care. Therefore, we set the confidence level to low (+/- 50%) for a **confidence interval of (28.5%, 85.5%).**

Cost of Care

We will use the 2022 Genworth Cost of Care Survey data for all cost assumptions. This data was collected from 14,326 surveys of long-term care providers. While there is data for

nursing homes, assisted living facilities, adult day health care facilities, home health aides, and homemaker services, we will only use the nursing home and home health aide data in our analysis. This paper's modeled changes in utilization due to paid family care leave account for nursing homes and home health care (aides) only. We are not aware of any evidence that adult day care and assisted living facilities are typically utilized in the short-term in a way that can plausibly be attributed to paid family care leave implementation. Following our discussion in Chapter 2 and as indicated in assumption (9.1.1.), we assume that all formal home health care hired during a paid leave is high-skilled home care, which is indicated as "home health aide" in the cost of care survey. In the survey, nursing home costs are separated by semi-private and private room types, but Medicare, the largest payer for post-acute care, only covers semi-private rooms for post-acute stays in skilled nursing facilities, so we use the semi-private room costs for our analysis. Finally, since individual state data is available, we will perform cost calculations on the state level ("Genworth cost of care survey", 2022).

This data is sourced from a very large sample size and comes from an industry leader in long-term care insurance. Therefore, we will assign a confidence level of high (+/- 10%) for this assumption.

Other Assumption Sources

State average weekly wage data comes from a 2020 Bureau of Labor Statistics (BLS) report ("Percent change in average weekly wages", 2022).

State elderly (aged 65+) population data comes from the 2020 US Census (Rubin, 2022).

State workforce population data comes from a 2018 BLS report ("Quarterly census of employment", 2022).

All three of these assumptions come directly from frequently used economic and demographic data sources provided by reputable government offices (BLS, US Census). Therefore, we assign a confidence level of high (+/- 10%) to all three.

Finally, we exclude from our analysis the states that already have paid family leave programs or have passed legislation to implement paid family leave programs within the next five years. A list of such states comes from the Kaiser Family Foundation, a nonprofit organization focused on national health issues ("Paid leave in the U.S.", 2021).

Summary of Assumptions

Assumption	Point Estimate	Confidence Level	Confidence Interval
Nursing Home Utilization	-0.5%	medium (+/- 30%)	(-0.35%, -0.65%)
Length of Averted Nursing Home Stay	3.57 weeks	medium (+/- 30%)	(2.5, 4.64)
Formal Home Care Use Length	4 weeks	high (+/- 50%)	(3.6, 4.4)
Formal Home Care Utilization	57%	low (+/- 10%)	(28.5%, 85.5%)
Paid Leave-Taking Rate	0.12%	low (+/- 50%)	(0.06%, 0.18%)
Paid Leave Length	4.4 weeks	medium (+/- 30%)	(3.1, 5.7)
Leave Cost Ratio	45% of statewide AWW	medium (+/- 30%)	(31.5%, 58.5%)
Administrative Cost Ratio	3%	high (+/- 10%)	(2.7%, 3.3%)
State Costs of Care	--	high (+/- 10%)	--
Statewide AWWs	--	high (+/- 10%)	--
State 65+ Populations	--	high (+/- 10%)	--
State Workforce Populations	--	high (+/- 10%)	--
Program Benefit Parameters	Broadly similar to those in California, New Jersey, and Rhode Island (see Appendix A for details regarding these programs)		

Table 3: Summary of assumptions

Chapter 4

Model Implementation and Results

The model was implemented using Excel. There are assumptions applied at the national level (i.e., the same for all states) and the state level (i.e., different for each state); the state-level assumptions are designated by an *s* subscript in the cost calculations section at the end of Chapter 2, and all others are national-level assumptions. Quantities are calculated with each state as a line item, drawing from the state level and national level assumptions as necessary. Unless otherwise stated in the next subchapter, all cost calculations follow the equations presented at the end of Chapter 2.

Methodological Note

We made one important deviation from the cost formulas presented in Chapter 2. Using the assumptions for leave-taking rate and change in the percentage of elderly population in nursing homes (Chapter 3), the model result was 180,000 averted nursing home stays, compared to 120,000 leaves taken. Clearly, this doesn't make sense, since the assumed causal mechanism by which nursing home stays are averted is leaves taken, and we directly assume that there is at most one averted nursing home stay for each leave taken. It must be the case that one or both of these assumptions is inaccurate. In Chapter 3, we discussed the issues inherent to using workforce population as the basis for the leave-taking rate, along with, on the other hand, several reasons trust the magnitude and direction of the nursing home utilization assumption. For these reasons, in states where the estimated number of averted nursing home stays exceeded the

estimated number of leaves taken, we decided to use the estimated number of averted nursing home stays to calculate the program costs.

Based on the sensitivity analysis, it seems that the issues with these two assumptions should not cast doubt on the overall result. The nursing home utilization had the fourth highest sensitivity of all assumptions tested, but the measured sensitivity is only about half the size of the overall result ($283 million sensitivity, compared to $402 million overall savings). This captures much of the effect on program costs as well, since we use averted nursing home stays in the program cost calculations when they are larger than the estimated leaves taken. For this reason, the sensitivity of the leave-taking rate is the second lowest among assumptions tested, with a sensitivity of $28 million. So, the two assumptions with issues discussed in this section (leave-taking rate and nursing home utilization) do not qualitatively affect the overall results even at the worst-case ends of their confidence intervals, and they should therefore not cast doubt on the overall results of the paper's analysis.

Key Results

We provide the estimated effects of a national paid family leave program on spending in Table 4 and the results of our sensitivity analysis in Table 5 and Table 6. These results will be discussed further in the next subchapter, "Discussion of Key Results".

Formal care spending		
	Nursing home spending change	(1,257,302,437)
	Home health care spending change	443,562,261
	Total formal care spending change	(813,740,175)
Program costs		
	Total program costs	411,571,706
Net spending		
	Total change in net spending	(402,168,469)

Table 4: Estimated changes in annual spending, dollars

Assumption	Best Case	Worst Case	Difference
Length of averted stay	(826,689,958)	(73,012,867)	753,677,091
HHC use length	(845,730,730)	(180,387,339)	665,343,392
HHC utilization	(620,079,519)	(168,777,096)	451,302,423
Change in % age 65+ in nursing home	(585,100,626)	(301,956,400)	283,144,226
NH Cost	(575,581,656)	(324,121,169)	251,460,487
Average weekly benefit amount / statewide AWW	(573,322,924)	(326,379,900)	246,943,024
Length of paid leave	(571,452,144)	(328,250,681)	243,201,463
HHC Cost	(489,439,344)	(410,263,480)	79,175,864
Paid leave-take Rate	(450,077,405)	(421,844,655)	28,232,750
Administrative cost ratio	(451,120,390)	(448,574,561)	2,545,829

Table 5: Assumption-level sensitivity analysis, dollars

Best Case	**Worst Case**
(1,676,182,981)	700,816,025

Table 6: Overall sensitivity analysis, dollars

Discussion of Key Results

Table 4 shows the estimated changes in spending. While it was clear based on the modeling framework (Chapter 2) that there would be a reduction in nursing home spending that is greater than or equal to an increase in home health care spending, it was not clear that this amount (**$**0.813 billion) would exceed the paid leave benefit and administrative costs ($0.411 billion); however, this is the case, and (highlighted blue) **the total annual net savings due to the implementation of the national paid family leave program is estimated at $0.402 billion**. We

later discuss how this savings is distributed across the different payers (Medicare, households) in the subchapter “Payer Distribution”.

Table 5 and Table 6 present the results of our sensitivity analysis. In Table 5, we set the listed assumption to its best-case and worst-case values within the estimated confidence interval, while leaving all other assumptions at their point estimates, and then recalculate the total net savings. The confidence intervals and point estimates are summarized in Table 3 at the end of Chapter 3; they are presented by difference in best- and worst-case in descending order. The three assumptions highlighted blue have the greatest potential impact (within their confidence intervals): expected length of averted nursing home stay, home health care use length, and home health care utilization rate. Observe that even in the worst-case for each of these assumptions, there is an overall net savings. Also, it is worth noting that the ranking of sensitivities is not just a reflection of the confidence levels used for each assumption: the confidence levels for the three assumptions listed are medium, high, and low, respectively.

An issue with the type of analysis of Table 5 (i.e., focusing on one assumption at a time) is that the assumptions are not completely independent of one another in the sense that certain configurations of assumptions are not logical and/or are disallowed under the model framework. For instance, we assume that the length of the averted nursing home stay and the length of home health care use must both be shorter than the length of the leave taken, but this may be violated if we adjust one assumption at a time. This consideration is made in the calculations in Table 6, which will be discussed shortly and presents overall best- and worst-case estimates. Disregarding this sense of dependence, we expect that the errors in the estimates are independent; the assumptions were developed with data and methodology that were generally unique to each

assumption, and if anything, there is conservatism inherent in the overall methodology, so we would expect hypothetical systematic error to be in a favorable direction.

In Table 6, we adjust all assumptions at once to the extremes of their confidence intervals to calculate overall best- and worst-case scenarios for total net change in costs. However, as noted in the discussion of Table 5, we do not simply change all the assumptions to the level that results in greater or lower spending, since certain assumptions are restricted by the values of others.

The best-case net spending outcome is an annual reduction of $1.676 billion. For this result, we use the end of the confidence interval resulting in greater savings, except for the expected leave-taking rate, which is left at 0.18% and the expected leave length, which is set to 1.16 months. The leave-taking rate is set to 0.18%, its worst-case value, because if there is an increase in the number of averted stays (by setting that assumption to its best case), then we expect an increase in leave-taking, though it makes little difference here because of the change to the program cost calculation that was discussed at the beginning of this chapter. The expected leave length is set to 1.16 months, slightly greater than its point estimate value, because we require in our modeling framework that the leave length exceeds both the home health care use length (set at 0.9 months) and averted nursing home stay length (set at 1.16 months).

The worst-case net spending outcome is an annual cost increase of $0.701 billion. In this case we do simply set all assumptions to their individual worst-case values since none of the individual values contradicts the modeling framework as was the case in the best-case scenario calculations. However, under these assumptions the model projects a net increase in *formal care* spending, which does contradict the modeling framework, where we argued that paid leaves should never cause formal care spending to increase. Therefore, we calculate the worst-case

assuming no net change in formal care spending, or simply the program costs under the worst-case individual assumptions.

Finally, recall based on previous discussion that the estimates and ranges may be underestimates for two reasons. First, as discussed in Chapter 2, we only model one of many possible cases in which savings may occur due to paid family leaves (see assumptions (10.) and (11.)). Therefore, it follows that we underestimate that true spending impact. Second, as discussed in Chapter 3, we only model cases in which a nursing home stay is completely averted, though it is conceivable that savings may occur due to shortened nursing home stays caused by paid family leaves (see "Additional Support for Nursing Home Utilization"). So, the results presented here are, based on available data, conservative by nature.

State-Level Analysis

One interesting point is to study the results at the level of individual states. Let's compare two very different states: Pennsylvania and Texas. Pennsylvania has an estimated $50 million net annual savings, while Texas has an estimated $3 million net annual cost. Two differences drive this result in the model. First, the ratio of people aged 65+ to working population is larger in Pennsylvania (39%) than in Texas (28%), so Pennsylvania has more cost-reducing averted nursing home stays relative to cost-increasing leaves taken. Second, the cost of care for nursing homes relative to the statewide AWW is higher in Pennsylvania (8.7) than in Texas (4.2), so each averted nursing home stay in Pennsylvania produces more nursing home cost-savings than each in Texas. And thirdly, the cost of care for home health care relative to the statewide AWW

is similar in Pennsylvania (4.2) and Texas (3.8), so an averted nursing home stay in each state produces a similar home health care-related cost increase.

But there is an issue with this type of state level analysis that becomes apparent by considering Florida: which state should get "credit" for the cost savings? Florida is like Pennsylvania in that it has a high ratio of people aged 65+ to working population, at 48%. But we know that Florida is filled with retirees. When people take paid leaves to care for elderly family members (most likely elderly parents, but perhaps also spouses for older workers), we don't know where their family members reside. It is quite possible that a leave taken in Texas leads to cost saving in Florida. So, (1) without being able to track where the savings is actually occurring, it is difficult to draw useful conclusions from the state level data, and (2) an argument for a national program, rather than individual state programs, is that states like Texas are discouraged from implementing their own programs because they expect higher net costs, even though it may be that leaves taken in such states are major drivers of savings in other states, where workers' elderly family members may be more likely to reside. In the case of a national program, the savings and costs in individual states are not relevant.

Payer Distribution

It is important to look at how the change in formal long-term care spending is distributed across the possible payers, mainly government services (Medicaid and Medicare) and households. Up to this point, our discussion has been "payer-agnostic": we haven't worried about which specific payers benefit from decreases in spending on care, only that at the aggregate economy level there is a decrease in spending. With the available data and research,

any attempt to answer this question is speculative. We faced a challenge in linking leave-taking behavior to formal care spending, and it is a further challenge to link this spending to specific payers. Nonetheless, it is worth exploring what information is available that may point us to an approximate answer.

Let's start by discussing the Medicare, Medicaid, and aged 65+ populations. According to the Centers for Medicare & Medicaid Services (CMS), in 2020 there were 54.5 million aged 65+ beneficiaries of Medicare Part A and B, and (also in 2020) there were 6.4 million aged 65+ Medicaid beneficiaries ("CMS Fast Facts", 2021). It seems that the Medicare population includes those who are dually eligible for Medicare and Medicaid, and since all people aged 65+ are eligible for Medicare, it is likely the case that the 2020 aged 65+ Medicaid population is a subset of the 2020 aged 65+ Medicare population ("Data analysis brief: Medicare-Medicaid dual enrollment", 2018). For these dually eligible beneficiaries, it is common to receive state assistance with Medicare premiums through the Medicare Savings Program, so in many cases the payer for dually eligible beneficiaries may still be Medicare (though Medicaid may pay the premiums) ("Dually eligible beneficiaries", 2020). According to the U.S. Census, in 2020 there were about 51 million people aged 65+ (Rubin, 2022). The reported aged 65+ Medicare beneficiaries actually exceeds the total U.S. aged 65+ population from the U.S. Census. Needless to say, it seems clear that most or all people aged 65+ use Medicare, and even in cases where they are also eligible for Medicaid, it is common for Medicaid to simply pay Medicare premiums, meaning Medicare is still the payer in those instances.

We have worked under the assumption that post-acute care is by far the most common type of care provided by leave-takers (see Chapter 2, assumption (10.1.)). For post-acute nursing homes (skilled nursing facility) stays (i.e., nursing home stays associated with a hospital stay),

Medicare Part A fully covers up to 20 days and has a $194.50 coinsurance charge for days 21-100, whereafter the insured must fully pay ("Skilled nursing facility care", n.d.). For post-acute home health care, Medicare will fully cover "part-time or intermittent nursing care, [which is] skilled nursing care you need or get less than 7 days each week or less than 8 hours each day over a period of 21 days (or less) with some exceptions in special circumstances." It seems that the patient is fully responsible for costs of care after 21 days. Medicare will also pay 80% of costs for durable medical equipment (DME; things like wheelchairs or walkers) related to home health care ("Home health services", n.d.).

Assuming that all family members who have nursing home stays averted due to paid family leaves are Medicare beneficiaries, they all require post-acute care, and they are therefore subject to the Medicare coverages described in the last paragraph, we can estimate the percentage of the reduction in spending on formal care services attributable to Medicare and households. Starting with nursing homes, our expected length of averted nursing home stay is 3.57 weeks, or 25 days (see Chapter 3). The national assumed median cost per day for semi-private room nursing home care is $260 ("Genworth cost of care survey", 2022). Thus, the average total cost per averted stay is $260*25 = $6,500. According to the Medicare coverages outlined above, for the average nursing home stay, Medicare pays the first 20 days in full and the amount in excess of $194.50 for the remaining 5 days, which totals to 20*$260 + 5*($260-$194.50) = $5,527.50. Therefore, we estimate that on average, for the averted nursing home stays, Medicare pays 85% of the costs and households pay the remaining 15%.

Moving on to the home health care, our estimated length of use for home health care is 4 weeks at 57% of full time (see Chapter 3). The national assumed median cost per day for a home health aide (high-skilled home nurse) is $169 ("Genworth cost of care survey", 2022). According

to the Medicare coverages above, Medicare will cover this home health care in full for the first 21 days, after which the patient will be responsible for paying. So, for the average home health care use in the case that we are modeling, Medicare pays 75% of the costs and households pay the remaining 25%. This does ignore the cost of DME, but as the payment split (80% Medicare, 20% households) is similar to what we estimate here this is not a major concern.

Finally, we apply these payer distributions to our model outputs from Table 4. The change in Medicare spending is calculated as 85% of the reduction in nursing home spending and 75% of the increase in home health care spending, or 1.257*0.85-0.443*0.75 = $0.736 billion in *savings*. The change in household spending is calculated as 15% of the reduction in nursing home spending, 25% of the increase in home health care spending, and 100% of the program costs, or 1.257*0.15-0.443*0.25-0.411*1.00 = $0.333 billion in *costs*.

We have assumed in this paper that a national paid family leave benefit (to be clear, we only consider paid family leave for family members aged 65+; additional cases such as child bonding are not considered) would be funded by an employee payroll tax, but these results suggest that it is in principle possible to avoid an additional tax. One thing to note is that "households" includes both workers and the elderly and that all the savings goes to the elderly while all the costs go to the workers in a given year. On the other side, Medicare is funded by employee and employer payroll taxes. Therefore, if we were to impose a new employee payroll tax sufficient to fund the paid family leave benefit while reducing the Medicare employee payroll tax by an equivalent amount, then there would be no net tax increase on workers, Medicare would still save about $0.325 billion annually, and the elderly population would still save the remaining $0.078 billion.

Chapter 5

Conclusion

In this paper we argued that under a national paid family care leave benefit for care recipients aged 65+, (1) if the provision of the paid family leave benefit increases the rate of leave-taking to care for people aged 65+, and (2) if when workers take leaves to care for people aged 65+, the (informal) care they provide acts as a substitute for formal care (like nursing homes, or home nursing), then (3) if the cost of the paid benefit for a leave is less than the cost of the formal care it acts as a substitute for, then there will be a net reduction in total spending from direct (spending on the LTC service itself) and indirect (spending on the paid leave benefit) sources.

Based on the existing body of research and the results of the calculations presented in this paper, we find strong evidence that a national paid family leave program will increase the rate of leave-taking to care for people aged 65+ and that leave-takers will act as substitutes for some formal care. Importantly, we estimate that such a program will lead to a roughly $402 million annual reduction in total combined spending on formal care and the program benefits.

We find that post-acute care is likely to be the primary driver for this savings, and since Medicare coverage includes most post-acute care costs and close to all people aged 65+ in the U.S. are Medicare beneficiaries, we expect that most of the projected reduction in savings will be attributable to the Medicare program. We therefore argue that reallocating some of the Medicare payroll tax to finance the national paid family leave program (for care recipients aged 65+ only) will result in no net tax increase on workers, an annual savings of about $325 million annually for Medicare, and an annual savings of about $78 million among the elderly population.

The results of this paper are a meaningful contribution to the policy debate on paid family leave. Proponents of paid family leave often cite as benefits improved family life for workers, greater flexibility in care arrangements, and greater workforce participation rates. With the results of this paper, they can now argue that there is a clear economic savings to providing paid family leave in the case of care for family members aged 65+.

A national paid family leave program only for care for family members aged 65+ is justified. Even without accounting for any of the benefits typically cited by paid family leave supporters, this paper shows that a national paid family leave program for care for family members aged 65+ leads to a more economically efficient outcome – namely a net $400 million reduction in spending primarily by Medicare. In the context of the estimated $60 billion in annual post-acute care expenses, this level of savings is admittedly not very large – between 0.5% to 1%. However, recall from our discussion in the introduction that the vast majority of workers appear to support paid leave to care for family members (including those aged 65+), so given that according to the calculations in this paper a national paid family leave program for care for family members aged 65+ can be implemented at no net cost to workers, it seems an obvious policy decision.

Now, if a hypothetical national paid family leave program allows leaves for the broader set of reasons that current state paid family leave programs allow (such as child bonding, which is the most common), then the effect of aged 65+ family care leaves will be to partially offset the overall costs, and therefore the tax burden of such a program. To be more specific, consider California's total paid family leaves exceeded the estimated number of aged 65+ family care leaves by a factor of about 7.5, so a national paid family leave program allowing the full set of leave reasons should cost about 7.5 times more than what was estimated in this paper ("Paid

family leave monthly data", 2022). The estimated spending reduction from formal care exceeded total program costs by a factor of 2. Therefore, a rough estimate is that the savings from the aged 65+ family care leaves would finance about 2/7.5 = 27% of the costs of such a program. So, if the additional benefits of implementing a "full" national paid family leave program (i.e., that includes broader reasons for leaves than we considered throughout this paper) outweigh the remaining ~73% of the program costs, then such a program should be implemented.

To conclude, this paper naturally suggests a large number of areas for future research. Within the scope of this paper, more research studying the relationship between paid family leave and formal care utilization would greatly increase the confidence in our results. Survey-based research (rather than only statistical analysis) on leave-takers in existing state paid family leave programs would provide more direct evidence for this paper's assumptions in general. Looking more broadly at future research areas, research quantifying the benefits and costs of the "full" national paid family leave program, rather than the program only for leaves to care for family members aged 65+ considered in this paper, is necessary for further progress in the paid family leave policy discussion. Research on the political viability of a national paid family leave program, especially in the context of this paper's findings, is also important for the paid family leave policy discussion. Research on the effects of variations in program benefit specifications and eligibility criteria will be important for optimizing the benefits of such a program, especially for low-income workers who report being unable to take needed leaves at higher rates than other workers. Research on alternative program features, such as employer-financed leaves, voluntary worker program participation, or private-sector program administration will provide a more complete understanding of the options for a paid family leave program.

Appendix A

PFL Benefit Specifications in CA, RI, and NJ

What are the benefits for different state paid family leave programs? This is of interest because we would like to make use of available claims data from multiple state programs, and we can only do this if our hypothetical program provides similar benefits; while modifying the benefits would no doubt cause changes in utilization, we will not provide a thorough analysis of this issue. We focus on California, New Jersey, and Rhode Island, the states for which detailed data exists on paid family leave programs. In California, through July 2020 up to 6 weeks of paid leave could be claimed for reasons including care for a seriously ill family member (we will call this paid family care leave); this has increased to 8 weeks as of July 2020. For workers with average weekly wages (AWWs) below a third of the state AWW, the rate is 70% of their AWW, and this reduces to 60% when the AWW is over one third of the state average; the weekly benefit is capped at $1,300. For New Jersey, through June 2020 up to 6 weeks of paid family care leave can be taken. The weekly benefit is approximately 67% of the worker's AWW up to a weekly limit of $667; as of July 2020, this has increased to 85% of the worker's AWW up to 70% of the statewide AWW, which is currently about $881 per week. In Rhode Island, workers can take up to 4 weeks of paid family care leave. The weekly benefit is equal to 4.62% of wages received in the highest quarter of the worker's base period (the first four of the five quarters preceding the claim) – approximately 60% of AWW – up to a maximum weekly benefit of $887.

Eligibility requirements for New Jersey and Rhode Island are similar – $10,000 and $12,800 in earnings in the base period ("Paid family and medical leave in the United States", 2020). California's requirements are more generous, at a minimum of $300 in earnings during the base period; however, quarterly earnings below $964 result in a weekly benefit of $50, and

only quarterly earnings above that level result in benefits under the rule described above ("Calculating paid family leave benefit payment amounts", n.d.). While it is difficult to determine how much the eligibility requirements will affect the number of eligible workers, it seems safe to say they are inclusive with even a part-time (20 hours per week, 50 weeks per year) worker with a wage of $10/hour being eligible for benefits in all three states. Until June 2020 (and all paid leave claims data used in this paper is from before that date), all three states provided similar weekly benefits at between 60% and 70% of AWW.

They do have differing benefit caps; relative to the statewide AWW, as of June 2020, California's cap is 89%, New Jersey's cap is 48%, and Rhode Island's cap is 75% ("Percent change in average weekly wages", 2022). With similar eligibility and weekly benefit formulas, the primary driver of differences in leave-taking rates between these states associated with their benefit structure will be the benefit maximum. There are of course many other societal and macroeconomic factors that may drive differences in leave-taking. An example of potential parameters for a national paid family leave program that mirror the state parameters is as follows: up to 6 weeks of leave at 65% of base period AWWs for a maximum of 75% of the statewide AWW, and similar eligibility requirements – say, $10,000 of earnings in the base period.

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ACADEMIC VITA

Lucas J. Richardsen

EDUCATION

The Pennsylvania State University, Schreyer Honors College, University Park, PA
B.S. Mathematics with Actuarial Science Option, Eberly College of Science
Minor Economics, College of the Liberal Arts
Minor Statistics, Eberly College of Science
Anticipated Graduation: May 2022

ACTUARIAL EXAMS

Exam P: Probability, Passed
Exam FM: Financial Mathematics, Passed
Exam IFM: Investment and Financial Markets, Passed
Exam LTAM: Long-Term Actuarial Mathematics, Passed
Exam STAM: Short-Term Actuarial Mathematics, Passed
Exam SRM, Statistics for Risk Modeling, Passed

PROFESSIONAL EXPERIENCE

Prudential Financial, Actuarial Intern, Remote
June 2021 – August 2021

- Created an Excel tool to automate the creation of state regulatory filings for long-term care policy block, reducing report generation time by 85%, reducing human error, and enabling application to future filings
- Systematically aggregated policyholder data from over 100 separate files to improve team data capabilities
- Developed a Python application to search over 700 files to extract and aggregate key information

Prudential Financial, Actuarial Intern, Remote
June 2020 – August 2020

- Streamlined an Excel-based process to reformat actuarial forecast data for upload into a financial database, reducing process runtime from 30 minutes to 30 seconds while reducing human error
- Developed a Power BI dashboard for a data integrity check and data visualization

Penn State Department of Risk Management, Teaching Assistant, University Park, PA
January 2020 – December 2021

- Delivered course lectures on actuarial science and probability and graded student assignments

Mid Atlantic Machinery Inc., Business Intern, Harrisburg, PA
May 2019 – August 2019

- Independently learned programming (VBA, Python, Java) to develop business automation software
- Saved over 100 labor-hours per year through automation of report generation and data collection

CLUB INVOLVEMENT

Penn State Actuarial Science Club, Member and 2021 President, University Park, PA
Fall 2018 – Spring 2022

- Managed 14-person team responsible for planning one of the nation's largest actuarial science career fairs and providing career training to students

Penn State Navigators, Member, University Park, PA,
Fall 2018 – Spring 2022