



# Calculating the Hidden Cost of Interrupting a Career for Child Care

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The child care affordability crisis in the United States can be summed up in two sentences. Sixty-five percent of children younger than age 5 have all co-habiting parents in the workforce.<sup>1</sup> The average annual cost to have two children in a child care center is nearly \$18,000.<sup>2</sup> This leaves many families to choose between spending a sizable portion of their paycheck on child care, finding less expensive—and possibly lower quality—unregulated child care, or leaving the workforce to become a full-time caregiver. This brief explores the financial toll that the latter decision places on families.

Yet the long-term cost can be much higher than these figures suggest when parents—and mothers in particular—find that expensive child care means they can barely afford to work until their children are old enough for public school. For most low-income and middle-class families, there is little government help with child care costs, but the cost of career interruptions can add up dramatically over a lifetime. Each year out of work can cost a family significantly more than three times a parent's annual salary in lifetime income.<sup>3</sup> Many low-income and middle-class families are stuck in a financial catch-22, with too little income today to afford child care that can sustain careers, raise incomes considerably, and provide a measure of financial security for the rest of their lives.

To help families calculate the financial costs of interrupting a career so a parent can become a full-time caregiver, the Center for American Progress has developed a simple, customizable interactive tool.<sup>4</sup> The single most important contribution this tool makes, and the most important lesson for families using the tool, is placing these financial tradeoffs in the economic framework of opportunity costs, or costs people incur when they lose out on potential gains.

Child care is expensive, but quitting a job to avoid that expense does not make child care free. In fact, as explained later, the cost of so-called free care is much more than a parent's lost wages. CAP's tool calculates the monetary value of those costs in terms of potential income and retirement savings. These dollar figures are important for families and policymakers. The most important insight, however, is that any serious economic analysis of child care affordability must be rooted in opportunity costs. As trivial as this

insight is in economics, CAP could not locate a tool to help families consider opportunity costs in choosing child care arrangements. The absence of such tools underscores that even with many families relying on all parents working and still feeling financially strained, American society still does not view giving families more child care choices as a serious economic issue. CAP hopes quantifying these large—and largely hidden—opportunity costs will help policymakers understand how important affordable high-quality child care is for raising family incomes and growing the economy.

The high cost of child care is well-documented. Previous research by CAP found that, for a typical middle-class family, child care costs grew by \$2,300 between 2000 and 2012 while wages during the same time span remained stagnant.<sup>5</sup> In all 50 states, the annual cost to enroll two children in a center exceeds median rent prices.<sup>6</sup> In the majority of states, annual child care costs also exceed tuition and fees at an in-state university.<sup>7</sup> Families living below the poverty line who pay for child care spend an average of 36 percent of their annual income on child care. The burden is not much easier for low-income families earning between 100 percent and 200 percent of the federal poverty line, or the equivalent of \$24,300 to \$48,600 for a family of four who spend a sizable portion of their income on child care.<sup>8</sup> With child care taking such a large bite out of earnings, it is easy to see how some parents—especially mothers in two parent families—can feel like leaving the workforce is not much of a choice.

Available data suggest that many families are opting to have a stay-at-home caregiver, usually the mother, in the face of exorbitant child care costs. A multidecade rise in mothers' labor force participation peaked in 1999, when 23 percent of mothers did not work outside the home. However, the share of mothers not working outside the home rose to 29 percent in 2012.<sup>9</sup> Child care costs also increased over the same time period. A 2015 poll commissioned by *The Washington Post* found that 62 percent of working mothers and 36 percent of working fathers switched to a less demanding job or stopped working altogether in order to care for children.<sup>10</sup> The United States was once a leader in female labor force participation, but has fallen behind other developed countries in the past few decades. In 1990, the United States ranked sixth in female labor force participation among 22 industrialized countries.<sup>11</sup> However, by 2010, the United States ranked 17th.<sup>12</sup> Researchers estimate that about one-third of this difference can be attributed to family friendly policies in other countries, including child care spending by government and paid leave.<sup>13</sup> This is not a symbolic issue; the increasing contributions of working mothers has been the key to stabilizing middle-class family earnings.<sup>14</sup>

When parents leave the workforce, the long-term financial penalty can exceed annual child care payments, even with today's high cost of child care. For some families, a full-time, at-home caregiver is an optimal and financially viable choice. But increasingly, single parents are the sole breadwinners and two-parent families need both incomes to make ends meet.<sup>15</sup> In addition to lost wages, parents who interrupt their career earn less when they return to the workforce and those effects also reduce their retirement savings and social security benefits.<sup>16</sup>

CAP research shows that workers can expect to lose up to three or four times their annual salary for each year out of the workforce. These losses add up because most parents have children when they are relatively young, so even a modest reduction in annual income can result in a very large lifetime earnings reduction over 30 years or more of work.<sup>17</sup>

A woman earning the median salary for younger full-time, full-year workers—\$30,253 annually in 2014—who takes five years off at age 26 for caregiving would lose \$467,000 over her working career, reducing her lifetime earnings by 19 percent.<sup>18</sup> A man in the same scenario—but earning the median wage for young male workers of \$33,278 annually in 2014—would lose \$596,000 over the course of his career and would see a 22 percent reduction in lifetime earnings.<sup>19</sup>

Clearly, the U.S. child care system is broken. Not only do costs exceed what families can afford to pay, but many families also have difficulty even finding a child care program in their community.<sup>20</sup> Researchers found that less than 10 percent of child care programs nationally are considered high-quality.<sup>21</sup> Moreover, child care workers make dismally low wages for the difficult but important job of caring for young children during a developmentally critical period of their lives.<sup>22</sup> Previous research has attempted to calculate the cost to the U.S. economy as a whole, finding that businesses lose more than \$4 billion per year due to inadequate child care.<sup>23</sup> But families pay a heavy cost as well. Described below are the ways in which families who opt out of the labor force bear the hidden costs of the lack of access to quality, affordable child care.

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### Why a child care calculator?

As high child care costs and families with all parents working have become increasingly common, new parents are frequently pushed to decide between continuing a career while paying child care costs or interrupting a career to provide care giving. There is a growing list of resources on the cost of child care in the United States, some, such as the U.S. Census Bureau's report, "Who's Minding the Kids," focus on what families spend on any amount and kind of child care, while others, such as Child Care Aware of America's report, "Parents and the High Cost of Child Care," and the Economic Policy Institute's report, "The Cost of Child Care in America" focus on the cost of full-time care.<sup>24</sup> Those resources are extremely important for families seeking information about the cost of paying for child care, and they provide increasingly important context for policymakers.<sup>25</sup> But the cost of providing full time family care is much more difficult to quantify, precisely because each person's opportunity cost varies based on many personal factors. Helping families and policymakers understand these hidden costs is a crucial part of the conversation society needs to have about child care in America. To date, CAP has not identified a publicly available tool that calculates this cost for families.

The calculator developed by CAP begins to fill in that gap by demonstrating how interrupting a career is likely to impact families' financial futures. Too often, policy discussions about child care treat parental choices as if they are unaffected by real life constraints. The assumption that parents who cannot afford child care can simply afford to stay home with children represents a failure to understand the fundamental economic tradeoffs families face. Moreover, this assumption is not true for single parents, who must find care in order to work and just as critically, the assumption is also not true of two-parent households when the hidden costs are counted. If interrupting a career to care for a child jeopardizes a parent's retirement or means that a family cannot afford to send a child to college without borrowing heavily, this parental care is anything but free.

## Scenarios not addressed by the calculator

It is important to note that this tool does not address three scenarios common to families: those that choose a full-time, at-home caregiver based on personal preference—as opposed to financial considerations; those that select lower-cost child care options; and those where one or both parents transition from full-time work to part time or self-employment.<sup>26</sup>

Some families would prefer a stay-at-home parent, informal child care arrangements, or reduced hours even if finances were not part of the decision. But, for many families, short-term child care costs lead to arrangements that may not align with their immediate preferences or long-term interests. A resource such as this calculator is not focused on families who are making these choices independent of financial constraints. This tool focuses on the families for whom finances play a very large role in these decisions. The goal is to simplify the financially complex decision facing families and to help policymakers understand the real world tradeoffs these constrained families are locked into under the nation's current child care system.

Some families might select informal child care arrangements or unregulated child care, that typically comes at a lower cost. This might include relatives or neighbors who are providing child care because of their relationship with the family. A subset of parents might prefer such arrangements, but the frequent use of unregulated child care is likely an indication that finances constrain choices for many families and that the nation is not providing families the tools to act in their long-term best interests.

All of these ad hoc workarounds have one thing in common: They avoid a concrete expense by trading away an uncertain cost. Some families choose lower-quality child care, which may reduce a child's future earnings. Some families only consider jobs close to family members who can provide unpaid family care, but this constrains job opportunities and reduces earning potentials. Others provide family care themselves, even if it reduces their long-term earnings.

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## Calculating the cost of leaving the labor force

Economists consistently find that interrupting a career has long lasting effects on wages, even well after workers return to their career.<sup>27</sup> Unfortunately, these insights have mainly informed economic and policy research. There has been little interest outside the field to help families understand the lifetime effects these decisions can have on earnings and retirement savings. The CAP child care calculator demonstrates how taking off a given number of years will affect lifetime finances. Moreover, the calculator was designed with families in mind. Such a design is a heavier lift than it may sound, and it is one reason this tool follows many of the cues of retirement calculators—which are one of the few tools for evaluating long-term financial tradeoffs consumers have experience with.

CAP estimates impact on family finances using data from the 1979 National Longitudinal Survey of Youth, or NLSY79, using data from 1979 through 2012.<sup>28</sup> We estimate the effects of experience and career interruptions on wages following a method developed in a 2005 paper by economist Christy Spivey with controls for education, demographics, and full- or part-time labor force status.<sup>29</sup> This process is described in greater detail in the Methodology section of this brief.

The total lost income to households is reported in three components—a so-called rule of thumb lost wages, lost wage growth, and lost retirement assets. All figures are in today's dollars, to control for inflation.

- The rule of thumb lost wages during a labor force absence is simply the worker's last annual salary before taking leave multiplied by the number of years out of the labor force. This figure represents the cumulative earnings the worker would have earned had they remained in full-time work at the pre-leave salary. This calculation likely resembles the kind of calculation many parents might employ when considering the financial costs of leaving the labor force.
- Lost wage growth reflects differences in estimated salary growth over time, after deducting employee 401(k) contributions. CAP assumes annual wage growth matches the mean effect of experience and nonexperience on real wages measured in the NLSY data assuming full-time, full-year employment, and reports the cumulative difference between the no-leave earnings profile and the leave earnings profile over time. This figure represents the additional income loss that the worker experiences after returning to the labor force full-time. The calculator deducts employee 401(k) contributions from wages, which are reflected in retirement assets.
- Lost retirement assets includes two components, calculated based on the lost earnings and wage growth: savings from a traditional 401(k) account and Social Security. CAP assumes that 401(k) accounts yield a 4 percent annual real return until retirement, which is a conservative estimate.<sup>30</sup> Users can set their 401(k) contribution rates; the

calculator default is a 5 percent annual contribution from both the employer and the employee, which is chosen to match the median combined employer and employee contributions of program participants.<sup>31</sup> CAP also determines Social Security benefits based on projected wages across the worker's career and includes the difference in Social Security earnings in the retirement calculation for 15 years after retirement. Again, the assumption is conservative as life expectancies for retirees at age 65 is already longer than 15 years with today's medical technology.<sup>32</sup>

Results from this calculator also demonstrate that, for many Americans who are struggling financially, and even those in the middle class, a lack of affordable child care can be a much larger financial trap than commonly understood.

For many workers, this calculation shows the long run income gains from working significantly outweigh the cost of even very expensive child care. But because the costs of child care are concentrated in a few years, while the benefits in earnings are spread out over many years, most families simply cannot afford to pay for the child care they need to keep their careers going strong in their children's early years. In real life, it is usually not possible to spend more than your income on child care for a period of years. Most parents who find themselves in that situation interrupt or reduce responsibilities in at least one career because they would run out of money before they could realize their long-term income gains from staying fully engaged.

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## Impact on families

Each family has different circumstances that will dictate the impact of time out of the workforce on their financial assets. The calculator is designed to take individual circumstances into account, including:

- Current salary
- Gender
- Age
- Age when the worker began full-time employment
- Age when the worker takes time off for child care
- Length of leave from the workforce

No tool can adequately account for all individual circumstances that contribute to a family's overall financial security when a parent leaves the workforce. This tool provides a useful figure for the hardest components to estimate in this calculation, but families should supplement this knowledge with additional information specific to their circumstances.

The lifetime cost of taking many years out of the labor force is significant, but the alternative is not free. Families must factor in the cost of care they will use, as well as the costs incurred while working—commuting costs, for example—and the additional taxes they will pay and benefits they may lose.

From an economic policy perspective, pre-tax income is the measure of the economic effect of additional family income on gross domestic product, or GDP. However, when families are making these decisions themselves, their marginal tax rates will have significant effects on the lifetime earnings differences, especially for high-income families or families who currently qualify for means-tested benefits. Determining a family's effective marginal tax rate would require much more information than this calculator collects, but it is an important component of the child care tradeoff families should consider in addition to information presented in this calculator.

The hypothetical examples below highlight the projected impact on workers in specific scenarios. It is important to note that these are projections based on average effects of a simplified model, which cannot predict each individual's actual career and earnings path. There are a host of important factors beyond the scope of this simple tool that impact individual earnings. It is also important to note that this tool provides a much more accurate characterization of the effects of career interruptions on earnings than families today have to work with.

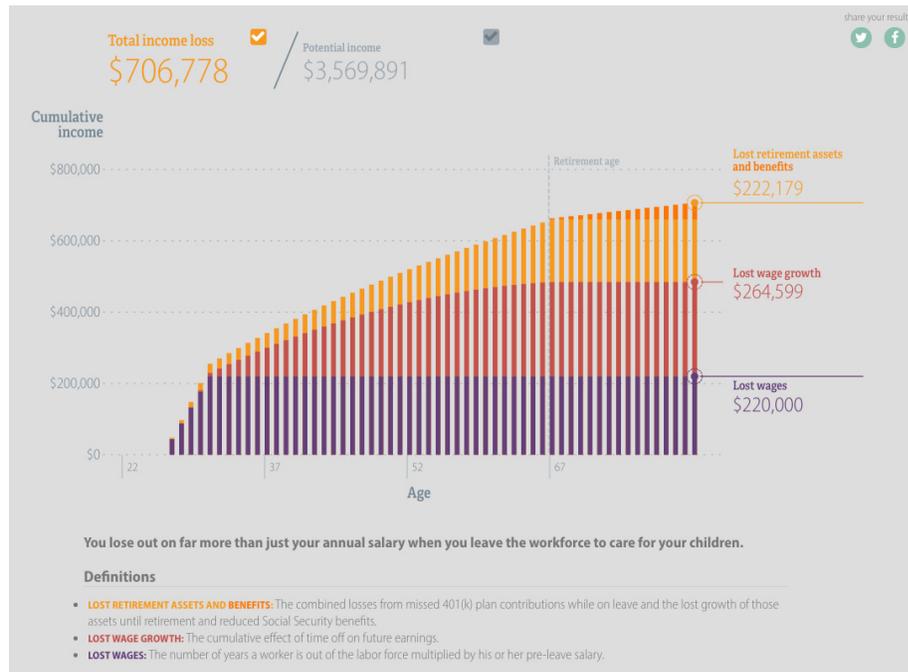
## Examples

Jane is a middle-class worker with a job as a first-grade teacher. As a relatively new teacher, her salary is at the 25th percentile for elementary school teachers in the United States and she earns \$44,000 annually.<sup>33</sup> She has a baby when she is 26 years old, the average age of a first-time mother in the United States.<sup>34</sup> Jane is deciding whether to leave the workforce until her child enters kindergarten or remain in the labor force and find child care.

During the five years that Jane is out of the labor force, she will lose her \$44,000 salary each year, so a simple estimate of the opportunity cost of caring for her child until kindergarten is \$220,000. This number, however, misses the totality of what Jane might lose; this is what the calculator is designed to capture. A five-year career interruption means Jane will lose out on an estimated \$265,000 in lifetime wage growth, plus another \$222,000 in retirement benefits.<sup>35</sup> In fact, we estimate that taking five years off will cost her nearly \$707,000, in today's dollars, over her lifetime—or roughly 3.2 times as much as her lost wages alone.

**FIGURE 1**  
**Jane's estimated cost of five years out of the labor force**

Example output from CAP interactive



Source: CAP analysis from "The Hidden Cost of a Failing Child Care System" interactive, available at <http://interactives.americanprogress.org/childcarecost>.

Table 1 provides additional illustrative examples. While financial loss varies by worker, in each case the lifetime income loss is much higher than just earnings lost.<sup>36</sup> In fact, these workers lose between two and four times their annual salary when they leave the workforce.

Though the numbers are quite large, they align with what is understood about personal finances. Income losses are largest for high earners who take many years off. Less obviously, but still intuitively: having a child later reduces the lifetime cost of career interruptions. Someone who works from age 25 to age 67 and takes two years off at age 30, for example, would see his or her wages reduced for 35 years, but taking two years off at age 40 means wages are only reduced for 25 years. The other important driver is Social Security benefits, which replace a larger fraction of a low-income worker's income. This is one reason that the ratio of lifetime income loss to lost wages is highest for low-income workers.

**TABLE 1**  
**Hypothetical examples of lifetime financial loss after leaving the workforce**

Results from the CAP study's model

|   | First grade teacher | Food service worker earning minimum wage | Social worker | Truck driver | Dentist   |
|---|---------------------|--|---------------|--------------|-----------|
| Gender  | Female              | Female                                   | Female        | Male         | Male      |
| Age   | 26                  | 18                                       | 28            | 28           | 30        |
| Age started full-time work                      | 22                  | 18                                       | 22            | 22           | 28        |
| Salary  | \$44,000            | \$14,500                                 | \$33,000      | \$33,000     | \$68,310  |
| Years out of the labor force                    | 5                   | 1  | 5             | 5            | 1         |
| Rule-of-thumb lost wages                        | \$220,000           | \$14,500                                 | \$165,000     | \$165,000    | \$68,310  |
| Lifetime lost wage growth                       | \$264,599           | \$30,250                                 | \$166,572     | \$219,044    | \$150,689 |
| Lost retirement assets and benefits             | \$222,179           | \$27,134                                 | \$144,983     | \$165,625    | \$79,277  |
| Lifetime income loss                            | \$706,778           | \$71,884                                 | \$476,556     | \$549,669    | \$298,276 |
| Lifetime income loss vs. rule-of-thumb estimate | 3.2x                | 5.0x                                     | 2.9x          | 3.3x         | 4.4x      |
| Reduction in lifetime income                    | 20%                 | 4%                                       | 19%           | 22%          | 6%        |

Note: Salaries for an elementary school teacher, social worker, and truck driver are based on the 25th percentile of earnings for each respective occupation. Salary for a dentist is based on the 10th percentile of earnings for that occupation. Salary for a food service worker is based on a \$7.25 hourly wage for 40 hours per week and 50 weeks per year. Listed salaries are salaries for each worker's current age. Model details are available in the appendix.

Source: Salaries from Bureau of Labor Statistics, "Occupational Employment Statistics: May 2015 National Occupational Employment and Wage Estimates United States," March 20, 2016, available at [www.bls.gov/oes/current/oes\\_nat.htm](http://www.bls.gov/oes/current/oes_nat.htm). Authors' analysis using National Longitudinal Survey of Youth 1979 cohort data from 1979 to 2012. See: NLS Investigator, "National Longitudinal Survey of Youth 1979," available at <https://www.nlsinfo.org/investigator/> (last accessed March 2016).

These hypothetical scenarios are akin to the decisions facing real families every day, and the stakes are much higher than policymakers often assume. Middle-class families make few decisions worth hundreds of thousands of dollars over the course of their lifetime, yet today families make this decision without a common framework for understanding the full effects of child care decisions—assuming they have the resources to afford the high cost of child care in the short term at all. The U.S. Department of Health and Human Services, or HHS, defines affordable child care as constituting no more than 10 percent of household income.<sup>37</sup> In the scenarios above, the nearly \$18,000 price tag for two children in a child care center exceeds what most of these workers can reasonably afford with 10 percent of their income. Many low-income and middle-class families are stuck in a financial catch-22, with too little income today to increase their incomes in the future.

## The policy solution

Most families cannot absorb the high cost of child care while maintaining their careers, nor can most parents afford to leave the labor force. The likely result of this financial strain on families today is an underinvestment in high-quality child care—the very type of child care that will produce benefits to all Americans for decades to come.<sup>38</sup> The United States should follow the lead of other industrialized countries and make child care assistance and other

family-friendly policies the norm. A study commissioned by the Department of Labor estimated that if strengthening work-family policies to match other advanced economies resulted in similar levels of women's labor force participation, the United States would see an additional 5 million women in the labor force and \$500 billion in increased GDP.<sup>39</sup> Today, women consistently earn the majority of college degrees, while also remaining more likely to interrupt a career. The costs of these interruptions to families and the U.S. economy, therefore, are set to rise even further over time.

Earlier this year The Center for American Progress proposed a High-Quality Child Care Tax Credit that would help parents afford high-quality child care.<sup>40</sup> The tax credit provides up to \$14,000 per child for families earning up to 400 percent of the poverty level, or \$97,000 annually for a family of four. Families contribute between 2 percent and 12 percent of their income on a sliding scale. The credit would be advanced during the year so that families have resources upfront to pay for child care, rather than wait until their tax return the following year. To ensure that low-income families can benefit from the program, the tax credit would be refundable.

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## Conclusion

Affordable, high-quality child care is a pressing financial issue for families and the U.S. economy. It is also an issue that politicians frequently shrink from due to the perception that these programs are unaffordable—even when the lack of these programs can be many times more expensive. When parents do not have the resources to afford high-quality child care, families pay in the short term and pay even more in the long term. Society also pays in the long term, in the form of increased financial stress in families, slower economic growth, lower labor force participation—especially among women, and fewer qualified workers. It is time to make investments that pay off for two generations by making high-quality child care affordable for all. Ample research shows the future workforce benefits from early investments in education. But these investments also create meaningful choices for parents, give parents the opportunity to make financial decisions that pay off in the short and long term, and provide real economic security for working families.

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## Methodology

Like a retirement calculator, the point of a child care cost calculator is to help illustrate long-term tradeoffs when rules of thumb fail to capture important features of a problem. We, the authors of this study, hope this tool will help families, policymakers and other researchers more easily grasp the opportunity costs of family-provided child care that can be very difficult to price without a tool of this kind. The following section outlines the methods we used to create this tool.

The importance of setting the problem up correctly is much greater than the importance of the individual numbers used in the calculation—it is far less important that retirement assets grow at 4 percent or 5 percent than it is to consider that taking time off affects retirement assets.

Our other goal is for this tool and the information it provides to be the beginning of a conversation about how to help families think about the complicated finances of child care. There are numerous retirement calculators, each with different strengths and assumptions, but all share very similar underpinnings. Constructing a tool like this, which balances simplicity and usability with rigor, is different than studying a problem academically. There is no universally optimal way to construct a child care calculator, and we encourage other experts to experiment with creating their own versions of similar tools. Coping with the nation's child care system is a major financial challenge, and families can use all the tools and help they can get.

We model wages, retirement assets and Social Security benefits across two career scenarios: one where the user works full-time until the user-designated retirement age and another which is identical except for period of leave as specified in the input fields. All figures are reported in today's dollars to control for inflation. Two important simplifications are that (1) workforce status can only change annually, and there is no part-time work in the model, and (2) the calculator only allows for one period of leave.

The user specifies:

- Current age
- Age when full time employment began
- Age when leave begins
- Length of leave
- Current salary
- Gender

There are also three optional inputs used in the retirement and Social Security calculations, which the user can adjust:

- Retirement age, the default of which is 67 years old
- Employee 401(k) contribution, the default of which is 5 percent
- Employer 401(k) contribution, the default of which is 5 percent

These inputs are used along with gender specific coefficients on years of:

- Experience
- Experience squared
- Length of career interruption
- Length of career interruption squared

The key to understanding the wage projections used in this calculator in comparison to most studies of wage determinants is that we are able to use the individual user's current, self-reported wage and experience as an input. In econometric terms, this means that because we observe the specific wage for an individual at one point in time, we can treat this observation as generated by a population wide underlying process and an individual fixed effect.

We assume that the individual's underlying characteristics do not change over time and therefore that the effects of those fixed characteristics—such as the impact of race on earnings—stay fixed over time. Our wage projections are based on results obtained from a more complicated regression model that allows for certain characteristics to change over time—for example, an individual can move to a different region, work full-time or part time, or graduate college, each of which affects right hand side demographic variables in a given year. The interactive calculator assumes that these variables are held constant and their effects are included in the current user-provided wage. As such, we model future wages as if the only thing that is changing is the worker's experience and length of career interruption.

All dollar values shown in the calculator account for inflation, so a \$1,000 change in income at age 30 is comparable to a \$1,000 change in income at age 60. To maintain comparability of our projections with those of retirement calculators we do not discount future income; more technically, this is a net present value calculation with a discount rate of zero applied to real changes in income.

TABLE A1

## Summary of key parameters used in CAP's "The Hidden Cost of a Failing Child Care System"

| Parameter   | Female   | Male    | Interpretation   | Sources   |
|---|----------|---------|--|---|
| Experience  | 4.870%   | 5.360%  | Combining these two coefficients gives the percentage increase in real earnings of an additional year of full-time work experience | Methodology based on Christy Spivey, "Time off at What Price? The Effects of Career Interruptions on Earnings," <i>Industrial and Labor Relations Review</i> 59 (1) (2005): 119–140; authors' analysis using National Longitudinal Survey of Youth 1979 cohort data from 1979 to 2012. See NLS Investigator, "National Longitudinal Survey of Youth 1979," available at <a href="https://www.nlsinfo.org/investigator/">https://www.nlsinfo.org/investigator/</a> (last accessed March 2016). |
| Experience <sup>2</sup>                                 | -0.089%  | -0.101% |  |   |
| Nonemployment   | -4.310%  | -6.270% | Combining these two coefficients gives the percentage increase in real earnings of additional time spent out of work               |   |
| Nonemployment <sup>2</sup>                              | 0.145%   | 0.246%  |  |   |
| Real growth rate of retirement assets while working     | 4%       |         | Annual rate of increase of 401(k) balance each year  | These are conservative assumptions. For context, see Peter A. Diamond, "What Stock Market Returns to Expect for The Future?" (Boston: Center for Retirement Research, 1999), available at <a href="http://economics.mit.edu/files/637">http://economics.mit.edu/files/637</a> .   |
| Real growth rate of retirement assets during retirement | 0%       |         |  |   |
| <b>Social Security assumptions</b>                      |          |         |  |   |
| Consumer Price Index                                    | 2.70%    |         | Assumed price inflation  | For the intermediate assumption for the CPI, see Social Security Administration, "The 2015 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds" (2015), available at <a href="https://www.ssa.gov/oact/tr/2015/tr2015.pdf">https://www.ssa.gov/oact/tr/2015/tr2015.pdf</a> .   |
| Annual wage growth                                      | 3.87%    |         | Assumed average wage growth for Social Security calculations   | For the intermediate assumption for annual growth rate in the average wage in OASDI-covered employment, see Social Security Administration, "The 2015 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds" (2015), available at <a href="https://www.ssa.gov/oact/tr/2015/tr2015.pdf">https://www.ssa.gov/oact/tr/2015/tr2015.pdf</a> .  |
| Early and late retirement factors                       | 70%–124% |         | Social Security early and late retirement formula, with those who retire at age 67 and earn 100 percent of benefits.               | Social Security Administration, "Effect of Early or Delayed Retirement on Retirement Benefits," available at <a href="https://www.ssa.gov/oact/Prog-Data/ar_drc.html">https://www.ssa.gov/oact/Prog-Data/ar_drc.html</a> (last accessed March 2016).  |
| Assumed years of received Social Security benefits      | 15       |         | Conservative estimate of years of Social Security benefits that a typical retiree collects   | For age 65 survival probabilities, see Elizabeth Arias, "Changes in Life Expectancy by Race and Hispanic Origin in the United States, 2013–2014" (Atlanta: Centers for Disease Control and Prevention, 2016), available at <a href="http://www.cdc.gov/nchs/products/databriefs/db244.htm">http://www.cdc.gov/nchs/products/databriefs/db244.htm</a> .  |
| <b>Retirement defaults</b>                              |          |         |  |   |
| Retirement age  | 67       |         | Social Security Normal Retirement Age, or NRA, for those born after 1959   | Social Security Administration, "Effect of Early or Delayed Retirement on Retirement Benefits," available at <a href="https://www.ssa.gov/oact/Prog-Data/ar_drc.html">https://www.ssa.gov/oact/Prog-Data/ar_drc.html</a> (last accessed March 2016).  |
| 401(k) employee contribution                            | 5%       |         | Percentage of a person's salary deposited in a 401(k), deducted from wage growth calculation                                       | These contributions sum to the rounded median combined contribution of 401(k) plan participants. See Vanguard, "How America Saves 2015: A report on Vanguard 2014 defined contribution plan data" (2015), available at <a href="https://institutional.vanguard.com/iam/pdf/HAS15.pdf">https://institutional.vanguard.com/iam/pdf/HAS15.pdf</a> .  |
| 401(k) employer contribution                            | 5%       |         | Percentage of a person's salary deposited in a 401(k) by an employer   |   |

## Career path assumptions

The methodology employed is straightforward. Essentially, it compares a null hypothesis wage growth profile—in which a worker works full time from the beginning of a career until retirement—with a career interruption case. The null hypothesis case is chosen to match the work assumptions of the retirement calculators we expect users to be most familiar with.<sup>41</sup> In the career interruption case, wages grow in line with the null hypothesis case until the interruption, when income is set to zero until work resumes. Once work resumes the worker is assumed to work full time until retirement.

For the computation, the calculator first takes in a series of inputs from users—age, salary, age full-time work began, and details about the timing and length of a planned career interruption. Second, the calculator models two scenarios: one where the user works uninterrupted until retirement and one where the user’s career is interrupted according to inputs to the calculator. Third, the career earnings from both cases are used to generate estimates of retirement assets and social security benefits.

The two scenarios modeled are worth discussing in some detail. In the uninterrupted case, the user is assumed to have entered a salary corresponding to full-time work. That assumption is maintained, so that the user is modeled as working full time until retirement, with wages in each year following the path determined by the regression, and earnings determined by wages and a constant hours term.

The career interruption case is also relatively straightforward. Wages are assumed to grow according to the same process as in the uninterrupted case until the age at which the user plans to take time off. The following year the user is assumed to earn no income, and this continues for the number of years the user plans to take off. These years are all modeled as one continuous spell of time off, which is a simplification chosen for tractability. After the career interruption period is over, the worker returns to the workforce at a real wage determined by their full-time experience and time off. Once the user returns to the labor force, he or she is assumed to work full time until retirement, with wage growth at the rate determined by our regressions.

There is no part-time work, partial-year employment, or unemployment in either modeled scenario.

### *Wage modeling*

Wages are modeled based on the National Longitudinal Study of Youth 1979, or NLSY79, using data from 1979 to 2012. This database tracks career interruptions, earnings and wages and a host of other details for a large group of Americans. Our regression specification closely follows a specification from Christy Spivey’s “Time off at What Price? The Effects of Career Interruptions on Earnings.”<sup>42</sup> We extend the author’s original analysis to incorporate waves of the NLSY79 panel that were not available when the original paper was written.

A detailed discussion of the regression models we use, and some alternative specifications from the original paper can be found at the end of this appendix.

Following Spivey’s specification, the annual percentage change in wages is a quadratic function of experience, time off, and a series of demographic controls.<sup>43</sup> This hump-shaped real earnings profile is common in economics: Earnings tend to start low and rise as workers gain experience, then level off in prime working years before flattening or declining as workers near retirement. In contrast, retirement calculators typically do not take this into account, instead assuming individuals’ annual earnings increase by the same percentage each year, both early in their career and in the years immediately before retirement. By using a quadratic wage model, we can more accurately show the impact of time off during early earnings years.

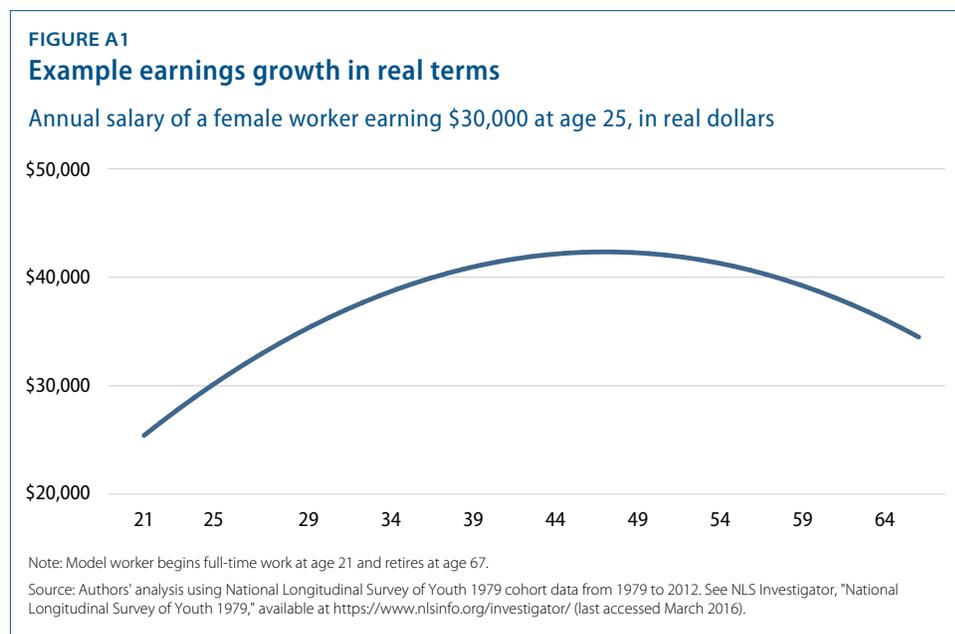
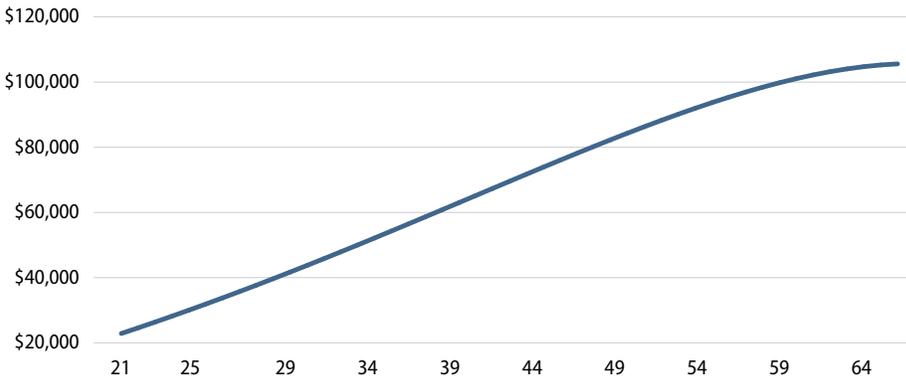


FIGURE A2

Example earnings growth in nominal terms

Annual salary of a female worker earning \$30,000 at age 25, in nominal dollars



Note: Model worker begins full-time work at age 21 and retires at age 67. This model assumes annual inflation of 2.7 percent.

Source: Authors' analysis using National Longitudinal Survey of Youth 1979 cohort data from 1979 to 2012. See NLS Investigator, "National Longitudinal Survey of Youth 1979," available at <https://www.nlsinfo.org/investigator/> (last accessed March 2016).

While this wage model, like virtually all such models, includes many control variables, we do not use these in our calculation. The assumption is that the impact of these demographic variables is already reflected in a user's salary, so we are seeing the effect of these controls captured in the initial earnings supplied by the user. As we discuss later in more detail, the mean effect may omit variation in worker mobility across the income distribution.<sup>44</sup>

Importantly, these control variables are assumed to remain constant in the calculation. While this is likely true for the majority of users, it is not true for all users. This is perhaps most clearly illustrated with education. The control variables for education show effects that are both relatively large and highly statistically significant, so users who will complete further education will find this calculation is likely to understate their lifetime income in both cases. The calculator assumes the wage impacts of a user's highest degree are already embodied in the user-supplied wage, which is only correct if the user does not complete any further schooling in the future.

So, based on the user's age, gender, wage, when they started full-time work, and the assumption that other factors—both observable and unobservable—are fixed, we estimate wage growth for a hypothetical career in which the user works full time with no interruptions. We then estimate wage growth for an alternative career including a single interruption, with the timing and length of this interruption set by the user.

So if a user has worked full time for  $x$  years enters a salary  $Y$ , we estimate the salary  $k$  years in the future as:

$$Y_{t+k}^G = Y_t + \beta_{exp}^G(k + x) + \beta_{exp^2}^G(k + x)^2 + \beta_{nonemp}^G P_{t+k} + \beta_{nonemp^2}^G P_{t+k}^2$$

The coefficients on experience; experience squared; nonemployment, which is our measure of time off; and nonemployment squared, vary by gender—hence the superscript  $G$ . In the base case the number of years of career interruption— $P$ —is set to zero, and in the alternative case,  $P_{t+k}$  is set to the number of years of career interruption the user plans to take by time  $t+k$  for each year. The wage profile is simply this calculation repeated until  $t+k$  reaches the user’s chosen retirement age—the default of which is set to age 67.

### *Social Security*

As of 2014, the Centers for Disease Control and Prevention’s life expectancy at age 65 is 18 years for males, 20.5 years for females.<sup>45</sup> Given that retirement happens between age 62 and 70 in the model—and that we expect the majority of users to be of childbearing age or younger—assuming 15 years of Social Security income seemed like a simple, if conservative, assumption. We do not assume any changes in the social security benefits formula for retirees.<sup>46</sup> Instead we focus on accurately projecting the current progressivity of the system to future years, so the ways in which Social Security benefits might become more or less generous or progressive over time quickly becomes a heuristic process.

### *Additional costs and taxes*

As noted briefly in the text, the lifetime effect of a career interruption is only one component of the decision households must make. Even if this tool perfectly captured this effect for all users, there are a number of other costs that are not considered. Many of these costs, like child care, are both significant and vary considerably by location. Because the opportunity cost computation may be new to users, CAP opted for simplicity over complexity in implementing this tool, in part to signal to users that other financial considerations are important for families making child care decisions.

Retirement calculators vary widely in how they treat taxes, and absent a clear standard, CAP’s approach was to abstract from taxes for this calculation. The measure of lost income is a difference between two hypothetical salaries, but because many households have multiple earners, the marginal tax rate applied to the same gap in two households may differ significantly based on the other earner’s salary and the complexity of a household’s tax filing.

More importantly, our goal is to help both users and policymakers understand the broader costs imposed on the economy when families have to interrupt a career because they cannot afford the care they need. The cost to the economy is independent of taxes. The tax rate just determines how the loss is split between individual households and the rest of society. In the simplest economic terms, we are using the benchmark classical economics assumption that a worker’s wage, not his/her after tax wage, is equal to his/her marginal product of labor.

## Comparison with other work

One important conceptual point in this analysis, and in comparison with other work, is the distinction between wages and earnings. While a wage is what a worker earns hourly, earnings are what a worker earns over a longer period of time without holding the number of hours fixed. Working half time mechanically reduces earnings by half as long as wages are unaffected. The NLSY79 data we used reports wages, which were converted to earnings assuming full-time, full-year employment.

While the earnings calculation is based on a simple extrapolation of a relatively simple wage model, the results are consistent with the consensus findings of a considerable body of research. The profile of wage growth over careers matches what other researchers have found, and the broad determinants of earnings are consistent with a long literature decomposing the sources of variation in earnings and wages.<sup>47</sup>

The estimated wage profile also fits well with more recent studies using administrative data to paint a richer picture of the distribution of changes in worker incomes from year to year.<sup>48</sup> Overall, the major parameters in this calculator match up with those used in other economic studies of wage determinants. When compared to the rigor underlying many of the retirement calculator tools available today, we believe this analysis compares quite favorably.

This calculator is not an investigation of pay gaps between men and women or non-mothers and mothers, though there is an extensive literature on both topics which informs this work. A recent, wide-ranging review of the literature on gender pay disparity from economists Francine Blau and Lawrence Kahn lays provides an excellent overview of key drivers of the persistent gender wage gap in the United States.<sup>49</sup> Consistent with this calculator, Blau and Kahn highlight differences in “women’s work force interruptions” as a significant factor in pay disparity.

This is just one of many contributors to gender pay differences, but it is worth clarifying the role of gender wage gaps in this calculator. To the extent that women are paid less than men for any reason—whether it is because men are more likely to work higher paying fields, or outright discrimination against women—this gap is captured in the initial wage supplied by the user. It may appear that this calculation does not control for issues such as occupational segregation because the user does not supply an occupation, but by treating the current salary as generated by an underlying occupation, the future wage does control for this characteristic as well as any population average based measure can.

It is worth noting that there are two overlapping, but distinct concepts and literatures that are relevant to this analysis. In the economic literature, gender wage gaps are typically decomposed into a series of individual specific attributes—such as experience and education, and any difference in gender pay is captured as the coefficient on gender in

the regression. On top of that, there is a literature on the parent wage gap, which isolates gender and parenthood.<sup>50</sup> The analysis here is closer to the latter, and in fact, we produce our estimated effects by running separate regressions for men and women. The parent pay gap literature typically finds that women with children in the home are paid less than women who do not have children in the home, while the effect of having children in the home on fathers' income is typically positive.<sup>51</sup> The results of our estimates are consistent with both the gender and parent wage gap literatures.

Another interesting thread of research is implicitly omitted in the simplified calculation because the lifetime cost of leaving the labor force is based on an average effect of career interruptions. A growing literature on the effect of career interruptions on earnings suggests that the effect varies across the income distribution today in ways it did not decades ago.<sup>52</sup> Research from sociologists Michelle Budig and Melissa Hodges of the University of Massachusetts, and similar work by sociologist Alexandra Killewald of Harvard, have used quantile regression techniques to estimate a motherhood penalty that varies across the income distribution.<sup>53</sup> The result that higher income women may pay relatively larger penalties for interruptions, while lower income women may pay relatively smaller penalties is an important distinction, and economists have found more evidence that low-wage workers see lower returns to education and experience more recently.<sup>54</sup>

This is an important trend for those studying the topic, and in an interactive tool designed for a lay audience this result presents a difficult design tradeoff. Avoiding kinks in the outputs from the interactive tool requires mapping different effects at discrete quantiles onto a continuous wage distribution. The challenge this involved, coupled with results that would be less comparable across users led us to avoid this approach.

There are, of course, numerous simplifications incorporated in this calculator for purposes of simplicity. For example, one of the major limits of this calculator is the fact that we only have the ability to calculate the effects of a single career interruption on earnings. Another is that workers work full time or not at all. This is the de facto assumption in the retirement calculators whose design we were targeting for usability. A variety of researchers have shown that part-time and flexible work plays an important role in wages of mothers.<sup>55</sup> However, a calculator implies all included inputs are estimated with equal significance and precision, which is not the case when including more complicated work histories in our regressions. This presentation challenge, along with the additional user complexity this would introduce, led us to the simplified work status we employ.

An important consideration here is that our regression estimates do not distinguish between causes of career interruptions—that is, a worker who is laid off for a year is not distinguished from a worker who takes a year off to care for a child. Spivey's 2005 analysis is especially useful for our purposes because it allows us to estimate separate

wage penalties for taking time off for men and women. However, the NLSY79 format makes it challenging to distinguish the reason for career interruptions. Other studies suggest both that women are more likely than men to experience career interruptions and that women's careers are much more likely to be interrupted to provide child care than men's careers.<sup>56</sup>

A related study by Shelley Phipps, Peter Burton, and Lynn Lethbridge using Canadian data gets at this shortcoming because the questionnaire explicitly asks members of the study why they took time off.<sup>57</sup> That paper is useful for noting some of the other hypotheses offered to explain why “mothers earn less than other women,” which the authors lay out succinctly:

*(1) mothers are more likely than other women to have taken time out of the labor force to care for their children and hence will have acquired less human capital than other women; (2) the extra household production and caring activity associated with motherhood may leave mothers with less energy to spare for their paid work, making them less productive on the job than other women; (3) women may choose jobs that are more ‘mother-friendly’ but that pay less (e.g., jobs that involve a shorter commute); (4) both motherhood and lower pay may be the result of some unobservable difference between mothers and non-mothers such as ‘career motivation’; (5) mothers may face discrimination in the labor market (i.e., employers may believe they are less productive even though this is not actually the case).<sup>58</sup>*

Our analysis focuses on the first point, as it has a very clear economic rationale that can be easily measured and attributed to a simple decision families can make.

### Comparison to Spivey, 2005

Our wage model is built upon Specification 2 in Christy Spivey's “Time Off at What Price? The Effects of Career Interruptions on Earnings.” We extend her analysis, which used NLSY 79 data from 1979-2000, by an additional 12 years until 2012.

Our model very closely replicated the results from Spivey's 2005 paper, which separated the effects of experience and nonexperience for observations by decade.<sup>59</sup> We then included data extending through 2012 and combined the effects of experience and non-experience for all decades. This allows us to determine the necessary coefficients for our calculator's wage model.

Combining the effects across decades makes sense given the additional data available today, as we can fit reasonable quadratic wage profiles over the work histories from NLSY79 participants. Part of the rationale for separating these experience coefficients in Spivey's 2005 analysis was the fact that wages tend to increase more rapidly early in

a career, but the work history did not extend out far enough into careers to cleanly fit a single quadratic wage profile to workers who were nearing peak earnings years. With the luxury of more data we were able to use a simpler model, and the results are in line with Spivey’s earlier work.

**TABLE A2**  
**Estimated impact of labor force experience and interruptions**

| Variables                  | (1)<br>Natural log of real wages, men | (2)<br>Natural log of real wages, women |
|----------------------------|---------------------------------------|---|
| Experience                 | 0.0536***<br>(0.00152)                | 0.0487***<br>(0.00146)                  |
| Experience <sup>2</sup>    | -0.00101***<br>(4.65e-05)             | -0.000893***<br>(4.64e-05)              |
| Nonemployment              | -0.0627***<br>(0.00625)               | -0.0431***<br>(0.00327)                 |
| Nonemployment <sup>2</sup> | 0.00246***<br>(0.000455)              | 0.00145***<br>(0.000174)                |
| Part time                  | 0.0610***<br>(0.0183)                 | -0.0234***<br>(0.00868)                 |
| Enrolled                   | -0.169***<br>(0.0134)                 | -0.0811***<br>(0.00962)                 |
| High school                | -0.0497**<br>(0.0206)                 | 0.0155<br>(0.0231)                      |
| Some college               | -0.000293<br>(0.0288)                 | 0.0879***<br>(0.0272)                   |
| College graduate           | 0.209***<br>(0.0390)                  | 0.222***<br>(0.0340)                    |
| Graduate school            | 0.296***<br>(0.0450)                  | 0.330***<br>(0.0385)                    |
| Married                    | 0.0534***<br>(0.00753)                | 0.0103<br>(0.00637)                     |
| Child in household         | 0.0348***<br>(0.00778)                | 0.00814<br>(0.00724)                    |
| Urban                      | 0.0152*<br>(0.00850)                  | 0.00970<br>(0.00815)                    |
| Northeast                  | 0.0557*<br>(0.0300)                   | 0.0515*<br>(0.0295)                     |
| North Central              | -0.0565**<br>(0.0243)                 | 0.0445*<br>(0.0234)                     |

| Variables                    | (1)<br>Natural log of real<br>wages, men | (2)<br>Natural log of real<br>wages, women |
|------------------------------|--|--|
| West                         | 0.0385<br>(0.0286)                       | 0.105***<br>(0.0265)                       |
| Unemployment rate            | -0.0101***<br>(0.00155)                  | -0.0115***<br>(0.00138)                    |
| Constant                     | 2.593***<br>(0.0284)                     | 2.369***<br>(0.0282)                       |
| <b>Observations</b>          | <b>42,761</b>                            | <b>40,893</b>                              |
| <b>R-squared</b>             | <b>0.308</b>                             | <b>0.273</b>                               |
| <b>Number of CASEID_1979</b> | <b>2,834</b>                             | <b>2,920</b>                               |

Note: Robust standard errors are in parentheses.

\* p < 0.1

\*\* p < 0.05

\*\*\* p < 0.01

Source: Authors' analysis using National Longitudinal Survey of Youth 1979 cohort data from 1979 to 2012. See NLS Investigator, "National Longitudinal Survey of Youth 1979," available at <https://www.nlsinfo.org/investigator/> (last accessed March 2016).

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- 35 As detailed in the Appendix, the retirement calculation is based on the balance of a 401(k) account at retirement plus 15 years of Social Security benefits.
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- 37 The White House, "The Economics of Early Childhood Investments" (2014), available at [www.whitehouse.gov/sites/default/files/docs/early\\_childhood\\_report1.pdf](http://www.whitehouse.gov/sites/default/files/docs/early_childhood_report1.pdf).
- 38 See, for example, David M. Blau, *The Child Care Problem: An Economic Analysis*, (New York: Russell Sage Foundation, 2001).
- 39 U.S. Department of Labor, *The Cost of Doing Nothing: The Price We All Pay Without Paid Leave Policies to Support America's 21st Century Working Families* (2015), available at [www.dol.gov/featured/paidleave/cost-of-doing-nothing-report.pdf](http://www.dol.gov/featured/paidleave/cost-of-doing-nothing-report.pdf).
- 40 See Katie Hamm and Carmel Martin, "A New Vision for Child Care in the United States: A Proposed New Tax Credit to Expand High-Quality Child Care" (Washington: Center for American Progress, 2015), available at [www.americanprogress.org/issues/early-childhood/report/2015/09/02/119944/a-new-vision-for-child-care-in-the-united-states-3/](http://www.americanprogress.org/issues/early-childhood/report/2015/09/02/119944/a-new-vision-for-child-care-in-the-united-states-3/).
- 41 See, for example, Bankrate, "401k Retirement Calculator," available at <http://www.bankrate.com/calculators/retirement/401-k-retirement-calculator.aspx> (last accessed May 2016); and Vanguard, "Retirement income calculator," available at <https://retirementplans.vanguard.com/VGApp/pe/pubeducation/calculators/RetirementIncomeCalc.jsf> (last accessed May 2016).
- 42 Spivey, "Time off at What Price? The Effects of Career Interruptions on Earnings."
- 43 This formula is determined from a fixed-effects regression. Control variables that can vary over time include a person's: part-time employment status; level of education; marriage status; urban status; current region; regional unemployment rate; and whether the individual is currently enrolled in school or has children present in the household.
- 44 For a discussion of varying labor mobility across the income distribution, see, for example, Heather Boushey, "No Way Out: How Prime-Age Workers Get Trapped in Minimum Wage Jobs" *The Journal of Labor and Society* 8 (1089-7011) (2005): 659-670, available at [http://cepr.net/documents/publications/labor\\_markets\\_2005\\_05.pdf](http://cepr.net/documents/publications/labor_markets_2005_05.pdf).
- 45 Data from the CDC show that a 65-year-old man will live another 18 years, while the average 65-year-old woman will live another 20.5 years. See Sherry L. Murphy and others, "Mortality in the United States, 2014" (Hyattsville, MD: National Center for Health Statistics, 2015), available at <http://www.cdc.gov/nchs/data/databriefs/db229.htm>.
- 46 In principle, one could allow users to forecast how much they expect to receive in Social Security benefits relative to today's benefits, and our approach would correspond to saying that they expect to receive 100 percent of scheduled benefits.
- 47 See, for example, Jacob Mincer, "Investment in Human Capital and Personal Income Distribution," *Journal of Political Economy*, 66 (4) (1958): 281-302, available at [https://www.jstor.org/stable/1827422?seq=1#page\\_scan\\_tab\\_contents](https://www.jstor.org/stable/1827422?seq=1#page_scan_tab_contents); Jacob Mincer, *Schooling, Experience, and Earnings*, (Cambridge, MA: NBER Press, 1974), available at <http://papers.nber.org/books/minc74-1>; Kevin M. Murphy and Finis Welch, "Empirical Age-Earnings Profiles," *Journal of Labor Economics* (8) (2) (1990): 202-229, available at <http://www.journals.uchicago.edu/doi/abs/10.1086/298220>; James J. Heckman, Lance J. Lochner, and Petra E. Todd, "Fifty Years of Mincer Earnings Regressions," Working Paper 9732 (National Bureau of Economic Research, 2003), available at <http://www.nber.org/papers/w9732>.
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- 49 Francine D. Blau and Lawrence M. Kahn, "The Gender Wage Gap: Extent, Trends, and Explanations," Working Paper 21913 (National Bureau of Economic Research, 2016), available at <http://www.nber.org/papers/w21913>.
- 50 Michelle J. Budig and Melissa J. Hodges, "Differences in Disadvantage: Variation in the Motherhood Penalty across White Women's Earning Distribution" *American Sociological Review* 75 (5) (2010): 705-728, available at <http://asr.sagepub.com/content/75/5/705.short>; Michelle Budig and Melissa Hodges, "Statistical Models and Empirical Evidence for Differences in the Motherhood Penalty across the Earnings Distribution," *American Sociological Review* 79 (2) (2014): 358-364, available at <http://asr.sagepub.com/content/79/2/358.short>.

- 51 Michelle J. Budig, "The Fatherhood Bonus and The Motherhood Penalty: Parenthood and the Gender Gap in Pay" (Washington: Third Way, 2014), available at <http://www.thirdway.org/report/the-fatherhood-bonus-and-the-motherhood-penalty-parenthood-and-the-gender-gap-in-pay>; Jane Waldfogel, "Understanding the 'Family Gap' in Pay for Women with Children," *Journal of Economic Perspectives* 12 (1) (1998): 157-170.
- 52 Blau and Kahn note that this divergence is more apparent today than it was in earlier decades. Francine D. Blau and Lawrence M. Kahn, "The Gender Wage Gap: Extent, Trends, and Explanations." Working Paper 21913 (National Bureau of Economic Research, 2016), available at <http://www.nber.org/papers/w21913>.
- 53 This is an active field of research and there are many other researchers looking at the effect across the income distribution. Michelle Budig and Melissa Hodges show that the effect of motherhood on wages varies across the income distribution, with the highest earning mothers seeing the types of pay increases more typical of fathers. Budig and Hodges theorize that this may be due in part to these women having the resources available to maintain their careers in ways most women do not. For more information, see, Budig and Hodges, "Differences in Disadvantage: Variation in the Motherhood Penalty across White Women's Earning Distribution"; Budig and Hodges, "Statistical Models and Empirical Evidence for Differences in the Motherhood Penalty across the Earnings Distribution"; and Alexandra Killewald, "A Reconsideration of the Fatherhood Premium: Marriage, Residence, Biology, and the Wages of Fathers," *American Sociological Review* 78 (96) (2013): 96-116, available at <http://scholar.harvard.edu/akillewald/publications/reconsideration-fatherhood-premium-marriage-residence-biology-and-wages-father>.
- 54 Adam Looney, and Day Manoli, "Are There Returns to Experience at Low-Skill Jobs? Evidence from Single Mothers in the United States over the 1990s" Working Paper 16-255 (W.E. Upjohn Institute for Employment Research, 2016), available at [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2779088](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2779088).
- 55 Francine D. Blau and Lawrence M. Kahn, "The Gender Wage Gap: Extent, Trends, and Explanations." Working Paper 21913 (National Bureau of Economic Research, 2016), available at <http://www.nber.org/papers/w21913>.
- 56 Spivey, "Time off at What Price? The Effects of Career Interruptions on Earnings"; Pew Research Center, "On Pay Gap, Millennial Women Near Parity – For Now" (2013), available at <http://www.pewsocialtrends.org/2013/12/11/on-pay-gap-millennial-women-near-parity-for-now/#the-balancing-act>.
- 57 Shelley Phipps, Peter Burton, and Lynn Lethbridge, "In and out of the labour market: long-term income consequences of child-related interruptions to women's paid work," *The Canadian Journal of Economics*, 34 (2) (2001): 411-429, available at <http://www.jstor.org/stable/3131861>.
- 58 Ibid.
- 59 Our coefficients for key variables compared to Spivey's original paper (in parentheses) are as followed:
- For men:
- Experience in 80s: .100 (.102); Experience<sup>2</sup> in '80s: -.005 (-.005);
  - Experience in 90s: .052 (.053); Experience<sup>2</sup> in '90s: -.001 (-.001);
  - Non-experience in 80s: -.078 (-.093);
  - Non-experience<sup>2</sup> in '80s: .008 (.009);
  - Non-experience in 90s: -.045 (-.055);
  - Non-experience<sup>2</sup> in '90s: .002 (.002)
- For women:
- Experience in 80s: .080 (.081);
  - Experience<sup>2</sup> in '80s: -.003 (-.003);
  - Experience in 90s: .044 (.045);
  - Experience<sup>2</sup> in '90s: -.001 (-.001);
  - Non-experience in 80s: -.059 (-.065);
  - Non-experience<sup>2</sup> in '80s: .005 (.005);
  - Non-experience in 90s: -.045 (-.049); Non-experience<sup>2</sup> in '90s: .002 (.002)
- Slight differences may be explained by the addition of new data (NLSY participants' past work histories that are missed can be filled in at future interviews) and differing techniques for determining a respondent's local unemployment rate.