# Do Marginal Tax Rates Inhibit Career Progression?*

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October 29, 2020

**Abstract**

A long-standing concern is that the structure of social safety net programs—featuring phase-outs as incomes rise—function as effective marginal taxes on income gains, possibly creating a disincentive to advance in a career. In this paper, we examine how effective marginal tax rates affect low-income workers' decisions to move up a career ladder. Our methodology for calculating marginal tax rate makes several advancements over what has been done in past literature. We incorporate all major taxes and public assistance programs and include detailed state-level rules and interactions between programs. Our methodology also incorporates all major policy changes to the Supplemental Nutrition Assistance Program (SNAP) and Medicaid that have occurred in the past decade. Using this novel methodology, we demonstrate how effective marginal tax vary for the same career transition across the United States. We find significant variation across geography, family composition, and years. We then use exogenous shocks to marginal tax rates created by policy changes to SNAP, Medicaid and children's health insurance program (CHIP) over time to estimate the cumulative effect of these policy changes on individual income gains. Our preliminary results suggest that the combined tax and transfer system creates a large disincentive effect on worker's career advancement decisions.

*Paper prepared for the 2020 Association for Public Policy Analysis & Management Annual Fall Research Conference. Results are preliminary. Please contact the authors before citing.

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# 1 Introduction

Long-term rising economic inequality and stagnating economic mobility in the United States led many policymakers and researchers to ask what factors help individuals transition from lower-paying jobs or unemployment to higher-paying jobs (Auerbach et al. 2017; Chetty et al. 2017; Gabe et al. 2019; King and Prince 2015). The economic impact of the 2020 COVID-19 pandemic and the policy response have increased the urgency of these questions. As of October 25 2020, the United States alone recorded approximately 8.5 million total cases and 224,000 deaths.[1] A crisis of this magnitude led to a series of responses that profoundly affected the U.S. labor market. In particular, social distancing practices, stay-at-home orders, and the related shutdown contributed to a large reduction in consumer spending, leading to widespread business closures and job losses (Chetty et al. 2020). The negative impact was not evenly distributed across the U.S.; rather, losses were concentrated among low-wage workers, young workers, and racial and ethnic minorities (Chetty et al. 2020; Engemann 2020; Kinder and Ross 2020).

During the COVID-19 pandemic, as in earlier economic downturns, more individuals participate in social safety net programs (Anderson et al. 2015; Bitler et al. 2020). Programs such as the Supplemental Nutrition Assistance Program (SNAP) provide critical financial support for individuals who recently lost their jobs, earn low-income, or are unable to work. However, the expansion of safety net use raises long-standing concerns that the safety net—a collection of federal, state, and local programs with income eligibility thresholds—disincentives work by applying an effective marginal tax rate on earnings.[2]

Does the safety net discourage work and career advancement? To answer this question,

[1] Statistics as of October 25, 2020 as reported by the Centers for Disease Control and Prevention (`https://covid.cdc.gov/covid-data-tracker/#cases_casesinlast7days`).

[2] See "Is $600 a Week in Extra Unemployment Aid Deterring People From Seeking Work?" Kate Davidson, Wall Street Journal. June 29, 2020. Available at `www.wsj.com/articles/is-600-a-week-in-extra-unemployment-aid-deterring-people-from-seeking-work-11596015000`. Last accessed October 25, 2020.

two steps are necessary. First, a methodology is needed to estimate the effective marginal taxes workers face. As Altig et al. (2020a) note, the combined tax and transfer system is extraordinarily complex with over 2,700 rules governing Social Security benefits alone. The methodology must include state and federal taxes, special provisions like the Earned Income Tax Credit and the Child Tax Credit, as well as complex rules of safety net programs such as Medicaid. After estimating these effective marginal tax rates, the second step is to identify the effect of marginal tax rates on worker career advancement. In other words, the methodology involves estimating a worker's effective marginal tax rate—accounting for the entire tax and transfer system—and relating that effective marginal tax rate to labor market decisions.

In this paper, we examine how effective marginal tax rates affect low-income workers' decisions to move up the career ladder. Our research most directly builds on Altig et al. (2020a), who use a unique dataset and methodology to estimate the current year and lifetime marginal tax rates of U.S. workers. Strikingly, the authors find that 25% of low-income workers face lifetime marginal tax rates above 70%. They suggest that this high marginal tax rate effectively locks low-income workers into poverty. The authors also demonstrate how the tax and transfer systems create immense variation in the effective marginal tax rate across U.S. states. Across all cohorts in their study, the typical worker in a low-income household can decrease its effective marginal tax rate by 99% by moving to another state. Workers in one state may face significantly different work incentives than a similar worker who lives in another state.

We advance this literature in three ways. First, our methodology expands that employed by Altig et al. (2020a). Similar to these authors, we calculate changes in effective marginal tax rates by examining changes in net financial resources after a hypothetical increase in employment income (typically, $1,000 in a year is used as the hypothetical increase). Our net resource measure includes household employment earnings, public assistance receipt, to-

tal tax liability, and household expenses. Altig et al. (2020b) only include housing expenses in their calculation. We expand the list of expenses to include childcare, food, healthcare, transportation, utilities, and miscellaneous expenses such as clothing. The inclusion of expenses is essential to calculate family net financial resources. Local variation in costs such as healthcare and childcare creates variation in the financial hardship a family faces if they loose public assistance. In addition, public assistance amounts are often conditioned on expense amounts. For example, SNAP allows for childcare costs, housing costs, and utility costs to be deducted when determining eligibility and benefit amount. The inclusion of these expenses in our methodology allows for more accurate calculations of public assistance receipt.

Second, we greatly expand and update the public assistance programs used in Altig et al. (2020a). We use a novel dataset we call the Benefits Data Base (BDB). The BDB contains all of the major federal and state assistance programs, tax rules, and tax credits available to working-age adults and their dependents. Furthermore, previous work only includes state-level variation in effective marginal tax rates at a single point in time. Our dataset introduces county-level variation in effective marginal tax rates. We also record public assistance rule changes over time, which allows us to calculate changes in effective marginal tax rates annually. As we show, effective marginal tax rates change considerably across time and across geographies. This spacial and temporal variation is central to our identification strategy.

Third, Altig et al. (2020a) do not examine how tax rates disincentivize work. Their paper is concerned with measurement of effective lifetime and current marginal tax rates alone. We measure these marginal tax rates and estimate the labor market response of U.S. workers. Specifically, we first measure how effective marginal tax rate on earnings gains varies across time, geography, and family types. We then exploit this variation to estimate the effects of effective marginal tax rates on career advancement and, more broadly, on individuals' labor supply decisions. We estimate how changes in effective marginal tax rates affect households'

income in the 2014 Survey of Income and Program Participation. We identify the effect of marginal tax rates on employment by exploiting policy changes to numerous programs. SNAP eligibility thresholds have changed in some states over time. Likewise, eligibility for Medicaid and CHIP have changed over time in many states, partially due to Medicaid Expansion. Last, the Affordable Care Act introduced premium tax credits for one segment of the population. Our identification strategy builds on Kaestner et al. (2017), who estimates only the effect of Medicaid expansion.

An additional contribution of our research is that we study how the safety net disincentives career advancement decisions. Previous work that estimates effective marginal tax rates typically assumes small annual income increases, such as $1,000 or $2,000 (Altig et al. 2020a; Chien and Macartney 2019). These changes are assuming the worker faces small, incremental changes in annual income, which approximate the decision to work a few more hours monthly or accept a small wage increase of about $1 per hour.

In job training programs targeted for lower-income workers, the decision workers face may be much different. Job training programs typically focus on skills advancement and new employment in higher-paying jobs. Workers in these programs may have to consider larger earnings increases than $1,000 or $2,000. For example, moving from an entry-level healthcare assistant to an entry-level nurse may lead to over a $10,000 annual earnings gain. Thus, calculating effective marginal tax rates on smaller earnings increments does not accurately reflect the marginal tax rates faced by workers in employment and training programs. Thus, our methodology seeks to model marginal tax rates in career advancement decisions. These career advancement tax rates more accurately capture the decisions faced by workers on public assistance who are enrolled in job training programs. These more relevant marginal tax rates can inform the design and implementation of workforce programs that seek to mitigate the disincentives in safety net programs, such as Bloom et al. (2005), Tessler and Seith (2007), and Verma et al. (2017).

Using data from the 2014 Survey of Income and Program Participation (SIPP) we estimate the effect of exogenous change in the effective marginal tax on the probability that a household increases income between two periods and on a household's rate of income growth. We find a statistically and economically significant decrease in the probability that a household experiences an increase in earnings if their marginal tax rates increase, relative to those that do not experience any changes in their marginal tax rates. Our preliminary results suggest that, on average, an exogenous increase in the marginal tax rate reduces the probability that a household experiences an increase in income by 11.6 percentage points. This corresponds to a 24.7 percentage points lower income growth for those who experience an increase in marginal tax rates.

The paper proceeds as follows. In Section 2 we review the relevant literature on safety net programs and labor supply. Section 3 details our methodology and the construction of our unique database. In Section 4, we apply our methodology and show how effective marginal tax rates vary by family type, geography, and time, including changes induced by the Affordable Care Act Medicaid expansion. In Section 5 we estimate the effect of changes in effective marginal tax rates on labor supply decisions. Sections 6 and 7 discuss future research and conclude.

## 2 Labor Supply Responses to the Safety Net

Given the large effective marginal tax rates that Altig et al. (2020a) identify in the tax and transfer system, one would assume that empirical evidence on the large disincentive effects is widely available. However, the literature offers mixed results. The evidence varies by program under study, the population under study, and of course the methodology researchers employ. We review in this section the literature most closely related to our work.

A large body of work examines the effect of the Earned Income Tax Credit on extensive and intensive labor supply decisions. In brief, a general conclusion of this research is that

the EITC increases the extensive margin response of single mothers with children, with more limited support for positive effects on the intensive margin. Reviews of this literature include Eissa and Hoynes (2006); Hotz and Scholz (2003). Chetty et al. (2013) find positive intensive margin responses using variation in knowledge about the EITC across geographies.

To identify the effect of the EITC on labor supply decisions, many studies use exogenous variation induced by changes to the EITC schedule, particularly the 1993 EITC expansion (Eissa and Hoynes 2006). However, Kleven (2019) argues that most of the post-change employment gains are due to contemporaneous welfare reforms and economic expansion, and not the EITC.

Public health insurance programs such as Medicaid also have possible disincentive effects on labor supply. An early review of the Medicaid program and its disincentive effects is Gruber (2003), who describes the higher marginal tax rates Medicaid creates. Gruber (2003) also discusses how Medicaid expansions could change the "welfare lock" phenomenon, in which parents face a large disincentive to move off of Medicaid. After the Affordable Care Act became law and expanded Medicaid, researchers used the expansion as an opportunity to study how changed work incentives affect labor supply. Kaestner et al. (2017) finds little evidence that the Medicaid expansions decreased earnings and employment. Buchmueller et al. (2019) reach a similar conclusion but find positive effects on labor force attachment for some groups such as parents and the short-term unemployed.

Food assistance is another safety net program that has received significant attention. Fraker and Moffit (1988) find small reductions in hours worked for single female participants. Hagstrom (1996) finds small disincentives for married couples relative to single women. Hoynes and Schanzenbach (2012) use the cross-county introduction of food stamps as a quasi-experiment and find modest reductions in employment and hours worked. East (2018) also uses a quasi-experimental design and finds large disincentive effect. She finds that the program reduces employment rates for single women by 6 percent, while married men

reduce their hours of work by 5 percent. In contrast, Meyerhoefer and Farkhad (2018) use an instrumental variable approach and find that SNAP participation leads to an increase in full-time employment for low-income adults. They argue that increased financial stability is the mechanism, with SNAP increasing the worker's ability to pay for job-related expenses.

### 2.1. Interventions in Job Training Programs

Workforce development or job training programs typically recruit workers who earn low-incomes and rely on one or more public assistance programs. Several prominent job training programs have recognized the possible disincentive effects of these public assistance programs and designed interventions to mitigate their impact. Bloom et al. (2005) study the Jobs Plus Program, which was designed for workers in publicly subsidized housing. One component of the intervention aimed to reduce the disincentive effect of increased rent payments as employment income rises. The Jobs Plus program introduced two strategies: a flat rent that remains constant when employment income rises, and a reduction in the percentage of income residents were required to pay in rent. The combined Jobs Plus intervention increased earnings of participants by 6.2 percent compared to the comparison group that received no components of the intervention. The study did not assess the impact of the rent incentive alone.

The Opportunity NYC-Work Rewards Demonstration similarly targeted families who are receive Housing Choice Vouchers (Verma et al. 2017). To mitigate the disincentive to work, the demonstration included two treatments: a Family Self-Sufficiency program (FSS) and an Family Self-Sufficiency plus Incentive (FSS + incentive) program. If workers earned more money and faced higher rent payments, both programs allowed the workers to place the extra rent payments into an escrow savings account. The FSS + incentive program included additional cash payments to promote sustained full-time employment. Neither program improved earnings and employment for workers who were already employed at baseline.

However, the FSS + incentives group increased employment and earnings for participants who were not working at baseline, relative to the control group outcomes.

The Work Advancement and Support Center Demonstration is another job training program that included a component to address work disincentives (Tessler and Seith 2007). Counselors at participating sites were given access to an online tool that calculated safety net support loss for clients when their incomes increased. Along with the tool, counselors engaged in career coaching to help clients make more informed decisions about work and safety net support. The final evaluation reports that the program increased safety net program enrollment. Furthermore, enrollment in safety net programs such as food stamps "does not appear to promote advancement and may even discourage it."

# 3 Methodology

## 3.1. Estimating Effective Marginal Tax Rates

In this section we develop a measure of effective marginal tax rates that accounts for all major federal and state taxes and public assistance programs and allows for changes in household-level expenses depending on program eligibility. We then explain how we apply this measure in the context of career advancement.

### 3.1.1 Net Resources

Our measure of effective marginal tax rates begins with measuring the household level of net resources. We calculate net resources of the household $i$ at the time $t$ as

$$NR_{it} = E_{it} + PA_{it}\{E_{it}\} - Tax_{it}\{E_{it}\} - Exp_{it} \tag{1}$$

Where $E_{it}$ is the household's total earnings and $PA_{it}\{E_{it}\}$ is total public assistance payments which is a usually, but not always, a decreasing function of earnings.[3] $Tax_{it}\{E_{it}\}$

[3]For households living in states that did not expand Medicaid, public assistance can be higher if households

is total tax liability, which is an increasing function of earnings. $Exp_{it}$ is total expenses, which consists of spending on childcare, housing, transportation, food and healthcare. Net resources can be interpreted as the extent to which the household is able to meet a basic set of expenses. A value of 0 would indicate the household is breaking even, taking into account income, public assistance, taxes, and expenditures, which are all specific to the composition of a household and its geographic location.

The concept of net resources is not commonly used in other analyses of effective marginal tax rates.[4] We argue that net resources is a more accurate way to measure effective marginal tax rates because it allows for expenses to change with program eligibility.[5] Child care, housing, transportation and food expenses are typically constant with respect to earnings. However, healthcare costs can vary with income if a family loses eligibility for certain public health insurance programs and has to switch to a different source of healthcare. Each type of health insurance coverage (The Health Insurance Marketplace, Medicaid, Medicare, employer-sponsored health insurance) has different pricing structures. For example, health insurance purchased through an employer does not typically vary depending on the employee's age, while premium for insurance purchased on the private market is higher for older individuals. Families that are eligible for Medicaid frequently receive free coverage while health insurance purchased through the Marketplace typically requires families to pay several hundred dollars in premiums. Therefore, households face different out-of-pocket

are ineligible for Medicaid at lower income levels but eligible for ACA subsidies at higher income levels.

[4]For example, much of the past academic research tends to exclude expenses from the analysis and instead focuses on income, government assistance and taxes (Maag et al. 2012). However, the concept of net resources is commonly used by think-tanks, non-profits, and government research centers (Chien and Macartney 2019; Purmort 2010)

[5]See Altig et al. (2020b)

healthcare costs based on which type of health insurance they have.[6][7]

### 3.1.2 Effective Marginal Tax Rates

We define the "potential" effective marginal tax rate which household $i$ faces in the period $t$ as:

$$mtr_{it} = 1 - \frac{\Delta NR_{it}}{\Delta E_{it}} \tag{2}$$

This rate is interpreted as the tax rate on the income gain. For example, if after an increase in earnings of $\Delta E_{it}$ there is no change in total public assistance payments $PA_{it}$, total tax liabilities $Tax_{it}$ or total expenses $Exp_{it}$, then the household's net resources increase equals the full amount of increase in earnings (i.e. $\Delta NR_{it} = \Delta E_{it}$) and $mtr_{it}$=0. However, if either $PA_{it}$ decreases, $Tax_{it}$ rises or $Exp_{it}$ increases, change in net resources would be smaller than the corresponding increase in earnings. In this case, the household faces a $mtr_{it} > 0$. This effective marginal tax rate is "potential" because it is calculated based on pre-specified amount of income change ($\Delta E_{it}$).

Equation 2 can be used to estimate effective marginal tax rates on different amounts of change in income ($\Delta E$). For example, effective marginal tax rates at the intensive margin of labor can be analyzed by setting $\Delta E$ equal to a fixed dollar amount. If extensive margin of labor is of interest, $\Delta E$ can be equal to the typical starting wage rate that individuals can expect to receive once employed.

[6] Our methodology takes into account eligibility of each household member for public healthcare programs and compares the net cost (premium paid by the household) of all the different possible health insurance options a household has. For example, a household of one adult and one child that is eligible for Children Health Insurance Program (CHIP) may compare their CHIP health insurance premium to the premium of purchasing a household plan through their employer. When we decompose changes in net resources due to changes in sources of the health insurance coverage, we compute the net changes in healthcare premiums.

[7] Our methodology allows for household expenses to change over time. For example, child care costs depend on the age of children as child care is more expensive for infants than for school-age children who only need after-school care. Total food and housing expenses depend on the family composition that changes over time as children get older and move out of the parents house.

In this paper, we measure effective tax rates on the income gains from career advancement and set $\Delta E_{it}$ equal to the income gains from switching occupations. Our analysis focuses on transitions that workers in job training programs are likely to face. For example, the effective marginal tax rate on a hypothetical career transition from an entry-level Certified Nursing Assistant (CNA) position to a higher paying Licensed Practical Nurse (LPN) position is defined as

$$mtr_{it} = 1 - \frac{\Delta NR_{it}}{\Delta E_{it\ cna-lpn}} \tag{3}$$

Where $\Delta E_{it\ cna-lpn}$ is the expected change in wages in a particular location from switching from a CNA to a LPN. When estimating Equation 3 at the household level, we assume the earnings of other household members remain fixed.

## 3.2. Estimating Expenses and the Values of Taxes, Tax Credits and Public Assistance Programs

### 3.2.1 Taxes, Tax Credits and Public Assistance Programs

Public assistance programs in the United States are made up of a patchwork of policies, implemented and administered at the federal, state, and local levels and subject to a diverse array of policy rules. These programs are designed separately from each other and have unique structure and terminology. Program rules are often buried in legislative documents or government websites, and are frequently difficult to interpret. Thus, to estimate the precise change in the amount of public assistance, value of tax credits, and total tax liability that arise due to change in earnings, we created a unique database called the Benefits Rule Database (Ilin & Terry, Forthcoming).[8] The BDB contains all of the major federal and state

[8]The key purpose of the BDB is to simplify the interpretation of all programs by creating a common structure and a common terminology. The BDB culls eligibility information into one easy to use policy database that describes policy rules in simple language and summarizes the complex program designs with a common set of logical or numeric fields. Importantly, the BDB will be a resource for individuals trying to understand the general structure of how each benefit program works as well as to programmers wanting

assistance programs, tax rules, and tax credits available to working-age adults and their dependents. Table 1 provides the full list of programs included in the BDB.

Table 1: List of Taxes and Public Assistance Programs Included in the BDB[9]

| | |
|---|---|
| Taxes | Income Tax (federal and state)<br>FICA Tax (federal)<br>Sales Tax (state) |
| Public Assistance Programs and Tax Credits | Earned Income Tax Credit (federal and state)<br>Child Tax Credit (federal and state)<br>Child and Dependent Care Tax Credit (federal and state)<br>Supplemental Nutrition Assistance Program (SNAP) (federal and state)<br>National School Breakfast and Lunch Program (federal)<br>Medicaid (federal and state)<br>Children Health Insurance Program (CHIP) (federal and state)<br>Marketplace Subsidies (federal and state)<br>Section 8 Housing Vouchers (state and county) |

For each program outlined in the Table 1, the BDB provides parameters and formulas for determining eligibility and computing the value of the program. We apply these rules to determine the value of $PA_{it}$ and $Tax_{it}$ for a household. The BDB contains historical information on the parameters and formulas for calculating eligibility for public assistance programs, spanning from 2011 to 2020. This allows for the calculation of historical effective marginal tax rates as well as current effective marginal tax rates.

### 3.2.2 Estimating Expenses

To estimate household expenses for any household we use a complementary original database. The Cost Database (CD), developed by Ilin & Terry (Forthcoming) is crucial for accurately estimating eligibility for—and the value of—public assistance programs. Calculations of values of public assistance programs often require knowledge of specific expenses faced by the household. For example, SNAP allows for childcare costs, housing costs, and utility costs to be deducted when determining eligibility and benefit amount. Likewise, the value of the

to estimate the value of a particular program. The BDB enables the calculation of benefit amounts for any individual—subject to some limitations– without requiring specialized knowledge.

Section 8 Housing Voucher depends on the household's rent. The value of the Marketplace subsidy is a function of the total health insurance premium, which varies by the person's age and location.

The Cost Database (CD) allows for a mapping of estimated expenses to household by county, family size, and ages of family members. Estimated expenses are not at the household level, but instead represent the typical expenses for a given county, family size, and age of family members. The expense estimates are intended to represent the amount a given family must spend to live in a given area at a reasonable standard of living without the need of public assistance.

The CD features detailed calculations by household demographics and geographic location. Geographic location is important since costs vary greatly by location. For example, 2020 Fair Market Rent for a 2 bedroom apartment in Brooklyn, NY is $1,830 per month compared to $1,115 in Albany, NY. Demographic detail is important as the age of family members can affect household expenses. For example, the CD takes into account the amount of child care a family needs based on the age of the children. Infants typically require more childcare than school-age children. In Atlanta, GA, infant care is estimated at $42 per day per compared to $19 per day for a school-age child.

The CD has an algorithm for choosing the optimal health insurance bundle. It calculates health insurance premiums for individual and family plans if purchased through an employer or if purchased through the private market. The CD's algorithm adjusts premiums for subsidies obtained through employer, Medicaid, CHIP or Marketplace and chooses the optimal bundle based on the lowest out-of pocket premium. For example, the eligibility threshold for CHIP is frequently higher than for Medicaid for adults and therefore a household may choose to have their children enrolled in CHIP but may themselves purchase health insurance through the Marketplace or through their employer, depending on which offers a lower

premium.[10]

The CD uses a variety of sources to estimate expenses. Its methodology closely resembles that of the University of Washington's Self Sufficiency Standard (SSS), and indeed many of the data behind the CD come from that source.[11] Child care estimates come from the SSS for the 28 states where data is available for 2020. For the remaining states, the CD uses data from Child Aware.[12] Food costs are estimated using the USDA's low-cost food plan.[13] Private market health insurance costs are estimated using data from the Kaiser Foundation data of plans purchased on the Health Exchange and adjusted by age using the extent to which each state permits the exchanges to price discriminate based on age.[14] Employer sponsored health insurance costs come from the Medical Expenditure Panel Survey. Utility costs come from the Consumer Expenditure Survey and Transportation and Miscellaneous expenses come from the University of Washington's Self-Sufficiency Standard.

All expenses included in the CD are listed in the Table 2 below:

Table 2: List of Expenses Included in the CD

| | |
|---|---|
| Expenses | Child care |
| | Food |
| | Private Market Health Insurance |
| | Employer Sponsored Health Insurance |
| | Rent |
| | Transportation |
| | Utilities |
| | Miscellaneous |

[10]Households are ineligible for Marketplace subsidies if their employer sponsored health insurance is "affordable."

[11]See www.selfsufficiencystandard.org/

[12]See www.childcareaware.org

[13]See www.fns.usda.gov/cnpp/usda-food-plans-cost-food-reports-monthly-reports

[14]See www.kff.org/health-reform/state-indicator/marketplace-average-benchmark-premiums/

# 4 Estimates of Effective Tax Rates

## 4.1. Effective Tax Rates on Income Gains from Career Advancement

We first demonstrate how the U.S. tax and transfer system creates disincentives for career advancement for lower-income workers. Throughout this section, we use a hypothetical career advancement progression in the healthcare sector as an example. Our choice is motivated by a large number of job training programs focused on this career path (e.g., Administration for Children and Families 2020). We then discuss how these disincentives vary across geographical locations and demographic groups and show how they have changed over the past decade as program rules have been revised. In particular, we discuss the effect of the introduction of the Health Insurance Marketplace and Medicaid expansion under the Affordable Care Act on the incentives for career advancement. Finally, we discuss how these three sources of variation—across time, geographical locations, and demographic groups—can be used to identify the effects of effective marginal tax rates on individual labor supply decisions.

To demonstrate the geographical variation in disincentives, we estimate the effective marginal tax rates for each county in the U.S. that a typical worker would face on the income gain from moving from Certified Nursing Assistant (CNA) to the Licensed Practical Nurse (LPN). We then decompose the sources of the effective marginal tax rates by contrasting two countries—Becker County, MN, with a 121.5 percent median effective tax rate on career advancement, and Albany County, WY, where the median effective tax rate on career advancement is 47.4 percent.

## 4.2. Estimating Effective Tax Rates on the CNA to LPN transition

The healthcare career pathway includes a variety of jobs that each require certain skills and credentials. Through training and skills acquisition, people can progress from low-wage jobs that require a minimum amount of education and experience to higher paying jobs. A typical entry-level position in the healthcare sector is a CNA. The CNA position is relatively

low-paying. The median annual entry-level CNA earnings in 2019 were $24,010. Workers in job training programs are often encouraged to move beyond the CNA and earn a more advanced credential. For example, a worker can obtain an Associates degree and become a LPN. The LPN job comes with higher wages—the median 2019 annual entry-level wage is $35,460.[15]

In this section, we refer to the marginal tax rate on the income gain from the CNA to LPN transition as an "effective tax rate" as opposed to "effective marginal tax rate" because the increase in income is no longer incremental and can be large. To estimate the income gains from this career transition, we use data from the Bureau of Labor Statistic's Occupational Employment Statistics Survey (OES). We proxy CNA and LPN starting wages by the 10th percentile of wages in a given area.

Overall, the effective tax rate on career advancement depends on several factors: i) household composition (number and age of family members); ii) geographic location iii) public assistance programs rules; and iv) entry-level wages of CNA and LPN.

To isolate the geographical variation in the effective tax rates, we compute the effective tax rate on the CNA to LPN transition for a single family type—households with one adult and one 4 year old child. Using one adult allows for a clean interpretation of income gains since we do not need to make any assumptions about the income of other adults in the household. The presence of children creates significant geographic variation due to the number of programs that are available to families with dependents. When calculating the value of government assistance programs, we intentionally exclude supply constraint public assistance programs—Section 8 Housing Vouchers and Child Care and Development Fund (CCDF) child care subsidies. Additionally, the value of subsidized school breakfast and lunch is not included in these calculations because the child is 4 year old and we assume

[15]Source: Bureau of Labor Statistics, (2019, May). Occupational Employment Statistics Survey. U.S. Department of Labor. Entry-level wages are approximated by a 10th percentile of wages in an area.

is not attending public school.[16] Thus, if eligible, the household can receive public health insurance (Medicaid/CHIP and Marketplace subsidies), SNAP and tax credits (CTC, EITC, CDCTC). This public assistance bundle is similar to the most common for those on government assistance programs (Chien and Macartney 2019). We assume that health insurance through an employer is not available. In computing these effective marginal tax rates we apply program rules and tax rules for 2020.

We calculate effective tax rates on career advancement in three steps. First, using the Cost Database we estimate the average expenses that a family would have in every U.S. county. Second, we use the OES wage data to estimate the starting CNA and LPN wages in each area. Third, we calculate the amount of taxes and the value of all public assistance programs available to the household at the CNA and LPN annual wages.

After calculating expenses, employment income, taxes, and the value of public assistance programs, we use equation 1 to estimate net resources separately computed for the starting CNA wage and the starting LPN wage. These calculations take into account geographic location, tax liabilities, the value of government assistance programs, and out of pocket healthcare premium costs. Finally, we use equation 3 and calculate the effective tax rate on the income gain.

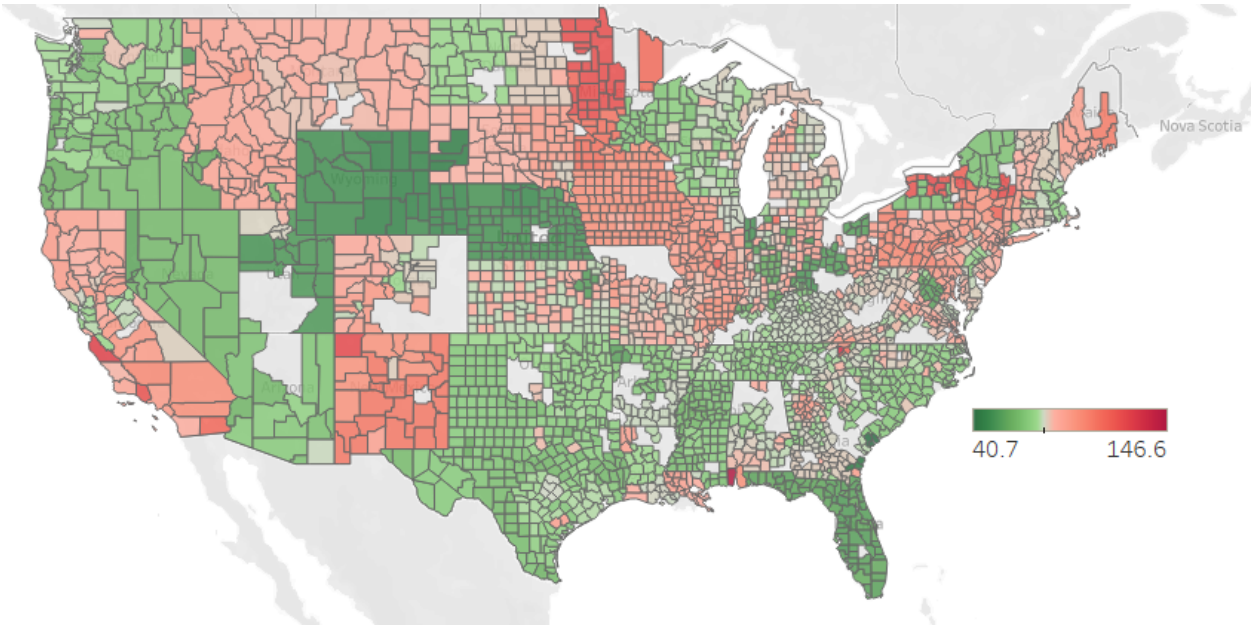
### 4.3. Geographical Variation in the Effective Tax Rates

Figure 1 plots the effective tax rate on the income gain from the CNA to LPN transition for each county in the U.S.[17]

[16] In some geographic areas, school starts at 4 year old due to voluntary pre-K programs. These program rules are still being added to the BDB.

[17] Estimates of the effective marginal tax rates can be sensitive to the exact amount of change in earnings. We follow Chien and Macartney (2019) and as a robustness check estimate effective marginal tax rates on $2,000, $5,000 and $10,000 increase in income. Results of the robustness check are provided by the figure 9 in the Appendix.

Figure 1: Effective Tax Rates Across U.S on the Income Gain from CNA to LPN Career Transition




Wage data comes from the Bureau of Labor Statistics, (2019, May) Occupational Employment Statistics Survey, U.S. Department of Labor. OES wage data is missing for the areas colored in gray. Family type: single adult with one 4 years old child. Public assistance bundle: public health insurance (Medicaid/CHIP, Marketplace subsidies), SNAP and tax credits (CTC, EITC, CDCTC).

We find significant variation in the effective tax rates across the U.S. The household with one adult and one child would face effective tax rates on the CNA to LPN income gain ranging between 40.7 and 146.6 percent.

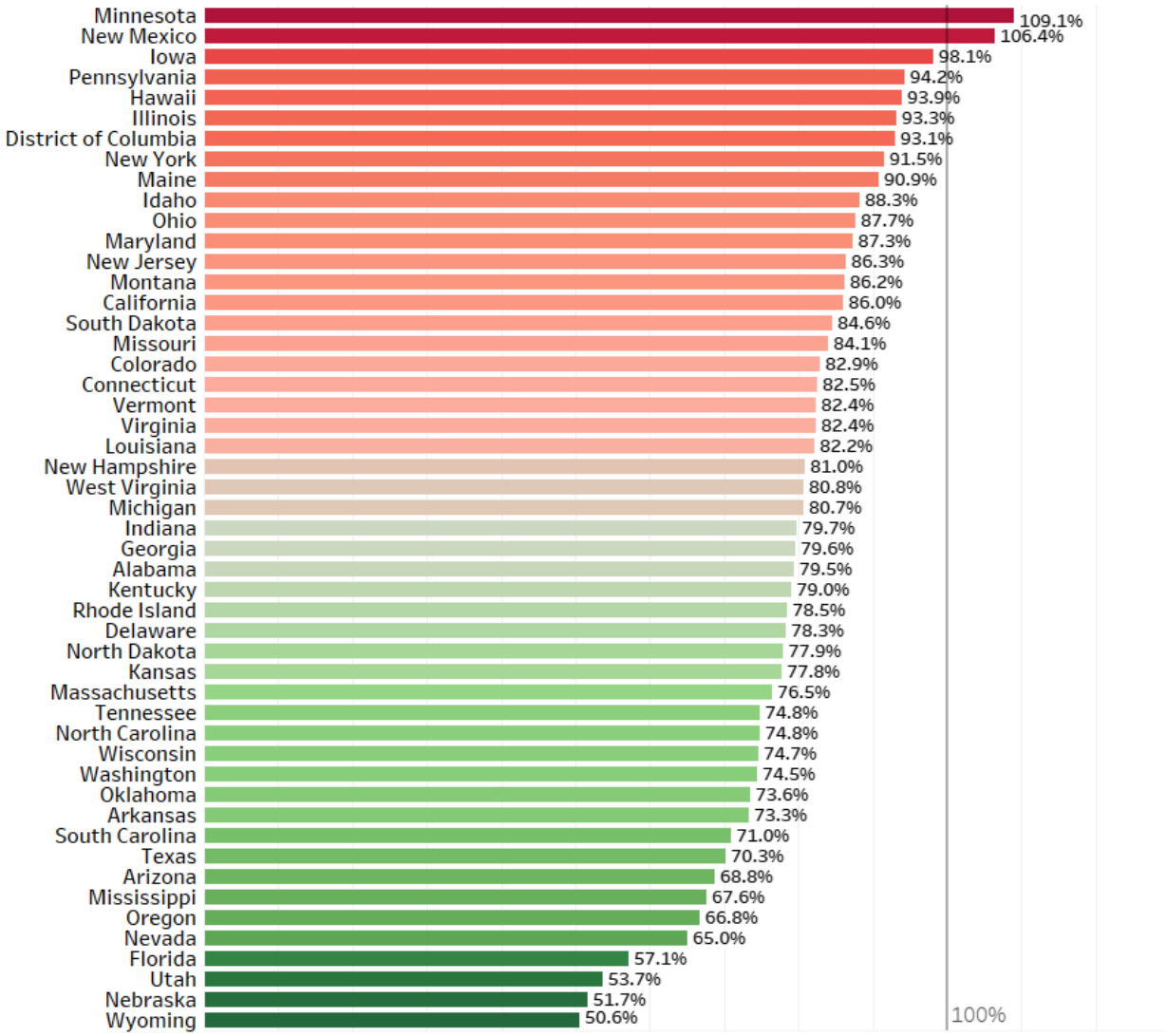
The variation in the effective tax rates across the U.S. is the result of geographical differences in the starting CNA wages and eligibility rules for public assistance programs. Because many programs are a function of the Federal Poverty Level, families living in areas with relatively low CNA starting wages have a higher probability of receiving public assistance programs, *ceteris paribus*.

Precise eligibility and assistance amounts depend on state rules; some states have more generous public assistance program rules than others. For example, under the ACA, some states expanded income eligibility for Medicaid to 138 percent of FPL for all adults. SNAP

income eligibility also varies across states, with some states having income limits above federal 130 percent under the Broad Based Categorical Eligibility (BBCE) rules. Moreover, some states have state-level versions of the CTC, EITC and CDCTC.

For simplicity of interpretation, Figure 2 shows one summary statistic for each state—the median effective tax rates on CNA to LPN income gains. The state-level median effective tax rate varies from 50.6 percent in Wyoming to 109.1 percent in Minnesota.

Figure 2: Median Effective Tax Rate Across U.S. States

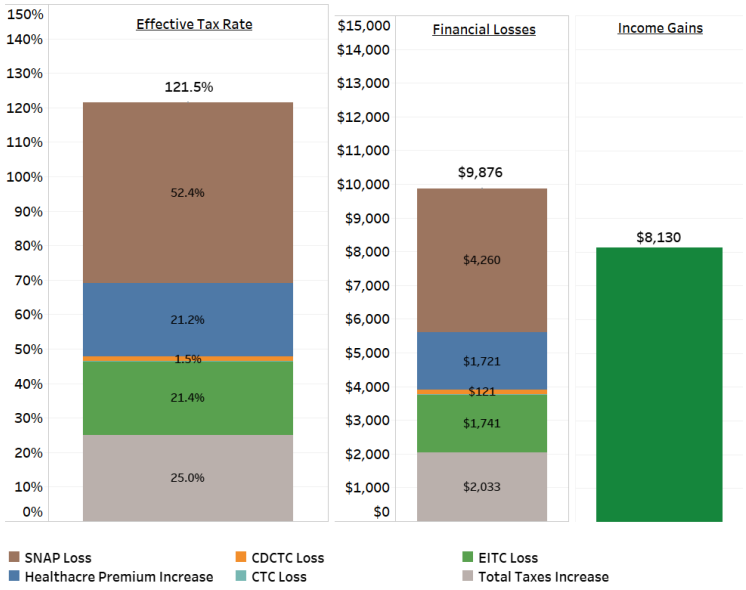



Notes: Alaska is excluded. Grey line represents 100% effective tax rate.

To explain the variation in the effective tax rates shown in Figures 1 and 2, we decompose the net tax rates for two counties in the highest and lowest median effective tax rate states—Becker County, MN and Albany County, WY. Becker County, MN has the highest effective tax rate at 121.5 percent. Albany County, WY has the lowest effective tax rate in the state.

Figure 3: Decomposition of Effective Tax Rates on the Income Gain from CNA to LPN Career Transition

(a) Becker County, MN (121.5 percent effective tax rate)




(b) Albany County, WY (47.4 percent effective tax rate)

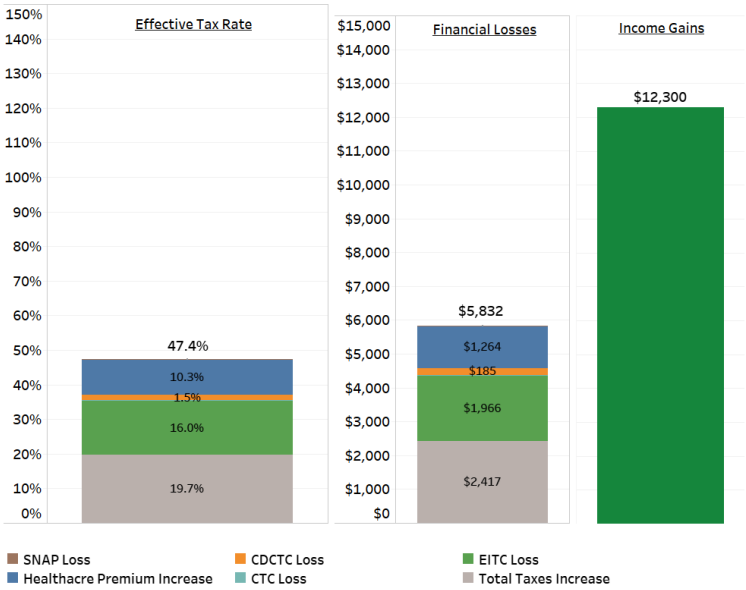



Figure 3 shows that the income gain from CNA to LPN in Becker County, MN is $8,130, which reflects an increase in earnings from $26,670 to $34,800. 52.4 percent of this income

gain is effectively lost due to a total loss in SNAP (valued at $4,260) because at the LPN wage rate the family is no longer eligible for food assistance.[18] Furthermore, a decrease in Marketplace subsidies offsets 21.2 percent of the income gain (valued at $1,721). The decrease in state and federal EITC is 21.4 percent of the income gain (or $1,741). Finally, a family will have to pay 25 percent of the income gain in state and federal taxes (estimated at $2,033).

In contrast, the financial incentives for advancement are different in Albany County, WY, where the CNA starting wage is $23,740 (roughly 140 percent of the FPL for the family of two). At the CNA wage, the family is just above the eligible threshold for SNAP and therefore does not lose food assistance as a result of the transition to LPN.[19] The cost of private health insurance is significantly lower in Wyoming than in Minnesota. Therefore, although the family experiences a phase-out of Marketplace subsidies, the loss is relatively small and equal to 10 percent of the income gain ($1,264). The income gain is large enough for a family to experience a full phase-out of federal EITC, accounting for a 16 percent loss of the income gain ($1,966). Unlike Minnesota, Wyoming does not have a state EITC to lose. Wyoming does not have state income tax and therefore a family has to pay a smaller income tax on the income gain—19.7 percent ($2,417).

### 4.4. Variation in the Effective Tax Rates Across Family Types

Eligibility for programs varies significantly by family composition. Federal poverty levels vary by a size of family; larger families are subject to higher income eligibility thresholds for many programs. Furthermore, some of the highest-valued public assistance programs, like CHIP, Medicaid, and CCDF (not included in these calculations) are only available for households with children. CTC is only available to those with children, CDCTC is only valuable for those with dependent care costs, and the value of EITC is higher amongst

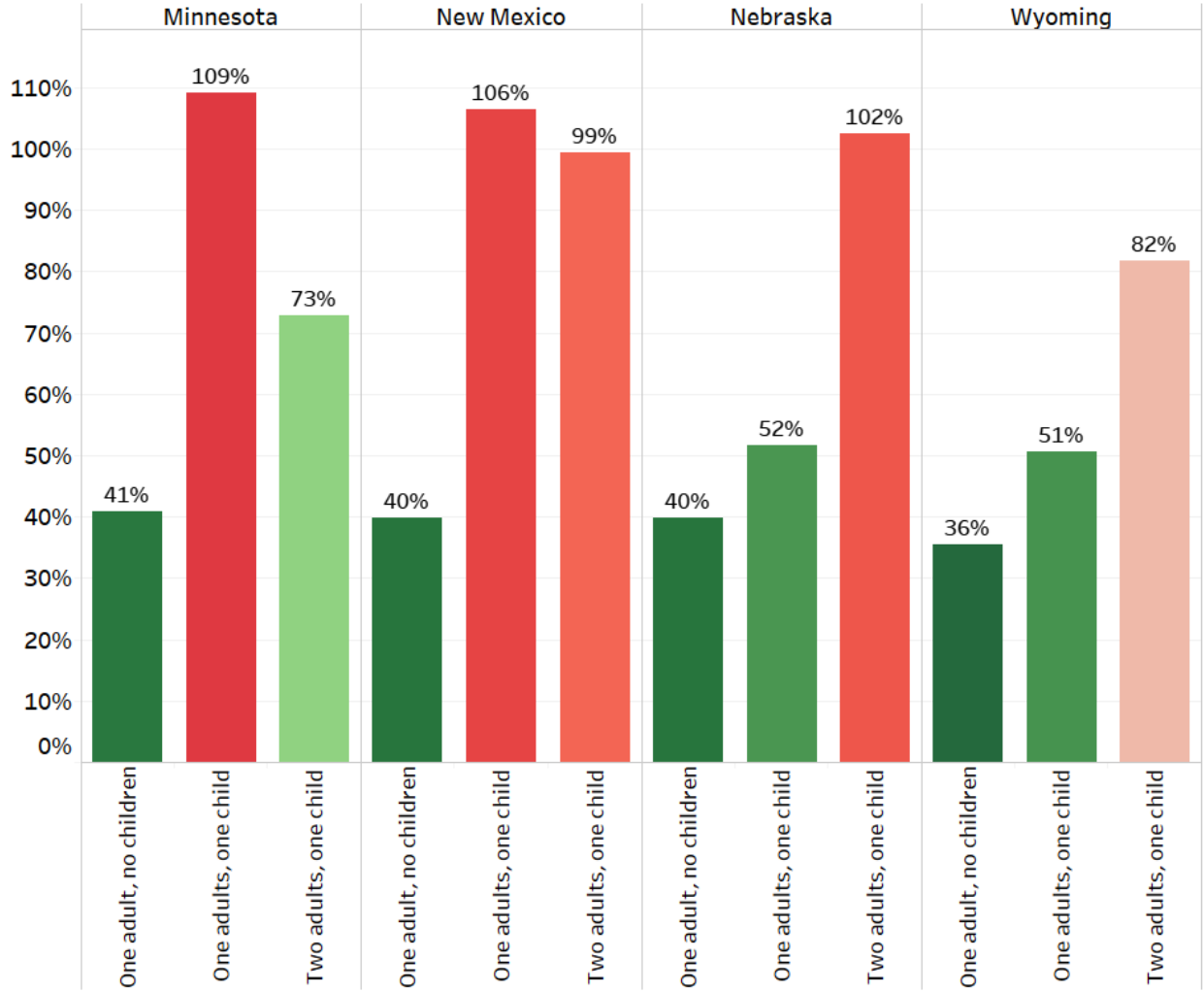
[18] In Minnesota, eligibility for SNAP is 165 percent of the FPL.

[19] Wyoming has not expanded SNAP eligibility under BBCE and has a federal income limit at 130 percent of FPL.

adults with children. In certain states Medicaid rules feature higher income eligibility limits for adults with dependents.

To illustrate the variation in effective tax rates on the CNA to LPN income that arise due to family composition, we estimate the median effective tax rates for two additional family types: one adult without children and two married adults with one 4 year old child.[20] Figure 4 compares the median effective tax rate on career advancement for the three family types in four states.

Figure 4: Median Effective Tax Rate by Family Type




[20]We keep income of the second adult constant at $0.

Figure 4 shows that in the four states a childless adult faces the lowest effective tax rate, with little variation across states. In some states, a family with one adult and one child faces the highest effective marginal tax rate while in others a family with one adult and two children face the highest effective marginal tax rate (of these three family types).

### 4.5. Variation in the Effective Tax Rates Across Time Periods

Public assistance program rules have changed over time, creating sudden and uneven changes to effective marginal tax rates. The policy change that had the largest (but not unambiguously positive or negative) effect on marginal tax rates was the Affordable Care Act (ACA), signed into law by President Barack Obama in 2010 (with coverage and subsidies beginning in January 2014). The ACA was enacted with the goal of providing affordable health insurance to a large segment of the population, through a combination of expanding Medicaid to individuals below 138 percent of the Federal Poverty Level (FPL) and providing health insurance subsidies (premium tax credits) on the health exchange to households with incomes between 100 and 400 percent of the FPL.

However, the Supreme Court later ruled that States could opt out of the Medicaid expansion, and many chose not to expand. In January 2014, 22 states immediately expanded Medicaid coverage. Since 2014, additional 12 states have chosen to expand Medicaid.[21]

The Medicaid expansion and introduction of Marketplace subsidies drastically changed the magnitude and timing of marginal tax rates by income level and family composition. Figure 5 plots effective tax rates for each county in the U.S. calculated using 2012, 2013, 2014 and 2015 rules. States did not experience significant change in the pattern of effective

[21]The following states expanded Medicaid under the ACA in January 2014: Arizona, Arkansas, California, Colorado, Connecticut, District of Columbia, Hawaii, Illinois, Iowa, Kentucky, Maryland, Minnesota, Nebraska, Nevada, New Jersey, New Mexico, North Dakota, Ohio, Oregon, Rhode Island, Washington, West Virginia. Some states adopted Medicaid after January 2014: Michigan (4/1/2014), New Hampshire (8/15/2014), Pennsylvania (1/1/2015), Indiana (2/1/2015), Alaska (9/1/2015), Montana (1/1/2016), Louisiana (7/1/2016), Virginia (1/1/2019), Maine (1/10/2019), Idaho (1/1/2020), Utah (1/1/2020), Nebraska (10/1/2020), Oklahoma (planned for 7/1/2021), and Missouri (planned for 7/1/2021). Among those states who expanded Medicaid in January 2014, Delaware, New York, Massachusetts and Vermont had pre-expansion generous Medicaid rules.

tax rates between 2012 and 2013 and between 2014 and 2015. However, the introduction of ACA can be seen in comparing 2013 to 2014 as the law significantly altered the pattern of effective tax rates on career advancement across the U.S.

Figure 5: Dynamics of Effective Tax Rate Over Time. Effect of the ACA.

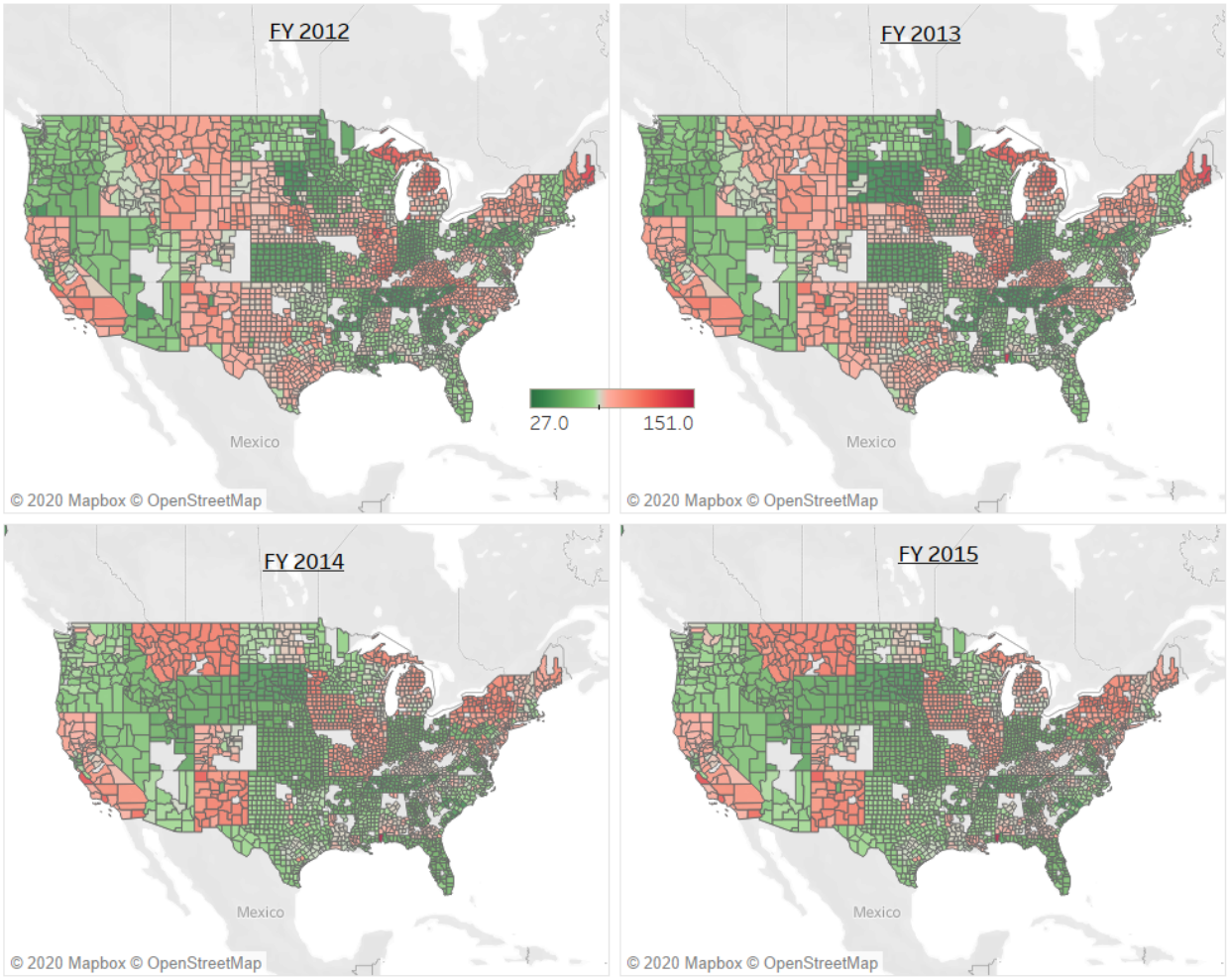



Figure 5 shows how median effective tax rates changed between 2013 and 2014 for each U.S. state. In some states, median effective tax rates increased significantly while in others they declined.

The provisions of the ACA created opposite changes in effective tax rates for expansion and non-expansion states for households just below the poverty threshold. Families living in

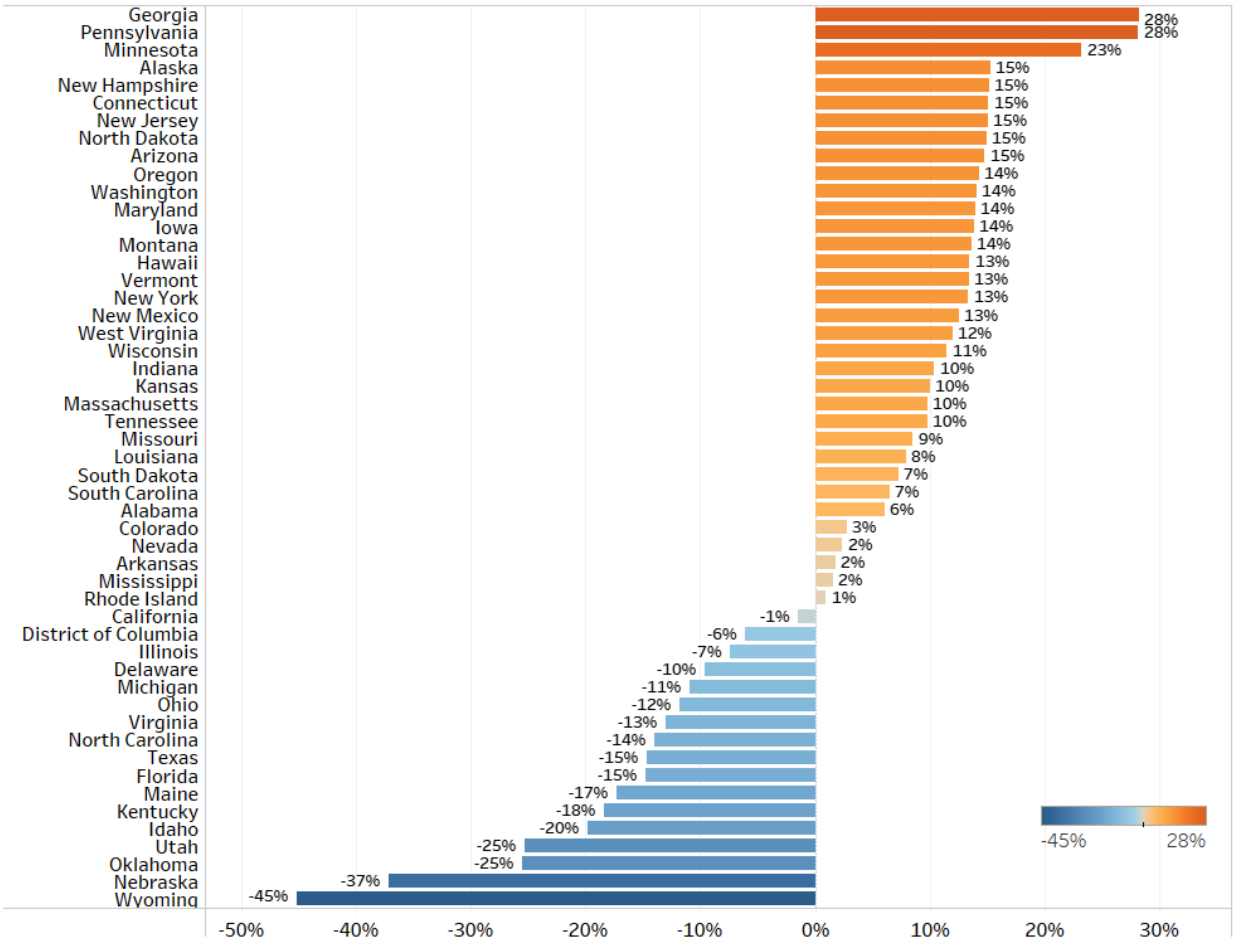
states that immediately expanded Medicaid experienced a reduction in marginal tax rates if their income was just below the Medicaid eligibility limits. Those below 138 percent of the FPL became eligible for Medicaid, providing a smooth transition to ACA subsidies, effectively reducing marginal tax rates for this segment of the population. In contrast, families living below the poverty threshold in states that chose not to expand Medicaid were suddenly faced with negative effective marginal tax rates: with an increase in income, such households would be able to gain premium tax credits and therefore experience an increase in net resources.

For families already above the eligibility limits for Medicaid at the time the law was introduced, the effect of the law was similar everywhere. In all locations, this segment of the population now qualified for premium tax credits. Thus, they now would experience an increase in marginal tax rates as the value of ACA subsidies phase-out with income.[22]

Across the U.S. the income level change from a CNA to LPN transitions varies greatly. Sometimes the career move results in a change in income just below eligibility for premium tax credits to just above the threshold. Other times, both salaries are below the threshold for premium tax credits. Still other times, both incomes are above the threshold for premium tax credits. This creates a wide divergence in the change in the effective tax rates on the CNA to LPN career move, as can be seen in Figure 6.

[22]The with subsidies "premium tax credits" lower the costs of health insurance purchased through the Health Insurance Marketplace. When the premium tax credit is applied, the insurance premium is capped on a sliding scale between 2 percent and 9.6 percent of income, depending on the income level. This is the amount paid by the household and the remaining cost of the health insurance is covered by the premium tax credit. For low-income households, the size of the subsidy is substantial. Households with income between 138 percent and 150 percent of the FPL pay only 2 percent of their income towards health insurance premiums.

Figure 6: Effect of the ACA on Median Effective Tax Rates Across U.S. States.




## 5 Effective Marginal Tax Rates and Individuals' Labor Supply

The 2014 Survey of Income and Program Participation (SIPP) is an annual survey conducted by the United States Census Bureau. It is designed to provide accurate information about the dynamics of individual and household income and serves as a primary source of information on the participation in public assistance programs. The 2014 SIPP panel covers reference years from 2013 to 2016.

SIPP collects information about household program participation, such as Medicaid, SNAP and Housing Voucher. It allows us to estimate the effective tax rates based on reported

participation in public assistance programs. The SIPP dataset features the same households for four years of data. However, households are missing in some years. Therefore, we restrict the SIPP dataset to households that appear in the entire panel dataset. We further collapse the dataset to one observation per household per year, totaling income from all members of the household, as that is the measure of income used for determining eligibility for government assistance programs.

### 5.1. Empirical Strategy

We start by estimating the value of government assistance and the set of expenses the household likely faces for every household in every year of the SIPP using the BDB and CD. Using the calculated value of public assistance and estimates of expenses and household income, we use Equation 1 to calculate household net resources.

When calculating expenses and public assistance we use several pieces of information from the SIPP. For example, we calculate government assistance and expenses related to healthcare by using information about whether the household has an option to purchase health insurance through their employer and if they participate in Medicaid or CHIP. We assume full participation in tax credits, since that is more automatic in the tax system. It is a well known fact that SIPP responses contain so-called "seam bias". This refers to the fact that transitions or changes in status within reference periods are under-reported while too many transitions or changes are reported between interviews (Ham et al. 2009). To mitigate this bias we consider responses about participation in public assistance programs only from December.

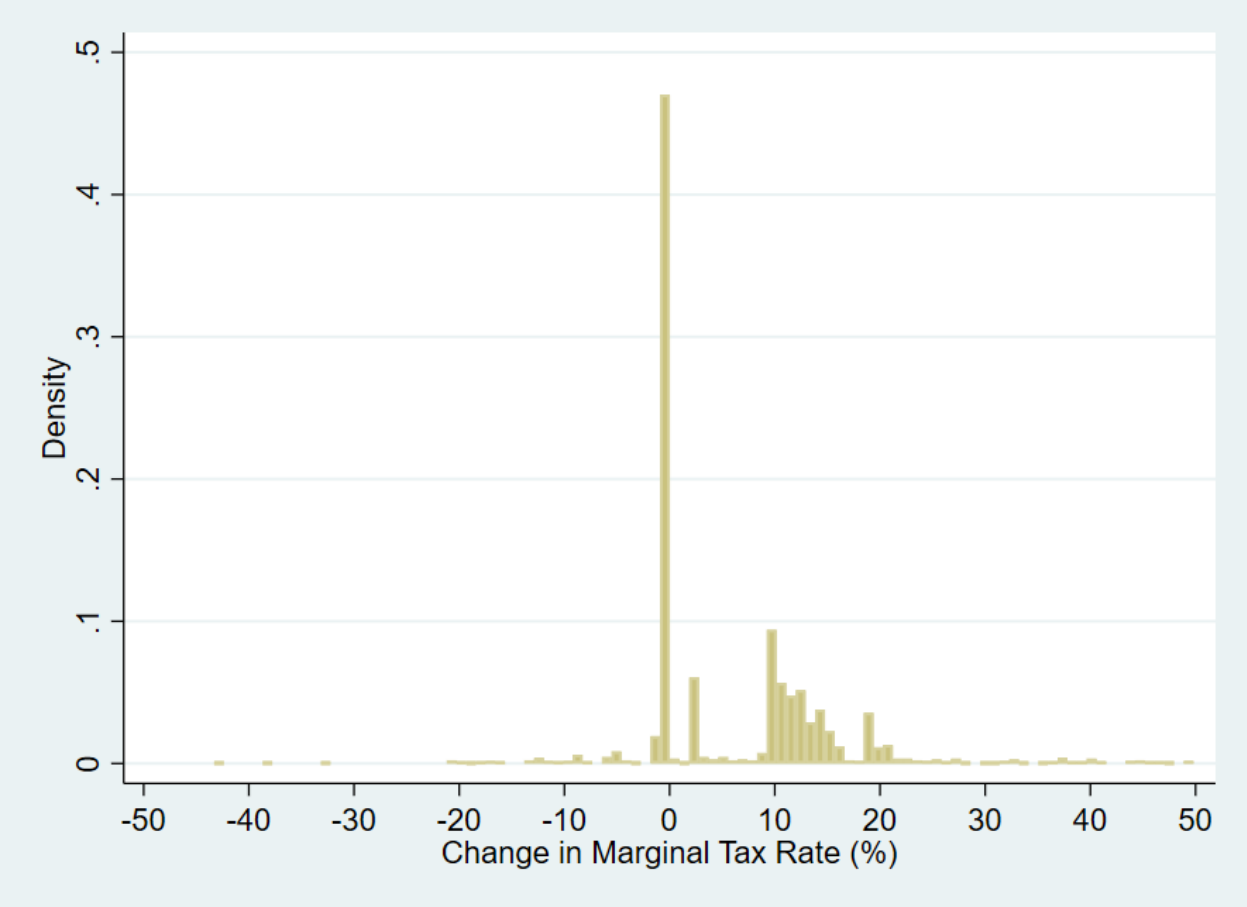
Our identification strategy centers around the notion that exogenous policy changes differentially treat households. That is, the policy change will effectively "treat" some of the population with change in marginal tax rates while leaving the rest of the population untreated. As discussed in the previous section, this differential treatment arises due to the

variation in household size, number of kids, age of kids, income, and geographic location. To measure the effect of the change in effective marginal tax rates we compare the effective marginal tax rates in a given period under current year rules ($mtr_t$) to that under the rules in the next calendar year ($mtr_t^t$). Thus, the exogenous policy-induced change in marginal tax rates ($\Delta mtr_t = mtr_t^t - mtr_t$) is our variable of interest. If labor supply decisions are affected by the effective marginal tax rates, then a change in marginal tax rates should elicit a response from the household. In particular, we would expect that treated households that experience an increase to their marginal tax rates will be less likely to increase their earnings compared to households who do not experience an increase in their marginal tax rates.

We start by allocating people into treatment and control groups based on whether or not their marginal tax rate increased due to a policy change. We restrict the sample to those that are below 200 percent of the poverty level as this includes the population most affected by the rules changes of public assistance programs. As a robustness check we also analyze a sample of those who participated in any kind of public assistance program in the previous year. We consider income of only those household members between 16 and 65 years old because we are primarily interested in working age individuals. We refer to this restricted sample as "households" in this section.

Figure 7 shows how the changes in the effective marginal tax rates are distributed across this subset of SIPP households. A little more than half of households (55 percent) experience no change in marginal tax rates in any year. These households are the control group. The other 45 percent of households with changes to their marginal tax rates are our treatment group.

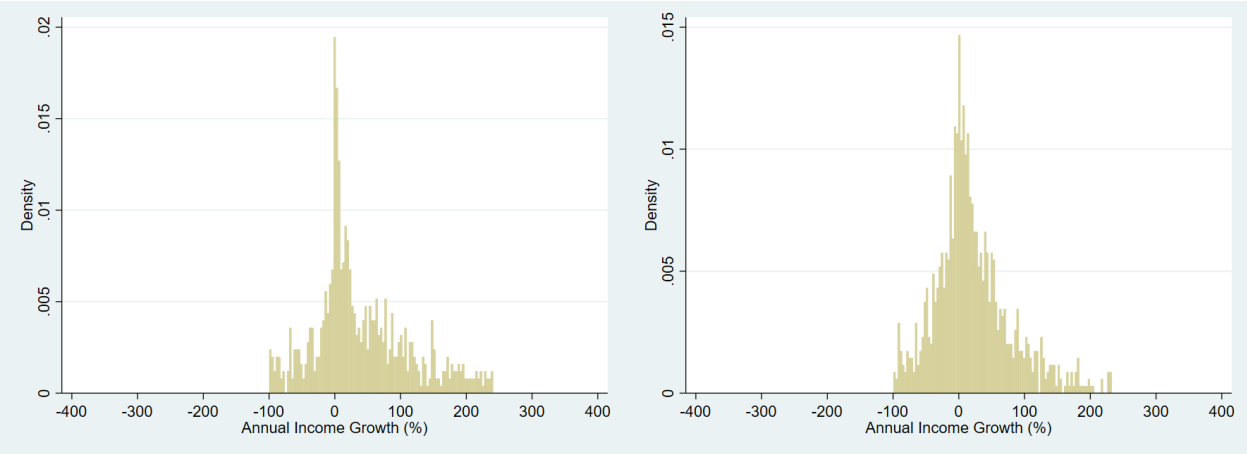
Figure 7: Distribution of Changes in the Effective Marginal Tax Rates




Without controlling for any demographic differences in treatment and control groups, Figure 8 shows clear differences in annual income changes between the two groups. Left chart of figure 8 plots the percent change in annual income among those that experienced no change in their marginal tax rates. The mean percent change in income amongst this group is 39.5 percent. The right chart plots the percent change in annual income among those households that experienced an increase in their marginal tax rate as a result of policy change. The median percent change in income among this group is 20 percent—19 percentage points lower than for those who did not experience an increase in the marginal tax rates.

Figure 8: Distribution of the Percent Change in Household Income

(a) With No Change in Marginal Tax Rate (b) With Increases in Marginal Tax Rate




Source: 2014 Survey of Income and Program Participation, authors' calculations

### 5.2. Preliminary Results

Two outcome variables of interest for our analysis are i) the probability that a household experiences increase in earnings between two time periods and ii) the percentage change in income between two time periods. We estimate the following regression:

$$y_{it} = \alpha + \beta treat_{it} + \gamma X_{it}^{T} + \epsilon_{it} \tag{4}$$

Where $y_{it}$ is a variable of interest. In case of the probability of earnings increase, $y_{it}$ is equal to 1 if household's total income in period $t+$ is greater than in $t$ and 0 otherwise. In case when we analyze percentage change in income, $y_{it}$ is equal to the percentage change in total household income between $t$ and $t+1$. The variable $treat_{it}$ is binary indicator of whether household $i$ experienced an increase in marginal tax rates in the period $t$. $X_{it}$ is a set of controls that include education level, race, ethnicity, family size, gender, marital status, number of children, age, and age squared.

Table 3 reports the results of our baseline regressions for two samples. The first sample

consists of households whose income is below 200 percent of the FPL. The second sample includes only households that were receiving SNAP, Medicaid, or CHIP in the period before. We include this as a robustness check because arguably the population receiving public assistance will not experience a shock to their marginal tax rates and may be different than those not on public assistance in unobservables. This restriction also limits the sample to households that can potentially be affected by the policy changes to SNAP, Medicaid, and CHIP that have occurred over these three years.

Table 3: Results of the Baseline Regressions

| | $< 200\%$ of FPL | | Receiving Public Assistance | |
|---|---|---|---|---|
| | Probability of Increase in Income | Percentage Change in Income | Probability of Increase in Income | Percentage Change in Income |
| *treat* | -11.6*** | -24.7*** | -11.2*** | -21.9*** |
| | (-4.98) | (-7.87) | (-9.98) | (-7.22) |
| Controls | Yes | Yes | Yes | Yes |
| N | 1,805 | 1,589 | 1,805 | 1,589 |

Note: t-statistics is reported in the parenthesis

For both samples, the increase in marginal tax rates has a significant negative effect on the probability of an increase in income and on the percentage change in income. For the first sample (those below 200 percent of FPL), on average those households that experience an increase in marginal tax rates are 11.6 percentage points less likely to increase their earnings and have 24.7 percentage points lower income growth rates. For the second sample, coefficients have similar magnitude—11.2 and 21.9 percentage points respectively.

This analysis however, has limitations. In the SIPP, the income of individuals changes year to year, but we do not observe whether or not these individuals are actively attempting to advance in their careers. Thus, the evidence presented here identifies an effect of marginal tax rates on income, but does not specifically address our career advancement research

question. Future work on this paper will use a data from a national job training program evaluation designed specifically designed to analyze career transitions.

## 6 HPOG 1.0 and Next Steps

In 2010, the Administration for Children and Families (ACF) within the U.S. Department of Health and Human Services awarded the first round of five-year HPOG grants (HPOG 1.0) to 32 organizations in 23 states. The purpose of the HPOG Program is to provide education and training to Temporary Assistance for Needy Families (TANF) recipients and other low-income individuals for occupations in the healthcare field that pay well and are expected to either experience labor shortages or be in high demand.

Job training programs organized using HPOG grants covered 13,802 participants. By design, programs targeted an economically disadvantaged population. At the time of entry into the study, 43 percent of the study participants were working. On average, participants had earned less than $10,000 in the year before applying to HPOG. Some of them were receiving public assistance at the time of program entry: 13 percent were receiving TANF cash assistance and 56 percent were receiving government food assistance in the form of SNAP or Special Supplemental Nutrition Program for Women, Infants and Children (WIC). HPOG programs provided healthcare training opportunities based on local labor market information. Most programs offered shorter-term training that typically lead to becoming certified nursing assistant (CNA). On the other hand, the majority of programs also offered longer-term training such as those for licensed vocational nurses (LPN) and registered nurses (RN). Thirty-seven percent of participants enrolled in and completed short-term CNA training but only 6 percent and 5 percent enrolled in LPN and RN training respectively.

A next step in our research we will estimate the marginal tax rates for HPOG 1.0 participants and analyze how the variation in marginal tax rates is associated with the probability

that a person advances to LPN or RN.[23]

# 7 Conclusion

In this paper, we examine how effective marginal tax rates affect low-income workers' decisions to move up a career ladder. We describe a methodological advance in the estimation of effective marginal tax rates that incorporates all major taxes and public assistance programs and includes detailed state-level rules and interactions between programs. We used this methodology to show how effective marginal tax vary for the same career transition across the United States.

Our estimates of effective marginal tax rates show significant variation across geography, family composition, and years. The variation supports our identification strategy, particularly the over-time changes in effective marginal tax rates induced by the expansion of Medicaid.

Finally, we used the exogenous shocks to marginal tax rates to estimate the cumulative effect of these policy changes on individual income gains. Our preliminary results suggest that the combined tax and transfer system creates a large disincentive effect on worker's career advancement decisions.

The results we present are preliminary. Our future work in this project will add data from the Health Profession and Opportunity Grant (HPOG) evaluation. This dataset provides precise individual-level data on public assistance receipt, demographics, and career choices. Thus, the dataset will allow us to estimate how effective marginal tax rates impact career advancement conditional on individuals being enrolled in a job training program. One of the concerns about studying career advancement in the general population of low-income workers is that it is difficult to control for the interest and the capacity (e.g., financial supports and training supports) to advance in one's career. Using the HPOG data allows

[23]The authors were unable to acquire in time to include the results in the conference paper.

us to condition on a sample of people with the expressed interest and support for career advancement. Thus, we will study how effective tax rates disincentize those who want to advance and have a variety of supports to enhance their capacity to advance.

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# Appendix

Figure 9: Effective Marginal Tax Rates on $2,000, $5,000 and $10,000 Income Gains