State Taxes, Migration, and Capital Gains Realizations

Lucas Goodman, US Department of the Treasury*
Ben Sprung-Keyser, Harvard University†

August 2022

Abstract

We analyze the impact of state capital gains tax rates on migration and realization. We find the probability of migrating to a zero-tax state before realization rises with one's potential tax savings. Exploiting individual-level variation in tax savings, we use a dynamic discrete choice model to quantify the behavioral effects of state capital gains taxes. We estimate that former residents of high-tax states realize an additional $2.8 billion yearly in zero-tax states due to tax savings. Reducing top rates would decrease tax avoidance by out-migrants, but the positive fiscal externalities would be less than 1% of the policy's mechanical cost.

Draft: Please Do Not Cite or Circulate

We thank Nathaniel Hendren, Raj Chetty, Ed Glaeser, Myrto Kaloupsidi, Yin Wei Soon, Evan Soltas, Stefanie Stancheva, and Audrey Tiew as well as participants at the NTA Annual Conference on Taxation, University of Kentucky seminar, Treasury OTA brown bag seminar. The views expressed in this support are the authors' and should not be interpreted as those of the U.S. Department of the Treasury. This research was supported by the National Science Foundation (#DGE1745303 (Sprung-Keyser)), Opportunity Insights, and Policy Impacts. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.

*lucas.goodman@treasury.gov
†bsprungkeyser@g.harvard.edu

I Introduction

Capital gains taxes make up a substantial portion of state revenue collected from high-income taxpayers. Amongst millionaires in California, for example, they account for more than one-third of state personal income tax liability (California Department of Finance, 2019). Amid popular concerns that high state taxes may drive residents to migrate out of state, it is natural to ask: what is the impact of state capital gains taxes on interstate migration and capital gains realizations?

In this article, we examine the effect of state capital gains taxes on migration and realization decisions. We use US administrative tax records to examine decisions amongst individuals with large quantities of capital gains. We observe that, for residents of high-tax states, the probability of migrating to a zero-tax state and then realizing one's gains increases substantially with the size of the tax bill that an individual can avoid.

Motivated by that evidence, we seek to estimate the causal effect of state capital gains taxes on migration and realization decisions. While there is substantial body of prior work analyzing the impact of taxes on migration, responses to state capital gains taxes have remained relatively unexplored. Existing work tend to focus on the impact of labor income taxes (Young et al., 2016; Young and Varner, 2011; Varner et al., 2018; Akcigit et al., 2016; Kleven et al., 2013; Moretti and Wilson, 2017) or, in some instances, estate taxes (Moretti and Wilson, 2021) or corporate taxes (Suárez Serrato and Zidar, 2016). The closest work is Agersnap and Zidar (2021) who measure the impact of state capital gains tax changes on the share of top 10% earners located in each state. They use that elasticity in calculating the revenue maximizing federal rate.[1]

In this paper, we build a dynamic discrete choice model where individuals can choose their location and the timing of their capital gains realization. We estimate our dynamic discrete choice model using the Euler conditional choice probability approach (Scott, 2013). This allows us to estimate the key parameters of the model with a simple difference-in-differences regression (Diamond et al., 2017). In our estimation, we exploit plausibly exogenous variation in migration and realization incentives due to variation in the size of one's capital gains. We utilize the fact that potential tax savings are higher for individuals with larger realizations. Our primary regression compares individuals who migrate before realization to individuals who realize before migration. We examine how the relative probability of these choices varies with the size of one's potential tax savings.[2] The results of these regressions align with our initial graphical evidence: potential tax savings have a clear effect on the likelihood that individuals migrate to zero-tax states in advance of major realizations.

We use the estimates from our difference-in-difference regression to examine the effects of unobserved counterfactual policy changes. In particular, we focus on two distinct policy counterfactuals identified in the

[1] In contrast, we focus on the realization and revenue impact of state tax reforms, rather than federal reforms. We exploit individual variation in the size of capital gains realizations interacted with state tax rates, rather than pooling event studies of state tax changes. Our approach allows for counterfactual policy analysis that captures both migration and retiming responses.

[2] As we discuss in Section V, our results look similar if we dispense with the choice model and estimate a difference-in-differences regression that compares migration levels before and after realization. That alternate approach is not preferred because it relies on the somewhat crude assumption that those who migrate before realizing are "treated" while those who realize before migrating constitute a control group.

model. First, we compare the status quo to a counterfactual where residents of high-tax states cannot avoid state capital gains taxes via migration. In this scenario, residents of high-tax states must pay capital gains taxes in their origin state regardless of whether they migrate. Compared to this counterfactual, we estimate that zero-tax opportunities in the status quo lead to an additional $2.8 billion in yearly realizations in zero-tax states. This $2.8 billion represents 55% of major realizations in zero-tax states by former residents of high-tax states, but just 1.1% of all major realizations in high-tax states.

Second, we estimate the change in state revenue that would occur if high-tax states were to make marginal reduction in their capital gains tax rates. We find that the decrease in out-migration amongst high income realizers has a de minimis impact on overall state tax revenue. We examine reductions in state tax, such as the elimination of California's millionaire surtax, and find that the behavioral response from reduced tax avoidance by out-migrants produces a positive fiscal externality that is less than 1% of the mechanical revenue lost from those policies.

Taken together, these results suggest that state capital gains taxes produce a clear, detectable behavioral response on the part of those with large potential tax liabilities. That said, these behavioral responses have a very small impact on the estimated revenue collected from lowering top tax rates. Reductions in tax avoidance offset almost none of the revenue lost from lowering capital gains rates. If states are seeking to prevent revenue losses from tax-motivated migrants, changes to rules regarding the sourced location of capital gains may prove more fruitful than changes to marginal rates.

II Institutional Context and Data

II.A Institutional Context

Individuals can generally avoid state capital gains taxes if they migrate to a zero-tax state before they realize their gains. The success of this approach relies on two basic principles of state taxation:

Principle 1: State tax obligations differ substantially for residents and non-residents. Residents[3] of a given state pay taxes to their home state on all income, but non-residents only pay taxes on income that is sourced to that state (Hellerstein et al., 2001). For example, a resident of California owes taxes to California on income sourced to any location. By contrast, a resident of another state only owes taxes to California on income sourced to California. This also means that residents of zero-tax states owe no taxes on income sourced to their home state.

Principle 2: Income on intangible assets is sourced to an individual's current state of residence. This principle is important because many large capital gains come from the sale of intangible assets. For example, if an individual is selling stock, that asset is considered intangible.[4] Similarly, if an individual is selling off a business, assets such as intellectual property or corporate "goodwill" are considered intangible.[5]

[3]Individuals are considered generally residents if they have a primary residence in a given state or they spend more than 183 days there (Thomas, 2018).

[4]These assets are considered intangible regardless of whether the gains are on stock in a publicly traded C-corp, closely held C-corp, or S-corp.

[5]For more on the tax considerations regarding business sales, see Collura and Friedman (2017)

Putting these two principles together, it is clear how a motivated individual can avoid state capital gains taxes by changing residency to a zero-tax state. If an individual then can structure their capital gains sale such that most of their gains are on intangible assets, they will mostly be subject to capital gains taxes in their new destination state. In that case, the individual will pay little to no state capital gains tax.

II.B Data

Our data is drawn from the universe of US federal tax returns. In particular, we use data from IRS Form 1040 between 1996 and 2019. We collect information on capital gains realized from Form 1040, Schedule D. We determine an individual's state of residence in year t based on their filing address in year $t-1$ because Form 1040 addresses are determined by an individual's location at the time of filing, rather than their location in the relevant tax year.

In our primary sample we restrict to individuals who, at some point, reside in a high-tax state. We classify states as high-tax if their personal income tax rate exceeds 6%. We also restrict our sample to individuals who have a capital gains realization within 4 years of residing in a high-tax state. We classify individuals by size of their largest capital gains realization.[6] Our primary sample is composed of individuals with a potential capital gains tax liability over $20,000.[7] We group individuals by the size of the tax bill they would face if they realized their gain in their high-tax state of origin.[8]

The mean age in our sample is approximately 60. The mean capital gains realization is $2.3 million with a median realization of approximately $750k. 44.9% of our sample is composed of individuals who initially reside in California, 15.5% from New York and 6.7% from New Jersey. According to a sub-sample of 2012 tax filers analyzed by the IRS Statistics of Income program, 30% of these large capital gains come from gains on C-corporation stock. 28.8% come from gains earned by pass-through businesses or through the sale of pass-through business assets. Additional descriptive statistics can be found in Appendix A.

III Model and Estimation Strategy

We seek to estimate the impact of state capital gains taxes on migration and realization decisions. Our estimation strategy is motivated by the graphical evidence presented in Figure 1. We focus on a sample of individuals who live in high-tax states eight years prior to their realization event. We plot their rates of migration to zero-tax states. We group individuals by the size of the tax bill they would owe if they realized their gains in their origin state. (We refer to this as their potential tax savings.) The pattern in this figure is clear: the probability of migrating to a zero-tax state in advance of realization rises substantially with the size of an individual's potential tax savings. We see, for example, that individuals with more than $1.5 million in potential tax savings have a 7.1% probability of migrating in the four years before realization. By

[6] In our sample, this largest gain represents 82% of dollar-weighted gains in a 3-year window and 73% in a 5-year window.
[7] Dollar values are in 2014 dollars.
[8] Our data on state top tax rates are from NBER TAXSIM (Feenberg and Coutts, 2018). When calculating tax savings, we adjust for the federal SALT deduction.

contrast, individuals with less than $30k in savings have a 2.9% probability of migrating.

This pattern suggests that state capital gains taxes have an impact on the migration and realization decisions of those with large capital gains. That said, this graphical evidence alone is not sufficient to determine the causal effects of state capital gains taxes. We turn to a dynamic discrete choice model to formally quantify those causal effects. We apply the Euler conditional choice probability approach to estimating our model and show that the key parameter of the model can be identified using a difference-in-differences regression. That regression examines the number of individuals who migrate before realization and compares them with individuals who realize before migration. It exploits variation in individual tax savings to examine how migration rates change with the size of the migration incentive. Interpreted in the context of Figure 1, we are comparing the size of the hump before realization to the more limited levels of migration after realization. The model elucidates how the comparison of these two groups can be used to isolate our parameter of interest and subsequently explore relevant policy counterfactuals.

III.A Setting Up The Model

We set up the dynamic discrete choice model as follows. In each period t, individual make two choices: they choose their state of residence and they choose whether they realize. Their choice set is: $C_{it} = (s_{it}, r_{it})$. Here, s_{it} the state where individual i chooses to live in period t. We let $s_{it} = \{H_j, Z_j\}$. In other words, the individual can choose to be in a high-tax state H_j or a zero-tax state Z_j.[9] r_{it} is an indicator capturing whether the individual realizes in period t.

There are a number of state variables in the model, given by the vector x_{it}. We let: $x_{it} = (z_{it}, s_{it-1}, \tau_{s_{t-1}} Q_i)$, where z_{it} captures demographic characteristics of person i. This includes indicators for 10-year age bins, and 10 decile bins for income in advance of realization. s_{it-1} captures the individuals state of residence in the previous period. Q_i captures the size of the individuals' unrealized capital gains[10] and $\tau_{s_{t-1}}$ captures the tax rate in state s, where the individual lived in period $t-1$. Together, $\tau_{s_{t-1}} Q_i$, captures taxes owed on unrealized capital gains.

Our analysis utilizes the fact that individuals have differing tax obligations depending on the size of their capital gains. To calculate those tax obligations, we assume that each individual realizes some fixed quantity, Q_i. We believe this is a reasonable assumption because we are examining the sale of major assets such as business interests. That said, in Section V we address the possibility that individuals adjust the size of their realizations in response to tax rates. We show that endogenizing realizations with respect to tax rates does not qualitatively impact our results.

Having established the choice set and state variables, we set up the following flow payoff for each individual:

[9] Here, j corresponds to the individual state that an individual chooses. In our simplest specification individuals choose to reside in a high- or zero-tax state. In our primary specification, they will chose individual states as destinations. For the time being, we put aside migration to non-zero tax states. As discussed in Section V, tax motivated migrants travel almost exclusively to zero-tax states.

[10] As noted in Section II, we classify individuals by the size of their largest capital gain. In Appendix C, we show that this assumption has a minimal impact on our results.

$$\pi_{it}(s,r) = z'_{it}(\alpha_{s,g} + \eta m_{it}(s_{it}, s_{it-1})) - \theta f(\tau_{s_{t-1}} Q_{it}) r_{it} \tag{1}$$

$\alpha_{s,g}$ represents a vector of coefficients that can be estimated. $\alpha_{s,g}$ captures the value of residing in the current state, s during tax regime g, for individuals with the various demographic characteristics captured in z_{it}. A tax regime is simply a period of time where taxes in a given state remains approximately constant.[11] $m_{it} = \mathbb{1}(s_{it} \neq s_{it-1})$ is an indicator for whether the individual has migrated since the previous period. η is the coefficient capturing the cost of migrating. $f(\cdot)$ captures the fact that the individuals payoff is a function of the tax savings.[12] θ is our coefficient of interest.

III.B Toward a Regression Equation

We use the standard Euler Conditional Choice Probability approach from Scott (2013) to derive a regression equation and estimate θ. (Appendix B provides step-by-step details.) In short, we make the standard assumption that the unobserved portion of flow utility follows a type I extreme value distribution. This allows us to write down the value function for each individual's dynamic optimization problem. We then utilize the logic of renewal actions to derive a regression equation. We take the choice-specific value functions of individuals who migrate before they realize and compare them to those of individuals who realize before they migrate. Those two groups start in the same position (residing in a high-tax state with large unrealized gains) and end in the same position (residing in a zero-tax state having realized their gains). Comparing these two groups allows us to difference out the unobserved continuation values in their choice-specific value functions.[13] That leads us to the following regression equation:

$$ln\left[\frac{Pr(s_t = Z, r_t = 0, s_{t+1} = Z, r_{t+1} = 1|x_{it})}{Pr(s_t = H, r_t = 1, s_{t+1} = Z, r_{t+1} = 0|x_{it})}\right] = z'_{it}(\alpha_{H_j,g} - \alpha_{Z_j,g}) + (z'_{it} - z'_{it+1})\eta + \theta\left(f\left(\tau_{H_j} Q_{it}\right) - f\left(0\right)\right) + \Delta\epsilon_t \tag{2}$$

On the left-hand side we have the log-odds ratio, which compares the probability of migrating before realization and the probability of realizing before migration. On the right hand side, $z'_{it}(\alpha_{H_j} - \alpha_{Z_j})$ captures individual preferences for residing in the high-tax and low-tax states. This is achieved using origin and destination fixed effects interacted with all demographic characteristics. $(z'_{it} - z'_{it+1})\eta$ captures time-varying demographic differences between those taking each path, and $\theta\left(f\left(\tau_{H_j} Q_{it}\right) - f\left(0\right)\right)$ captures the role of potential tax savings. This formalizes our investigation of the pattern we saw in Figure 1 where the odds of migration before realization rose with tax savings. The model motivates a difference-in-differences regression that exploits variation in Q_{it}, realization size, to estimate the causal effect of potential tax savings.

[11] As discussed in Section IV.A, the inclusion of too many choice or state variables introduces bias in the calculation of our log-odds probability ratios. The use of tax regimes allows us control for changes in location preferences that vary over time with changes in state tax rates without using full state-by-year fixed effects. We define a tax regime as any time period in which state top tax rates do not vary more than 2pp.

[12] In setting up the model, we don't specify the function that translates potential tax savings into individual payoffs. We discuss this function in more detail in Section IV.A.

[13] As discussed in Appendix B, these value functions only differ by an expectational error term.

IV Results and Counterfactuals

IV.A Estimating our Coefficient of Interest

Capturing the causal effect of state tax changes requires estimating Equation 2. The left-hand side of the regression is a log-odds ratio with the probability of migrating before realizing in the numerator and the probability of realizing before migrating in the denominator. These probabilities are calculated conditional on x_{it}, which means they are calculated within demographic-specific cells. In our primary regression, we encounter a problem typical in dynamic discrete choice estimation – the number of observations in each cell is relatively limited. Such a limited number of observations could produce bias in our estimates (Almagro and Domínguez-Iino, 2021), and so we follow the approach of Kalouptsidi et al. (2020) and predict the left-hand side using a logit regression. In particular, we use the logit to smooth our conditional choice probabilities across our age, income and state bins. (We show in Appendix Table B that this approach to estimating our conditional choice probabilities has a limited impact on our results.) We are interested in calculating θ, our coefficient on $f\left(\tau_{H_j} Q_{it}\right) - f\left(0\right)$, which captures the impact of potential tax savings on individual payoffs. Thus far, we have written the expression $f\left(\tau_{H_j} Q_{it}\right) - f\left(0\right)$ rather than $\tau_{H_j} Q_{it} - 0$ in order to remain agnostic about the appropriate functional form in the context. Appendix Figure A.1 shows non-parametric relationship between tax savings and the log-odds ratio. This is clearly non-linear, and so the figure also shows the fit of a variety of different functional forms. Informed by this evidence, we estimate $f\left(X\right)$ as the following log function: $ln(X + B) - ln(B)$, where $B \approx 152$. As shown in Appendix Table A.2, this is the value that of B that minimizes the RMSE of the model. This particular functional form allows us to capture the log relationship while imposing the intuitive restriction that $f(0) = 0$. In other words, state taxes don't impact the payoff function of individuals without state tax obligations.

In our primary specification we estimate that $\theta = .0951$. Figure 2 presents the data visually, demonstrating how the log-odds ratio rises with the size of potential tax savings.[14] (This pattern is consistent with the graphical evidence presented in Figure 1.) In order to better to understand the impact of state tax policy, we then use that coefficient to examine the behavioral response to two key policy counterfactuals.

IV.B Impact of Zero-Tax Opportunities on Realizations

In this section we examine how tax avoidance opportunities impact capital gains realizations in zero-tax states. In particular, we consider a counterfactual where residents of high-tax states cannot avoid state capital gains taxes via migration. Instead, those residents must pay capital gains taxes in their origin state regardless of whether they migrate. We compare this counterfactual to the status quo and estimate that zero-tax opportunities in the status quo lead to an additional approximately $2.8 billion in yearly realizations in zero-tax states. For context, this $2.8 billion is 55% of major realizations in zero-tax states by former residents of high-tax states, but just 1.1% of all major realizations in high-tax states.

We estimate this counterfactual by evaluating the following expression:

[14] For the full details of the regression, see Table 1.

$$\sum_{Q}\sum_{x}\left(N_{Q,x}Q\left(P(A|x,\tau_Z=0)-P(A|x,\tau_Z=\tau_H)\right)\right) \tag{3}$$

$P(A|x,\tau_Z=0)$ represents the probability of migrating in advance of realization if zero-tax states do not levy capital gains taxes. Here, A represents the course of action of moving before realizing. $P(A|x,\tau_Z=\tau_H)$ represents the probability of migrating in advance of realization if residents of high-tax states must pay their origin state tax rate in any destination. Q represents the quantity that an individual realizes and N_Q represents the number of individuals realizing that quantity.

We evaluate equation 3 for each set of state variables x_{it}. We can plug in values for Q, N_Q, and $P(A|x,\tau_Z=0)$ directly[15] but we need to estimate $P(A|x,\tau_Z=\tau_H)$. We do so using the properties of the logit:

The probability of taking any given course of action can be written as the ratio of choice specific value functions. For example for a given course of action A,

$$P(A|x,\tau_Z=0)=\frac{\exp(\bar{V}(A,x_i,0))}{\sum_{J}\exp(\bar{V}(J,x_i,0))} \tag{4}$$

Here, $\bar{V}(A,x_i,0)$ represents a choice-specific value function based on the flow payoffs from Equation 1. J indexes potential courses of action. When zero-tax opportunities are available, migrating before realizing produces the following choice-specific value function: $\bar{V}(A,x_i,\tau_Z=0)=z_i'\alpha_Z+z_i'\alpha_Z+z_i'\eta-\theta f(0)+E[V(x_{i,t+2})]$. When zero-tax opportunities are eliminated, that value function changes to: $\bar{V}(A,x_i,\tau_Z=\tau_H)=z_i'\alpha_Z+z_i'\alpha_Z+z_i'\eta-\theta f(\tau_H Q_{it})+E[V(x_{i,t+2})]$. These value functions only differ by a function of θ, which we have already estimated. We use the change in the choice-specific value function to estimate a change in the probability of migrating before realizing. We then use that information to solve Equation 3 and produce our estimate of $2.8 billion in yearly realizations. (Additional step-by-step details can be found in Appendix B.)

In interpreting these results, it is important to note that the $2.8 billion is realized by individuals who respond to zero-tax opportunities in a variety of different ways. Some individuals respond by changing the relative timing of their migration and realization. These are individuals who, in the absence of a zero-tax opportunity, would have realized in their home state and then migrated. The presence of a zero-tax opportunity means that these individuals choose to migrate before they realize.[16] Other individuals respond to the zero-tax opportunity by making a new move. In the absence of a zero-tax opportunity, those individuals would have stayed in their home state and realized their gain in that location. The presence of a zero-tax opportunity means that they now choose to migrate. There may even be individuals who respond to the zero-tax opportunity by making new realizations altogether. These individuals realize their gains rather than

[15] In our simplest specification we observe $P(A|x,\tau_Z=0)$ directly. In our primary specification we use the logit to get a smoothed prediction of this probability.

[16] We are able to capture this retiming behavior because we examine migration relative to the time of realization, rather than examining changes in migration rates over time.

holding them until death.[17] While we know that our $2.8 billion figure contains realizers from each of these groups, our methodology is unable to disentangle the relative size of these various groups.

IV.C Revenue Consequences of State Tax Changes

Thus far, our focus has been on the impact of state capital gains taxes on dollars realized. In this section, we explore the revenue consequences of a new policy counterfactual – a reduction in top marginal tax rates. We consider the impact of a 1 percentage point reduction in top tax rates and estimate the increase in state revenue from reduced tax avoidance by out-migrants. We find that this positive fiscal externality offsets at most 1% of the mechanical cost of the policy.

We consider the case of California to provide intuition for this result. From from 2005 to 2011, California had a 1pp surtax on those earning over $1 million. We estimate the revenue change from eliminating the surtax in the following manner:

We begin by following the same approach as in Section IV and writing migration probabilities in terms of choice-specific value functions. In this case, we modify the payoff associated with realizing in one's origin state.[18] This allows us to estimate changes in the probability of migration in advance of realization. For example, from 2005-2011, Californians with more than $1.5 million in potential capital gains tax liability had a 5.64% probability of migrating to a zero-tax state prior to realization. We estimate that a 1pp reduction in California's top marginal rate would have reduced that migration probability from 5.64% to 5.59%. Translating those small probability changes into dollars realized, we estimate that individuals originating in California would realize $13.7 million fewer dollars in zero-tax states.[19]

Next, we then translate that figure into a fiscal externality. If we multiply the $13.7 million realized by California's top marginal tax rate, we find that the state would gain approximately $1.3 million in revenue.[20] Between 2005 and 2011, California collected an estimated $4 billion in yearly capital gains revenue from large realizations. That means that a 1pp reduction in top marginal tax rates would have a mechanical cost of approximately $364 million. Consequently, a $1.4 million increase in revenue from reduced tax avoidance by out-migrants would offset less than 0.5% of mechanical costs.

While we focus here on the state of California due the presence of a millionaire surcharge, we can repeat this basic exercise for each individual state. We find that the fiscal externality is less than 1% in all cases, with an average of 0.52%. As explained in Appendix C, this variation across states is primarily explained by variation in baseline rates of migration to zero-tax states.

The 1% fiscal externality may be an overestimate for two key reasons. First, interstate migrants might

[17] This group adds additional complexity to our counterfactual analysis because these individuals change their realization quantity. In Section V we demonstrate that accounting for this type of behavior does not meaningfully impact our results.

[18] This impacts individuals who take several different course of action. The reduction in top tax rates changes payoffs for individuals who stay in their home state and realize, individuals who realize in advance of migration, and individuals who realize before moving to a non-zero tax state.

[19] These effects are slightly non-linear for small changes in tax rates. The effect would be 3. times larger for a 3pp tax change and 6.3 times for a 5pp change. The effects only become substantially non-linear when tax rates approach zero.

[20] This calculation implicitly assumes that realizations are subject the highest marginal tax rate. We consider this a reasonable approximation because 89% of the revenue here comes from dollars in excess of $1 million AGI.

not avoid 100% of their origin state tax burden. For example, an individual might sell a business that has gains on tangible assets, taxed in their origin, and gains on intangible assets, taxed in their destination. Adjusting for such considerations would be straightforward if we observed state taxes paid, but our federal data provides limited information about state taxes. To address this concern, we use data on the SALT deduction. In Appendix Figure 4, we plot the state income tax deductions as a fraction of AGI. The data suggests that migration to a zero-tax state results in a less than 62% reduction in state and local taxes paid. This is merely an approximation, but it suggests that former residents of high-tax states may be unable to shift the entirety of their capital gains across states.[21]

Second, our revenue calculation assumes that individuals realize a fixed quantity of capital gains. It could be, however, that the presence of a zero-tax opportunity causes individuals to realize assets they would have otherwise held indefinitely. For example, an individual who chooses to realize a $10 million gain in Florida might have, in the absence of that opportunity, simply passed some of the unrealized asset along to their heirs. Step-up in basis tax rules mean that the individual's origin state would collect no revenue on the unrealized gain. In that case, a reduction in top tax rates would reduce realizations in zero-tax states, but it would not increase revenue in high-tax states.

Taken together, these results suggest that out-migration has a de minimis effect on the welfare consequences of reducing state taxes. Placing the results in the context of the Marginal Value of Public Funds helps to illustrate this point. Let us imagine that, in the absence of any tax avoidance by out-migrants, reducing the top tax rate has an MVPF of 1. Incorporating the fiscal externality from reduced tax avoidance raises the MVPF to just $\sim$1.01. Compared to the typical variation across MVPF estimates (Hendren and Sprung-Keyser, 2020), a change from 1 to 1.01 is little more than a rounding error.[22]

V Robustness

In this section, we address five key considerations regarding the robustness of our results:

First, we examine the interplay between state capital gains taxes and state income taxes. Nearly all states have the same tax rate on capital gains and labor income, and so individuals moving to zero-tax states may also avoid labor income taxes. In our primary specification, we control for labor income taxes by grouping individuals according to their pre-realization income. This allows us to exploit variation in capital gains realizations within sets of individuals with similar levels of labor income. As shown in Figure 3A, controlling for pre-realization income has no clear impact on the estimated treatment effect. Moreover, if we control for income in the years immediately following realization, the treatment effect rises slightly. This helps rule out the possibility that our observed treatment effect is driven by individuals avoiding labor income taxes. In fact, the results in Figure 3B show that another effect could be at play. In the figure, we hold capital gains

[21] Our primary calculation assumes that individuals can shift their major realization tax liability, but no other liability. If we assume that origin states lose other tax revenue, that has a minimal impact on our results. If origin states lose all out-migrant capital gains tax revenue for 7 years after migration, the average fiscal externality rises to 0.87% from 0.53%. If out-migrants are able to shift both capital and labor income the number rises to 1.45%.

[22] For a discussion of the MVPF of taxes from the perspective of individual competing states, see Agrawal et al. (2021).

realizations constant and group individuals by their average income levels in years 4-8 prior to realization. We find that individuals with higher levels of income are less likely to migrate in advance of realization. The basic intuition here is that, for individuals with lower levels of income, capital gains savings make up a larger portion of their net worth. Consequently, the incentive to migrate is greater for those individuals. In formal terms, this means that the income effect associated with lower levels of labor income has a larger impact on migration then the substitution effect associated with labor income taxes avoided.

Second, we explore the role of migration to non-zero tax states. Our analysis thus far focuses on individuals from high-tax states migrating to zero-tax states. While there is the potential that tax considerations would drive migration to non-zero tax states, we see little evidence of that in the data. Figure 4 maps migration relative to realization for those migrating to low-tax states. Rates of migration in advance of realization fall amongst those with larger realization quantities. This is suggestive of a substitution effect, whereby some individuals who might have traveled to low-tax states choose to migrate to zero-tax states due to the tax advantage. This pattern is confirmed when we apply our dynamic discrete choice model to migration to low-tax states. (Additional details can be found in Appendix C.)

Third, we address the role of endogenous realization quantities. Thus far our calculations have assumed that individuals realize some fixed quantity, Q_i. We believe this is a reasonable assumption because we are examining the sale of major assets such as business interests.[23] That said, there is the possibility that zero-tax opportunities cause individuals to change their realization quantities. It might be that an individual would have realized \$9 million in a high-tax state but now chooses to realize \$10 million after migrating to Florida. This is part of the reason that our revenue estimates in Section IV.C are considered an upper bound. While we cannot directly estimate changes in realization quantities, we can demonstrate that this effect has a relatively small impact on the magnitude of our estimates. Accounting for this effect is simply a matter of choosing the right comparison group when analyzing individuals who migrate before they realize. For example, let us imagine that individuals who realize and then migrate are induced to increase their realization by 10%. In that case, those who migrate and then realize \$11 million should be compared with individuals who realize \$10 million and then migrate. Those two groups have same quantity of potential tax savings, even if they choose to realize different amounts. In Appendix C, we conduct this exercise using various different assumptions regarding the impact of taxes on realization quantities. We find that this adjustment has a minimal impact on our results. For example, a 10% change in realization quantities results in \$2.6 billion realized in zero-tax states rather than \$2.8 billion.

Finally, we address the impact of our particular regression specification on our results. In Table 1, we show that the inclusion of a battery of regression controls such as age and income have only a small impact on our regression results. As a final check, we dispense with the dynamic discrete choice model and adopt a simplified treatment-control framework. Using a difference-in-differences in migration levels, we consider those who migrate before realizing as the treatment group and those who realize before migrating as the

[23] As noted in Section II, major realizations constitute 82% of dollars realized in the 3-year period containing the realization.

control group. (The details are outlined in Appendix C).[24] We find an effect that is the same order of magnitude as our previous evidence. In our first counterfactual, the additional quantity of dollars realized is $2.7 billion rather than $2.8 billion.

VI Conclusion

In this paper, we analyze the impact of state capital gains taxes on realization and migration decisions. We find that state capital gains taxes produce clear and detectable avoidance behaviors. In quantifying the magnitude of this response, we find that zero-tax opportunities cause additional $2.8 billion in yearly realizations by former residents of high-tax states. That said, these behavioral responses have a very small impact on the revenue lost or gained from statutory changes in capital gains rates. In analyzing state tax reductions such as the elimination of California's millionaire surtax, we find that the positive fiscal externality from reduced tax avoidance by out-migrants is at most 1% of the policy's mechanical cost. This suggests that states seeking to prevent revenue losses from tax-motivated migration should consider other approaches instead of reductions in top tax rates. Possible avenues for policy change include new rules regarding the sourcing of intangible assets or sourcing capital gains based on historical residency.

[24] This is a somewhat crude assumption because individuals can select into treatment or control depending on whether they migrate before or after realization. The dynamic discrete choice model accounts for that concern when deriving a causal effect from a comparison of those two groups.

References

Agersnap, O. and O. Zidar (2021). The tax elasticity of capital gains and revenue-maximizing rates. *American Economic Review: Insights 3*(4), 399–416.

Agrawal, D. R., W. H. Hoyt, and T. Ly (2021). The marginal value of public funds in a federation. *Available at SSRN*.

Akcigit, U., S. Baslandze, and S. Stantcheva (2016). Taxation and the international mobility of inventors. *American Economic Review 106*(10), 2930–81.

Almagro, M. and T. Domínguez-Iino (2021). Location sorting and endogenous amenities: Evidence from amsterdam.

California Department of Finance (2019). California department of finance fall 2019 report. `https://data.ftb.ca.gov/stories/s/Other-Tax-Data/sgxz-494k#department-of-finance-exhibits`.

Collura, T. J. and K. P. Friedman (2017). Buying or selling a small business. `https://nysba.org/NYSBA/Coursebooks/Fall\%202017\%20CLE\%20Coursebooks/Buying\%20or\%20Selling\%20a\%20Small\%20Business/_F17_BuyingorSellingaSmallBusiness.pdf.pdf`.

Diamond, R., T. McQuade, and F. Qian (2017). The effects of rent control expansion on tenants, landlords, and inequality: Evidence from san francisco.

Feenberg, D. R. and E. Coutts (2018). Maximum state income tax rates. `https://users.nber.org/~taxsim/state-rates/`.

Hellerstein, J. R., W. Hellerstein, and J. M. Youngman (2001). *State and local taxation: cases and materials* (7th ed ed.). American casebook series. St. Paul, Minn: West Group.

Hendren, N. and B. Sprung-Keyser (2020). A unified welfare analysis of government policies. *The Quarterly Journal of Economics 135*(3), 1209–1318.

Kalouptsidi, M., P. T. Scott, and E. Souza-Rodrigues (2020). Linear IV regression estimators for structural dynamic discrete choice models. *Journal of Econometrics*.

Kleven, H. J., C. Landais, and E. Saez (2013). Taxation and international migration of superstars: Evidence from the european football market. *American economic review 103*(5), 1892–1924.

Moretti, E. and D. J. Wilson (2017). The effect of state taxes on the geographical location of top earners: Evidence from star scientists. *American Economic Review 107*(7), 1858–1903.

Moretti, E. and D. J. Wilson (2021). Taxing billionaires: Estate taxes and the geographical location of the ultra-wealthy. *American Economic Journal: Economic Policy, Forthcoming*.

Scott, P. (2013). Dynamic discrete choice estimation of agricultural land use.

Suárez Serrato, J. C. and O. Zidar (2016). Who benefits from state corporate tax cuts? a local labor markets approach with heterogeneous firms. *American Economic Review 106*(9), 2582–2624.

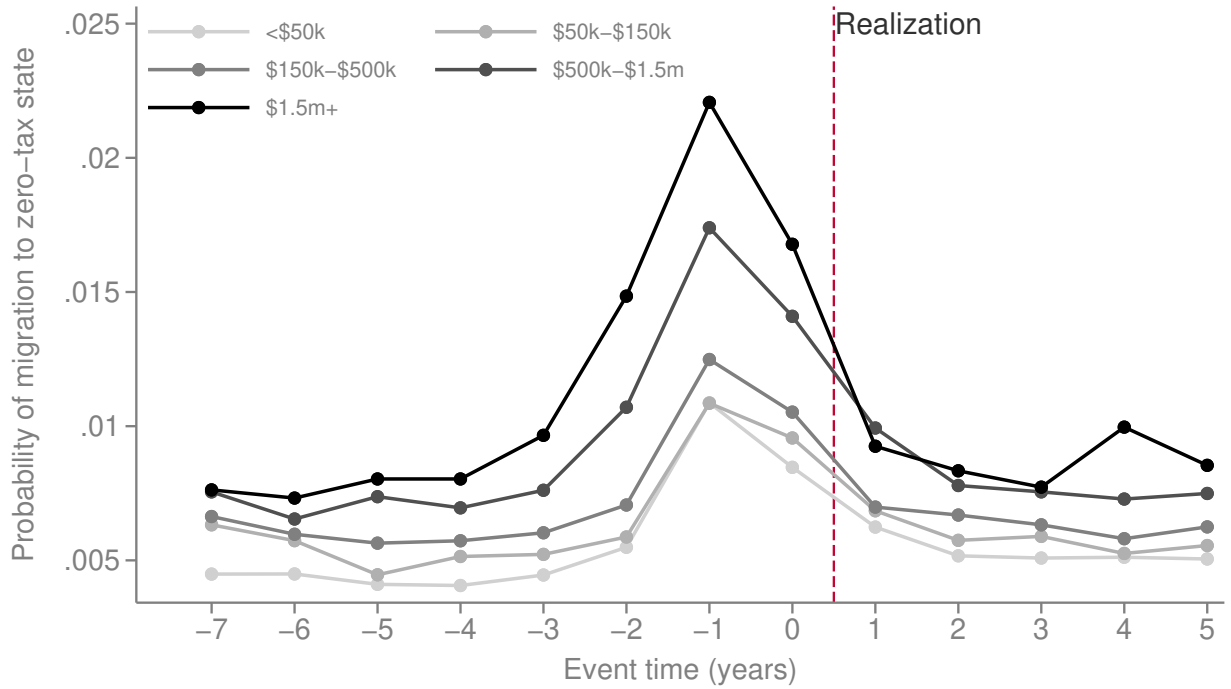
Thomas, S. R. (2018). Domicile in multistate personal income tax residency matters: Enter the swamp at your own peril. *Pace L. Rev. 39*, 875.

Varner, C., C. Young, and A. Prohofsky (2018). Millionaire migration in california: Administrative data for three waves of tax reform. In *111th Annual Conference on Taxation*. NTA.

Young, C. and C. Varner (2011). Millionaire migration and state taxation of top incomes: Evidence from a natural experiment. *National Tax Journal 64*(2), 255.

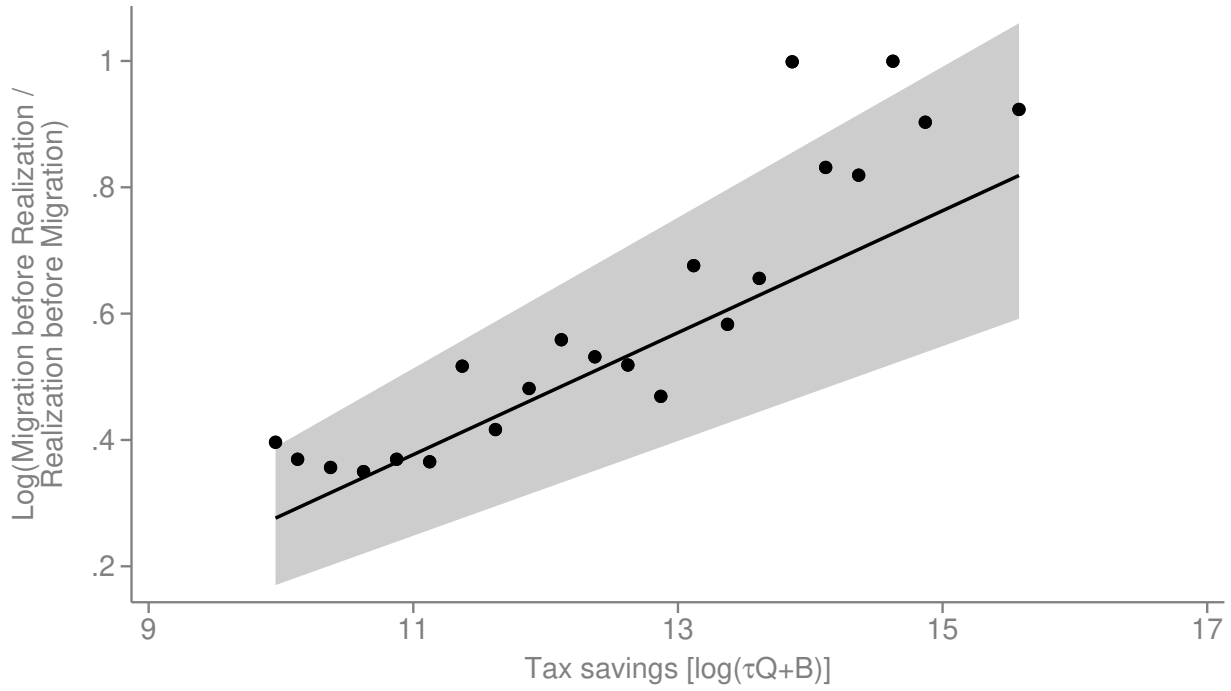
Young, C., C. Varner, I. Z. Lurie, and R. Prisinzano (2016). Millionaire migration and taxation of the elite: Evidence from administrative data. *American Sociological Review 81*(3), 421–446.

Figure 1: Rates of Migration to Zero-Tax States Relative to the Timing of Realization, Plotted by Potential Tax Savings



Notes: This figure shows rates of migration to zero-tax states. Rates of migration are plotted relative to the time of an individual's largest realization, $t = 0$. The sample is composed of all individuals who reside in a high-tax state eight years in advance of their realization. (High-tax states are those with a top rate greater than 6%.) Individuals are binned by the size of the tax bill they would owe if they realized their gains in their origin state. We refer to this as their potential tax savings.

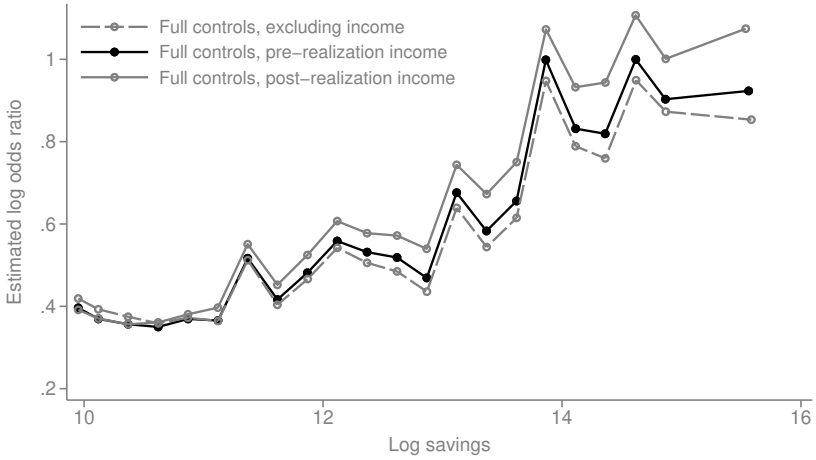
Figure 2: Relationship between Potential Tax Savings and Migration Relative to Realization



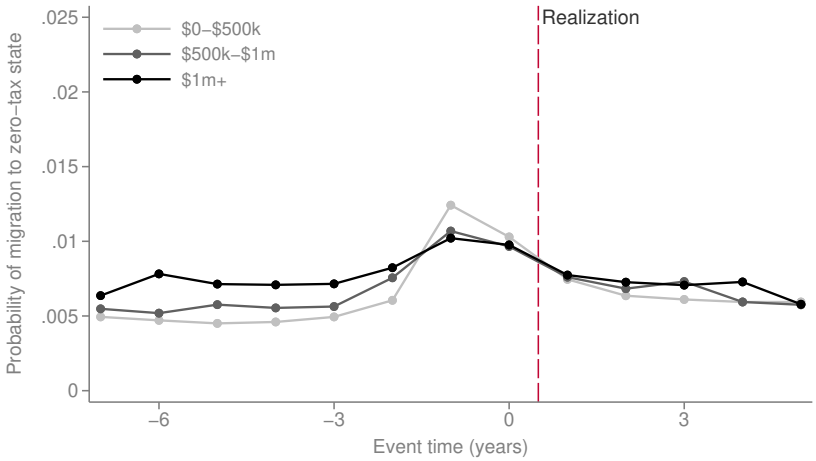
Notes: This figures plots the relationship used to derive the θ coefficient in our primary regression, displayed in Equation 2. The Y-axis corresponds to the left-hand side of that regression, the log-odds ratio comparing migration in advance of realization to realization in advance of migration. The X-axis displays potential tax savings. Individuals are grouped into potential savings bins and the non-parametric relationship is plotted using savings bin fixed effects. The figure also displays the parametric relationship between tax savings and the log-odds ratio based on the value of θ derived in our primary regression. Those results are displayed in Table 1. The shaded region displays the 95% confidence interval obtained using a Bayesian Bootstrap.

Figure 3: Impact of Income on Estimated Treatment Effect and Observed Migration Rates

A. Adding Income Controls to Primary Specification



B. Rates of Migration to Zero-Tax States Relative to the Timing of Realization, Plotted by Pre-Realization Income



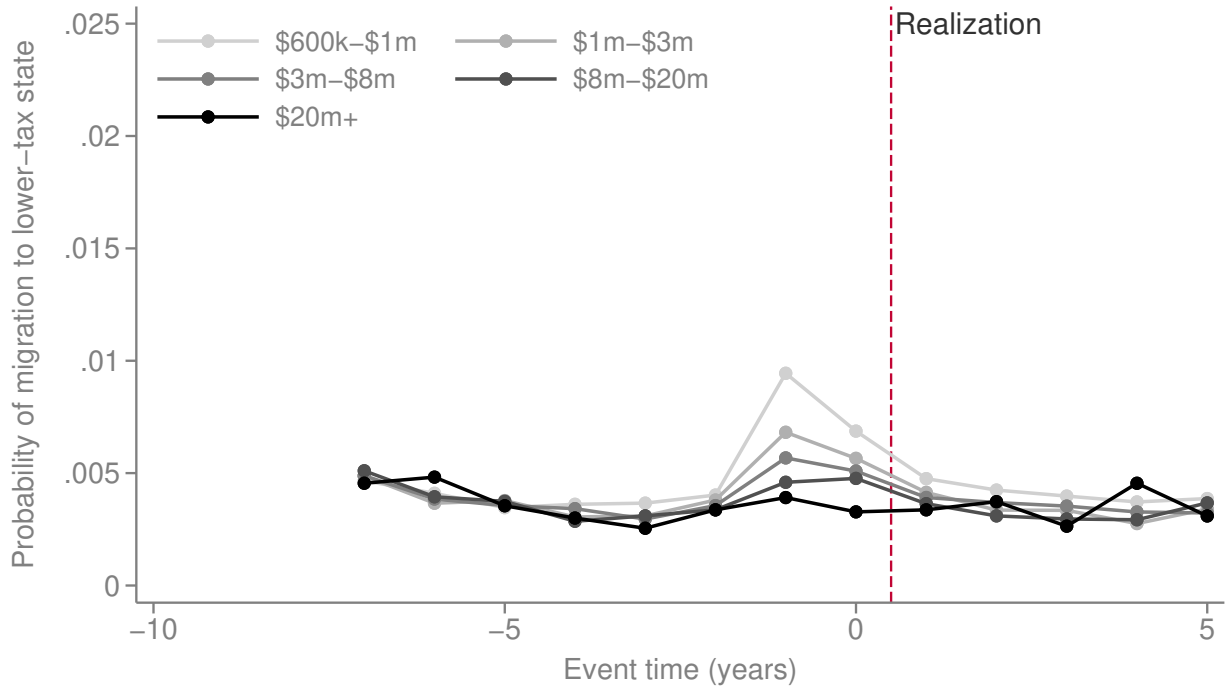
Notes: This figure demonstrates the impact of income controls on our results. Panel A demonstrates the impact of adding income controls into our primary specification. The "full controls, pre-realization income" specification plots the non-parametric relationship potential tax savings and the log-odds ratio on the left-hand side of our primary regression. (This log-odds ratio compares the probability of migration in advance of realization with the probability of realizing in advance of migration.) The "full controls, excluding income" specification plots the same relationship but removes pre-period income levels from the set of state variables, x_{it}, incorporated in the model. (In our primary specification we group individuals into bins by the quantity of non-capital gain income earned in years 5 and 6 before realization.) Removing these income bins from our state variables means that we no longer control for them by estimating our coefficient of interest within income bins. The "full controls, post-realization income" specification plots a modified version of our primary specification where the income control bins are based on income levels in years 1 and 2 after realization. Panel B provides the intuition as to why the treatment effect increases when income controls are added. This panel plots rates of migration to zero-tax state. Rates of migration are plotted relative to the time of an individual's largest realization, $t = 0$. The sample is composed of all individuals who reside in a high-tax state eight years in advance of their realization. Controls are added for realization levels and realizer age. Individuals are grouped by their average non-capital gains income (AGI - capital gains) in years 5 and 6 before realization.

Table 1: Variation in Results Across Alternate Specifications

	DDC Method			**Linear Method**
	(1)	(2)	(3)	(4)
θ Coefficient	0.0627 [0.0593, 0.0664]	0.0926 [0.0703, 0.1146]	0.0965 [0.0750, 0.1194]	
Linear θ Coefficient				0.0067 [0.0057, 0.0076]
Zero-Tax Realizations	\$2,021m [1869, 2174]	\$2,682m [2166, 3143]	\$2,846m [2339, 3332]	\$2,695m [2321, 3069]
CA Fiscal Externality			\$13.7m [10.5, 17.3]	\$24.9m [21.4, 28.4]
Income/age controls		X	X	X
Origin controls			X	X
Destination controls			X	
Smoothed dependent variable		X	X	

Notes: This table shows our primary estimates under a range of specifications. In each of the first three columns, we report our coefficient of interest, θ, from Equation 2. This captures the impact of potential tax savings on individual payoffs. Next, we consider a counterfactual where residents of high tax states cannot avoid state capital gains taxes via migration. We compare this counterfactual to the status quo and estimate the effect of the status quo on new realizations in zero-tax states. We report the quantity of new yearly realizations by former residents of high-tax states. Finally, we consider a counterfactual where the state of California reduces its top marginal tax rate by 1%. We report the effect of reduced out-migration on capital gains realizations in zero-tax states. (Section IV.C discusses why this estimate is likely an upper bound.) In Column 1 we report estimates for the case where our dynamic discrete choice model is estimated without any controls. We also group together all high-tax origins and zero-tax destinations. In Column 2 we consider the case where pre-period income bins and age bins are added to our state variables, x_{it}. In order to avoid the bias associated with estimating log-odds ratios with very few observations, we estimate our conditional choice probabilities using a logit model. (Further discussion of this process can be found in Section IV.A and Appendix B.IV.) In Column 3, we consider a version of our model where individuals begin in a single origin state and choose a particular destination. In our primary regression this results in origin-by-demographics and destination-by-demographics controls. Once again, we estimate the log-odds ratio on the left-hand side of Equation 2 using a logit. This is our primary specification. In Column 4, we dispense of the dynamic discrete choice model and adopt a simple linear probability model. (Details of this model can be found in Appendix C.III.) In this case we report the θ from Appendix Equation C.3. This approach produces a primary regression that is a difference-in-difference with migration probability levels on the left-hand side rather than a log-odds ratio. All 95% confidence intervals are obtained using the Bayesian bootstrap.

Figure 4: Rates of Migration to Lower-Tax States Relative to the Timing of Realization, Plotted by Realization Size



Notes: This figure shows rates of migration to lower states. The sample is composed of all individuals who reside in a high-tax state eight years in advance of their realization. (High-tax states are those with a top rate >= 6%.) For each individual, a destination is considered "lower-tax" if the tax rate is non-zero but >= 3% below their origin state tax rate. Rates of migration are plotted relative to the time of an individual's largest realization, $t = 0$. Individuals are binned by the size of their largest realization.