Internal Migration and the Effective Price of State and Local Taxes

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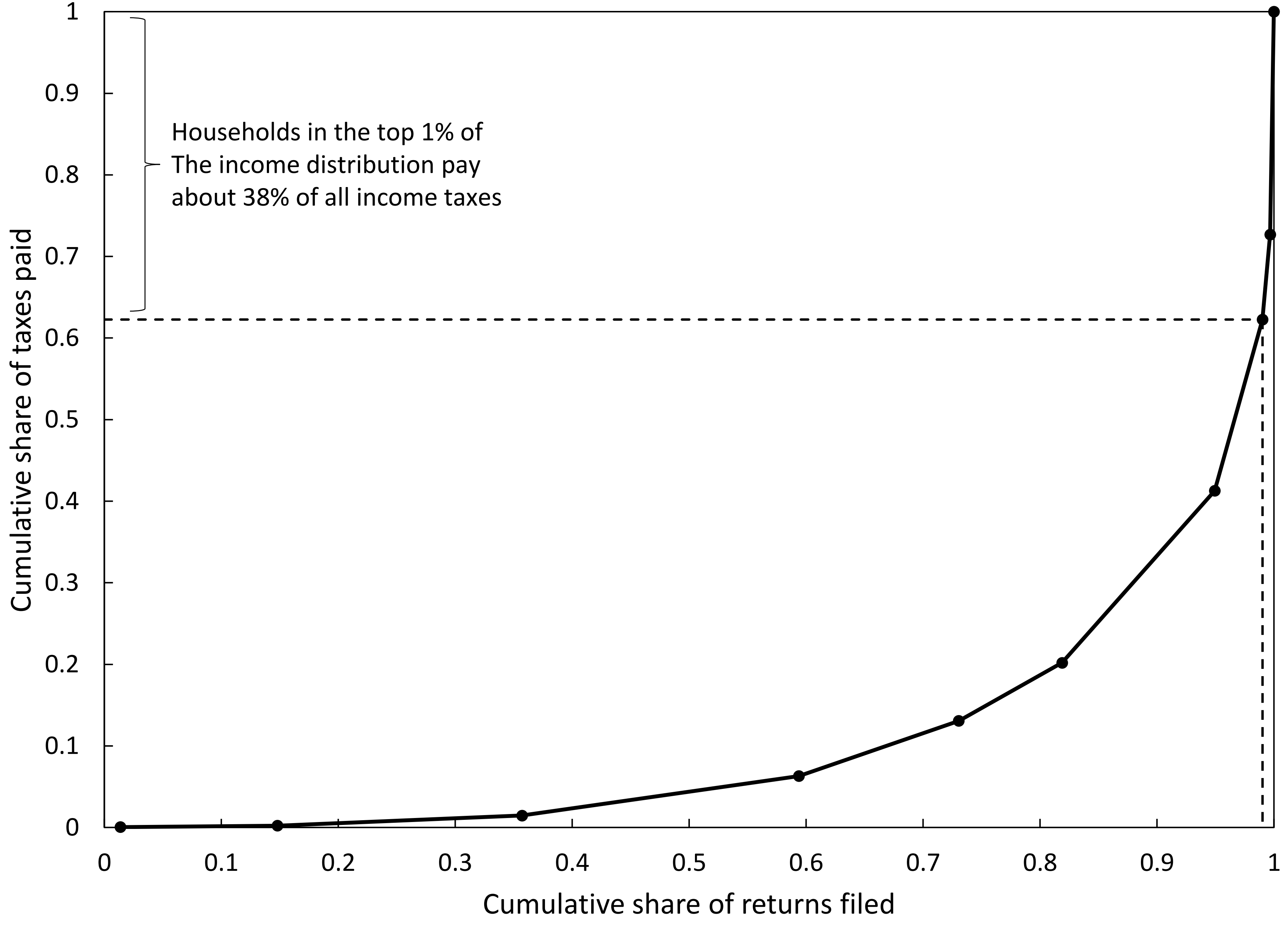
Presented at: Tax Economists Forum

Motivation

- Do people choose locations in response to spatial tax differentials?
- Despite being a central mechanism in several strands of economic theory, direct empirical evidence on the responsiveness of individual location decisions to taxes is scant
- Understanding the relationship between taxes and mobility is important because a high mobility response could attenuate the intended revenue and distributional effects of tax policy

<u>Cumulative Share of Individual Income Taxes Paid in 2017</u>



SALT Claims before AMT Determination on Federal Tax Returns in 2017

	Adjusted gross income			
	$100,000–$200,000	$200,000–$500,000	$500,000–$1 million	$1 million and above
Share claiming SALT	0.753	0.935	0.936	0.919
Share paying AMT	0.035	0.598	0.509	0.214
Average SALT claim (dollars)	11,399	23,386	56,152	280,991
Average income tax claim (dollars)	5,841	14,178	39,708	245,702
Average property tax claim (dollars)	4,823	8,227	15,079	32,162

Notes: The share of returns claiming SALT and paying the AMT are as a share of all returns filed. Average SALT claims are conditional on itemizing.

Background

- The Tax Cuts and Jobs Act (TCJA) was the largest tax reform in 30 years and made significant changes to individual income taxation
- The bill was introduced on November 2, 2017, signed into law on December 22, 2017, and became effective for tax year 2018
- Among other provisions, the TCJA capping the state and local tax (SALT) deduction at $10,000 where previously there was no cap*

* Taxpayers subject to the alternative minimum tax (AMT) cannot deduct SALT.

Americans continue their march to low-tax states

BY JONATHAN WILLIAMS, OPINION CONTRIBUTOR — 02/12/19 02:30 PM EST
THE VIEWS EXPRESSED BY CONTRIBUTORS ARE THEIR OWN AND NOT THE VIEW OF THE HILL

3,173 COMMENTS

High Tax States Are Practicing Financial Destruction

The Four High-Tax States Of The Apocalypse

Licensing

STEPHEN MOORE | 02:00 AM ET 02/26/2019

"This is the flip side (of) tax the rich, tax the rich, tax the rich. The rich leave, and now what do you do?" said New York Governor Andrew M. Cuomo on Feb. 4.

One surprising way to beat the SALT deduction cap: Move to a nearby town

PUBLISHED SAT, FEB 16 2019•2:00 PM EST | UPDATED TUE, FEB 19 2019•9:18 AM EST

THE HILL

Cuomo calls on wealthy to return to New York City: 'You got to come back!'

BY J. EDWARD MORENO - 08/06/20 09:34 AM EDT

625 COMMENTS

Blue-State Tax Break Becomes a Flashpoint in Coronavirus-Relief Bill

Democrats say $10,000 limit on state and local deductions hurts states' ability to fund services; Republicans mock effort to repeal the cap

'Serious as a heart attack': Cuomo warns of falling state revenue

By Tom Precious Feb 4, 2019 0

Baby Please Come Back, Says Andrew Cuomo

By KYLE SMITH | August 7, 2020 12:17 PM

SALT Claims before AMT Determination on Federal Tax Returns in 2017 by State

Top 10		Bottom 10		Top 10		Bottom 10	
State	Share claiming SALT	State	Share claiming SALT	State	Average SALT claim (dollars)	State	Average SALT claim (dollars)
MD	0.991	NH	0.841	NY	84,609	AL	31,978
NJ	0.991	ND	0.825	CA	80,302	FL	28,071
CT	0.991	TX	0.817	NJ	74,707	TX	27,443
RI	0.989	WA	0.809	MN	72,912	ND	27,218
DC	0.989	TN	0.801	CT	72,824	NV	27,201
NY	0.987	FL	0.797	OR	71,166	WY	25,867
VA	0.986	NV	0.789	DC	68,612	WA	25,632
MA	0.986	SD	0.721	MD	68,090	SD	22,154
MN	0.985	WY	0.712	VT	67,898	TN	19,526
CA	0.983	AK	0.665	ME	65,439	AK	16,906

Notes: For AGI between $500,000 and $1 million. The share of returns claiming SALT is as a share of all returns filed. Average SALT claims are conditional on itemizing.

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Voted for Biden in 2020

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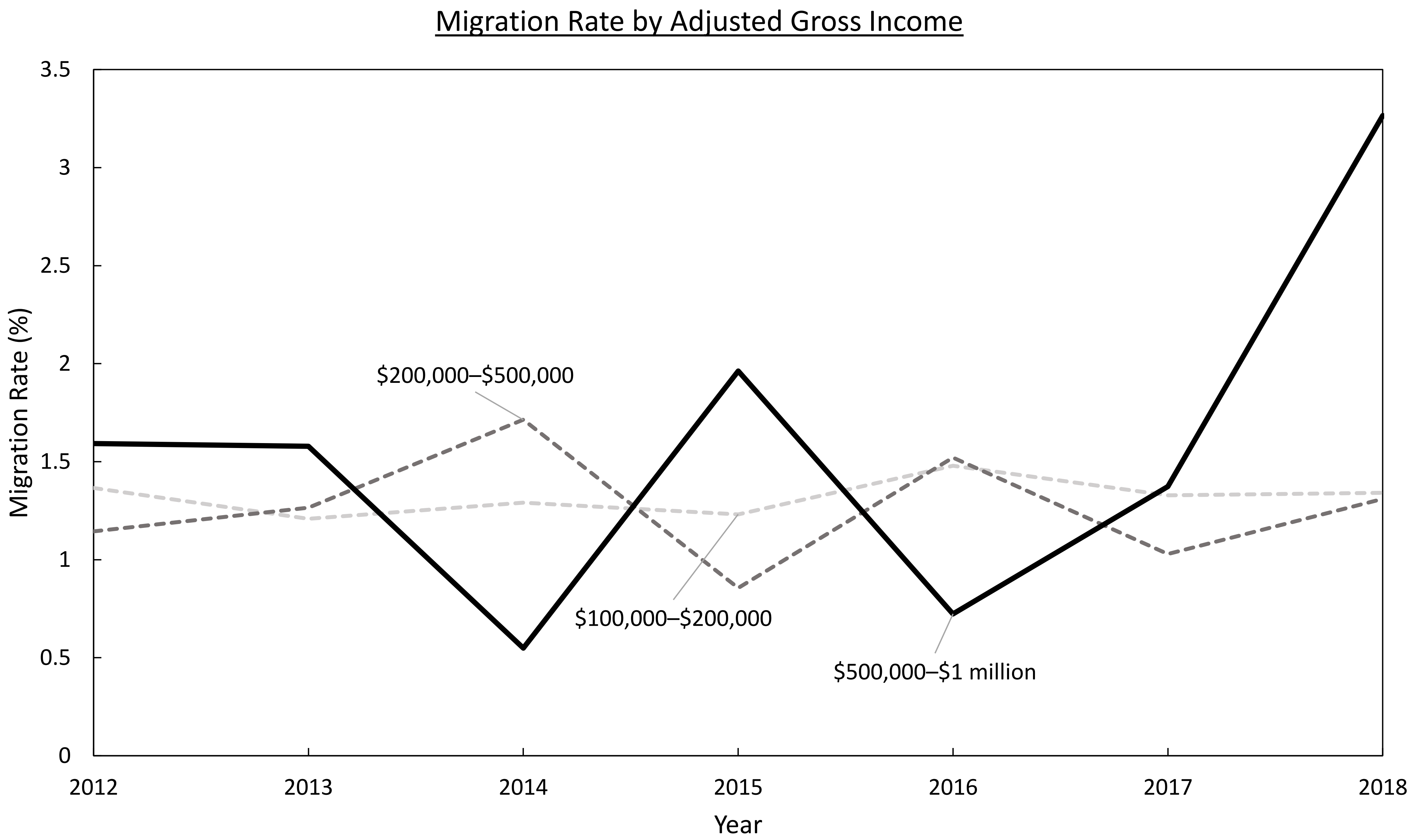
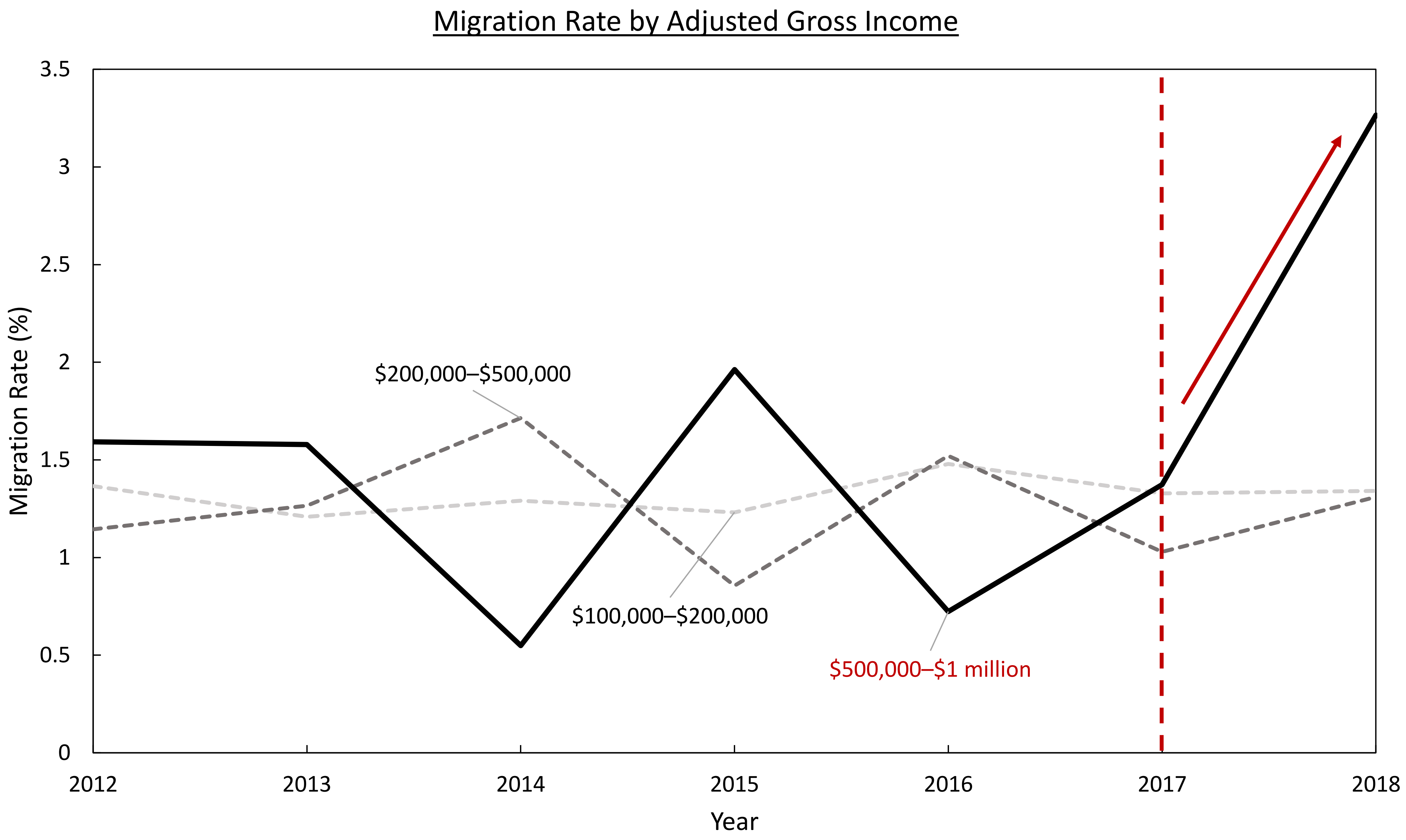


Migration Rate by Adjusted Gross Income
3.5
3
2.5
2
1.5
1
0.5
0
Migration Rate (%)
2012
2013
2014
2015
2016
2017
2018
Year
$200,000–$500,000
$100,000–$200,000
$500,000–$1 million



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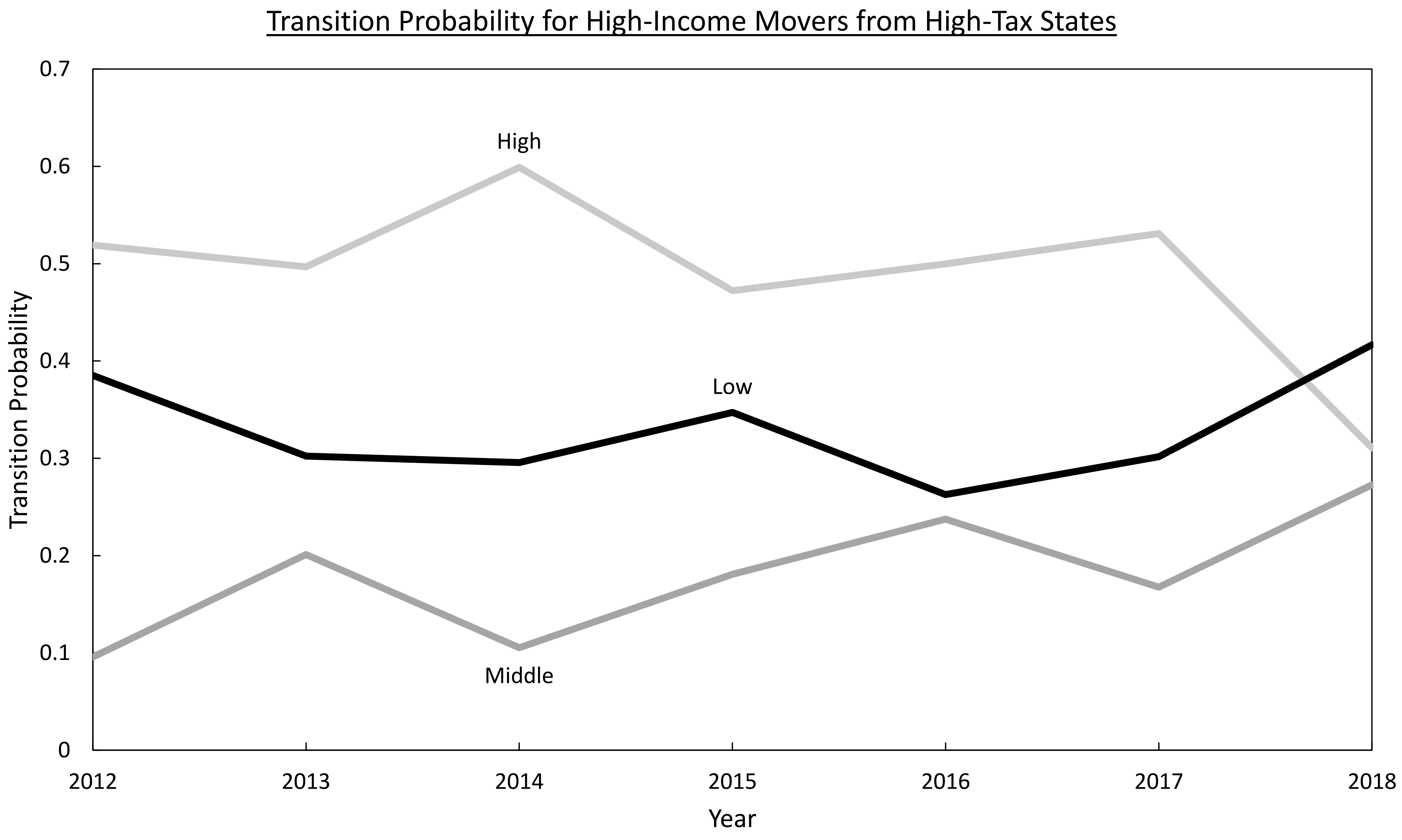
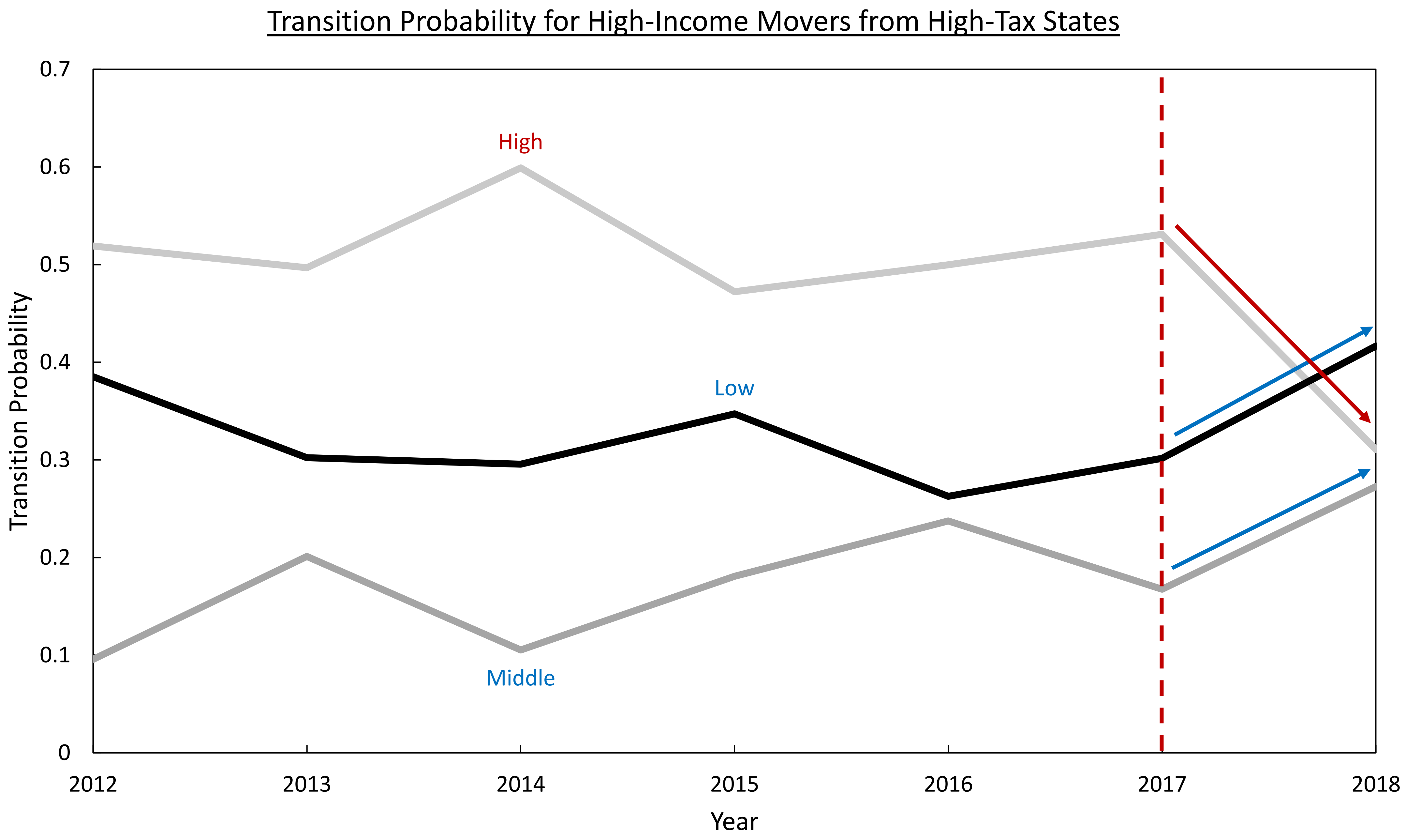

Transition Probability for High-Income Movers from High-Tax States
High
Low
Middle
Transition Probability
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
2012
2013
2014
2015
2016
2017
2018
Year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0
2012
2013
2014
2015
2016
2017
2018
Year
High
Low
Middle

Research Question

- Did the TCJA’s cap on the SALT deduction induce taxpayers to move out of high-tax states and/or move in to low-tax states?
  - *Extensive margin*: Did the SALT cap cause people to leave high-tax states?
  - *Intensive margin:* Did the SALT cap cause movers to choose low-tax states?
- What are the potential long-term revenue implications?

Mechanism

- The SALT cap induced state-level variation in the tax price of SALT
- The tax price of SALT can be thought of as the *effective* cost of a dollar of state and local spending, owing to the fact that SALT is deductible from federally taxable income
- A lower tax price does not change the amount of taxes residents *actually* pay only what they *effectively* pay

Mechanism

- Justification for the tax price of SALT as the relevant mechanism is based on Tiebout’s pure theory of local expenditures:
  - Consumers register their preferences for public goods through SALT
  - Consumers are surrounded by a government whose objective it is to ascertain their wants for public goods and tax accordingly
  - Consumers’ preferences over locations are revealed by their choices
  - Changing the price of SALT should induce a behavioral response

Mechanism

- Under a tax regime where SALT is fully deductible, for a taxpayer who itemizes deductions and does not pay the AMT, the marginal and average tax price of SALT is:

$$\tau = 1 - \tau^F$$

Federal marginal
income tax rate

- If a taxpayer pays the AMT or does not itemize then $\tau = 1$

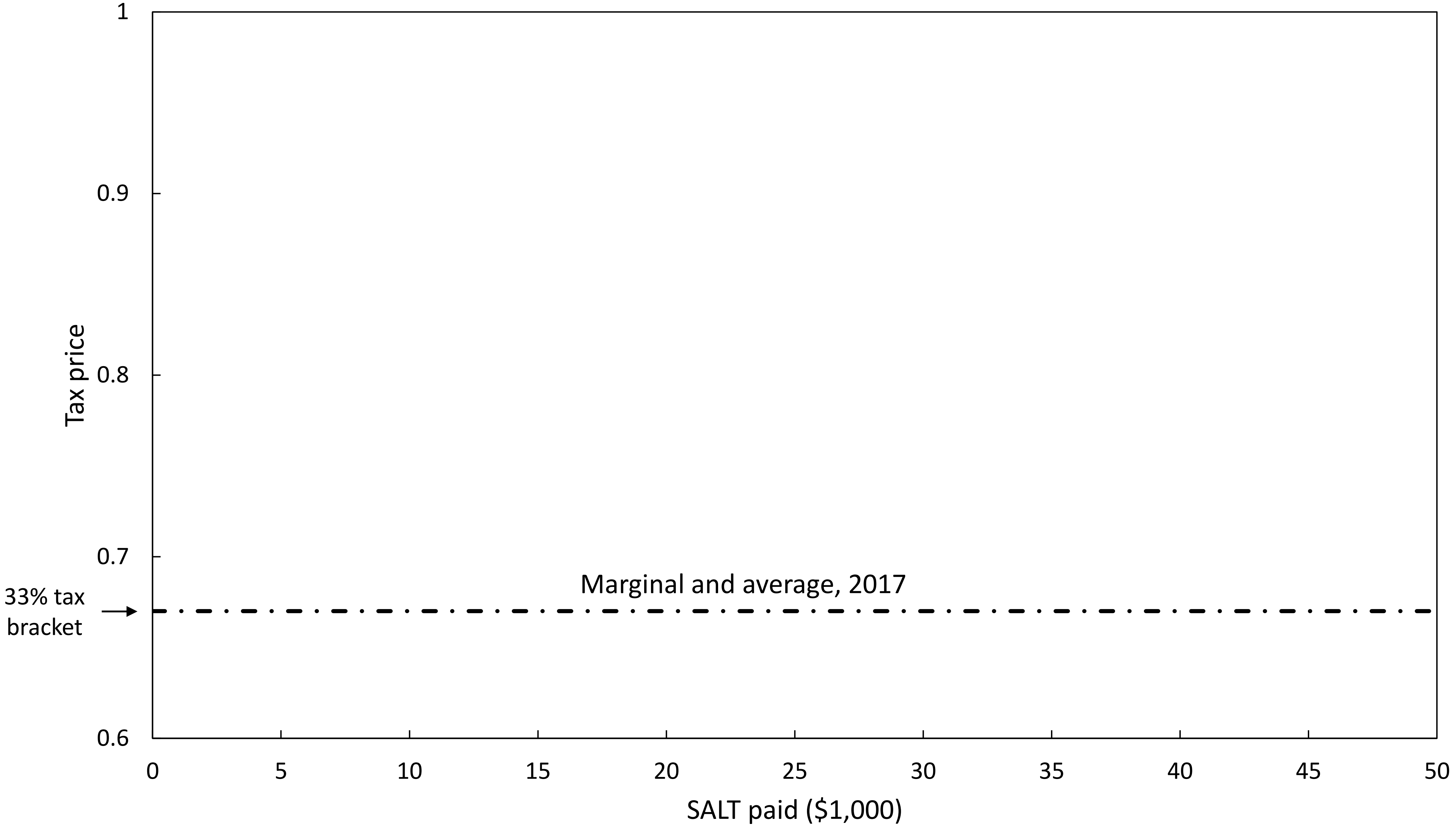
Mechanism

- When SALT is *not* fully deductible then the *marginal* tax price of SALT is 1 for amounts over the deductibility cap
- For a taxpayer who itemizes and does not pay the AMT, the *average* tax price of SALT is:

$$\tau = 1 - \tau^F(\underbrace{S'}_{\substack{\text{Deductible}\\ \text{SALT paid}}}/\underbrace{S}_{\substack{\text{Total}\\ \text{SALT paid}}})$$

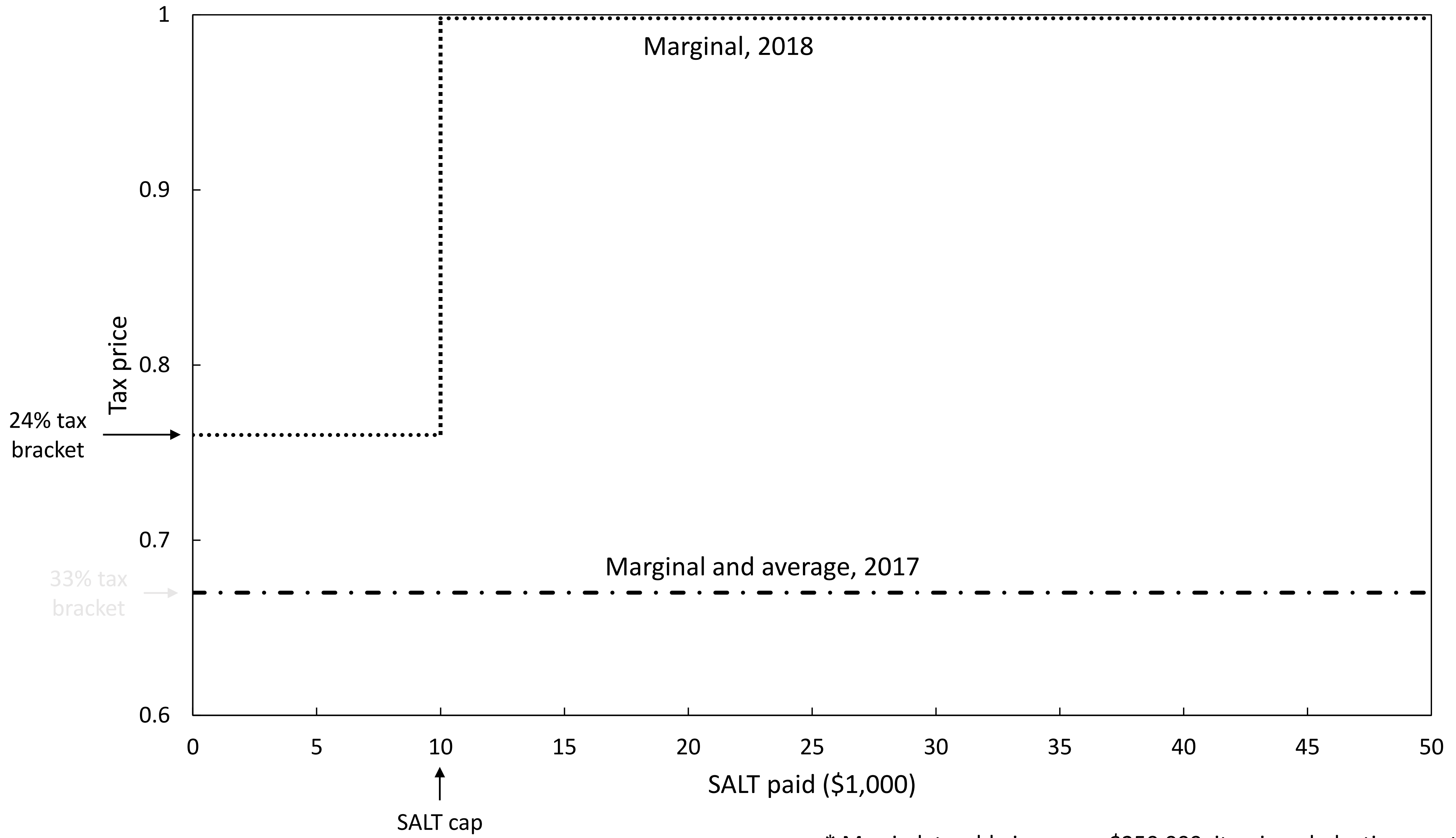
- When SALT is fully deductible $S' = S$ and $\tau = 1 - \tau^F$

Marginal and Average Tax Prices for a Hypothetical Household* in 2017 and 2018



* Married, taxable income = $250,000, itemizes deductions, not subject to AMT.

Marginal and Average Tax Prices for a Hypothetical Household* in 2017 and 2018



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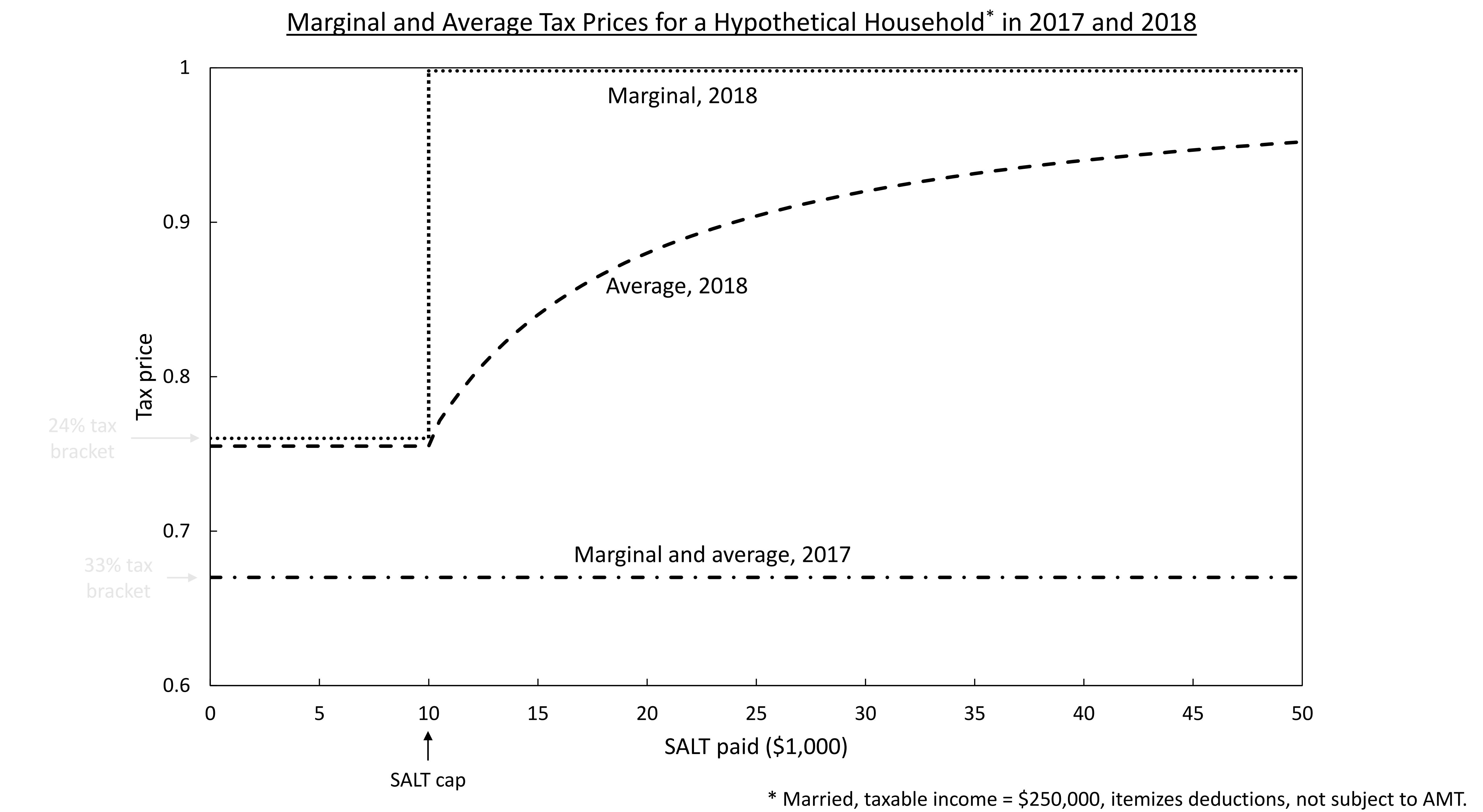
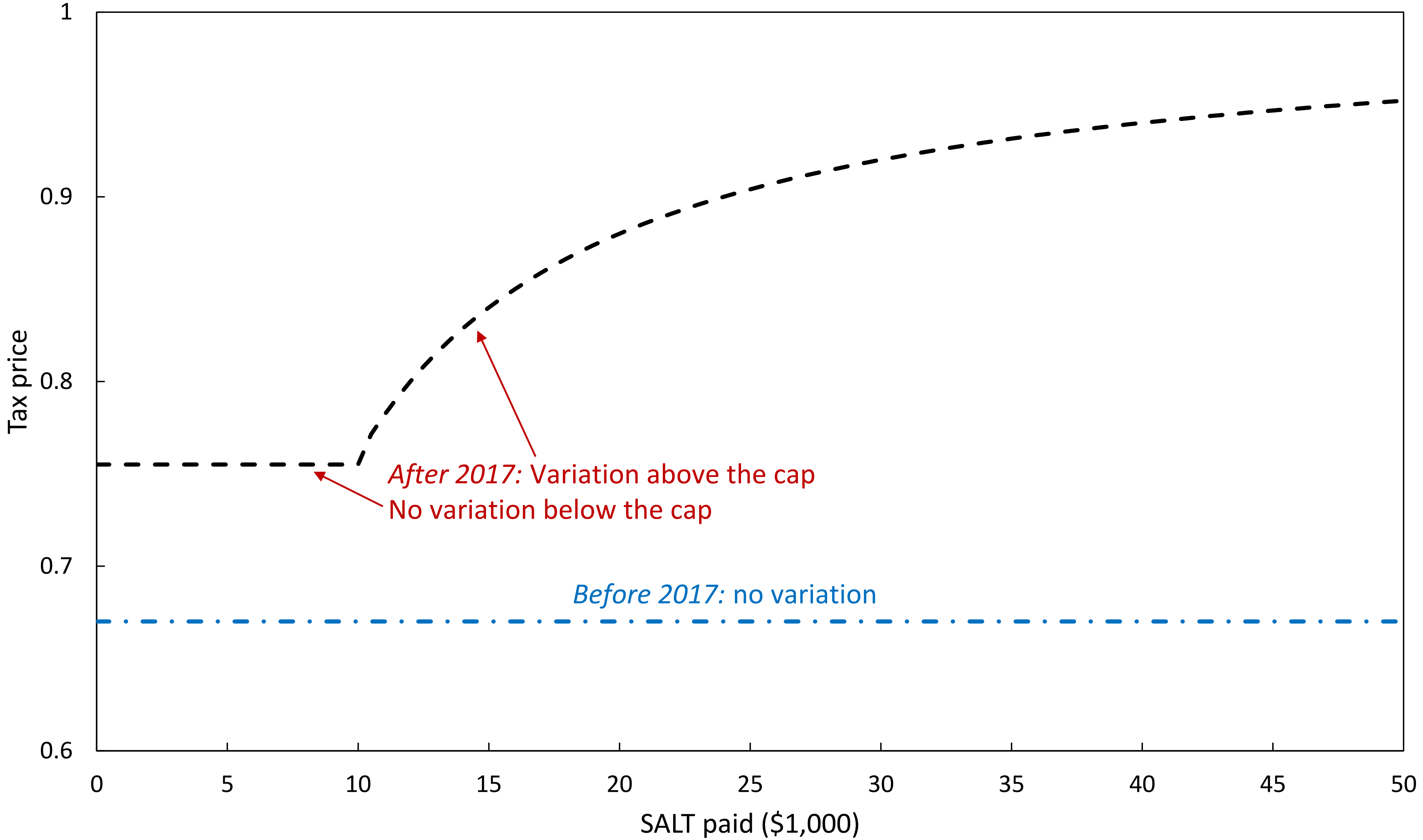

Marginal and Average Tax Prices for a Hypothetical Household* in 2017 and 2018
Tax price
1
0.9
0.8
0.7
0.6
24% tax bracket
33% tax bracket
Marginal, 2018
Average, 2018
Marginal and average, 2017
0
5
10
15
20
25
30
35
40
45
50
SALT paid ($1,000)
SALT cap
* Married, taxable income = $250,000, itemizes deductions, not subject to AMT.

Marginal and Average Tax Prices for a Hypothetical Household* in 2017 and 2018



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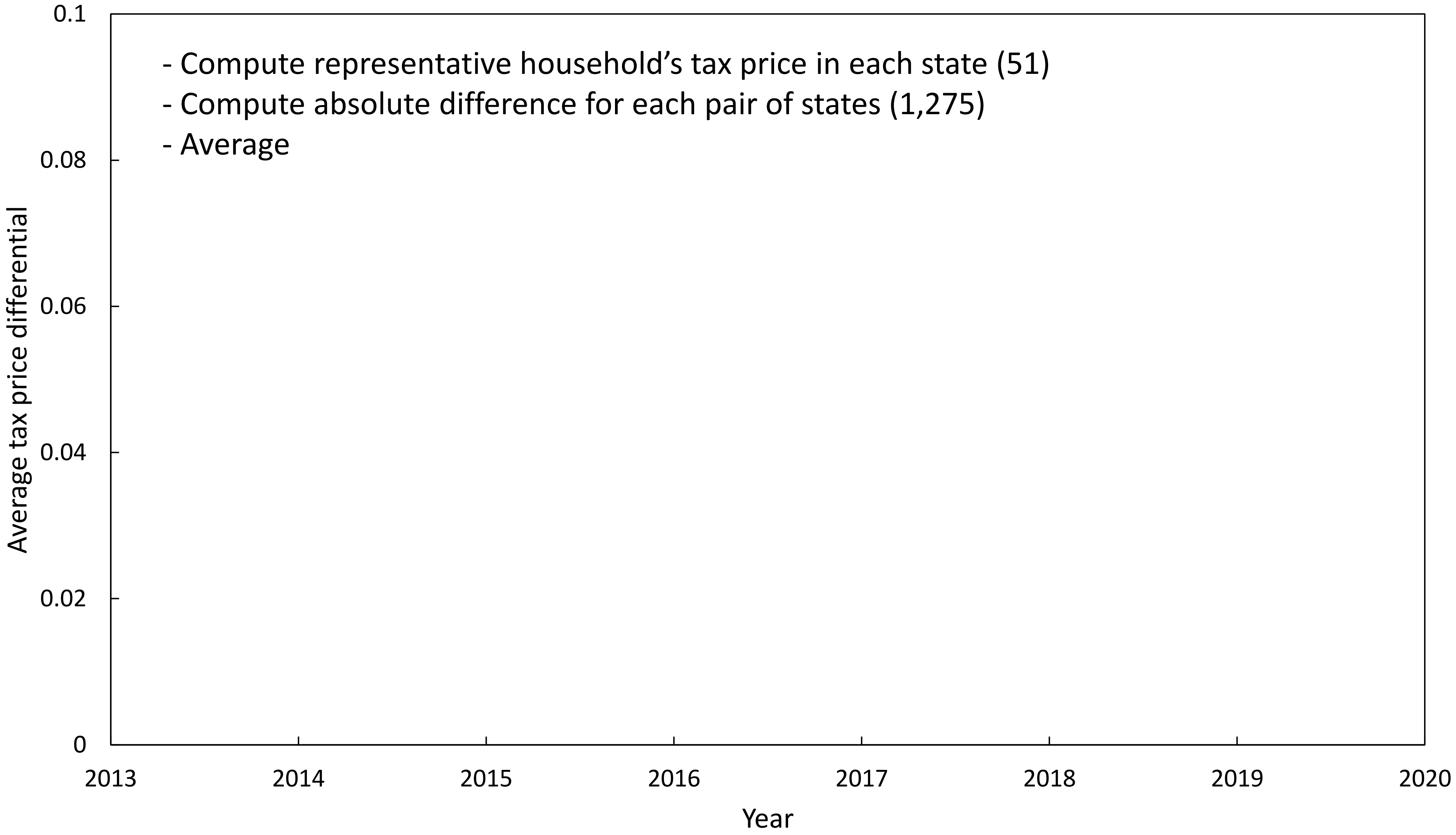
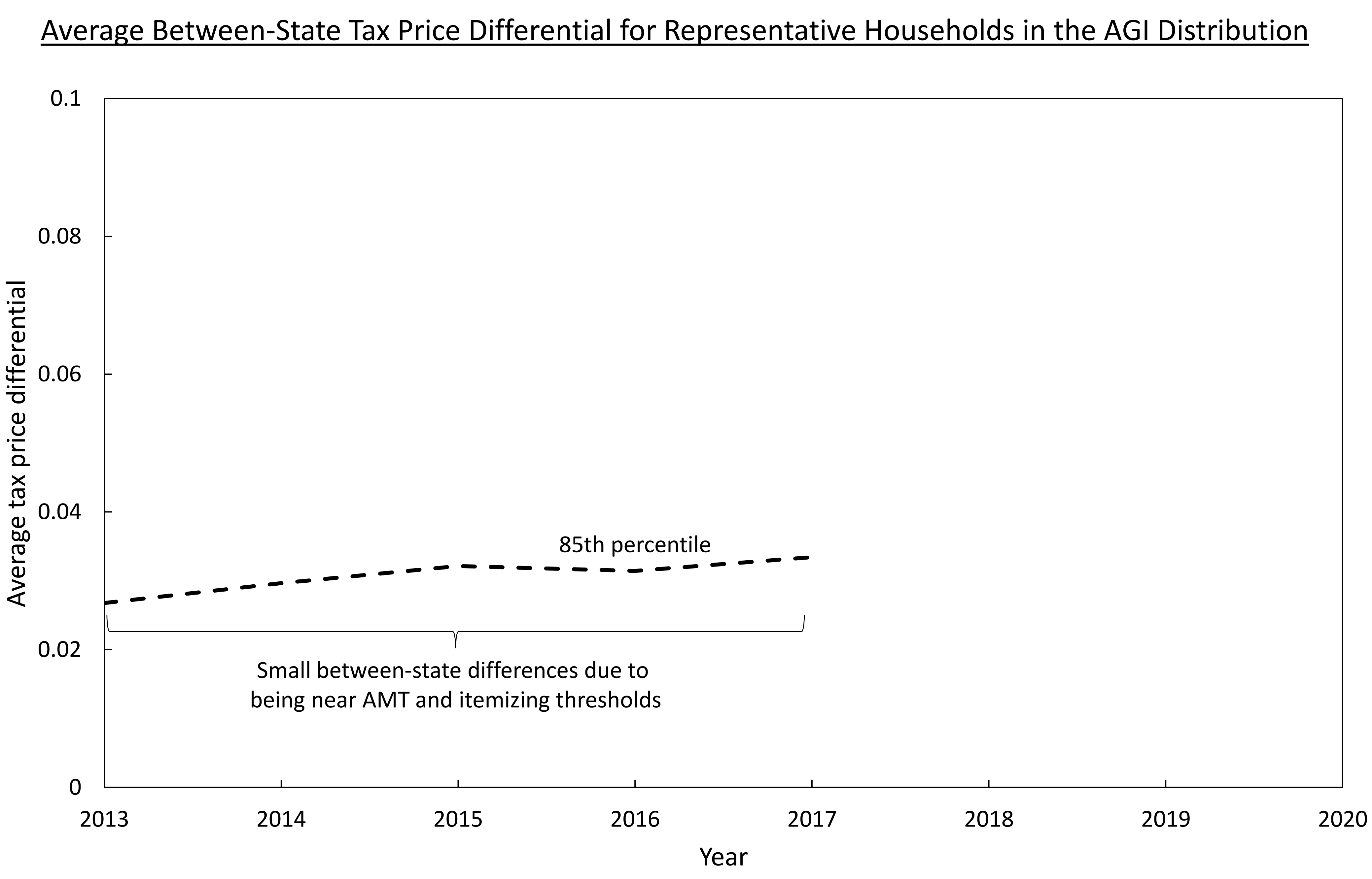
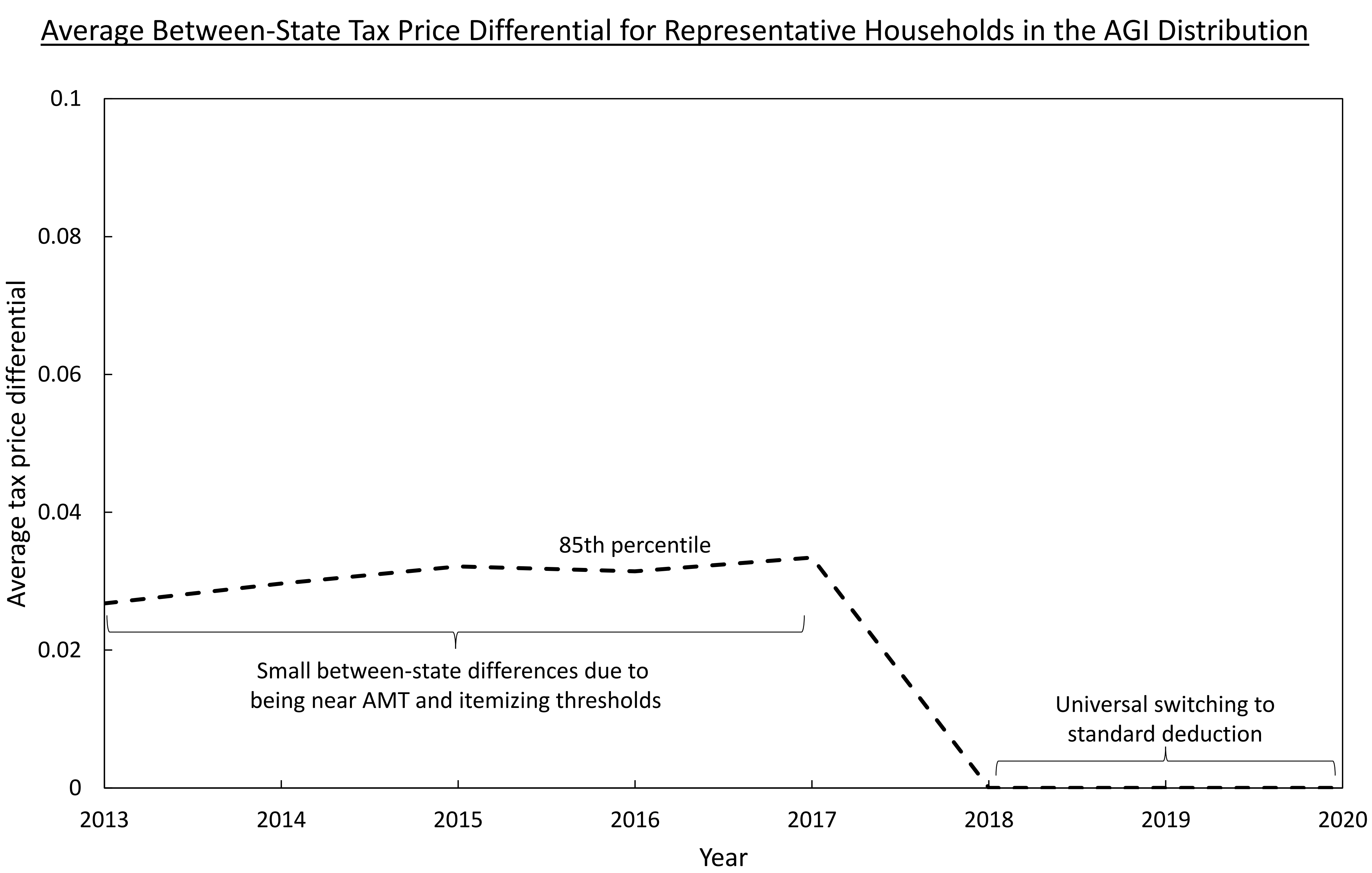
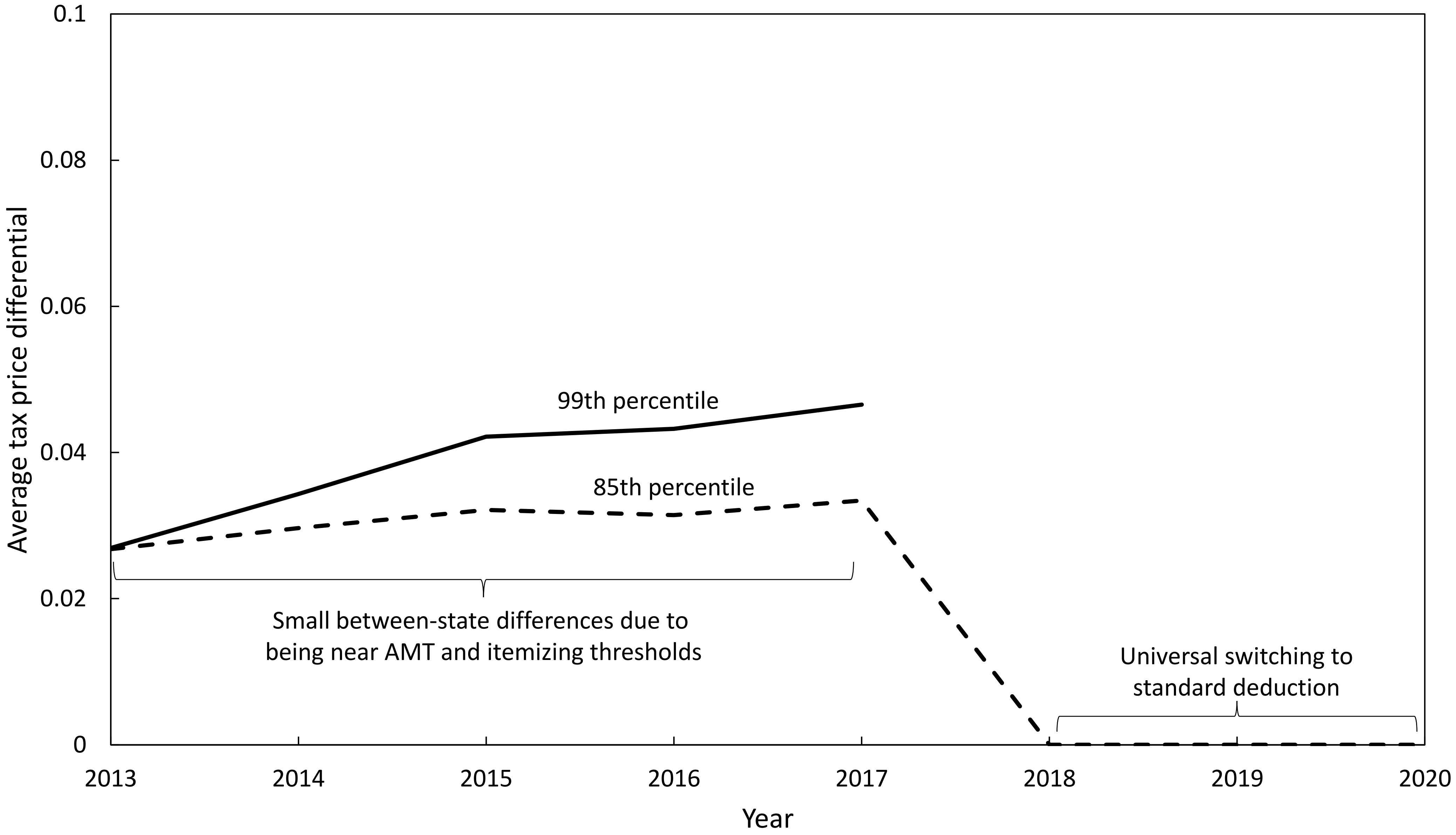
Average Between-State Tax Price Differential for Representative Households in the AGI Distribution




Average Between-State Tax Price Differential for Representative Households in the AGI Distribution
Average tax price differential
0.1
0.08
0.06
0.04
0.02
0
85th percentile
Small between-state differences due to being near AMT and itemizing thresholds
2013
2014
2015
2016
2017
2018
2019
2020
Year


Average Between-State Tax Price Differential for Representative Households in the AGI Distribution
Average tax price differential
0.1
0.08
0.06
0.04
0.02
0
85th percentile
Small between-state differences due to being near AMT and itemizing thresholds
Universal switching to standard deduction
2013
2014
2015
2016
2017
2018
2019
2020
Year

Average Between-State Tax Price Differential for Representative Households in the AGI Distribution



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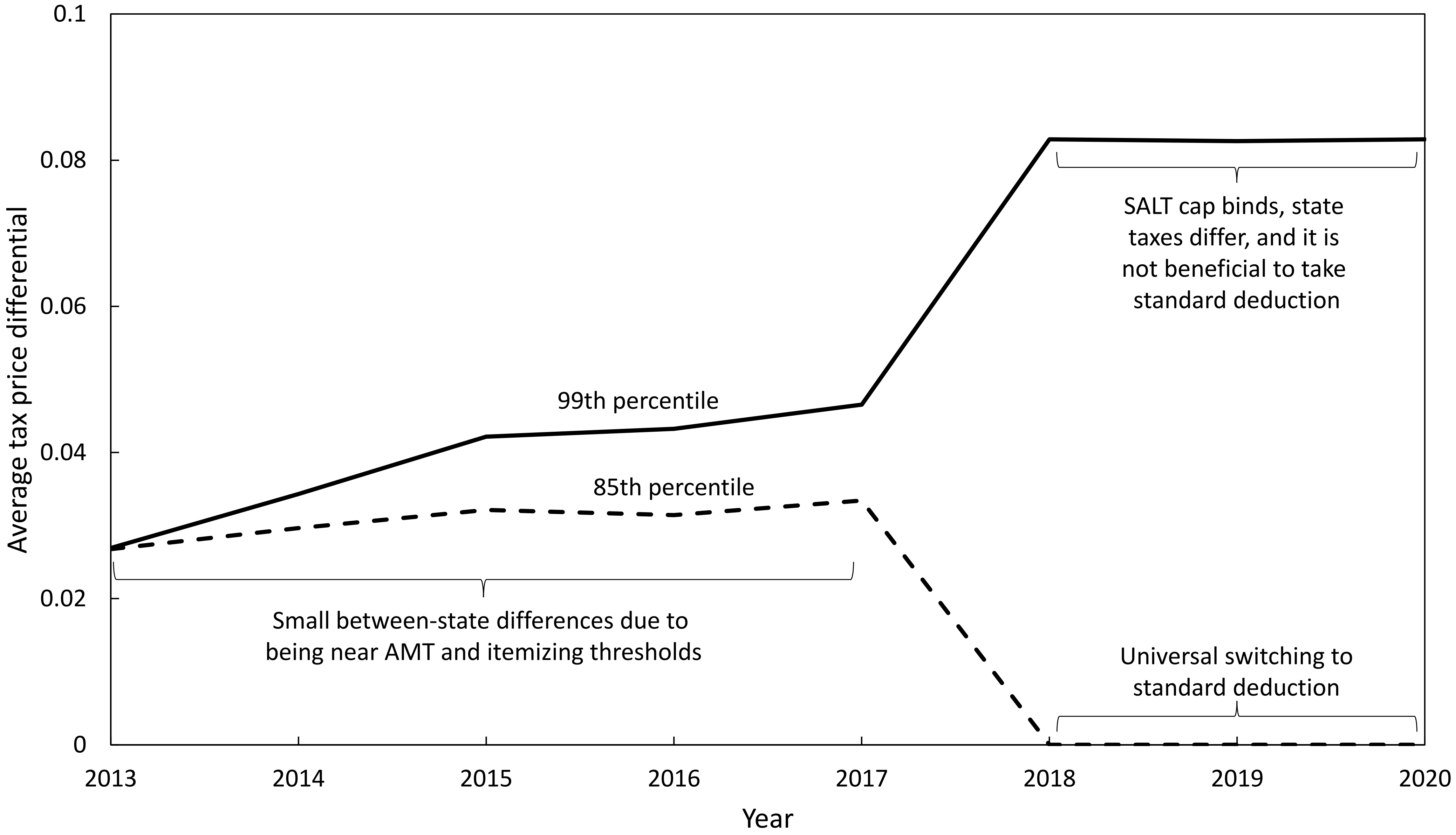

Walkthrough

- Model
- Data
- Extensive margin analysis
- Intensive margin analysis
- Long-term predictions

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Model: Utility

$$U_{ijt} = A_j c_{ijt}^{(1-\alpha^*-\beta^*)} h_{ijt}^{\alpha^*} g_{ijt}^{\beta^*}$$

Model: Utility

$$U_{ijt} = A_j c_{ijt}^{(1-\alpha^*-\beta^*)} h_{ijt}^{\alpha^*} g_{ijt}^{\beta^*}$$

Utility

for individual i

living in state j

in year t

Model: Utility

State and local government services

Consumption

Housing

Amenities

$$U_{ijt} = A_j c_{ijt}^{(1-\alpha^*-\beta^*)} h_{ijt}^{\alpha^*} g_{ijt}^{\beta^*}$$

in year t

Utility

living in state j

for individual i

Model: Utility

Share of income spent
on each component

State and local
government
services

Consumption

Housing

Amenities

$$U_{ijt} = A_j c_{ijt}^{\overbrace{(1-\alpha^* - \beta^*)}} h_{ijt}^{\alpha^*} g_{ijt}^{\beta^*}$$

in year t

Utility

living in state j

for individual i

Model: Utility

Utility from government services is proportional to SALT paid such that $g_{ijt} = \omega S_{ijt}$ with $\omega > 0$

$$U_{ijt} = A_j c_{ijt}^{(1-\alpha^*-\beta^*)} h_{ijt}^{\alpha^*} g_{ijt}^{\beta^*}$$

Utility from housing derives from the size of one's house H_{ijt} at a constant flow rate μ such that $h_{ijt} = \mu H_{ijt}$

Model: Utility

Price† of g_{ijt} is $\tau_{ijt}\omega^{-1}$

Utility from government services is proportional to SALT paid such that $g_{ijt} = \omega S_{ijt}$ with $\omega > 0$

Price of c_{ijt} is 1

$$U_{ijt} = A_j c_{ijt}^{(1-\alpha^*-\beta^*)} h_{ijt}^{\alpha^*} g_{ijt}^{\beta^*}$$

Utility from housing derives from the size of one's house H_{ijt} at a constant flow rate μ such that $h_{ijt} = \mu H_{ijt}$

Price of h_{ijt} is P_{jt}

† Normalizes the tax price to be between $1 - \tau_{ijt}^{F}$ and 1.

Model: Budget Constraint

$$\underbrace{(1-\bar{\tau}^S_{ijt}-\bar{\tau}^F_{ijt})w_{ijt}}_{\text{After-tax wage income}} - \underbrace{\mu\tau^P_{jt}P_{jt}H_{ijt}}_{\text{Property taxes}} + \underbrace{\tau^F_{ijt}S'_{ijt}}_{\text{SALT deduction}} = \underbrace{c_{ijt}+P_{jt}h_{ijt}}_{\text{Consumption}}$$

Model: Budget Constraint

Equivalently:

$$\underbrace{(1-\bar{\tau}^{F}_{ijt})w_{ijt}}_{\text{After-federal-tax wage income}} = \underbrace{c_{ijt}} + \underbrace{P_{jt}h_{ijt}} + \underbrace{\tau_{ijt}\omega^{-1}g_{ijt}}$$

Income spent on consumption, housing, and government services

Model: Budget Constraint

The utility function implies…

$$\alpha^*\left(1-\bar{\tau}^F_{ijt}\right)w_{ijt}P_{jt}^{-1}$$

$$(1-\alpha^*-\beta^*)\left(1-\bar{\tau}^F_{ijt}\right)w_{ijt} \qquad \beta^*\left(1-\bar{\tau}^F_{ijt}\right)w_{ijt}\omega\tau_{ijt}^{-1}$$

$$\underbrace{\left(1-\bar{\tau}^F_{ijt}\right)w_{ijt}}_{\text{After-federal-tax wage income}} = c_{ijt} + P_{jt}h_{ijt} + \tau_{ijt}\omega^{-1}g_{ijt}$$

Income spent on consumption, housing, and government services

Model: Indirect Utility

$$U_{ijt} = A_j c_{ijt}^{(1-\alpha^*-\beta^*)} h_{ijt}^{\alpha^*} g_{ijt}^{\beta^*}$$

Model: Indirect Utility

$$\overset{V'_{ijt}}{U_{ijt}} = A_j \, \overset{(1-\alpha^*-\beta^*)\left(1-\bar{\tau}^F_{ijt}\right)w_{ijt}}{c_{ijt}}^{(1-\alpha^*-\beta^*)} \, \overset{\alpha^*\left(1-\bar{\tau}^F_{ijt}\right)w_{ijt}P_{jt}^{-1}}{h_{ijt}}^{\alpha^*} \, \overset{\beta^*\left(1-\bar{\tau}^F_{ijt}\right)w_{ijt}\omega\tau_{ijt}^{-1}}{g_{ijt}}^{\beta^*}$$

Model: Indirect Utility

$$\alpha^*\left(1-\bar{\tau}^F_{ijt}\right)w_{ijt}P_{jt}^{-1}$$

$$(1-\alpha^*-\beta^*)\left(1-\bar{\tau}^F_{ijt}\right)w_{ijt} \qquad \beta^*\left(1-\bar{\tau}^F_{ijt}\right)w_{ijt}\,\omega\,\tau_{ijt}^{-1}$$

$$V'_{ijt}$$

$$U_{ijt} = A_j c_{ijt}^{(1-\alpha^*-\beta^*)} h_{ijt}^{\alpha^*} g_{ijt}^{\beta^*}$$

$$\ln V'_{ijt} = \ln A_j + \ln w_{ijt} - \alpha^* \ln P_{jt} - \beta^* \ln \tau_{ijt} + \underbrace{C_1}_{f(\alpha,\beta,\omega,\bar{\tau}^F)}$$

$$\bar{\tau}^F_j \approx \bar{\tau}^F_k \ \forall\, j,k$$

Model: Production

- Each state is assumed to have a perfectly competitive representative firm producing according to the production function:

Elasticity of substitution:
$\nu = 1/(1-\rho)$

$$\underset{\text{Output}}{Q_{jt}} = \underset{\text{Productivity}}{B_j}\left[\theta \underset{\text{Capital}}{K_{jt}^{\rho}} + (1-\theta)\underset{\text{Labor}}{N_{jt}^{\rho}}\right]^{1/\rho}$$

Model: Production

- The labor market is perfectly competitive so wage equals the marginal product of labor:

$$w_{ijt} = \frac{dQ_{jt}}{dN_{jt}} = (1-\theta)B_j Q_{jt}^{1/\nu} N_{jt}^{-1/\nu}$$

Model: Production

- The labor market is perfectly competitive so wage equals the marginal product of labor:

$$w_{ijt} = \frac{dQ_{jt}}{dN_{jt}} = \cancel{(1-\theta)}B_j\cancel{Q_{jt}^{1/\nu}N_{jt}^{-1/\nu}}$$

with perfectly elastic substitution between capital and labor

Model: Production

- The labor market is perfectly competitive so wage equals the marginal product of labor:

$$w_{ijt} = B_j$$

Model: Indirect Utility

$$w_{ijt} = B_j$$

$$\ln V'_{ijt} = \ln A_j + \ln w_{ijt} - \alpha^* \ln P_{jt} - \beta^* \ln \tau_{ijt} + C_1$$

Model: Indirect Utility

$$w_{ijt} = B_j$$

$$\ln V'_{ijt} = \ln A_j + \ln w_{ijt} - \alpha^* \ln P_{jt} - \beta^* \ln \tau_{ijt} + C_1$$

$$\ln V'_{ijt} = \ln\left(A_j B_j\right) - \alpha^* \ln P_{jt} - \beta^* \ln \tau_{ijt} + C_1$$

Model: Housing Supply

- There is competition for land and an imperfectly elastic supply of housing, which is determined by an underlying state-specific (inverse) housing supply elasticity:

$$\zeta_j = \frac{\ln P_{jt}}{\ln N_{jt}}$$

Model: Indirect Utility

$$\ln P_{jt} = \zeta_j \ln N_{jt}$$

$$\ln V'_{ijt} = \ln\left(A_j B_j\right) - \alpha^* \ln P_{jt} - \beta^* \ln \tau_{ijt} + C_1$$

Model: Indirect Utility

$$\ln P_{jt} = \zeta_j \ln N_{jt}$$

$$\ln V'_{ijt} = \ln(A_j B_j) - \alpha^* \ln P_{jt} - \beta^* \ln \tau_{ijt} + C_1$$

$$\ln V'_{ijt} = \ln(A_j B_j) - \alpha^* \zeta_j \ln N_{jt} - \beta^* \ln \tau_{ijt} + C_1$$

Model: Indirect Utility

$$\boxed{\ln V'_{ijt} = \ln\left(A_j B_j\right) - \alpha^* \zeta_j \ln N_{jt} - \beta^* \ln \tau_{ijt}}$$

Walkthrough

- Model
- Data
- Extensive margin analysis
- Intensive margin analysis
- Long-term predictions

Data and Taxes

- Individual-level data spanning 2012–20 come from the American Community Survey, which contains rich income and demographic data for constructing tax rates and migration rates
- The ACS asks whether a household lived in a different state in the previous year
  - The ACS asks where the respondent currently works but not where they worked in the previous year
  - I abstract from the issue of residence-based taxation vs. employment-based taxation and assume households live in the same state that they work

Data and Taxes

- The NBER TAXSIM calculator is used to construct tax rates
- Tax variable construction closely follows Coyne (*NTJ* 2017)
- Statistics of Income is used to impute itemization status, charitable contributions, qualified medical expenses, and property tax payments
- Housing supply elasticities are from Saiz (*QJE* 2010)
- Other economic and demographic control variables are from Local Area Unemployment Statistics and the Bureau of Economic Analysis

Construction of the Tax Price Variable

- Formulas for the tax price of SALT introduced above do not properly account for many of the complications of how the tax system actually works, such as interactions between state tax laws, itemization status, and AMT liability
- Fundamentally, the tax price of SALT can be thought of as the amount by which SALT liability is offset by a decline in federal income tax liability caused by SALT
- Rather than rely on a formula, we can use TAXSIM to compute the tax price algorithmically

Construction of the Tax Price Variable

- TAXSIM is used to construct the tax price variable as follows:
  1. Taxes in each state are calculated for a representative household
  2. Federal tax liability is recalculated assuming property taxes and state income or sales taxes calculated in step 1 *are* deductible
  3. Federal tax liability is recalculated assuming property taxes and state income or sales taxes calculated in step 1 *are not* deductible
  4. Federal tax liability in step 2 is subtracted from federal tax liability in step 3
  5. Tax price is computed as $\tau_{ijt} = 1 - \left(\Delta T_{ijt}/S_{ijt}\right)$ where ΔT_{ijt} is the difference computed from step 4

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Decline in income tax liability caused by SALT

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  5. Tax price is computed as $\tau_{ijt} = 1 - \left(\underbrace{\Delta T_{ijt}/S_{ijt}}_{\text{Amount by which SALT liability is offset}}\right)$ where ΔT_{ijt} is the difference computed from step 4

Walkthrough

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Estimation: Extensive Margin

- The first estimating equation considers the *extensive margin* migration effects of the change in SALT deductibility:
- The effect of the SALT cap on the decision of *whether* to move

Estimation: Extensive Margin

$$\ln V'_{ijt} + \varepsilon_{ij\ell t} = \ln\left(A_j B_j\right) - \alpha^* \zeta_j \ln N_{jt} - \beta^* \ln \tau_{ijt} + \varepsilon_{ij\ell t}$$

Estimation: Extensive Margin

- Spatial equilibrium requires $V'_{ijt} = V'_{ikt}$ for all states j and k:

$$\ln V'_{ijt} + \varepsilon_{ij\ell t} = \ln(A_j B_j) - \alpha^* \zeta_j \ln N_{jt} - \beta^* \ln \tau_{ijt} + \varepsilon_{ij\ell t}$$

$$\ln\left(N_{jt}^{\zeta_j} / N_{kt}^{\zeta_k}\right) = \beta \ln(\tau_{ijt}/\tau_{ikt}) + \xi_j + \xi_k + \varepsilon_{jkt}$$

$-\beta^*/\alpha^*$ $\quad$ $\ln(A_j B_j)/\alpha^*$ $\quad$ $-\ln(A_k B_k)/\alpha^*$ $\quad$ $\varepsilon_{ij\ell t} - \varepsilon_{ik\ell t}$

Estimation: Extensive Margin

- The coefficient of interest is β: the elasticity of relative population stocks with respect to relative tax prices

$$\ln\left(N_{jt}^{\zeta_j}/N_{kt}^{\zeta_k}\right) = \beta \ln\left(\tau_{ijt}/\tau_{ikt}\right) + \xi_j + \xi_k + \varepsilon_{jkt}$$

Estimation: Extensive Margin

- The coefficient of interest is β: the elasticity of relative population stocks with respect to relative tax prices
- Differentiating with respect to $\ln \tau_{ijt}$:

$$\ln\left(N_{jt}^{\zeta_j}/N_{kt}^{\zeta_k}\right) = \beta \ln\left(\tau_{ijt}/\tau_{ikt}\right) + \xi_j + \xi_k + \varepsilon_{jkt}$$

$$\beta \approx \zeta_j \frac{d \ln N_{jt}}{d \ln \tau_{ijt}} \underbrace{- \zeta_k \frac{d \ln N_{kt}}{d \ln \tau_{ijt}}}_{\to 0 \text{ as } J \to \infty}$$

- β is approximately the elasticity of a state's own population with respect to its own tax price (adjusted for its own housing elasticity)

Estimation: Extensive Margin

- I estimate β using a difference-in-differences strategy
  - A representative household in the 99th percentile of AGI is "treated"
  - A representative household in the 85th percentile of AGI is the "control"

$$\ln\left(N_{jt}^{\zeta_j}/N_{kt}^{\zeta_k}\right) = \beta \ln\left(\tau_{ijt}/\tau_{ikt}\right) \times \text{treated}_i \times \text{post}_t + \gamma\ \text{treated}_i$$
$$+ \xi_j + \xi_k + \xi_t + \boldsymbol{\phi}\mathbf{X}_{jkt} + \varepsilon_{jkt}$$

Post-TCJA dummy

Year fixed effects

Economic and demographic controls

Estimation: Extensive Margin

- A possible threat to identification is that state legislators changed their tax policies in anticipation of or in reaction to the TCJA
- Informally, anticipatory tax changes are unlikely because of the TCJA's speed of passage (from inception to law in less than 2 months)
- The IRS dramatically curbed some states' attempt to classify SALT as charitable deductions and payroll tax credit schemes did not get much traction with businesses
- Hence, non-random, state-level anticipatory or reactionary tax changes are unlikely to be a threat to identification

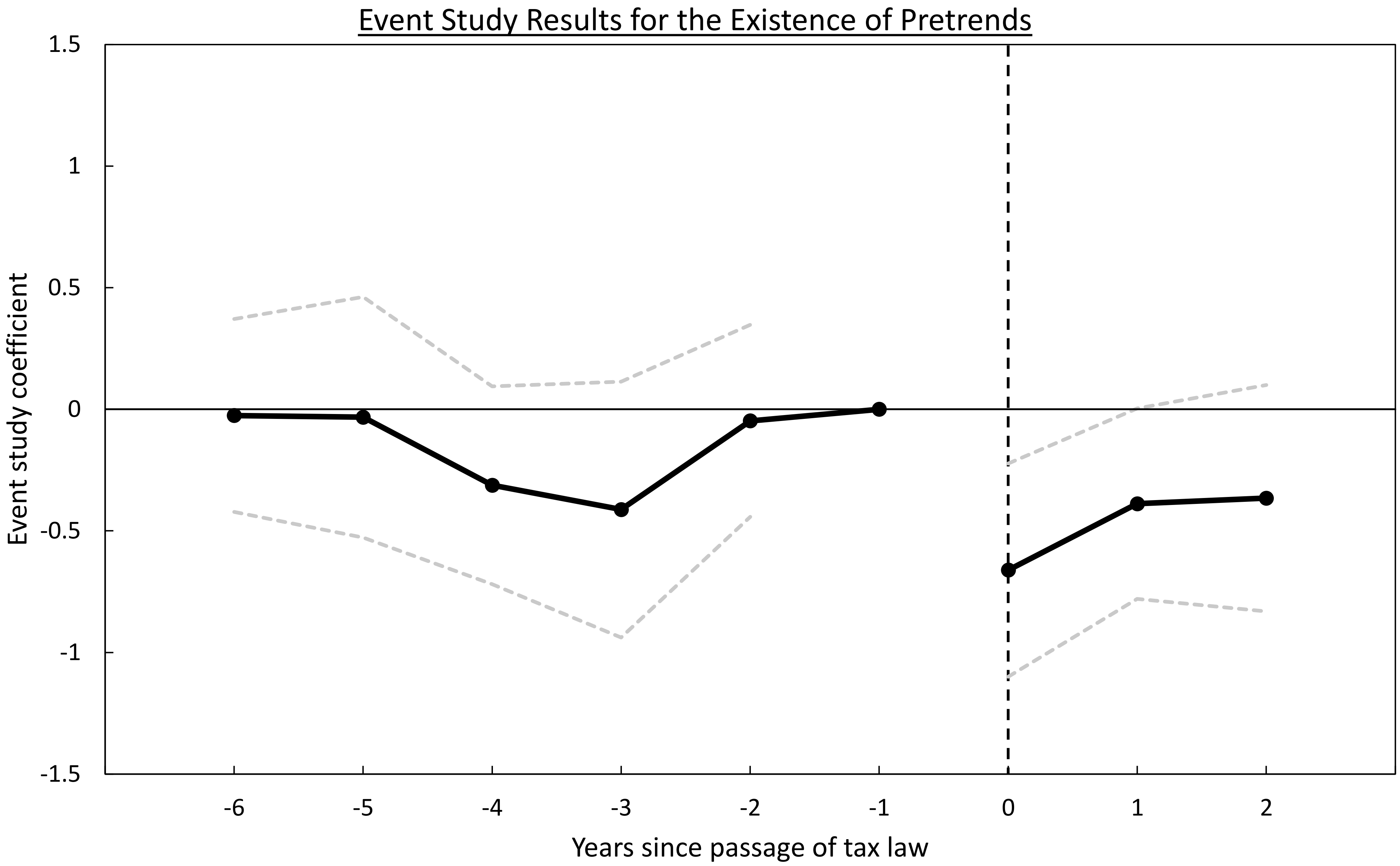
Estimation: Extensive Margin

- Formally, I implement an event study approach to check for the existence of pretrends

$$\ln\left(N_{jt}^{\zeta_j}/N_{kt}^{\zeta_k}\right) = \overline{\ln}\left(\tau_j/\tau_k\right) \sum_{y=-6}^{2} \beta_y\left(\mathbf{1}_y \times \text{treated}_i\right) + \gamma \text{ treated}_i$$
$$+ \xi_j + \xi_k + \xi_t + \boldsymbol{\phi}\mathbf{X}_{jkt} + \varepsilon_{jkt}$$

Average of
post-TCJA
tax price ratios

Measures the
intensity of
the treatment


Event Study Results for the Existence of Pretrends
Event study coefficient
1.5
1
0.5
0
-0.5
-1
-1.5
-6
-5
-4
-3
-2
-1
0
1
2
Years since passage of tax law

Extensive Margin Results (Difference-in-Differences)

Log Population Ratio	(1)	(2)
Log Tax Price Ratio	–0.642**	–1.014**
	(0.257)	(0.359)
Housing Elasticity	Yes	No
Control Group	85th	85th
No. of Observations	22,950	22,950
R^2	0.992	0.880

Notes: Housing elasticity indicates whether the population ratio was adjusted for local housing price elasticities. Regressions include economic controls, demographic controls, origin fixed effects, and destination fixed effects. Robust standard errors clustered at the origin-year, destination-year, and origin-destination levels are shown in parentheses. Statistical significance is indicated at the 5%** level.

Extensive Margin Results (Difference-in-Differences)

Log Population Ratio		(1)	(2)
Log Tax Price Ratio	A 1% increase in the relative tax price decreases the relative population stock by ≈ 0.64%	$\boxed{-0.642^{**}}$	-1.014^{**}
		(0.257)	(0.359)
Housing Elasticity		Yes	No
Control Group		85th	85th
No. of Observations		22,950	22,950
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Neglecting to consider housing supply elasticities overstates the effect of taxes on migration and results in a worse model fit

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Walkthrough

- Model
- Data
- Extensive margin analysis
- Intensive margin analysis
- Long-term predictions

Estimation: Intensive Margin

- The second estimating equation considers the *intensive margin* migration effects of the change in SALT deductibility:
- The effect of the SALT cap on *where* to move conditional on moving

Estimation: Intensive Margin

$$\ln V'_{ijt} + \varepsilon_{ijt} = \ln\left(A_j B_j\right) - \alpha^* \zeta_j \ln N_{jt} - \beta^* \ln \tau_{ijt} + \varepsilon_{ijt}$$

Estimation: Intensive Margin

$$\ln V'_{ijt} + \varepsilon_{ijt} = \ln\left(A_j B_j\right) - \alpha^* \zeta_j \ln N_{jt} - \beta^* \ln \tau_{ijt} + \underbrace{\varepsilon_{ijt}}_{\sim\,\mathrm{EV1}}$$

$$\Pr_{ijt} = \frac{V'_{ijt}}{\sum_{\ell} V'_{i\ell t}}$$

Estimation: Intensive Margin

- Estimation typically proceeds by finding the vector of parameters that maximizes the probability that households in the sample choose their observed locations

$$\mathrm{Pr}_{ijt} = \frac{V'_{ijt}}{\sum_{\ell} V'_{i\ell t}}$$

- A few issues complicate a standard MLE in this context

Estimation: Intensive Margin

- Mismeasurement of τ_{ijt} arises because households are only observed in their chosen state but I must construct τ_{ikt} for all unchosen states
- Taxes for each household in each unchosen state must be computed based on *unobservable* counterfactual wages and deductions
- My assumptions about counterfactual wages and deductions produce a noisy measure of a household's "true" counterfactual taxes

Estimation: Intensive Margin

- Counterfactual deductions:
- Charitable contributions are constant across states
- Mortgage interest deduction is constant across states
    - $750,000 cap is not binding for most households
    - High-income households are less likely to have a mortgage
- Property taxes are adjusted using state-specific property tax multipliers

Estimation: Intensive Margin

- Counterfactual wages:
- Begin by assuming a household’s counterfactual wages in each state are equal to their observed wages in their chosen state
  - *Measurement error:* All else equal, a household is more likely to move to a state where they expect to earn higher wages
  - *Attenuation bias:* Overestimating counterfactual wages will overestimate counterfactual tax rates and thus underestimate the tax price

Estimation: Intensive Margin

- An IV strategy is used to correct for potential measurement error
  - 2SLS cannot be used because the probability of moving to a particular state is a nonlinear function of the parameters
  - Instead I use *two-stage residual inclusion* (2SRI)

$$\ln V'_{ijt} + \varepsilon_{ijt} = \beta \ln \tau_{ijt} + \alpha \zeta_j \ln N_{jt} + \lambda \kappa_{ijt} + \varepsilon_{ijt}$$

Residual from a 1st-stage auxiliary regression of $\ln \tau_{ijt}$ on an instrument $\ln \tau^*_{ijt}$ and all exogenous regressor

Estimation: Intensive Margin

- The instrument is motivated by the following insight:
  - A household's marginal tax rate proxies for the exogeneous component of its average tax rate because it is independent of earnings conditional on being in the same tax bracket
- I construct the first-dollar tax price following Coyne (*NTJ* 2017):
  1. Assign households a probability of itemizing $\hat{d}_{ijt}$ and a probability of paying the AMT $\hat{a}_{ijt}$ based on state-level empirical probabilities
  2. Calculate first-dollar marginal tax rate $\hat{\tau}^F_{ijt}$ assuming SALT is not deductible
  3. Construct first-dollar tax price instrument as: $\tau^*_{ijt} = 1 - \hat{d}_{ijt}(1 - \hat{a}_{ijt})\hat{\tau}^F_{ijt}$

Estimation: Intensive Margin

- I include various other controls by exploiting the richness of the ACS

$$\ln V'_{ijt} + \varepsilon_{ijt}$$
$$= \beta \ln \tau_{ijt} + \alpha\zeta_j \ln N_{jt} + \xi_j \mathbf{Z}_{it} + \boldsymbol{\psi}\mathbf{Z}_{ijt} + \boldsymbol{\phi}\mathbf{X}_{jt} + \lambda\kappa_{ijt} + \varepsilon_{ijt}$$

Household-specific covariates: age, age^2, has child, married, homeowner, college

Household-specific, state-varying covariates: distance between states, birth state dummy

State-specific covariates: unemployment rate, value added in outdoor recreation, population age 25 and younger, college population

Intensive Margin Results (Two-Stage Residual Inclusion)

Log Odds Ratio	(1)	(2)
Log Tax Price	–4.298***	–0.171
	(1.570)	(0.387)
First-Stage Residual	3.948***	
	(1.155)	
No. of Observations	85,782	85,782
No. of Households	1,682	1,682

Notes: Regressions include various controls and are estimated using frequency weights. Bootstrap standard errors clustered at the household level are shown in parentheses. Statistical significance is indicated at the 1%*** level.

Intensive Margin Results (Two-Stage Residual Inclusion)

Log Odds Ratio		(1)	(2)
Log Tax Price	A 1% increase in the tax price reduces the probability of moving to a particular state by 4.2%	$\boxed{-4.298^{***}}$	–0.171
		(1.570)	(0.387)
First-Stage Residual		3.948***	
		(1.155)	
No. of Observations		85,782	85,782
No. of Households		1,682	1,682

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No. of Observations	85,782	85,782
No. of Households	1,682	1,682

Failing to correct for mismeasurement underestimates the effect (attenuation bias)

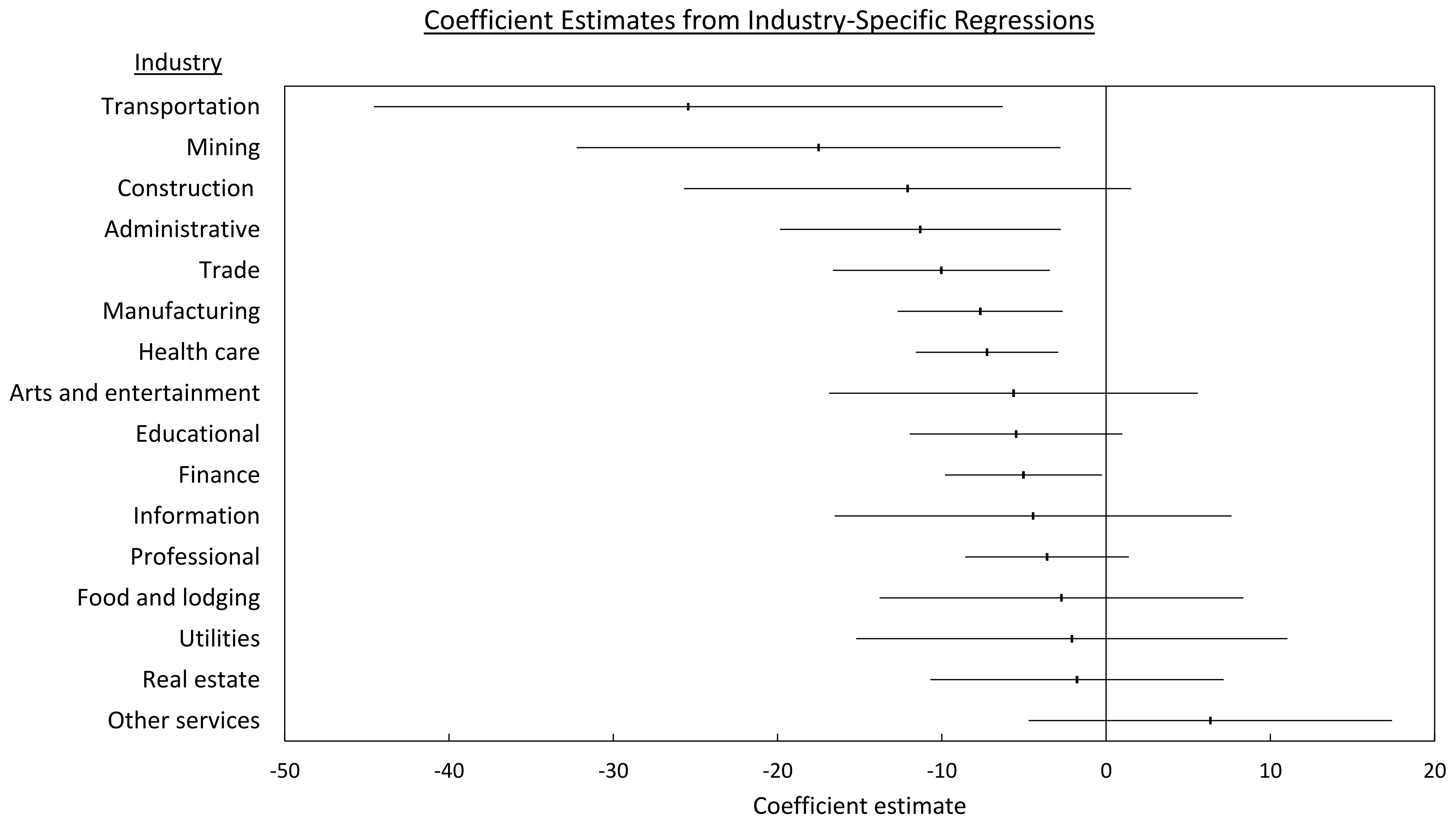
Notes: Regressions include various controls and are estimated using frequency weights. Bootstrap standard errors clustered at the household level are shown in parentheses. Statistical significance is indicated at the 1%*** level.

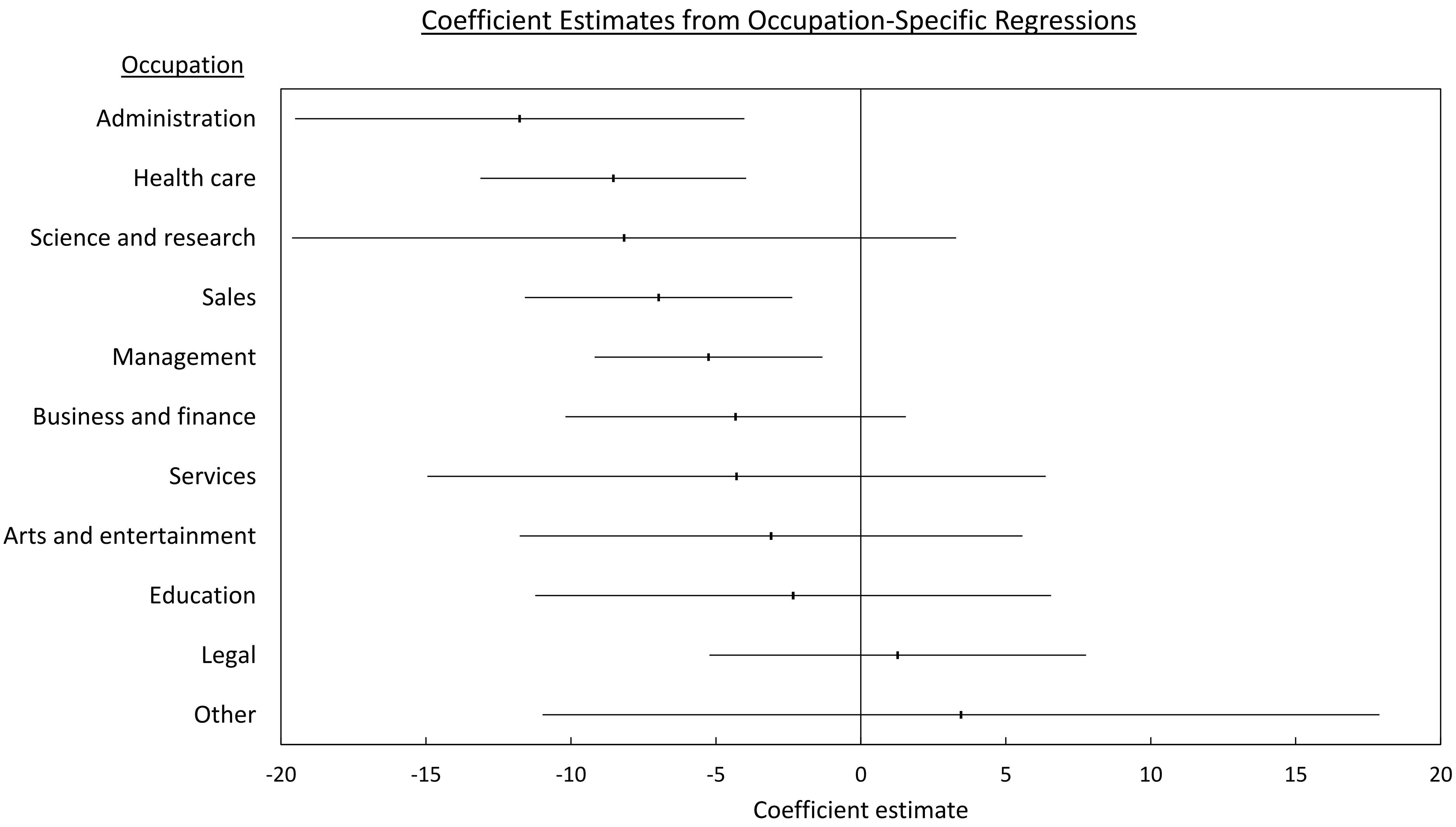
Estimation: Intensive Margin

- The richness of the ACS also allows for heterogeneous analyses of migration effects by industry and occupation

$$\ln V'_{ijt} + \varepsilon_{ijt}$$
$$= \sum_g \beta_g \left(1_g \times \ln \tau_{ijt}\right) + \lambda_g \kappa_{igjt} + \alpha \zeta_j \ln N_{jt} + \xi_j \mathbf{Z}_{it} + \boldsymbol{\psi} \mathbf{Z}_{ijt} + \boldsymbol{\phi} \mathbf{X}_{jt} + \varepsilon_{ijt}$$

Industry- or occupation-specific coefficients


Coefficient Estimates from Industry-Specific Regressions
Industry
Transportation
Mining
Construction
Administrative
Trade
Manufacturing
Health care
Arts and entertainment
Educational
Finance
Information
Professional
Food and lodging
Utilities
Real estate
Other services
-50
-40
-30
-20
-10
0
10
20
Coefficient estimate


Coefficient Estimates from Occupation-Specific Regressions
Occupation
Administration
Health care
Science and research
Sales
Management
Business and finance
Services
Arts and entertainment
Education
Legal
Other
-20
-15
-10
-5
0
5
10
15
20
Coefficient estimate

Walkthrough

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Long-Run Revenue Implications

- An important policy question is how tax flight will affect state tax revenues and which states will be most affected
- To study the differential effects of the SALT cap on migration and state revenues, I modify my structural model to incorporate dynamics

Model: Indirect Utility

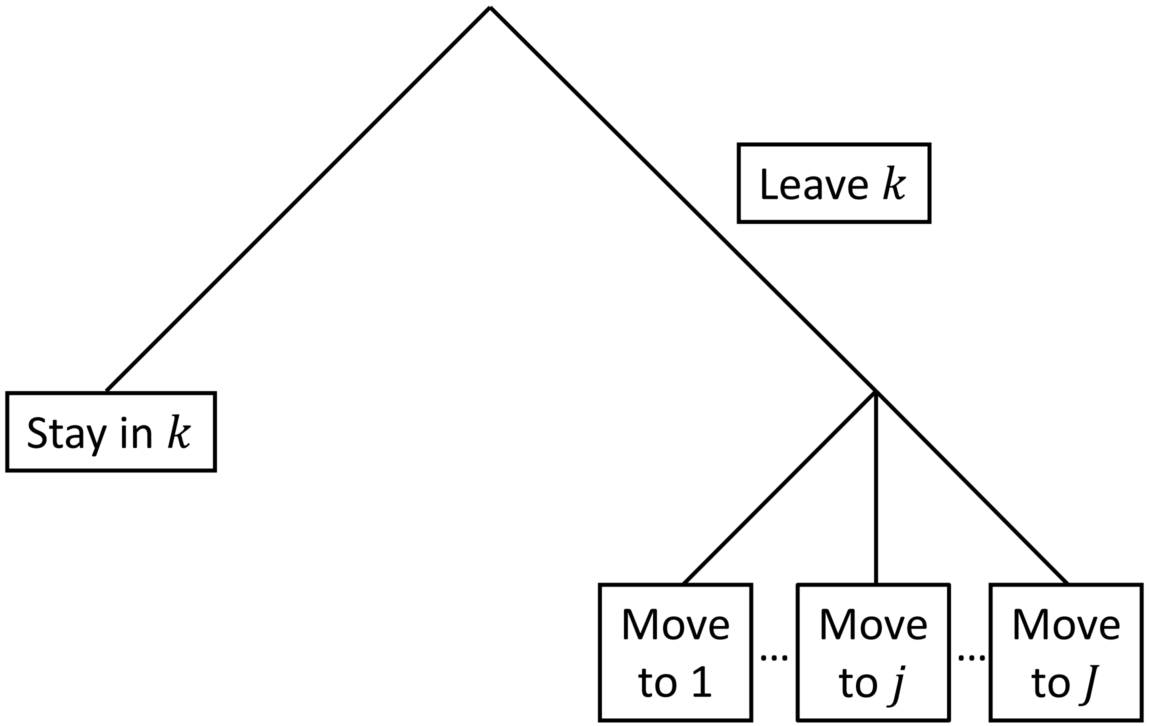
$$v_{ijkt} = \ln V'_{ijt} + \delta E_t\left[\ln V_{ij,t+1}\right] + \varepsilon_{ijkt}$$

Model: Indirect Utility

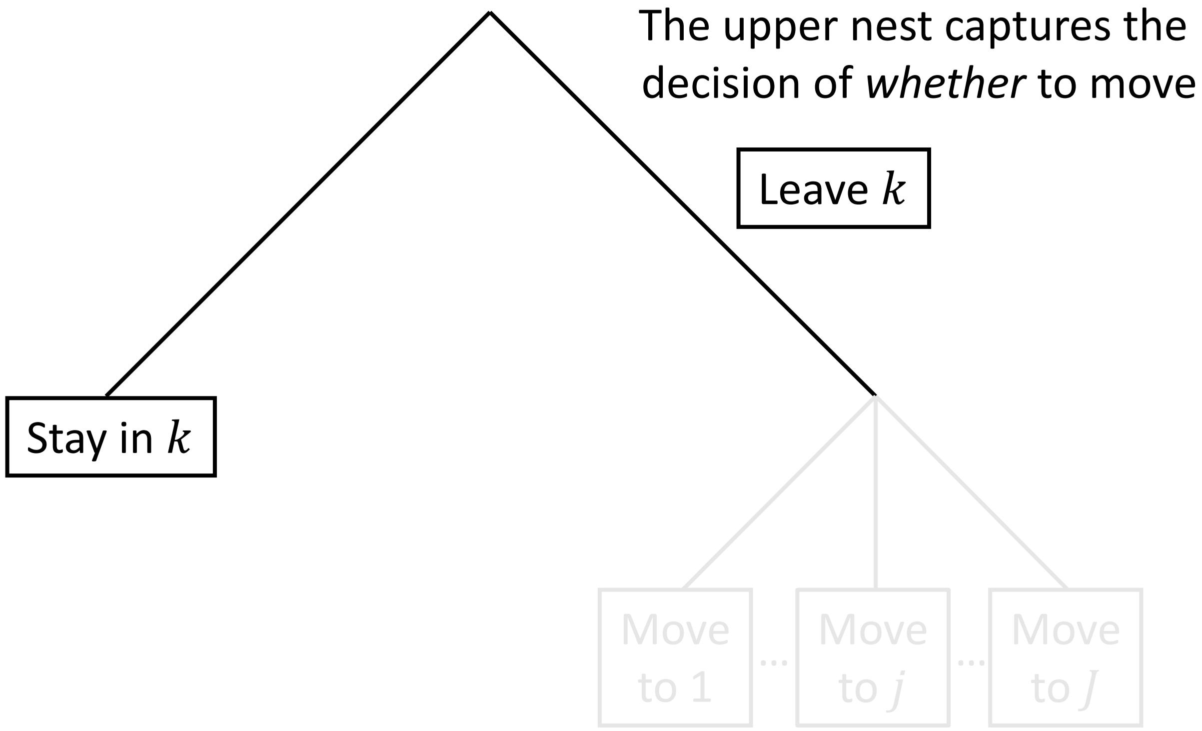
$$v_{ijkt} = \underbrace{\ln V'_{ijt} + \delta E_t\left[\ln V_{ij,t+1}\right]}_{\ln V_{ijt}} + \underbrace{\varepsilon_{ijkt}}_{\text{Taste shock for state } k \text{ in period } t+1 \text{ given that you live in state } j \text{ in period } t}$$

$\sim$ GEV

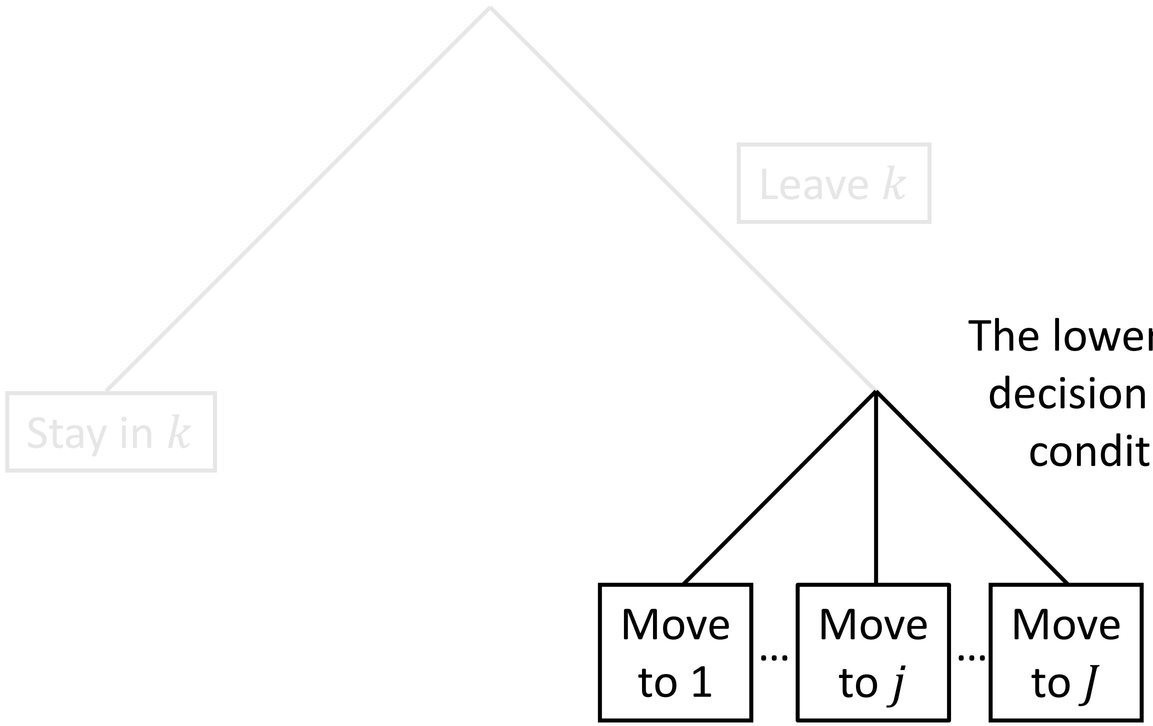
Model: Moving Costs



Model: Moving Costs

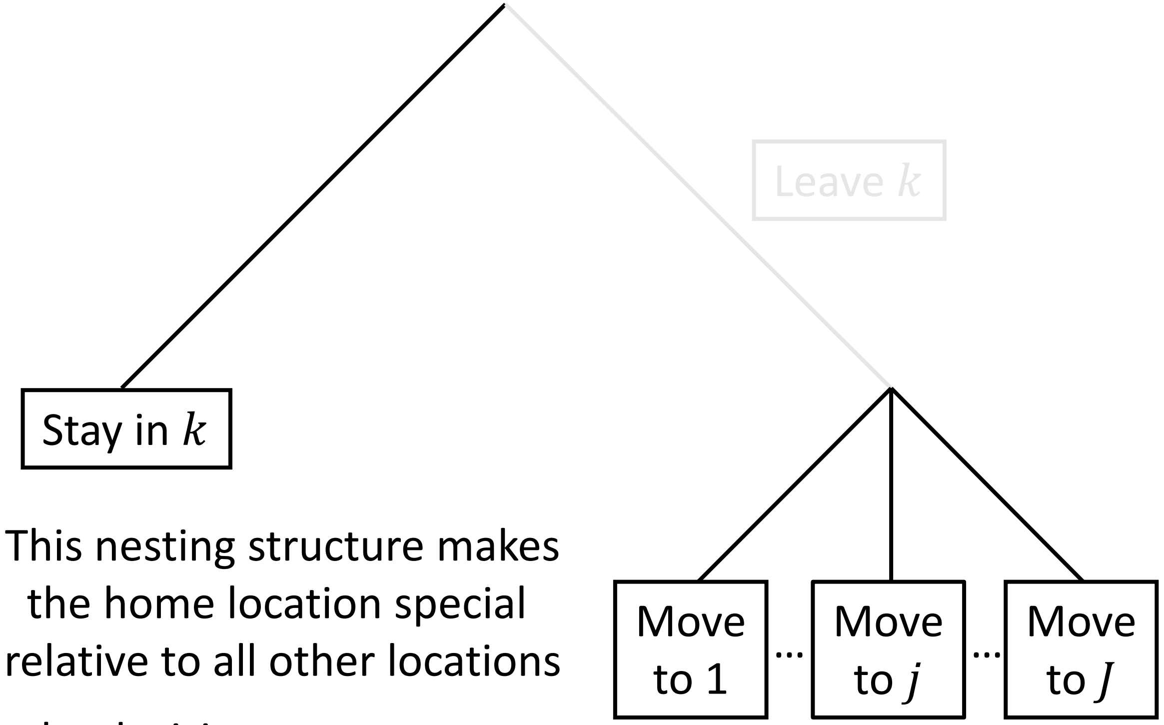


Model: Moving Costs



The lower nest captures the decision of *where* to move conditional on moving

Model: Moving Costs



This nesting structure makes the home location special relative to all other locations

So the decision to move comes through the location choice decision and not through the fixed costs of moving

Model: Population Evolution

- The nesting structure implies that the probability that an individual moves from state k to state j is:

$$\mathrm{Pr}_{jkt} = \eta_{kt} \frac{V_{jt}^{1/\lambda}}{\sum_{\ell} V_{\ell t}^{1/\lambda}}$$

Model: Population Evolution

- The nesting structure implies that the probability that an individual moves from state k to state j is:

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Fraction of people in state k who endogenously consider relocating

Governed by $1/\gamma$: the elasticity of substitution in the upper nest

$$\longrightarrow \quad \eta_{kt} = \frac{\eta V_t^{1/\gamma}}{(1-\eta) V_{kt}^{1/\gamma} + \eta V_t^{1/\gamma}}$$

Model: Population Evolution

- We can construct flows between states using the moving probability:

$$N_{j,t+1} = \sum_k N_{kt} \mathrm{Pr}_{jkt}$$

Population of state j in period $t+1$

Population of states k in period t

Probability of moving to j from k

- The population evolves according to a weighted average between the share of value in state j and the population already in j

Model: Value Evolution

- If $1/\gamma = 0$ then the evolution of value $V_{j,t+1}$ has a closed form
  - Formally, $1/\gamma$ is the elasticity of substitution between moving and staying
  - Intuitively, $1/\gamma \approx 0$ implies a small response of out-migration to a shock
- The migration literature has shown that decreases in net-migration from a negative shock are driven primarily by declines in the in-migration rate, with little response of the out-migration rate
- I also estimate $1/\gamma \approx 0$

Model: Dynamic System

- The dynamic system is characterized by the equations for the evolution of population and value and a set of initial conditions
- To solve the model forward:
    1. Determine initial conditions
    2. Apply a shock
    3. Recalculate initial conditions
    4. Determine the evolution of each state’s population and value
- The iterative process that occurs after a shock is a contraction mapping so the process converges and is globally stable

Model: Calibration

- Solving the dynamic system requires calibrating several parameters:
- Calibration:
  - $\eta = 0.05$: share of the population that relocates each year
  - $\alpha^* = 0.3$: share of income spent on housing
  - $\beta^* = 0.1$: share of income paid in SALT
  - $\delta = 0.95$: discount factor
- Estimated:
  - $1/\gamma \approx 0$: from a regression of out-migration rate on tax price
  - $1/\lambda = 1.87$: from a regression of in-migration rate on tax price

Model: Calibration

- I must also apply a “shock” to the system from a change in tax price
- I assume there is a social cost of public funds: increasing the effective price of SALT distorts productive activity
  - Specifically, a 1% increase in the in the SALT burden decreases productivity B_j by 0.5%

Model-Predicted Change in State Revenues from SALT Shock

Top 10				Bottom 10			
State	Revenue Change (%)	Income Tax as a % of All Revenues	Tax Price Increase	State	Revenue Change (%)	Income Tax as a % of All Revenues	Tax Price Increase
NV	0.48	0	0.05	CT	–0.55	23	0.23
FL	0.42	0	0.07	MO	–0.38	17	0.30
TN	0.31	1	0.05	GA	–0.38	18	0.30
WY	0.31	0	0.10	MA	–0.35	23	0.30
TX	0.24	0	0.15	NJ	–0.34	17	0.24
SD	0.24	0	0.08	KS	–0.33	10	0.31
WA	0.15	0	0.06	MD	–0.31	29	0.31
NH	0.15	1	0.20	NC	–0.30	17	0.30
ND	0.05	4	0.23	DC	–0.28	19	0.21
AK	0.04	0	0.11	NY	–0.25	23	0.23

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Conclusions

- Evidence is presented for a migration response to changes in SALT deductibility by households in the top 1% of the income distribution
- The results imply that the optimal degree of state tax progressivity is less than it would be without such responses
- High-tax states, which tend to vote Democratic, are likely to be the most adversely affected by the TCJA's limitation of the SALT deduction, while low-tax states stand to gain the most
- State policymakers should take seriously the idea that imposing high taxes could cause high-income taxpayers to flee their states, thereby attenuating the intended revenue and distributional outcomes

Thank you!

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website: https://www.adrukker.io