

Interstate Migration and State Taxes: A Natural Experiment in Montana

Dan Dodds¹

Summary

In 2005, Montana reduced income taxes for high income taxpayers by about one-fifth while leaving taxes for middle- and lower-income taxpayers essentially unchanged. This provided a natural experiment to test the responsiveness of interstate migration to state tax differences. If migration is highly responsive to tax differences, there should be a break in observed migration behavior of high income households that is not observed for middle and low income households. An analysis of migration using state tax returns shows some evidence of an effect on in-migration but no evidence of an effect on out-migration .

Introduction

Individual decisions of whether and where to move are affected by many personal, social and economic factors.² One of the economic factors affecting this decision is expected disposable income in different locations. Since disposable income is partly determined by taxes, changes in taxes levied by a jurisdiction may be expected to have an effect on a resident's probability of migrating out of the jurisdiction and on a non-residents' probability of migrating into the jurisdiction. Changes to Montana's income tax that took effect in 2005 provide a natural experiment to test the importance of taxation for migration decisions of higher-income individuals.

Through 2004, Montana had income tax rates ranging from 1% to 11% and allowed an itemized deduction for the full amount of federal income taxes. The top rate applied to taxable income over \$80,300. In 2005, the top rate on ordinary income was reduced to 6.9%, the top rate on capital gains income was reduced, first to 5.9% and then to 4.9% in 2007³, and the deduction for federal taxes was limited to \$5,000 (\$10,000 for a joint return.) Rate brackets were made narrower, and the top rate applied to taxable income over \$13,900.

These changes resulted in large tax reductions for most, but not all, higher-income taxpayers, essentially no change on average for middle income taxpayers, and reductions for lower-income taxpayers that were large in relative terms but small in absolute terms. On average, higher-income taxpayers had their disposable income increased by 1% or more, while middle and low income taxpayers had imperceptible changes in disposable income.

¹ Montana Department of Revenue. The opinions expressed in this paper are the author's and do not necessarily reflect the positions of the Department of Revenue.

² For recent surveys of research on economic influences on migration, see Cushing and Poot (2004) and Etzo (2008).

³ Preferential treatment for capital gains is implemented as a non-refundable credit equal to 2% of capital gains income.

If state taxes have a large effect on interstate migration, in-migration should have increased and out-migration should have decreased for high-income individuals relative to the rest of the population. This paper uses Montana income tax return data to test for these relative changes in migration.

Migration and Possible Effects of Tax Policy

Migration can be seen as a process where people try to improve the match between their heterogeneous preferences and human capital and the heterogeneous amenities, dis-amenities and employment and business opportunities of various locations. People will migrate if they expect that, on balance, the rest of their life will be enough better somewhere else to compensate for the costs of moving.

People may find themselves in a location where they see a poor match for their preferences or human capital because of their own past decisions or because that is where their family of origin is. In some cases, a past move may not have worked out as hoped. For example, someone may have moved to take a job with an employer who later went out of business. In other cases, the mismatch may be because people have different preferences at different points in the life cycle. People often want different amenities after they retire than they did when they were younger and had children in school. Sometimes, people will decide there is a mismatch when they become aware of opportunities or amenities in other locations. They may be sent a job announcement or they may be enchanted by a place they visit.

Moving has monetary and non-monetary costs. The monetary costs may be low for a young single but can run into the tens of thousands of dollars for a middle aged couple with children. The non-monetary costs include the time involved in the move, the breaking of routines and ties to people and places, and the effort of establishing new ties and routines in an unfamiliar place.

The process of deciding to move also has costs. In most cases, potential migrants will expend time and resources learning about one or more potential destinations. In some cases, a person faces a binary decision of whether to accept a job offer in another location. At the other extreme, someone feeling dis-satisfied with their current situation faces an open-ended search problem. They may conduct a sequential, multi-level search process until they either find a place they want to move to or give up and stay where they are.

Individual decisions to migrate may be triggered by a number of factors. Some people may begin a search process as the result of long-running dis-satisfaction with their current situation. At the other extreme, people who were not contemplating moving may be made aware of opportunities in another location by formal means or informal contacts. In many cases, the decision process is triggered by a life event that changes the benefits or costs of different locations or reduces the cost of migrating. These events can include finishing school, retirement, loss of a job, marriage, divorce, birth of a child or children growing up and leaving home.

The sum of individual migration decisions generally will produce a two-way flow of migrants between any pair of states. Changes over time in the myriad of factors that affect individual migration decisions will affect the rates of in- and out-migration for any area. These factors include the relative economic performance of various areas, including the relative performance of industries that are more or less

important in an area; the state of the business cycle and whether two areas are in phase or out of phase; changes in amenities, such as increasing congestion in an area with rapid population growth; changes in tastes for amenities; changes in the age composition of the population; changes in the relative cost of housing; and many others. Some of these changes will produce trends in migration rates. Others will produce short-run fluctuations.

If a state changes its taxes, it may affect individual migration decisions, which will affect the state's in-migration and out-migration rates. A change in one state's taxes will directly affect the present value of expected future disposable income that can be earned in that state, which will affect the relative benefits and costs of a move into or out of that state.

Potential migrants may also perceive indirect messages from a change in taxes. A general increase or decrease in taxes may be perceived as a signal about a jurisdiction's commitment to provide public services. A general tax increase may make a state more attractive to someone who places a high value on public services, while a general tax decrease may make a state more attractive to someone who places a low value on public services. A change in taxes that shifts tax burden between groups of taxpayers may be perceived as a signal about the general attitude towards different groups of people. If more of the tax burden is shifted onto or off of people like me, I may feel like I will be less or more welcome in a state.

To the extent that potential migrants respond to a change in expected after-tax income or other signals, a change in state taxes can be expected to affect in-migration and out-migration rates from the time of the change on. Any change in migration rates due to the change in tax law will occur at the same time as short- and long-term changes from other factors. The challenge is to separate any change due to the change in tax law from the many changes due to other factors.

Expected Effects of the Montana High-Income Tax Cut

In 2003, the Montana legislature passed legislation that significantly restructured the state's income tax, to be effective in 2005. Top and bottom rates were lowered, the number of rate brackets were reduced and brackets were made much narrower. The itemized deduction for federal income tax, which only a few states allow, was capped at \$5,000 per taxpayer. And, capital gains income was given preferential treatment, which less than half of states do. Table 1 shows rate tables for the year before and the year after the law change.⁴

⁴ Unlike most states and federal law, Montana has a single rate table for all taxpayers rather than different rate tables for singles, joint, married separate, and head-of-household filers. Montana also allows married couples who file a joint federal return to file separate state returns.

Table 1
Montana Rate Tables Before and After Law Change

2004		2005	
Taxable Income	Marginal Rate	Taxable Income	Marginal Rate
\$0 to \$2,300	2%	\$0 to \$2,300	1%
\$2,301 to \$4,600	3%	\$2,301 to \$4,100	2%
\$4,601 to \$9,200	4%	\$4,101 to \$6,200	3%
\$9,201 to \$13,800	5%	\$6,201 to \$8,400	4%
\$13,801 to \$18,400	6%	\$8,401 to \$10,800	5%
\$18,401 to \$22,900	7%	\$10,801 to \$13,900	6%
\$22,901 to \$32,100	8%	Over \$13,900	6.9%
\$32,101 to \$45,900	9%		
\$45,900 to \$80,300	10%		
Over \$80,300	11%		

This restructuring was targeted towards reducing taxes on high-income individuals, but it changed taxes for people all up and down the income distribution. The lower bottom rates reduced taxes for everyone, while the narrower brackets started offsetting that for taxpayers with taxable incomes over about \$10,000. The lower top rates and capital gains preference reduced taxes for higher-income taxpayers, but the cap on the itemized deduction for federal taxes more than offset that for some taxpayers.

Table 2 shows the population of 2008 resident income tax returns divided into six income groups and the effects of the tax restructuring on each group.⁵

Table 2
Income Groups and Effects of Tax Law Change

Income Group	Income Range 2005\$	Number of 2008 Returns	Mean 2008 Tax Change		Mean Change After-Tax Income*	Share With Tax Change		
			\$	%		<-2%	-2% to +2%	>+2%
1	Less than \$0	6,574	\$0	n/a	0.00%	0%	100%	0%
2	\$0 to \$25,000	204,880	-\$25	-13.2%	0.20%	60%	39%	1%
3	\$25,000 to \$50,000	105,493	-\$7	-0.6%	0.02%	40%	33%	27%
4	\$50,000 to \$100,000	91,039	-\$55	-2.1%	0.08%	47%	28%	25%
5	\$100,000 to \$250,000	25,643	-\$532	-7.3%	0.42%	63%	15%	22%
6	Over \$250,000	4,820	-\$10,022	-20.6%	2.01%	75%	7%	18%

*Mean change in income less federal and state income tax, accounting for interaction of federal and state taxes.

This income tax restructuring affected potential migrants in ways that varied with income. It changed expected future disposable income for many, with winners and losers distributed throughout the

⁵ Montana allows married couples to file separate returns on a single form. In constructing income groups, separate returns on the same form were treated as a single return and their income was combined.

income distribution. High income taxpayers were primarily winners, with average increases in after-tax income on the order of 1% to 2%. In the middle of the income distribution, about a quarter were losers, and the rest were winners or had negligible changes. The average change for middle income taxpayers was essentially zero. Low income taxpayers were disproportionately winners, but the average change in after-tax income was small.

Overall, income tax revenue was reduced by about 10%. The legislation was made revenue neutral in the short run by increases in narrow-based consumption taxes on lodging, car rentals, cigarettes, and other tobacco products. In the longer run, growth of these replacement taxes has not kept pace with the growth of income tax revenue, and there has been a significant net revenue reduction.

The lodging and rental car taxes were intended to shift part of the state's tax burden to visitors but also impacted residents. Payments of these offsetting taxes probably are weakly correlated with income. The cigarette and tobacco tax increases shifted taxes to tobacco users from non-users. Cigarette and tobacco taxes were almost quadrupled. A pack-a-day smoker would have paid an additional \$190 per year in tax. This was larger than the average income tax cut for taxpayers with incomes less than \$100,000 and much smaller than the average income tax cut for taxpayers with incomes over \$250,000. Since tobacco use is negatively correlated with income, the net effect would have been a reduction in disposable income for low and middle income tobacco users, a mix of small changes in both directions for low and middle income non-tobacco-users, and predominantly increases that were large in dollar terms but relatively small in percentage terms for high income individuals regardless of their tobacco use.

The legislation was promoted as being revenue neutral, at least in the short run, so there was little reason to expect changes in public services or other amenities. Some potential migrants may have seen the legislation as an indication of a general change in political climate, but any such changes in perceptions of Montana as a place more or less friendly to "people like me" is likely to be correlated with changes in disposable income.

Individuals make a binary choice of whether to migrate, based on a myriad of individual characteristics and circumstances, most of which are unobservable. Observed choices can be viewed as draws from a probability distribution where migration probabilities depend on observed characteristics. The observed migration rate for a population is the result of the individual migration decisions of its members. Identifying the effect of a tax law change on migration depends on identifying subpopulations where the migration rate is expected to respond differently to the tax change.

The change in tax law considered here did not have a threshold between affected and unaffected taxpayers, so it is impossible to construct control and comparison groups who are similar but on opposite sides of a threshold. With individuals who saw both increases and decreases in expected future disposable income all up and down the income distribution, identification here depends on the proportion of winners and losers and the size of changes in disposable income being different between income groups.

For Group 6 in Table 2, winners outnumber losers by a wide margin and average gains may be large enough to affect behavior.

For Group 5, winners outnumber losers, but the average gain is much smaller than for Group 6, in both average and percentage terms. If individuals in Groups 5 and 6 are similar in ways other than income,

the smaller after-tax income changes for Group 5 would be less likely to change migration decisions than the larger changes for Group 6.

Groups 3 and 4 have lower proportions of winners and higher proportions of losers than Groups 6 and 5. For non-tobacco users, the average change in disposable income is probably too small to notice, let alone affect location decisions. For tobacco users, the average loss probably is noticeable, but probably is not large enough to affect location decisions except possibly for a few taxpayers at the margin.

For Group 2, winners outnumber losers for non-tobacco-users but the changes in current disposable income are probably too small to notice, let alone affect location decisions. For tobacco users, losers outnumber winners, and losses are large enough to be noticeable, but probably not large enough to affect migration choices except for a few potential migrants who are right on the margin. Group 2 contains a mix of individuals with low lifetime incomes and individuals with low current incomes but higher lifetime incomes. Members of Group 2 who have low current incomes either because they are young or because their current-year income has large negative transitory components may perceive the tax change as affecting their expected future incomes as if they were members of one of the higher income groups. Because of this, it is possible that migration rates could change in either direction, but there is no basis for strongly expecting a change in one direction over the other.

Individuals in Group 1 have losses from business or asset sales that are greater than their current income from other sources. While some will be in this position year after year because of successful tax planning or unsuccessful business planning, most will expect to be in one of the other income groups in future years. As with group 2, there is no basis for forming a strong expectation of changes in migration rates.

To the extent that migration decisions are affected by expectations of future after-tax income, it can be hypothesized that Group 6, and possibly Group 5, will see an increase in in-migration and a decrease in out-migration not shared by the other income groups.

Since migration rates are affected by many factors, it is necessary to use a difference-in-differences methodology comparing the change in a group expected to respond to the tax change to the changes in groups where the migration rate is not expected to respond to the tax law change. Since a difference-in-differences comparison can yield false positives if the control group's behavior changes in response to unobserved factors, having multiple comparison groups with different characteristics should help with identification. Having a relatively long data series also helps with identification. If the tax law change affected two groups differently, there should be a break in the data associated with the law change with a persistent difference between the two groups' before and after behavior. With multiple years before and after the law change, it is less likely that the effects of other transitory factors will be misinterpreted as being due to the law change.

Group 3 was chosen as the primary reference group because the income tax change should, on average, have had no effect on disposable income, and incomes are high enough that the tobacco tax increases effect on users' disposable incomes would be relatively small. Group 6 is the primary comparison group because it is the one group where the income tax changes may be large enough to produce an observable change in migration.

Groups 2 and 4 were chosen as secondary reference groups because they also are minimally affected by the tax change. Comparing Groups 3 and 6 to them may help determine whether any difference between Group 6 and Group 3 is due to changes by Group 6 or changes by Group 3.

What we are looking for is, for out-migration

$$\frac{\text{Group 6 Outmigration Rate, Post}}{\text{Group 6 Outmigration Rate, Pre}} < \frac{\text{Group 3 Outmigration Rate, Post}}{\text{Group 3 Outmigration Rate, Pre}}$$

and not

$$\frac{\text{Group 6 Outmigration Rate, Post}}{\text{Group 6 Outmigration Rate, Pre}} \approx \frac{\text{Group } i \text{ Outmigration Rate, Post}}{\text{Group } i \text{ Outmigration Rate, Pre}}$$

for $i = 2$ and 4 .

For in-migration, we are looking for

$$\frac{\text{Group 6 Outmigration Rate, Post}}{\text{Group 6 Outmigration Rate, Pre}} > \frac{\text{Group 3 Outmigration Rate, Post}}{\text{Group 3 Outmigration Rate, Pre}}$$

and not

$$\frac{\text{Group 6 Outmigration Rate, Post}}{\text{Group 6 Outmigration Rate, Pre}} \approx \frac{\text{Group } i \text{ Outmigration Rate, Post}}{\text{Group } i \text{ Outmigration Rate, Pre}}$$

for $i = 2$ and 4 .

While the effect of a tax change should show up as a persistent difference between Groups 6 and 3, that difference may not be constant over time.

Interstate migration is affected by business cycles, particularly when the cycles in different states or regions are out of sync. It is possible that the effect of taxes on migration would vary across the business cycle. For example, suppose that business cycles are typically in phase for States A and B and that these states typically are out of phase with State C. When A and B are booming and C is in recession, outmigration from C is likely to be elevated. Since the additional migrants are more-than-usually motivated by economic factors, their choice between A and B as destinations may be more-than-usually sensitive to differences in after-tax income. When C is booming and A and B are in recession, potential out-migrants from C are likely to be more-than-usually motivated by non-economic factors, and their choice between A and B as destinations may be less-than-usually sensitive to differences in after-tax income.

The response to a tax change may also have dynamic components. It is possible that a change in tax law could include a short-term surge in migration with a smaller long-term change. This could be the case if there is a large number of people close to the margin between migrating and not migrating and the tax change pushes a significant number over that margin.

The opposite could occur if migration decisions often involve protracted search and information gathering with a progressive narrowing of options. In this case, potential in-migrants who had already eliminated a state from consideration and potential out-migrants who had already decided to leave might not respond to a change in tax law. This would produce a larger effect in the long term than in

the short term. Having a relatively long data series makes it possible to look for these kinds of dynamic effects.

Montana Tax Returns and Measurement of Interstate Migration

The author has maintained a database of information from all timely-filed Montana income tax returns since 1998. For each year, it includes returns processed by the first week of November. This includes almost all returns that were filed by the October 15 deadline for filing with an extension. It does not include some returns that were filed by the deadline but were rejected because of math errors or other inconsistencies. It also does not include most returns filed after this deadline. This database was used to identify migrants and non-migrants. It also was used as the source for data on individual characteristics to use as control variables. The long time span it covers, seven years before the law change and eleven after, allows the use of year dummies to account for unobserved transitory effects, such as business cycles, that may affect the income groups differently.

The data

Montana income tax returns require taxpayers to provide the same information as is on their federal income tax return, plus some state-specific information. This includes each of the income line items on the federal return and essentially the same itemized deductions as allowed by federal law. Montana's standard deduction is much lower than the federal standard deduction, so some taxpayers who take the federal standard deduction itemize on their state returns.

State tax returns require taxpayers to choose one of three residency statuses. A full-year resident is, as the name implies, someone who has maintained their residence, for tax purposes, in the state for the whole year. A non-resident is someone whose residence, for tax purposes, is in another state. In general, a non-resident will file a return with a state only if they have income whose source is in that state. A part-year resident is someone who has either moved into the state or moved out of the state during the year. Someone who changes their permanent residence during a year should file part-year returns with both the state they are leaving and the state they are moving to. Someone who splits their time between two or more residences in different states has to choose one state as their state of residence for taxes and other purposes. If they have income in more than one state, they should be filing a resident return with one state and non-resident returns with the others.

When a taxpayer has income in two or more states, each state will use a formula to apportion that income. In general, when a taxpayer moves between states, the apportionment is based on the fraction of total income earned while a resident of each state. For a taxpayer with income from several states, the general rule is that the state of residence taxes all income but gives a credit for taxes paid to other states, while other states tax income from employment or directly-owned business activities in that state. This means that a taxpayer with homes and businesses in two or more states may be able to reduce their taxes by picking their tax residence without making any change to their physical residence.

Taxpayers are required to give an address on their return. In most cases, this is the address of the taxpayer's primary residence. However, in some cases it is something else, and this limits its usefulness in analyzing interstate migration. The address on the return may be a former address where the taxpayer no longer lives. It may be a temporary or seasonal address where the taxpayer happened to be

when they filed their return. In some cases, it is the tax preparer's address. About two percent of resident returns give an out-of-state address. For taxpayers who file a part-year return as part of an interstate move, it appears that about 85% give an address in their new state and about 15% give an address in their old state.

For a taxpayer who dies during the year, their personal representative is required to file a return, and there is a checkbox to indicate the final return of a decedent. Unfortunately, this field was not recorded in the database before 2008. This makes it impossible to distinguish between a taxpayer who stopped filing returns because they moved out of state and a taxpayer who stopped filing because they died in the pre-tax-law-change period.

Interstate migration and observed filing status transitions

Individual outcomes used as the dependent variable in the analyses presented here are transitions from filing status in a base year to or from filing status in a comparison year, which is either later or earlier than the base year. The transitions serve as indicators of whether the taxpayer has stayed in place, made an interstate move, or changed tax home.

Ideally, a taxpayer who moves between states in year t should file the following sequence of returns: For year $t-1$, they should file a resident return with their old state, and they may file a non-resident return with the new state, but only if they have income with its source in the new state. For year t , they should file part-year returns with both states. For year $t+1$, they should file a resident return with their new state, and they may file a non-resident return with their old state, but only if they have income with its source in the old state. Someone selling real estate or a business interest in their old state may be required to file non-resident returns for several years.

Ideally, a taxpayer who is just changing their tax home will make the change as of the end of a year. For the year before the change, they will file a resident return with the old state and a non-resident return with the new state. For the year after the change, they will file a resident return with the new state and a non-resident return with the old state.

Of course, people do not always follow these ideal patterns. In some cases, this is for legitimate reasons. Someone who makes a physical move near the beginning of the year or who had no income in their old state may not have any reason to file a part-year return. On the other hand, where tax returns are concerned, a significant fraction of the population just doesn't do it right, sometimes intentionally, sometimes not. In particular, taxpayers moving out of a state often ignore their filing responsibilities unless they had tax withheld and expect a refund.

Seven observed transitions are used as the outcome measures in the analysis reported here. For the reasons outlined above, these observed filing status transitions are imperfect indicators of physical migrations or changes of tax home.

1. Resident to resident: The taxpayer files a resident return in both the base year and the comparison year. This taxpayer is assumed not to have migrated and has not changed their tax home.
2. Resident to part-year or non-resident: The taxpayer files a resident return in the base year and either a part-year or non-resident return the following year. This taxpayer is assumed to have migrated or changed tax home.

3. Resident to non-filer: The taxpayer files a resident return in the base year and does not file the next year. This taxpayer may have moved out of state. They may also have died, stopped filing for some other reason, or have filed after the extension deadline.

The actual number of out-migrants, including those changing tax home, is larger than the number of resident to part-year or non-resident transitions and smaller than the sum of that number and the number of resident to non-filer transitions. For year-to-year comparisons, the number of resident to part-year or non-resident transitions can be interpreted as a consistent measure of the number of out-migrants who file more or less correctly. This should be very highly correlated with the total number of out-migrants. The number of resident to non-filer transitions measures the sum of out-migrants who do not file correctly, the number of taxpayers who die, and the number who stop filing for some other, unknown reason. This is likely to be less highly correlated with the number of out-migrants. However, the other components of this number, such as deaths, may be uncorrelated with the number of migrants and with the explanatory variables.

4, Non-resident or part-year resident to resident: The taxpayer files a resident return in the base year and filed either a part-year or non-resident return the previous year. This taxpayer is assumed to have either migrated or changed tax home.

5. Non-filer to resident: The taxpayer files a resident return in the base year and did not file in the previous year. This taxpayer may have migrated and not filed correctly. This taxpayer may also be a resident who previously did not file a return. They may be a young person who previously had no income or someone whose income was below the filing threshold. They may be a newly divorced person who previously was included in a joint return. Or they may be a non-filer who was caught and forced to file.

The actual number of in-migrants, including those changing tax home, is larger than the number of nonresident or part-year resident to resident transitions and smaller than the sum of that number and the number of non-filer to filer transitions. Again, the transition from part-year or non-resident filer to resident filer is likely to be highly correlated with actual migration, and the other components of the number of non-filer to resident transitions may be uncorrelated with actual migration and the explanatory variables.

6. Resident claiming credit for other states' taxes to non-resident or part-year resident: This taxpayer filed a resident return claiming the credit for taxes paid to another state in the base year. The next year, they filed a non-resident or part-year resident return. This is assumed to be a taxpayer who either moved out of the state or changed their tax home.

7. Non-resident or part-year filer to resident claiming credit for other states' taxes. This taxpayer filed a non-resident or part-year resident return for the base year. The next year, they filed a resident return claiming the credit for taxes paid to another state. This is assumed to be a taxpayer who either moved to the state or changed their tax home.

Taxpayers who have income with sources in multiple states are very likely to be in that situation year after year. Limiting the analysis to the population of residents who claimed the credit in the base year and filed a return in the comparison year eliminates the uncertainty associated with non-filing but restricts the analysis to a smaller sub-population. This should increase confidence in the results but make them less general.

Potential explanatory variables

In general, someone will migrate if they expect the rest of their life to be better somewhere else and for that difference to more than offset the costs of moving. The probability of an individual migrating in any year depends on many factors. Some are idiosyncratic, such as job skills, preferences, family circumstances, life-stage changes, and positive or negative associations with a particular place or region. Others are related to outside circumstances, such as employment prospects and wages in different places or the state of the business cycle.

Migration behavior here is modeled as a choice between either two or three of the transitions listed above. The explanatory variables of primary interest are a set of dummies indicating membership in one of the six income groups in Table 1 and whether the time period is before or after the tax law change. Income Group 3 before the tax law change is taken as the baseline. Taxpayers are divided into groups for two reasons.

First, there is not a simple division of the population into affected and unaffected subpopulations. Taxpayers with the highest incomes were most likely to have received a tax cut and they had larger tax cuts than those with not-quite-so-high incomes. Taxpayers with medium and lower incomes had changes that were small on average, but some had tax increases and some had tax reductions. This suggested using individual income as an explanatory variable rather than trying to classify individuals as affected or unaffected, but preliminary runs with income treated as a continuous variable generally failed to converge to a numeric solution.

Second, taxpayers who were not affected by the tax law change are a diverse group. In particular, income group 2 includes many young taxpayers and taxpayers whose income-earning prospects in their current location are limited. These are both groups who have a higher probability of migrating and who are likely to respond differently to circumstances than older, higher income taxpayers. This is another reason for separating the population into multiple subpopulations.

The income tax database provides information on a number of individual characteristics that can be used as control variables.

Marital status is an indicator of attachment to a place and of the costs of moving. Marital status is coded with two dummy variables, one for married and one for head-of-household, i.e. single with dependents. This gives single with no dependents as the default.

Homeownership may have conflicting relationships with the migration decision. Homeowners are more likely to be attached to a place and may have higher costs of moving. On the other hand, they are likely to have more resources and be better able to pay the costs of moving. The database does not have a homeownership variable, but it does record whether the taxpayer claimed itemized deductions for mortgage interest or for property taxes. This is coded with two dummy variables, one for claiming at least one of these deductions and one for itemizing without claiming either deduction. This gives taking the standard deduction as the default. Taxpayers who claim one or both of the deductions are almost certainly homeowners. Taxpayers who itemize without claiming one or both of the deductions are almost certain not to be homeowners. Taxpayers who claim the standard deduction may be homeowners, but if so, they are likely to be different from itemizers in a number of ways,

Having dependents is likely to be associated with attachment to a place and with higher costs of moving. Whether the taxpayer claimed any dependents is coded as a binary variable.

Taxpayers who own a business are likely to have strong ties to a place. Taxpayers who are retired may be less attached. Taxpayers who rely on wage and salary income may be more likely to respond to differences in employment prospects, particularly over the course of the business cycle. To try to capture these effects, three dummy variables for dominant source of income were created. One indicates taxpayers with at least 75% of income from wages and salaries. The second indicates at least 75% of income from business sources (reported on the lines for dividends, for income from a sole proprietor business, for income from a pass-through entity, for income from a sole proprietor farm, or on the other income line). The third indicates at least 75% of income from retirement-related sources (social security benefits, IRA distributions, and pensions). The default is no dominant income source.

These control variables are included in all regressions reported here. In addition, year dummies and interactions of the year dummies and control variables were candidates for inclusion in all models.

With the dependent variables and all explanatory variables being categorical variables, it makes sense to think of the analysis presented here as modelling migration rates for subgroups rather than as modelling individual migration decisions. Evidence of the tax law change's effect on migration will be seen in a break in migration rates for subgroups where a majority of subgroup members had large tax reductions with no corresponding break in migration rates for other subgroups.

Estimation and Results

Migration involves two sets of decisions made by at least three populations. The two decisions are whether to change physical residence and whether to change tax residence.

Physical interstate migration, moving from one state to another, involves a change of physical residence. For people of working age moving into or out of Montana, it probably involves changing jobs because Montana has no cross-border urban areas where someone who works in one state can choose whether to live in that state or in one or more others.

For physical migration out of Montana, the population is residents of the state. Residents who are employed or have other income should be filing state tax returns. Thus, the population of resident tax returns for a year provides almost complete coverage of the population of potential out-migrants, missing only those who are not required to file a tax return.

For physical migration into Montana, the population is residents of the rest of the world. Only a tiny fraction of this population files tax returns with Montana, so it is impossible to use Montana tax returns to directly look at the behavior of this population. What is possible is to look at migration rates defined as the fraction of resident returns in a year that can be identified as not having previously been a resident. This should be a reasonable stand-in for migration rates defined as the fraction of the rest of the world that moves to Montana as long as the ratio of Montana population to the rest-of-the world population by income group is stable.

Change of tax residence is a possibility for individuals who have income and residences in multiple states. For change of tax residence into Montana, the population is individuals who are residents of

another state but have a business or other source of income in Montana. These individuals should be filing non-resident Montana tax returns. For change of tax residence out of Montana, the population is individuals who are Montana residents and have income with its source in another state. These individuals should be filing resident Montana tax returns and claiming the credit for taxes paid to another state.

For change of tax residence in either direction, Montana tax returns should provide complete coverage of individuals who have the option to make this choice. The limitation on this data is that there is no way to distinguish between members of these populations who have changed tax home with no real change in residence and those who have physically migrated.

This suggests four general models, one of the rate of out-migration by individuals filing resident returns, one of the rate of in-migration defined as the ratio of in-migrants to resident returns, one of out-migration or change of tax home by individuals filing resident returns and claiming the credit for other states' taxes, and one of in-migration or change of tax home by individuals filing non-resident returns.

In each case, what we are looking for is robust evidence of a break in behavior of the affected population (Group 6) that is not shared by the control population (Group 3).

All four decision processes are modeled as logits with either two or three choice options and potential explanatory variables consisting of dummy variables for income group x pre-law change period, income group x post-law change period, individual characteristics, year, year x income group, and year x individual characteristics. Full models with all explanatory variables (with one from each group excluded as the baseline) were estimated, but the full sets of explanatory variables are close to collinear, and the estimated standard errors of the income group x tax law interaction estimates are very large. To get more precise estimates of the parameters of interest, a series of smaller models were run. In each of these, the income group x tax law interaction variables and the control variables were included and then stepwise addition was used to select from the year dummies and their interactions with the other variables.

Choice of the base year for the year dummies was expected to affect the variables selected. For example, if the base year were a typical year, relatively few year dummies and interaction terms, for atypical years, would be selected. On the other hand, if the base year were an atypical year, such as a year with a sharp recession, more year dummies and interaction terms would probably be selected. Which year dummies and interaction terms were selected would affect the estimates of the other variables unless they were all orthogonal. Therefore, each model was run with each possible base year for the year dummies, and in fact, the number of variables selected and estimated parameters vary between runs.

There is no a priori reason to prefer one base year over another, so results are presented based on the set of all runs for each model. Only results for the variables of interest, the interactions of the income groups and the tax law dummy, are shown here. Full results are available from the author on request.

For each model, a primary test for the null hypothesis of no change in migration due to the tax law change was performed as a one-sided test on the difference in differences between Group 6 and Group 3 at a 5% significance level. The no-effect hypothesis was tentatively rejected for that model if the difference in differences had the expected sign and the Wald Chi-square statistic for the restriction that the difference in differences is zero had a p value less than 0.1.

Secondary checks were performed to try to determine whether any observed difference between Group 6 and Group 3 is due to a change in migration by Group 6, Group 3, or both. First Groups 2 and 4 were compared to Group 3 to see whether Group 3 had a change in migration not shared by the other groups that should have been minimally affected by the tax law change. Next, Group 6 was compared to Groups 2 and 4 to see whether any change in migration by Group 6 was similar to changes experienced by these minimally affected group.

A final check was to look at the odds ratios for the year dummies and their interactions with the income group dummies to see if there are any time patterns that might be affecting the results, such as transitory spikes masking longer-term movements, or that otherwise need explaining.

Outmigration

Outmigration is modeled as a three-way multinomial logit. The population is the set of resident returns from each year from 1998 through 2014. These returns were matched against the next year's returns to classify each into one of three groups based on residency status transitions. The three transition groups are resident to resident (the default), resident to non-resident or part-year resident, and resident to non-filer.

Table A-1 in the appendix shows odds ratio estimates for the income group dummy x tax law interactions. The odds ratio is the ratio of the odds of observing the given outcome conditional on the dummy variable taking the value 1 to the odds of observing the outcome with the dummy taking the value 0.⁶ For each variable, the table shows the mean, median, range, and inter-quartile range of the odds ratio estimates from 17 specifications with different base years for year dummies.

Income Group 3 Pre-Law-Change is the baseline for this group of dummies, so the odds ratio for any other of these variables is the ratio of the odds of observing the given outcome if the observation is in the subpopulation indicated by that variable to the odds of observing the outcome if the observation is in Group 3 before the law change. For example, on average, the odds of a taxpayer in Groups 1 or 2 becoming a non-filer the next year are more than twice as high as the odds of a taxpayer in Group 3 becoming a nonfiler. Since it is the baseline, the odds ratio for Income Group 3 Pre-Law-Change is one by definition.

For each income group, the post-law-change odds ratio was divided by the pre-law-change odds ratio to give a measure of the change in migration by that group.⁷ A ratio greater than one indicates that, for the income group in question, the odds of the given outcome, compared to the default, were higher after the law change than before. A ratio less than one indicates lower post-law-change odds.

Table 3 shows the results. For each income group, it shows the mean, median, range and interquartile range of the calculated ratios for the 17 specifications.

⁶ If b is the coefficient of the dummy variable x in the logistic regression, the associated odds ratio is calculated as e^b .

⁷ If b_{i0} and b_{i1} are the coefficients of the dummy variables for the pre-law-change x Group i interaction and the post-law-change x Group i interaction, then the reported ratio is $e^{b_{i1}}/e^{b_{i0}}$.

Table 3 - Logit Results for Outmigration Model 1

Comparison of Pre-and Post-Law-Change Odds Ratios of Income Group x Tax Law Interactions

Post-Law Change Odds Ratio / Pre-Law Change Odds Ratio

Mean, Median, Range and Interquartile Range over 17 Specifications of Control Variables

Outcome	Income Group	Mean	Median	Range	Inter-Quartile Range
Resident in Base Year, Non-Resident or Part-Year Next Year					
	Group 1	0.926	0.927	0.236	0.049
	Group 2	1.018	1.048	0.280	0.109
	Group 3	0.944	0.964	0.236	0.077
	Group 4	1.022	1.039	0.318	0.117
	Group 5	0.909	0.895	0.225	0.047
	Group 6	1.096	1.103	0.294	0.096
Resident in Base Year, Non-Filer Next Year					
	Group 1	0.922	0.894	0.241	0.081
	Group 2	1.004	0.979	0.377	0.117
	Group 3	1.041	1.014	0.405	0.068
	Group 4	1.161	1.155	0.754	0.131
	Group 5	1.165	1.033	1.902	0.074
	Group 6	1.474	1.188	4.084	0.397
Fraction of Specifications Where Group 6 - Group 3 Difference in Differences is Negative and Significant at 5%					
	Resident in Base Year, Non-Resident or Part-Year Next Year				0.000
	Resident in Base Year, Non-Filer Next Year				0.059

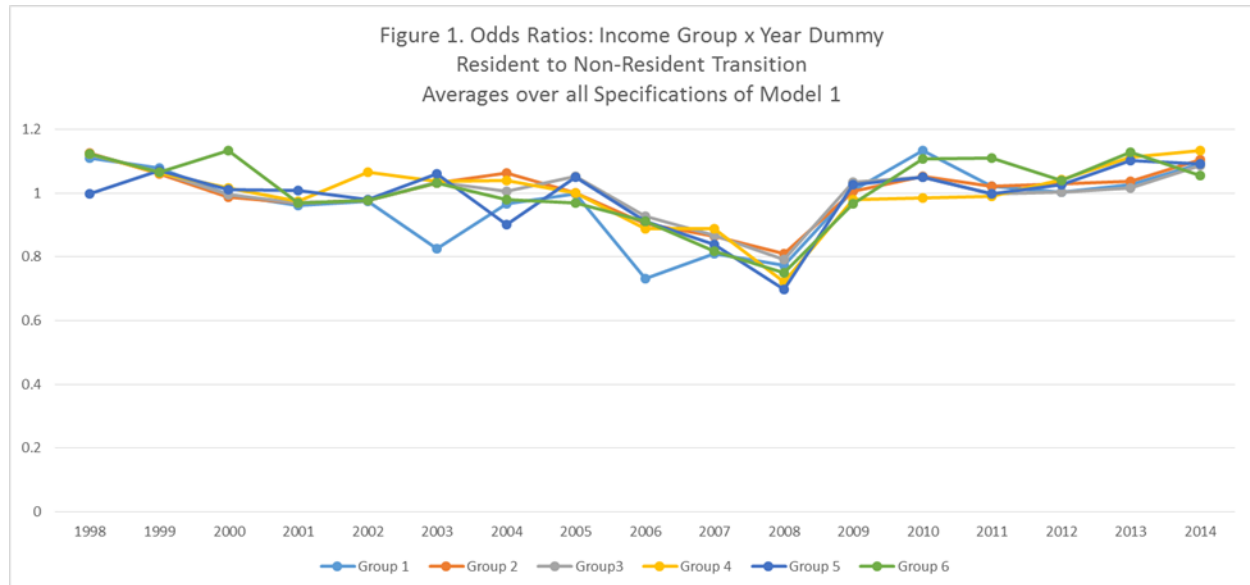
Dividing this ratio for Group 6 by the ratio for Group 3 is equivalent to calculating the difference in differences for the underlying regression parameters and then exponentiating. The bottom part of the table shows the fraction of specifications where this underlying difference in differences is negative and statistically significant for the resident to non-resident or part-year and resident to non-filer transitions.

For the transition from resident to non-resident or part-year filer, the difference in differences is the wrong sign in all specifications. For the transition from resident to non-filer, the difference in differences is the wrong sign in 10 of 17 specifications and is the expected sign and significant in only one specification.

Figures 1 and 2 show information on dynamics within the pre- and post-law-change periods. Each dot shows the average, over all specifications, of the product of the odds ratios for the year dummy for that year (1 for the base year) and the income group x year interaction dummies. For terms that were not selected for inclusion in a specification, this is 1 by definition. For years where the year dummy was selected for inclusion, the associated odds ratio indicates the extent to which the rate of transition in questions was higher or lower that year than in the base year for the specification. For year x income group interactions that were selected, the odds ratio indicates the extent to which the transition rate was higher or lower in that year than in the base year for that group. The product of these two odds

ratios thus captures year-to-year variation in transition rates, both shared by income groups and varying across income groups. The resulting lines show time patterns of the odds for each income group with inter-group differences removed.

Figure 1 shows these ratios for the resident to non-resident or part-year-resident transition



There is a general downward trend from 2004 through 2008 followed by a jump upward for all groups in 2009. This pattern mirrors general economic conditions in Montana. The state lagged behind the national economy in the late 1990s but experienced strong growth in the mid 2000s, largely fueled by exploration and development of oil fields in the Bakken formation of far eastern Montana and western North Dakota. This came to an end between 2008 and 2009 as oil prices spiked downward, development of the Montana portion of the Bakken was largely completed, and the global financial crisis hit.

Group 6 follows the same pattern as the other income groups. There is no indication that these short-run dynamics might be obscuring longer-term inter-group trends.

Figure 2 shows these ratios for the resident to non-filer transition

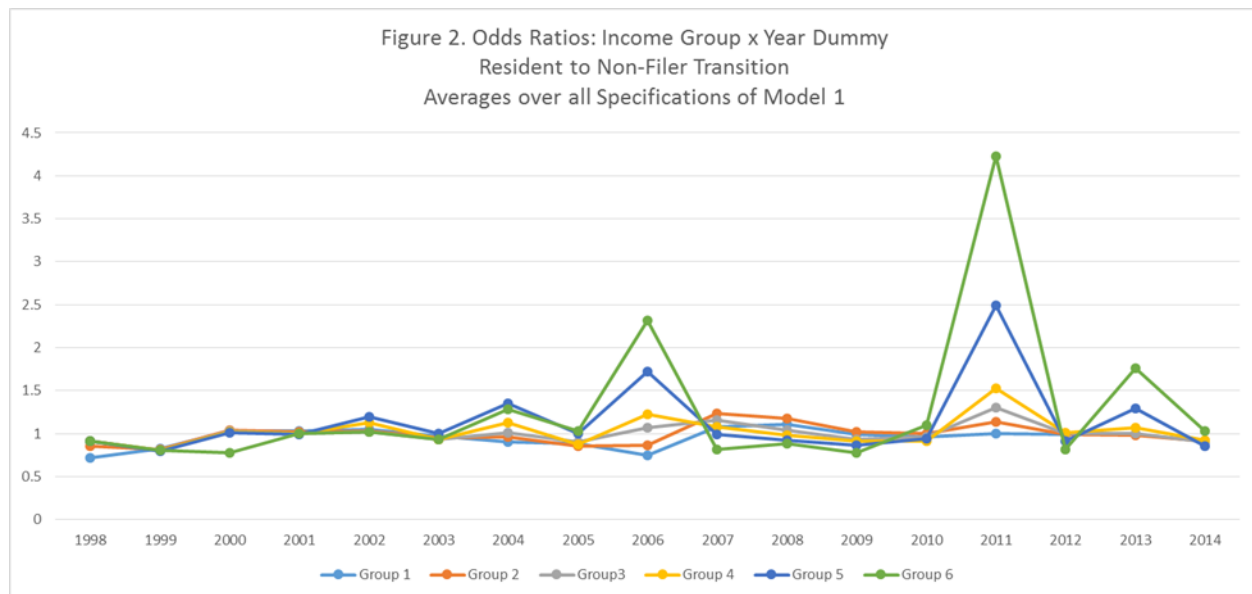


Figure 2 does not show any trends, but has spikes in 2006, 2011, and 2013. These spikes are largest for Group 6 but are present for other groups. A spike in 2006 might be related to the law change (although it goes in the wrong direction), but spikes in 2011 and 2013 are likely due to other causes. One possibility is that these spikes might be due to an abnormally high number of late and/or rejected returns those years, possibly related to federal law changes.

To test whether the spikes in Figure 2 are due to late filing rather than migration, resident returns for each year were matched against the next three years of returns and classified based on the first match or failure to match in the three years. This increased the number of taxpayers classified as making the resident to resident and resident to non-resident or part-year resident transitions and decreased the number classified as making the resident to non-filer transition. This also eliminated the last two years of data, since these returns could not be matched against returns from three later years.

The logit models were re-estimated with this changed classification. Figures 3 and 4 present the same information as Figures 1 and 2 but for the re-estimated models.

Figure 3 has the same general pattern as Figure 1 but a little less inter-group variation.

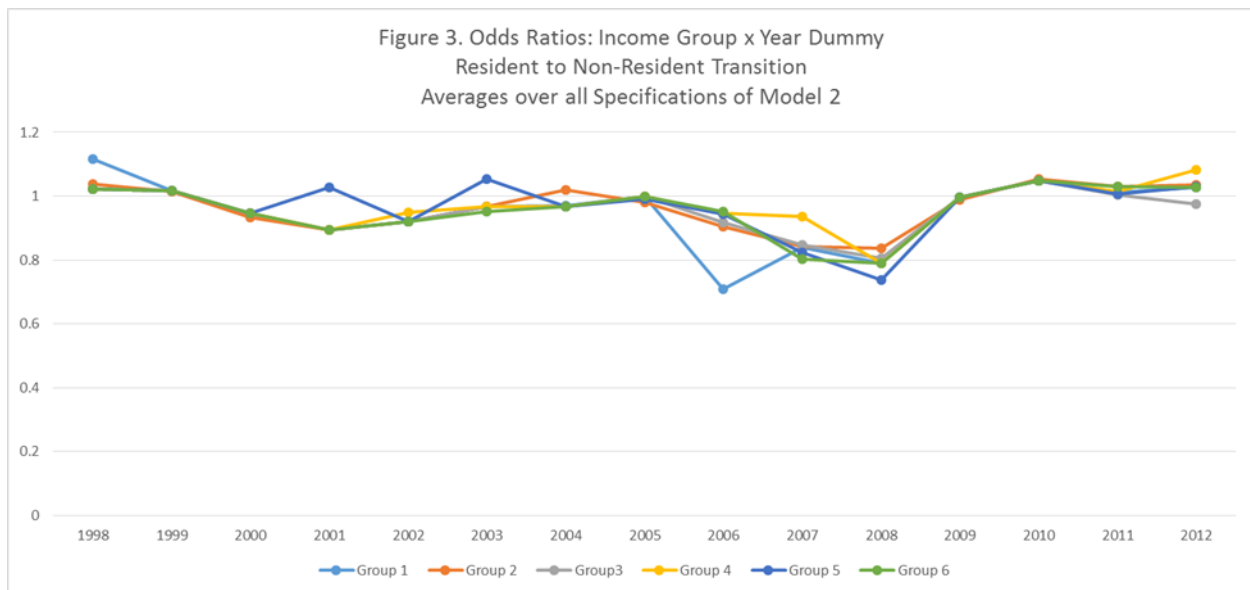
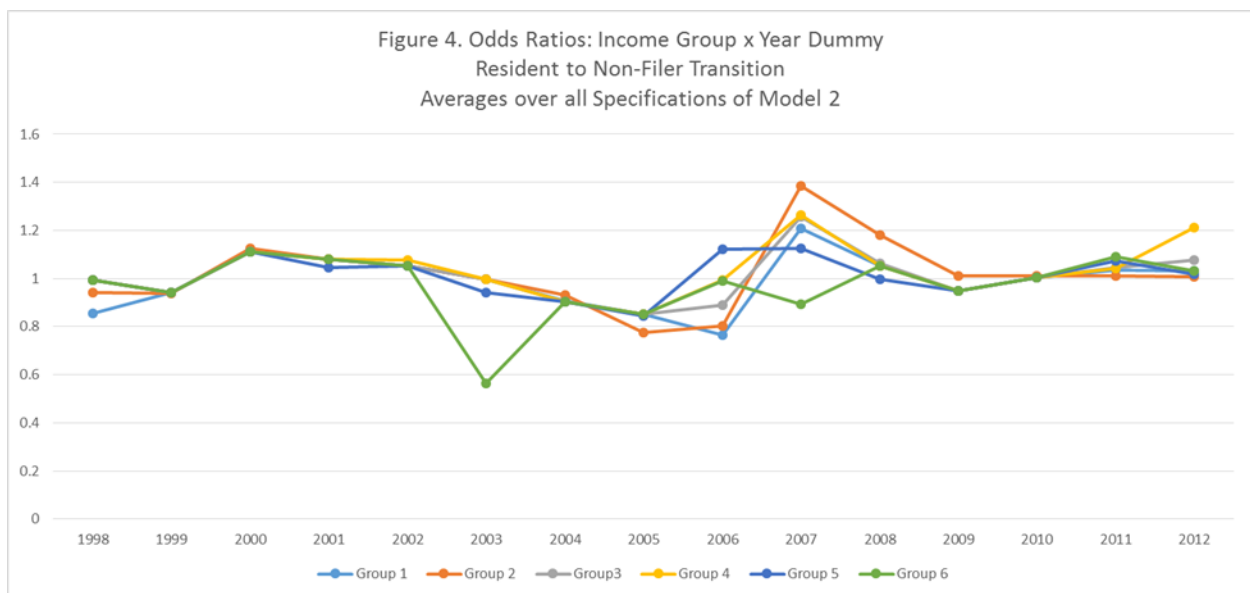


Figure 4 does not have the spikes that are so prominent in Figure 1 but does have some variation. It appears that the spikes were increases in late filers or rejected returns rather than increases in transitions from resident to non-filer. There are relatively large inter-group differences in 2006 and 2007, and most income groups have large changes in these years. Group 6 does not. Group 6 does have a downward spike in 2003. This could conceivably be due to a one-time reduction in out-migration associated with the passage of the income tax restructuring rather than its implementation.



Odds ratio estimates for the re-estimated models are shown in appendix table A-2 Ratios of odds ratios and significance tests are shown in Table 4

Table 4 - Logit Results for Outmigration Model 2

Comparison of Pre-and Post-Law-Change Odds Ratios of Income Group x Tax Law Interactions

Post-Law Change Odds Ratio / Pre-Law Change Odds Ratio

Mean, Median, Range and Interquartile Range over 15 Specifications of Control Variables

Outcome	Income Group	Mean	Median	Range	Inter-Quartile Range
Resident in Base Year, Non-Resident or Part-Year Later Year					
	Group 1	0.950	0.949	0.206	0.055
	Group 2	0.965	0.969	0.241	0.046
	Group 3	0.916	0.924	0.202	0.038
	Group 4	0.917	0.915	0.185	0.071
	Group 5	0.923	0.930	0.207	0.065
	Group 6	1.043	1.052	0.227	0.059
Resident in Base Year, Non-Filer Later Year					
	Group 1	0.957	0.963	0.338	0.128
	Group 2	1.097	1.102	0.480	0.156
	Group 3	1.072	1.078	0.376	0.135
	Group 4	1.100	1.090	0.435	0.144
	Group 5	0.972	0.969	0.376	0.083
	Group 6	1.135	1.109	0.433	0.201
Fraction of Specifications Where Group 6 - Group 3 Difference in Differences is Negative and Significant at 5%					
	Resident in Base Year, Non-Resident or Part-Year Next Year				0.000
	Resident in Base Year, Non-Filer Next Year				0.000

The difference in differences between Group 6 and Group 3 has the wrong sign in every specification for the resident to non-resident or part-year transition and in 16 of 17 specifications for the resident to non-filer transition. In the one specification where it has the expected sign, it is not significant.

Is it possible that the effect of the tax change is being overshadowed by the effect of some other factor affecting Group 6 and Group 3. Table 4 shows little evidence to support this possibility. For the transition from resident to non-resident or part-year resident, the odds ratios decrease for Groups 2 through 4 but increase for Group 6. For the transition from resident to non-filer, the odds ratios for Groups 2 through 4 and Group 6 all increase, with Group 6 having the largest increase.

Change of Tax Residence From Montana to Another State

The population who can change tax home is made up of people who have income from more than one state and may have homes in more than one state. Someone in this population should be filing a resident tax return with one state and filing non-resident returns with the rest of the states where they have income (except for states with no income tax). Someone who changes tax home should just

change which state receives the resident return. Thus, the population for this analysis is resident returns in each year that claim the credit for income tax paid to another state and have a matching return the next year.

The two possible transitions are resident to resident (the baseline) and resident to non-resident or part-year filer.

Odds ratios for the income group x tax law interactions are in appendix Table A-3. Table 5 shows the ratios of post-law-change odds ratios to pre-law-change odds ratios.

Table 5 - Logit Results for Change of Tax Home to Another State

Comparison of Pre-and Post-Law-Change Odds Ratios of Income Group x Tax Law Interactions

Post-Law Change Odds Ratio / Pre-Law Change Odds Ratio

Mean, Median, Range and Interquartile Range over 17 Specifications of Control Variables

Outcome	Income Group	Mean	Median	Range	Inter-Quartile Range
Resident with Credit for Tax Paid fo Other States in Base Year, Non-Resident or Part-Year Next Year					
	Group 1	3.000	3.000	0.000	0.000
	Group 2	1.068	1.071	0.065	0.004
	Group 3	1.013	1.013	0.062	0.009
	Group 4	1.067	1.073	0.112	0.008
	Group 5	0.956	0.958	0.045	0.009
	Group 6	1.060	1.059	0.102	0.008

Fraction of Specifications where Difference in Differences compared to Group 3 is Negative and Significant at 5%

Group 6	0.000
Group 2	0.000
Group 4	0.000

Fraction of Specifications where Difference in Differences Compared to Group 6 is Positive and Significant

	Positive	Significant
Group 2	0.882	0.000
Group 4	0.824	0.000

The Group 6 - Group 3 difference in differences is the wrong sign in all specifications.

Again, it is possible that this result is due to changes in Group 3 rather than changes in Group 6. Groups 2, 4, and 6 all have ratios that are higher than Group 3's and that are similar. Group 6 has a slightly lower ratio than either Group 2 or Group 4 in most specifications, but the difference in differences is never significant.

Figure A-1, in the appendix, shows the product of the year dummies and the year dummy x income group interactions. The graphs are essentially flat, except for two years for Group 4.

It looks like migration by Groups 2, 4, and 6 may all have been affected by some common factor that had a smaller effect on Group 3. There is no evidence of a change in the expected direction that is unique to Group 6.

In-Migration

In-migration is modeled with a three-way multinomial logit. The population is resident returns for each year matched against the previous year's returns. Returns were classified into one of three transitions based on residency status in the previous year or the failure to match a return in the previous year. The three transitions are resident in the base year from resident in the prior year (the baseline), resident in the base year from non-resident or part-year filer in the earlier year, and resident in the base year from non-filer in the earlier year.

Odds ratios for the income group x tax law interactions are in appendix Table A-4. Ratios of post-law-change odds ratios to pre-law-change odds ratios are in Table 6.

Table 6 - Logit Results for In-Migration Model 1

Comparison of Pre-and Post-Law-Change Odds Ratios of Income Group x Tax Law Interactions					
Post-Law Change Odds Ratio / Pre-Law Change Odds Ratio					
Mean, Median, Range and Interquartile Range over 17 Specifications of Control Variables					
Outcome	Income Group	Mean	Median	Range	Inter-Quartile Range
Resident in Base Year, Non-Resident or Part-Year Previous Year					
	Group 1	1.005	1.025	0.248	0.084
	Group 2	0.992	0.985	0.264	0.065
	Group 3	0.932	0.929	0.324	0.113
	Group 4	1.018	1.022	0.302	0.070
	Group 5	0.890	0.897	0.230	0.063
	Group 6	1.144	1.125	0.514	0.102
Resident in Base Year, Non-Filer Previous Year					
	Group 1	1.018	1.012	0.516	0.199
	Group 2	1.147	1.104	0.710	0.135
	Group 3	1.234	1.187	0.757	0.223
	Group 4	1.395	1.366	0.853	0.179
	Group 5	1.380	1.237	2.019	0.263
	Group 6	1.665	1.226	4.125	0.534
Fraction of Specifications Where Group 6 - Group 3 Difference in Differences is Positive and Significant at 5%					
	Resident in Base Year, Non-Resident or Part-Year Prior Year				0.824
	Resident in Base Year, Non-Filer Prior Year				0.235

Group 6's odds of having previously filed as a non-resident or part-year resident increased relative to Group 3's in 16 of 17 specifications, and the difference in differences is significant in 14. Group 6's odds of having previously been a non-filer increased relative to Group 3's in 14 of 17 specifications, but the difference in differences is significant in only 4.

Figure 5 shows the products of year dummy and year dummy x income group odds ratios for the transition from non-resident or part-year filer to resident. There is a possible pattern after the law change, with Group 6 starting lower than the other groups but increasing over time and generally being higher than the other groups in the later years.

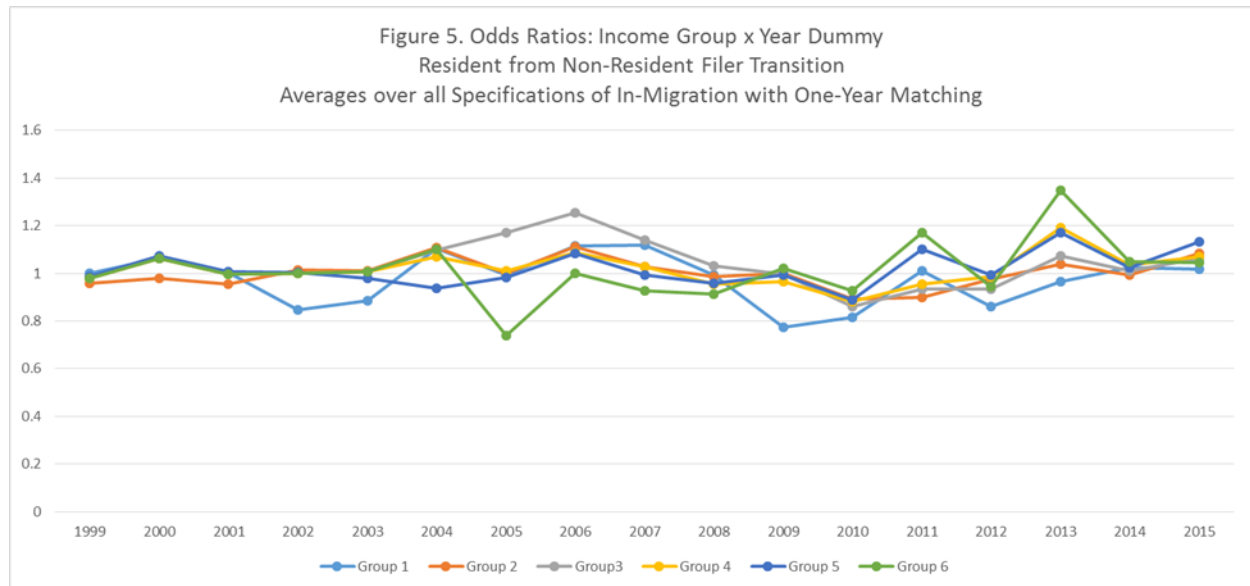
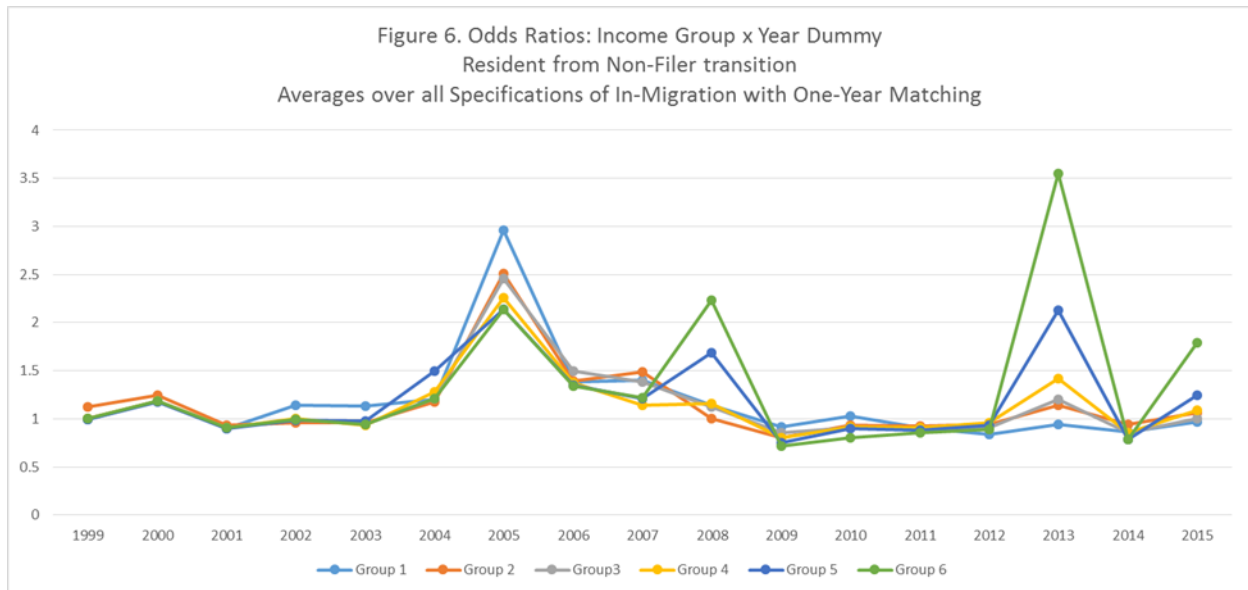
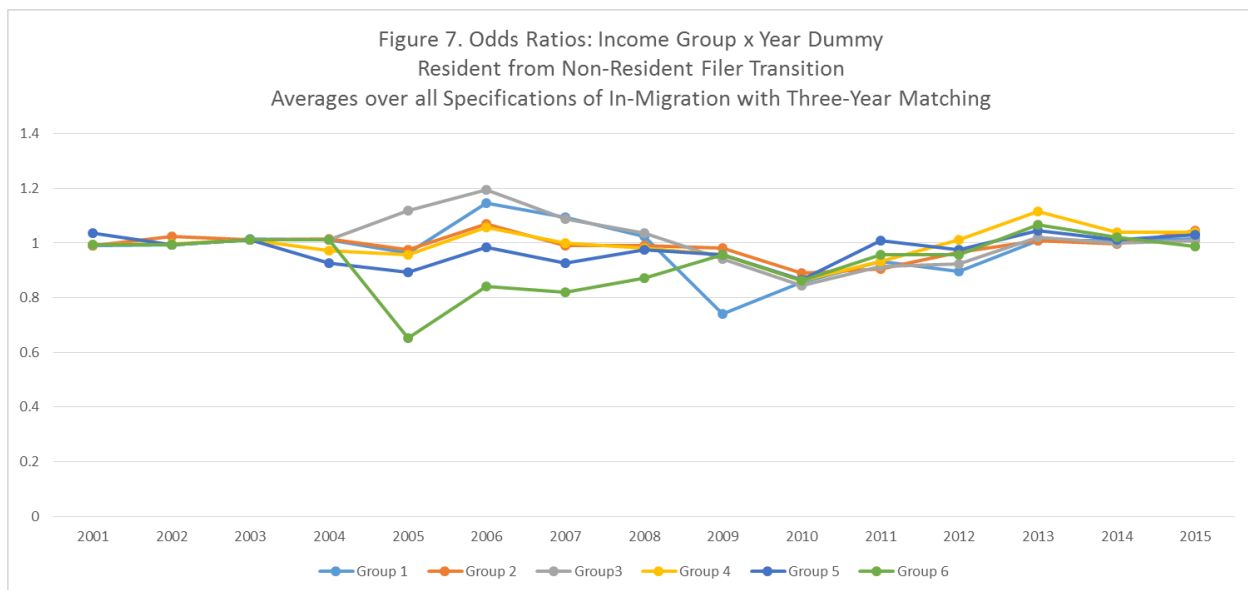


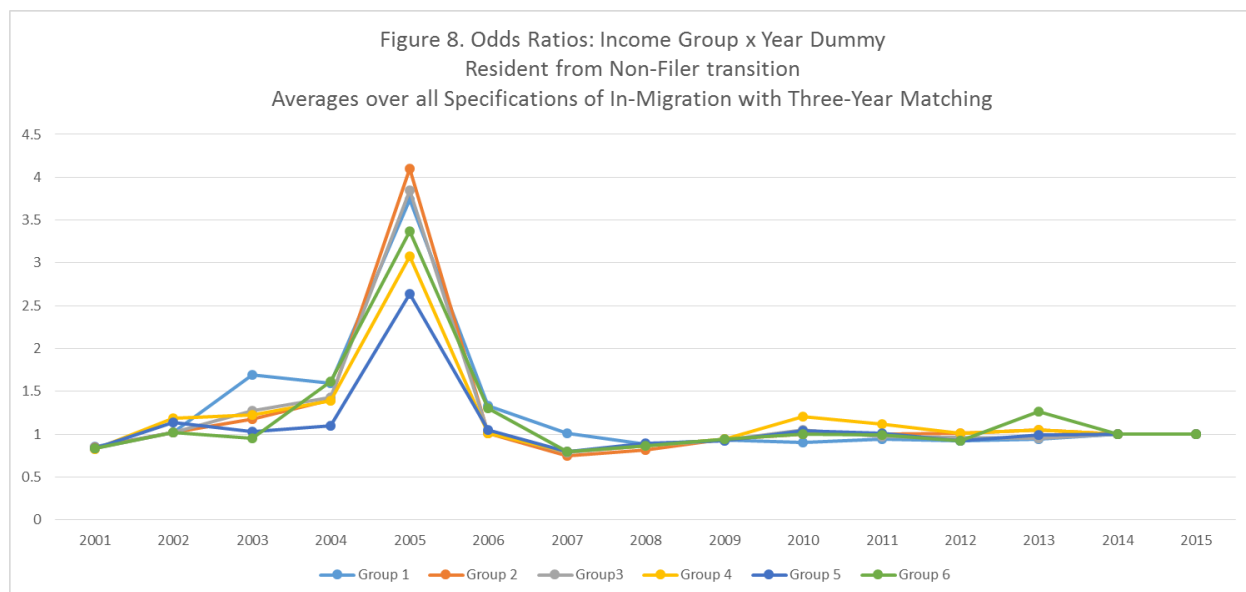
Figure 6 shows the products of year dummy and year dummy x income group odds ratios for the transition from non-filer to resident. For all income groups, there is a large increase from 2003 to 2005 followed by a decline back to the baseline by 2009. There also are spikes for the high income groups in 2008 and 2013.

It is possible that these spikes are echoes of the spikes in the resident to non-filer transition in 2006 and 2007 in Figure 2. The spikes in Figure 2 appear to have been due to increases in late returns (or incorrect returns that were processed late). If most of the taxpayers who filed late in 2007 and 2012 filed on time in 2008 and 2013, this would create spikes in the apparent number of new filers in these years. To take this likelihood into account, the analysis was repeated with resident returns in each year matched backward against the set of returns for the previous three years and classified based on the residency status for the first match or lack of a match.



Figures 7 and 8 repeat Figures 5 and 6 for the In-migration model with returns matched against the previous three years' returns. There are several differences.





The spikes in 2008 and 2013 are gone, indicating that they were due to increased late filing in 2007 and 2012. The surge in new filers from 2003 to 2005 returns to the baseline by 2007 instead of 2009. For the transition from non-resident or part-year filer, Group 6 starts the post-law change lower, but returns to the baseline instead of ending higher.

Odds ratios for the income group x tax law variables are in appendix Table A-5. Ratios of post-law-change odds ratios to pre-law change odds ratios are in Table 7.

Table 7 - Logit Results for In-Migration with Three-Year Matching

Comparison of Pre-and Post-Law-Change Odds Ratios of Income Group x Tax Law Interactions

Post-Law Change Odds Ratio / Pre-Law Change Odds Ratio

Mean, Median, Range and Interquartile Range over 15 Specifications of Control Variables

Outcome	Income Group	Mean	Median	Range	Inter-Quartile Range
Resident in Base Year, Non-Resident or Part-Year Previous Year					
	Group 1	1.097	1.101	0.213	0.061
	Group 2	1.003	0.994	0.246	0.042
	Group 3	0.936	0.949	0.282	0.076
	Group 4	1.017	1.018	0.240	0.056
	Group 5	0.966	0.963	0.247	0.065
	Group 6	1.300	1.326	0.324	0.129
Resident in Base Year, Non-Filer Previous Year					
	Group 1	0.732	0.671	0.472	0.080
	Group 2	1.007	1.104	0.928	0.049
	Group 3	1.066	1.187	0.945	0.092
	Group 4	1.196	1.366	0.625	0.103
	Group 5	1.103	1.237	0.484	0.100
	Group 6	1.042	1.226	0.725	0.071
Fraction of Specifications Where Group 6 - Group 3 Difference in Differences is Positive and Significant at 5%					
	Resident in Base Year, Non-Resident or Part-Year Prior Year				0.933
	Resident in Base Year, Non-Filer Prior Year				0.000
Resident in Base Year, Non-Resident or Part-Year Prior Year					
Fraction of Specifications Where Difference in Differences Compared to Group 3 is Positive and Significant at 5%					
	Group 2				0.800
	Group 4				0.867
Fraction of Specifications Where Difference in Differences Compared to Group 6 is Negative and Significant at 5%					
	Group 2				0.867
	Group 4				0.867

For the transition from non-filer, the Group 6 - Group 3 difference in differences is positive in only 4 of 15 specifications and is never positive and significant. For Groups 2 through 6, the odds ratios all increased, and the increases are all in the same range

For the transition from non-resident or part-year filer, the Group 6 - Group 3 difference in differences is positive in all 15 specifications and is significant in 14. The odds for Group 3 went down while for Groups 2, 4, and 6, they went up, with Group 6 going up the most.

The difference-in-differences between Groups 2 and 4 and Group 3 are both positive in 14 of 15 specifications. The Group 2 - Group 3 difference in differences is positive and significant in 12 of 15 specifications and the Group 4 - Group 3 difference in differences is positive and significant in 13 of 15 specifications.

The difference-in-differences between Group 6 and Groups 2 and 4 is positive in all specifications. It is significant in 13 of 15 for Group 2 and in 14 of 15 for Group 3.

It appears that part of the difference between Group 3 and Group 6 is due to a decrease in the odds of in-migration for Group 3, but part is also due to an increase for Group 6.

The transition from non-resident or part-year filer to resident includes two different populations making different decisions. Part-year filers are making physical moves and did not previously have Montana-source income. Non-resident filers have business interests or other income sources in at least two states, including Montana, and may be making a physical move but may also just be changing their tax home.

To see whether the change in migration for the combined group is due to a change by one or the other sub-group or both, non-residents were pulled out for separate analysis and this analysis was repeated for the remaining population.

For the model with this reduced population, odds ratio estimates are reported in appendix Table A-6, and ratios of post-law-change odds ratios to pre-law-change odds ratios are reported in Table 8.

Table 8 - Logit Results for In-Migration, Three-Year Match, Non-Resident Filers Excluded

Comparison of Pre-and Post-Law-Change Odds Ratios of Income Group x Tax Law Interactions

Post-Law Change Odds Ratio / Pre-Law Change Odds Ratio

Mean, Median, Range and Interquartile Range over 15 Specifications of Control Variables

Outcome	Income Group	Mean	Median	Range	Inter-Quartile Range
Resident in Base Year, Part-Year Previous Year					
	Group 1	0.934	0.879	0.264	0.142
	Group 2	1.142	1.153	0.623	0.228
	Group 3	0.991	0.969	0.314	0.130
	Group 4	1.120	1.099	0.467	0.115
	Group 5	1.083	1.028	0.351	0.152
	Group 6	1.314	1.302	0.487	0.178
Resident in Base Year, Non-Filer Previous Year					
	Group 1	0.810	0.740	0.605	0.078
	Group 2	1.135	1.104	1.323	0.149
	Group 3	1.169	1.187	1.304	0.099
	Group 4	1.240	1.366	1.242	0.219
	Group 5	1.143	1.237	0.893	0.073
	Group 6	1.136	1.226	1.390	0.105
Fraction of Specifications Where Group 6 - Group 3 Difference in Differences is Positive and Significant at 5%					
	Resident in Base Year, Part-Year Prior Year				0.400
	Resident in Base Year, Non-Filer Prior Year				0.000
Resident in Base Year, Part-Year Filer Prior Year					
Fraction of Specifications Where Difference in Differences Compared to Group 3 is Positive and Significant at 5%					
	Group 2				0.667
	Group 4				0.667
Fraction of Specifications Where Difference in Differences Compared to Group 6 is Negative and Significant at 5%					
	Group 2				0.133
	Group 4				0.000

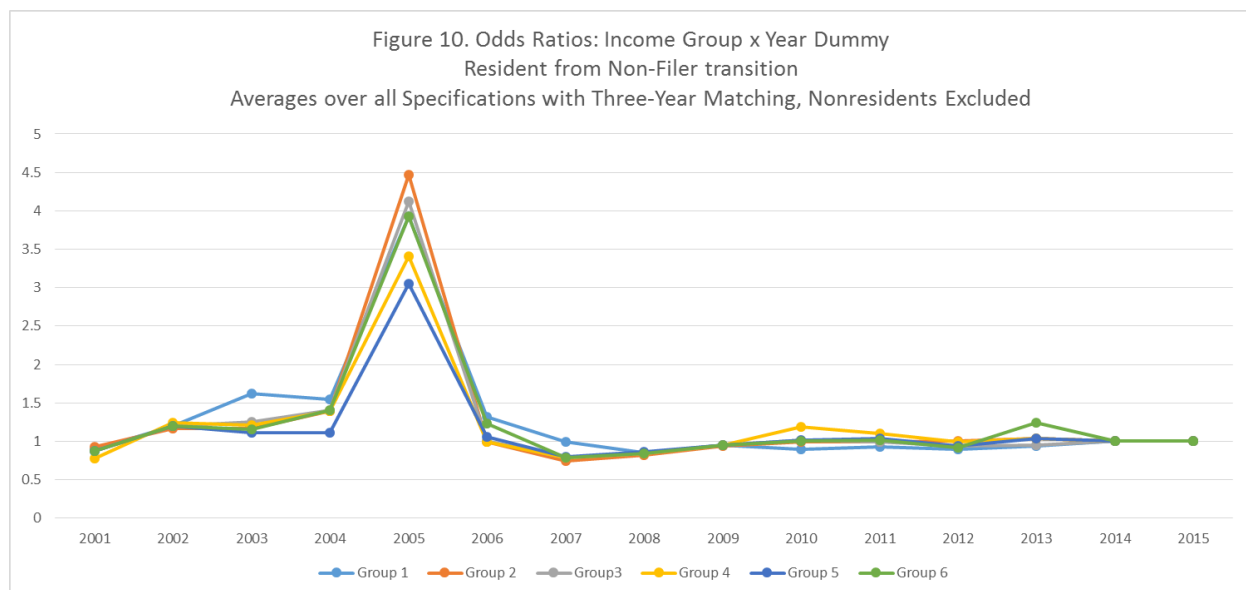
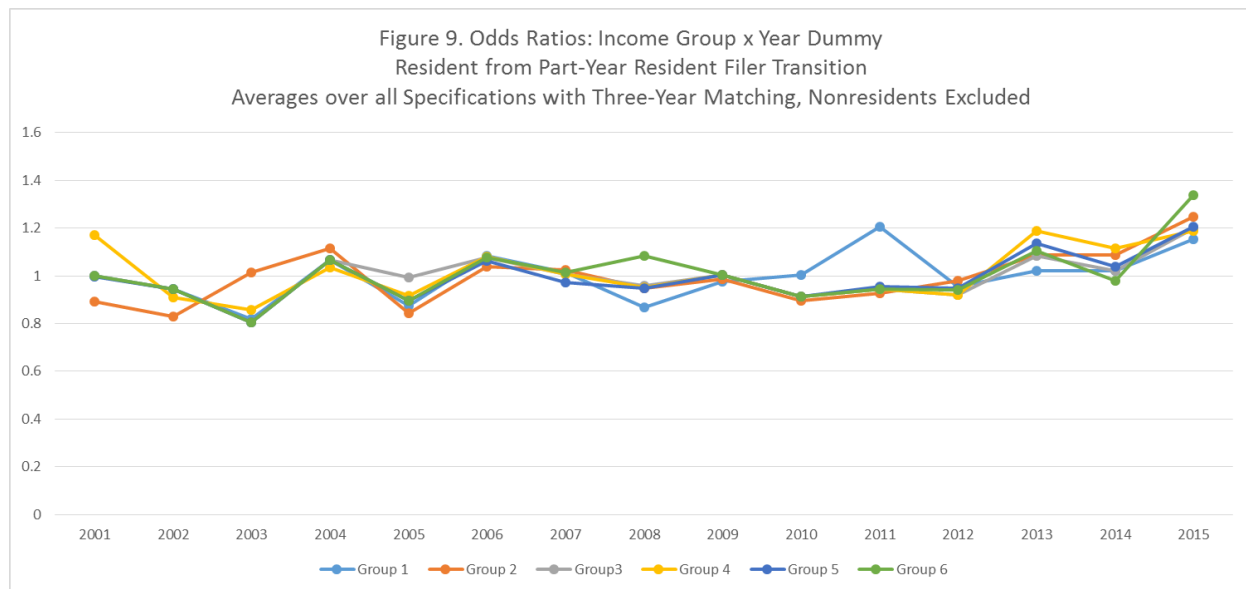
For the transition from non-filer, the Group 6 - Group 3 difference in differences is positive only in 4 of 15 specifications and is never positive and significant. The ratios are similar for Groups 2 through 6, with Group 6 in the middle. There is no evidence of a change for Group 6 not shared by other groups.

For the transition from part-year filer, group 3's odds of having made the transition went down while the odds went up for Groups 2, 4, and 6. The Group 6 - Group 3 difference in differences is positive in 15 of 15 specifications, but is significant only in 6.

For both Group 2 and Group 4, the difference in differences from Group 3 is positive in 13 of 15 specifications and significant in 10. This indicates that Group 3 experienced a change in migration not shared by the other minimally affected groups.

The difference in differences between Group 6 and Group 2 is positive in 14 of 15 specifications but is significant only in 2. The difference in differences between Group 6 and Group 4 is positive in all specifications but is never significant.

Figures 9 and 10 repeat Figures 7 and 8 for the analysis with non-residents excluded. Figure 10 is virtually indistinguishable from Figure 8, while the diversity of behavior between groups in 2005 through 2008 in Figure 7 is missing from Figure 9.



Combining these results, it appears that the odds of having transitioned from part-year filer went down for group 3 and up for Groups 2, 4, and 6. Group 6 went up the most, but because Group 6 is much smaller than the others, the difference in differences involving Group 6 are less likely to be significant than those between Groups 2 and 4 and Group 3.

This evidence is consistent with the tax law change having affected high income in-migration, but is not strongly in favor of there being an effect.

Change of Tax Residence to Montana

Individuals who have another state as their tax residence and could shift it to Montana should be filing non-resident returns with Montana. A non-resident taxpayer should stop filing Montana returns only if they stop having Montana-source income or if they die. In either case, a non-resident who stops filing is not a candidate for changing their tax residence. Thus, the set of non-resident returns with a matching return the next year is the population of taxpayers who can shift their tax residence to Montana.

The choice by this population is modeled as a binomial logit with the non-resident to non-resident transition as default and non-resident to resident or part-year filer as the alternative.

Odds ratios for the income group x tax law variables are reported in appendix Table A-7. Ratios of post-law-change and pre-law change odds ratios are shown in Table 9.

Table 9 - Logit Results for Nonresident Transition to Resident

Comparison of Pre-and Post-Law-Change Odds Ratios of Income Group x Tax Law Interactions

Post-Law Change Odds Ratio / Pre-Law Change Odds Ratio

Mean, Median, Range and Interquartile Range over 17 Specifications of Control Variables

Outcome	Income Group	Mean	Median	Range	Inter-Quartile Range
Non-Resident in Base Year, Resident or Part-Year Next Year					
	Group 1	1.179	1.255	0.690	0.325
	Group 2	0.861	0.857	0.063	0.026
	Group 3	0.789	0.785	0.077	0.036
	Group 4	0.790	0.788	0.073	0.021
	Group 5	0.703	0.710	0.089	0.033
	Group 6	0.836	0.828	0.047	0.029

Fraction of Specifications Where Group 6 - Group 3 Difference in Differences is Positive and Significant at 5%
0.235

Fraction of Specifications Where Difference in Differences Compared to Group 3 is Positive and Significant at 5%
Group 2 0.824
Group 4 0.412

Fraction of Specifications Where Difference in Differences Compared to Group 6 is Negative and Significant at 5%
Group 2 0.000
Group 4 0.000

The odds of making the transition from non-resident filer to resident went down for groups 2 through 6. Group 6 went down by less than Groups 3 and 4 but more than Group 2. The ratios for groups 3 and 4 are almost the same and much lower than the ratio for Group 2.

The Group 6 - Group 3 difference in differences is positive in all 17 scenarios, but is significant only in 4.

The Group 6 - Group 2 difference in differences is negative in all 17 scenarios, while the Group 6 - Group 4 difference in differences is positive in all 17 scenarios, but is never significant.

The Group 2 - Group 3 difference in differences is positive in all 17 specifications and significant in 14, while the Group 4 - Group 3 difference in differences is positive in 13 of 17 specifications and significant in 7.

Common factors appear to have lowered the odds of shifting tax home to Montana for all groups with positive income. The reduction in odds was smaller at the top and bottom of the income distribution. This is consistent with Group 6 having responded positively to the tax restructuring, but it probably is more consistent with all groups having reduced the rate at which they make this transition and the middle of the income distribution either having had a larger reaction to the factors behind this shift or

having been affected by other influences that did not affect the top and bottom of the income distribution.

When in-migration was measured by the proportion of residents who had filed a non-resident or part-year return in an earlier year and the proportion of residents who had not filed in a previous year, the Group 6 - Group 3 difference in difference had the expected sign in all specifications and was significant in 14 of 15. When non-residents were removed from the population, the Group 6 - Group 3 difference in differences still had the expected sign in all specifications but was significant only in 6 of 15. This is partly because the odds of Group 3 making the transition went down after 2005 more when non-residents were included than when they were excluded.

Separate treatment of non-residents is preferable because the database includes data on the full population of non-resident filers, but including them in analysis of resident returns matched backward excludes the majority of non-residents who stay non-residents.

Summary of results

As outlined above, there will be strong evidence of the tax law change having affected high-income migration if there is a persistent change (in the expected direction) in migration by Group 6 that is not shared by Group 3 and the observed difference between Group 6 and Group 3 is not due to a change in Group 3 migration. This second condition will be satisfied if there are also persistent differences (in the expected direction) between Group 6 and Groups 2 and 4. The second condition is especially important if persistent differences between Group 3 and either or both of Groups 2 and 4 indicate that there probably was a change by Group 3.

Table 10 shows a summary comparison between groups. For each of the transitions in each of the models, it shows the ratio of the mean of the post-law-change odds ratios to the mean of the pre-law-change odds ratios, all divided by that ratio for Group 3. This scales each set of ratios, with the ratio for Group 3 equal to 1.

Under each column, there is an indication of whether the difference between Group 6 and Group 3 is in the expected direction. For the two cases where the Group 6 - Group 3 difference is in the expected direction, there are additional indications of whether the differences between Group 6 and Groups 2 and 4 are also in the expected direction and whether these differences generally are significant or insignificant.

**Table 10 - Ratios of Post-Law-Change Odds Ratios to Pre-Law-Change Odds Ratios
Scaled to Give Group 3 == 1**

Out-migration				Change Tax Home Out		In-migration				Change Tax Home In	
Resident -> Non- Resident/Part Year		Resident -> Non- Filer		Resident -> Non- Resident/Part Year		Part-Year -> Resident		Non-Filer -> Resident		Non-Resident -> Resident	
Group 3	1.00	Group 3	1.00	Group 3	1.00	Group 3	1.00	Group 2	0.97	Group 3	1.00
Group 4	1.00	Group 2	1.02	Group 6	1.05	Group 4	1.13	Group 6	0.97	Group 4	1.00
Group 2	1.06	Group 4	1.02	Group 4	1.05	Group 2	1.15	Group 3	1.00	Group 6	1.06
Group 6	1.14	Group 6	1.06	Group 2	1.05	Group 6	1.33	Group 4	1.06	Group 2	1.09
Group 6 <1? NO		Group 6 <1? NO		Group 6 <1? NO		Group 6 >1? YES Significant < 1/2 Specifications		Group 6 >1? NO		Group 6 >1? YES Significant < 1/4 Specifications	
						G 6 > G 2 & G 4? YES Almost Never Significant				G 6 > G 2 & G 4? NO	

By the criteria outlined above, there is moderate evidence for a change in high-income migration following the Montana income tax restructuring only for physical in-migration, and there only for the transition from part-year filer to resident.

For physical outmigration and change of tax home to another state, the evidence is strongly contrary. The difference between Group 6 and Group 3 is in the wrong direction and is as large or larger than the difference between either Group 2 or Group 4 and Group 3. There is a persistent difference between the group expected to be affected by the tax law change and the groups expected not to be affected, but, unless high income taxpayers responded perversely to the tax cut, the difference in behavior must be due to other factors that affected the groups differently before and after 2005.

For change of tax home from another state, the evidence is mixed. The differences between Group 6 and Groups 3 and 4 are in the expected direction, but the difference between Group 6 and Group 2 is in the wrong direction.

There are two important caveats to the finding that the Montana tax restructuring increased physical in-migration. One is that the one model with evidence of the expected effect on migration is also the model with the most glaring weakness. It measures migration as the share of residents who can be classified as having migrated in the previous year, not as the share of potential migrants who migrated in a year. Differences between measured group migration rates in this model could be due to many factors that, due to the limits of the data, are unobserved. For example, the observed differences in migration could be due to different evolutions of the income distribution in Montana and in the rest of the world which change the ratios of Montana population in each income group to rest-of-world population in each income group.

The second caveat is that there is a certain amount of hubris (or over-reliance on priors) involved in accepting the one finding of a difference with the expected sign while attributing all of the “wrong”

signs to unknown factors. If these unknown factors made Montana a less attractive place for high-income people to live, it may be that the effect of the tax law change is larger than estimated. If the unknown factors made high-income people more likely to migrate, that could explain the observed increases in both out-migration and in-migration, which would imply that the effect of taxes on high-income in-migration is over-estimated.

Despite these caveats, there is a case that can be made for the Montana income tax restructuring affecting in-migration but not out-migration or choice of tax residence. Potential migrants typically engage in a search process that involves collecting information about potential migration destinations, comparing potential destinations with each other and with the current location, and eliminating options until the potential migrant either moves to one of the possible destinations or stays put. Potential migrants are aware of the taxes they actually pay in their current location. Taxpayers with incomes from multiple states also are aware of the taxes they pay in each. Potential migrants typically have limited and partial information about the taxes they would pay in various possible destinations. When doing a first comparison of the disposable income they might earn in various locations, they are likely to do at most a quick and dirty calculation of taxes they might pay in each. For most Montana residents, the difference between after-tax income under the new law and under the old law may be too small to affect the state's ranking in a first comparison of potential locations. However, under the old law, a resident of another state was likely to overestimate the taxes they would pay in Montana. Under the new law, the top marginal rate is 6.9%. Under the old law, with an 11% top marginal rate and full deductibility of federal income tax, higher income individuals faced an effective marginal rate in the neighborhood of 7%, depending on their federal rate bracket. However, most states do not allow a deduction for federal income tax, and potential in-migrants may have done their quick-and-dirty calculation of after-tax income based on the 11% statutory rate rather than the 7% effective marginal rate. The tax law change may have kept Montana from being eliminated early in the search process for some potential migrants, ultimately increasing in-migration.

Conclusions

The effect of taxes on interstate migration is a question of great interest to state policy makers. It is also a question where the answer may depend very much on circumstances. This makes it important both to replicate results and to try to answer the question in as many different circumstances as possible.

Montana's 2005 income tax restructuring reduced income taxes for most higher income individuals while having minimal effect, on average, for individuals with middle and lower incomes. This study looked for evidence of a break in migration behavior of high-income households not shared by middle and lower income households, with in-migration increasing and out-migration decreasing.

It found some evidence that this tax restructuring may have led to a relative increase in in-migration of high income individuals. It found possible evidence of an effect on individuals with income in multiple states shifting their tax residence to Montana. It found no evidence of a change for individuals with income from multiple states changing their tax residence from Montana to another state. For out-migration, it found a persistent change in behavior between the affected and un-affected groups, but in the wrong direction.

It appears that one or more other factors not controlled for in this analysis had an effect on out-migration that was larger than any effect that the tax restructuring might have had. It seems likely that the same factors may also have affected in-migration. In fact, the simplest explanation for these results is that there appears to have been an unexplained increase in high-income migration, in both directions, relative to migration by middle income households.

The effect of the tax restructuring appears to have been small relative to the effect of other factors for out-migration. The measured effect is tenuous for in-migration, and if unknown factors caused a relative increase in high-income migration, the effect of the tax change is probably smaller than the measured effect.

Even if migration were relatively elastic with respect to after-tax income, a relatively large change in state taxes may produce a small effect on migration. Montana taxpayers who received a 20% cut in state income taxes had at most a 2% increase in disposable income. Interstate migration rates are on the order of 2%. For the highest income group, the average rate of transition from resident to non-resident or part-year filer is 1.59%. If the elasticity of this group's out-migration rate with respect to disposable income is 1, the Montana income tax cut would have reduced the rate of high-income out-migration by at most 0.03 percentage points. This is an order of magnitude smaller than the average year-to-year change, which is 0.15 percentage points, and might be hard to detect even with ideal data and experimental design.

Some other studies have found small but significant effects of targeted tax increases in other states and of differences between states.⁸ Montana differs from other states in ways that may make the effect of taxes on migration particularly small. Montana is a large state with a small population bordered by other sparsely populated US states and Canadian provinces. Montana has three cities with population over 50,000. None are within an hour's drive of the state border. The only city of 50,000 or over outside of Montana and within an hour's drive of the border is Lethbridge, Alberta. Thus, there are minimal opportunities for the kind of cross-border tax arbitrage that is possible in urban areas that span state boundaries.

In addition, Montana and three of the four neighboring states have atypical tax structures. Montana has an income tax but no sales tax. Wyoming and South Dakota have sales taxes but no income tax. North Dakota has both, but severance taxes are the largest source of state and local revenue. For taxpayers whose location decisions are sensitive to one tax or another, the fact that one state does not have that tax may make marginal changes in that tax in a neighboring state irrelevant.

Montana has an abundance of certain types of amenities, but incomes in Montana are below average. In-migrants are likely to be people who are drawn by the amenities and not put off by the prospect of lower income. For them, a small change in after-tax income may be immaterial. Out-migrants are likely to be people willing to sacrifice amenities for higher incomes or who are looking for a different set of amenities. Given the large income differences between Montana and urban areas a day's drive away, a small change in after-tax income in Montana may be immaterial for this group too.

There may also be aspects of Montana's income tax restructuring that made the impact on migration small or hard to detect. It did not draw a bright line between affected and unaffected populations. This

⁸ See, for example Young and Varner (2016) and Cohen, Lai and Steindel (2014).

analysis relied on different income groups having different proportions of winners and losers and different sizes of typical gains or losses. It may be that basing the analysis on individual winners and losers rather than differentially affected groups would allow better identification of the effects of the tax law change.

However, there are reasons to think that this might not be the case. First, the way the restructuring was done makes it difficult for individual taxpayers to know whether they were winners or losers without actually calculating their tax under both the new and the old law. The top marginal rate was reduced by over one-third, but for some high-income taxpayers, the cap on the itemized deduction for federal tax more than offset this. Rate brackets were compressed, which meant that some taxpayers ended up with a higher marginal rate under the new law, and most had higher infra-marginal rates on part of their income.

Second, some, perhaps most, of the high-income taxpayers who appear to be losers based on a single year's tax return probably are not consistently losers. The restructuring was designed so that, for higher-income taxpayers, the gain from lower rates would be significantly more than the loss from capping the deduction for federal tax on the taxpayer's current income as reported on the Montana return. High income taxpayers would be losers only if they had paid significantly more in federal tax during the year than would be expected from the income reported on their return. There are several possible reasons for this to happen, but the most likely is that the taxpayer, or their accountant, was using the timing of payments as part of active tax planning. The reciprocal deductibility that existed between federal and Montana taxes before 2005 gave tax planners one more variable to manipulate in minimizing the present value of taxes, particularly for taxpayers with income from multiple states and the ability to choose when and how to recognize income.

Finally, migration decisions should be affected by expectations of future disposable income, not just current disposable income. For some taxpayers, these may be weakly correlated. This is a problem for any analysis that relies on one year's income measurement. The group with the largest financial impact from a tax cut would be young people who expect high average incomes over their remaining life. They may not have high current incomes and may not be in the group identified as being affected by the tax cut. They also may not be classified as winners based on a current tax return when they expect to be winners over their remaining life. On the other hand, some taxpayers with high current incomes will expect to have lower incomes over the rest of their lives, either because they are approaching retirement or because their current income has a large transitory component.

In any case, the main finding here is that changes to one or more other factors appear to have overshadowed any effect of the tax restructuring. Can these other factors be identified and taken into account?

It is unlikely that they fall under the heading of general economic conditions. The data covers a long enough time both before and after the tax restructuring that business cycle effects should have been captured by the year dummies and their interactions. The effects of a once-a-generation oil boom and bust show clearly in the year dummies, but these effects are common to all income groups.

This leaves changes in population characteristics, such as changing age structure. Tax returns contain limited information that would be useful here, but this avenue requires further exploration.

Appendix

Table A-1 - Logit Results for Out-Migration Model 1

Default Outcome - Resident in Base Year, Resident Next Year

Odds Ratios of Income Group x Tax Law Interactions

Mean, Median, Range and Interquartile Range over 17 Specifications of Control Variables

Outcome	Variable	Mean of Odds Ratios	Median of Odds Ratios	Range	Inter-Quartile Range
Resident in Base Year, Non-Resident or Part-Year Next Year					
	Income Group 1, Pre-Law Change	0.963	0.983	0.109	0.066
	Income Group 2, Pre-Law Change	0.911	0.909	0.044	0.006
	Income Group 3, Pre-Law Change	1	1	n/a	n/a
	Income Group 4, Pre-Law Change	1.016	1.019	0.032	0.003
	Income Group 5, Pre-Law Change	1.393	1.423	0.214	0.021
	Income Group 6, Pre-Law Change	1.301	1.300	0.056	0.022
	Income Group 1, Post-Law Change	0.890	0.896	0.229	0.068
	Income Group 2, Post-Law Change	0.927	0.953	0.237	0.101
	Income Group 3, Post-Law Change	0.944	0.964	0.236	0.077
	Income Group 4, Post-Law Change	1.039	1.059	0.322	0.120
	Income Group 5, Post-Law Change	1.266	1.274	0.335	0.111
	Income Group 6, Post-Law Change	1.426	1.434	0.394	0.131
Resident in Base Year, Non-Filer Next Year					
	Income Group 1, Pre-Law Change	2.512	2.551	0.388	0.016
	Income Group 2, Pre-Law Change	2.380	2.397	0.185	0.012
	Income Group 3, Pre-Law Change	1	1	n/a	n/a
	Income Group 4, Pre-Law Change	0.767	0.762	0.052	0.005
	Income Group 5, Pre-Law Change	0.805	0.783	0.283	0.028
	Income Group 6, Pre-Law Change	0.857	0.857	0.093	0.005
	Income Group 1, Post-Law Change	2.313	2.270	0.637	0.016
	Income Group 2, Post-Law Change	2.390	2.342	0.900	0.012
	Income Group 3, Post-Law Change	1.041	1.014	0.405	0.000
	Income Group 4, Post-Law Change	0.891	0.880	0.571	0.005
	Income Group 5, Post-Law Change	0.931	0.802	1.388	0.028
	Income Group 6, Post-Law Change	1.261	1.026	3.481	0.005

Table A-2 - Logit Results for Outmigration Model 2

Default Outcome - Resident in Base Year, Resident Later Year

Odds Ratios of Income Group x Tax Law Interactions

Mean, Median, Range and Interquartile Range over 15 Specifications of Control Variables

Outcome	Variable	Mean of Odds Ratios	Median of Odds Ratios	Range	Inter-Quartile Range
Resident in Base Year, Non-Resident or Part-Year Later Year					
	Income Group 1, Pre-Law Change	0.945	0.941	0.038	0.023
	Income Group 2, Pre-Law Change	0.952	0.952	0.019	0.008
	Income Group 3, Pre-Law Change	1	1	n/a	n/a
	Income Group 4, Pre-Law Change	1.032	1.036	0.014	0.010
	Income Group 5, Pre-Law Change	1.314	1.298	0.061	0.033
	Income Group 6, Pre-Law Change	1.337	1.337	0.010	0.002
	Income Group 1, Post-Law Change	0.897	0.902	0.199	0.038
	Income Group 2, Post-Law Change	0.919	0.919	0.231	0.051
	Income Group 3, Post-Law Change	0.916	0.924	0.202	0.038
	Income Group 4, Post-Law Change	0.947	0.949	0.200	0.071
	Income Group 5, Post-Law Change	1.213	1.219	0.300	0.068
	Income Group 6, Post-Law Change	1.395	1.406	0.299	0.076
Resident in Base Year, Non-Filer Later Year					
	Income Group 1, Pre-Law Change	2.579	2.582	0.091	0.046
	Income Group 2, Pre-Law Change	2.466	2.463	0.082	0.023
	Income Group 3, Pre-Law Change	1	1	n/a	n/a
	Income Group 4, Pre-Law Change	0.726	0.727	0.010	0.003
	Income Group 5, Pre-Law Change	0.738	0.741	0.022	0.011
	Income Group 6, Pre-Law Change	0.619	0.621	0.039	0.002
	Income Group 1, Post-Law Change	2.468	2.508	0.856	0.290
	Income Group 2, Post-Law Change	2.706	2.729	1.168	0.389
	Income Group 3, Post-Law Change	1.072	1.078	0.376	0.135
	Income Group 4, Post-Law Change	0.799	0.796	0.311	0.101
	Income Group 5, Post-Law Change	0.717	0.715	0.274	0.069
	Income Group 6, Post-Law Change	0.703	0.684	0.266	0.124

Table A-3 Logit Results for Change of Tax Home to Another State

Default Outcome - Resident with Credit for Tax Paid to Other States in Base Year, Resident Next Year

Odds Ratios of Income Group x Tax Law Interactions

Mean, Median, Range and Interquartile Range over 17 Specifications of Control Variables

Outcome	Variable	Mean of Odds Ratios	Median of Odds Ratios	Range	Inter-Quartile Range
Resident with Credit for Tax Paid fo Other States in Base Year, Non-Resident or Part-Year Next Year					
	Income Group 1, Pre-Law Change	0.001	0.001	0.000	0.000
	Income Group 2, Pre-Law Change	1.121	1.119	0.011	0.002
	Income Group 3, Pre-Law Change	1	1	n/a	n/a
	Income Group 4, Pre-Law Change	0.892	0.889	0.048	0.002
	Income Group 5, Pre-Law Change	1.008	1.007	0.012	0.004
	Income Group 6, Pre-Law Change	0.814	0.813	0.016	0.003
	Income Group 1, Post-Law Change	0.003	0.003	0.000	0.000
	Income Group 2, Post-Law Change	1.197	1.199	0.070	0.004
	Income Group 3, Post-Law Change	1.013	1.013	0.062	0.009
	Income Group 4, Post-Law Change	0.952	0.954	0.060	0.006
	Income Group 5, Post-Law Change	0.964	0.965	0.055	0.011
	Income Group 6, Post-Law Change	0.863	0.861	0.085	0.005

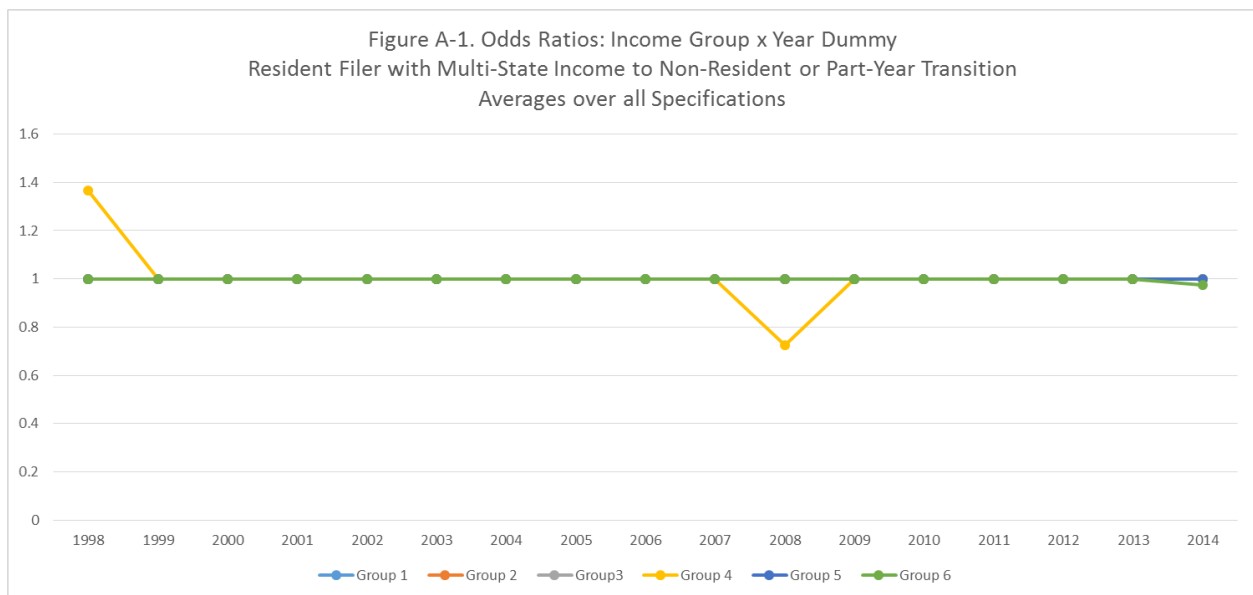


Table A-4 - Logit Results for In-Migration Model 1

Default Outcome - Resident in Base Year, Resident Previous Year

Odds Ratios of Income Group x Tax Law Interactions

Mean, Median, Range and Interquartile Range over 17 Specifications of Control Variables

Outcome	Variable	Mean of Odds Ratios	Median of Odds Ratios	Range	Inter-Quartile Range
Resident in Base Year, Non-Resident or Part-Year Previous Year					
	Income Group 1, Pre-Law Change	0.913	0.919	0.106	0.005
	Income Group 2, Pre-Law Change	0.826	0.833	0.077	0.010
	Income Group 3, Pre-Law Change	1	1	n/a	n/a
	Income Group 4, Pre-Law Change	1.091	1.091	0.023	0.016
	Income Group 5, Pre-Law Change	1.631	1.645	0.207	0.013
	Income Group 6, Pre-Law Change	1.790	1.793	0.028	0.014
	Income Group 1, Post-Law Change	0.917	0.930	0.217	0.065
	Income Group 2, Post-Law Change	0.819	0.824	0.149	0.057
	Income Group 3, Post-Law Change	0.932	0.929	0.324	0.113
	Income Group 4, Post-Law Change	1.111	1.114	0.334	0.080
	Income Group 5, Post-Law Change	1.450	1.468	0.384	0.094
	Income Group 6, Post-Law Change	2.048	2.024	0.931	0.166
Resident in Base Year, Non-Filer Previous Year					
	Income Group 1, Pre-Law Change	2.469	2.453	0.374	0.042
	Income Group 2, Pre-Law Change	2.744	2.691	0.559	0.050
	Income Group 3, Pre-Law Change	1	1	n/a	n/a
	Income Group 4, Pre-Law Change	0.935	0.934	0.038	0.013
	Income Group 5, Pre-Law Change	1.191	1.185	0.241	0.010
	Income Group 6, Pre-Law Change	1.461	1.462	0.013	0.005
	Income Group 1, Post-Law Change	2.514	2.472	1.322	0.445
	Income Group 2, Post-Law Change	3.144	3.085	2.029	0.323
	Income Group 3, Post-Law Change	1.234	1.187	0.757	0.223
	Income Group 4, Post-Law Change	1.305	1.272	0.780	0.150
	Income Group 5, Post-Law Change	1.637	1.455	2.229	0.311
	Income Group 6, Post-Law Change	2.433	1.790	6.033	0.789

Table A-5 - Logit Results for In-Migration with Three-Year Matching

Default Outcome - Resident in Base Year, Resident Previous Year

Odds Ratios of Income Group x Tax Law Interactions

Mean, Median, Range and Interquartile Range over 15 Specifications of Control Variables

Outcome	Variable	Mean of Odds Ratios	Median of Odds Ratios	Range	Inter-Quartile Range
Resident in Base Year, Non-Resident or Part-Year Previous Year					
	Income Group 1, Pre-Law Change	0.833	0.830	0.028	0.007
	Income Group 2, Pre-Law Change	0.827	0.824	0.040	0.007
	Income Group 3, Pre-Law Change	1	1	n/a	n/a
	Income Group 4, Pre-Law Change	1.073	1.078	0.031	0.022
	Income Group 5, Pre-Law Change	1.529	1.536	0.121	0.054
	Income Group 6, Pre-Law Change	1.670	1.672	0.035	0.010
	Income Group 1, Post-Law Change	0.913	0.922	0.182	0.045
	Income Group 2, Post-Law Change	0.829	0.819	0.200	0.034
	Income Group 3, Post-Law Change	0.936	0.949	0.282	0.076
	Income Group 4, Post-Law Change	1.090	1.089	0.261	0.064
	Income Group 5, Post-Law Change	1.475	1.465	0.311	0.086
	Income Group 6, Post-Law Change	2.172	2.196	0.562	0.219
Resident in Base Year, Non-Filer Previous Year					
	Income Group 1, Pre-Law Change	3.077	3.100	0.227	0.031
	Income Group 2, Pre-Law Change	3.390	3.415	0.365	0.037
	Income Group 3, Pre-Law Change	1	1	n/a	n/a
	Income Group 4, Pre-Law Change	1.005	0.990	0.168	0.008
	Income Group 5, Pre-Law Change	1.501	1.467	0.147	0.078
	Income Group 6, Pre-Law Change	1.837	1.837	0.042	0.007
	Income Group 1, Post-Law Change	2.248	2.093	1.359	0.202
	Income Group 2, Post-Law Change	3.416	3.358	3.340	0.176
	Income Group 3, Post-Law Change	1.066	1.012	0.945	0.092
	Income Group 4, Post-Law Change	1.202	1.202	0.740	0.073
	Income Group 5, Post-Law Change	1.654	1.675	0.700	0.086
	Income Group 6, Post-Law Change	1.915	1.823	1.340	0.128

Table A-6 - Logit Results for In-Migration, Three-Year Match, Non-Resident Filers Excluded

Default Outcome - Resident in Base Year, Resident Previous Year

Odds Ratios of Income Group x Tax Law Interactions

Mean, Median, Range and Interquartile Range over 15 Specifications of Control Variables

Outcome	Variable	Mean of Odds Ratios	Median of Odds Ratios	Range	Inter-Quartile Range
Resident in Base Year, Part-Year Previous Year					
	Income Group 1, Pre-Law Change	1.622	1.619	0.146	0.041
	Income Group 2, Pre-Law Change	1.110	1.089	0.432	0.131
	Income Group 3, Pre-Law Change	1	1	n/a	n/a
	Income Group 4, Pre-Law Change	1.013	0.980	0.216	0.062
	Income Group 5, Pre-Law Change	1.359	1.368	0.062	0.020
	Income Group 6, Pre-Law Change	1.897	1.908	0.094	0.029
	Income Group 1, Post-Law Change	1.515	1.469	0.527	0.205
	Income Group 2, Post-Law Change	1.252	1.201	0.342	0.160
	Income Group 3, Post-Law Change	0.991	0.969	0.314	0.130
	Income Group 4, Post-Law Change	1.131	1.080	0.333	0.141
	Income Group 5, Post-Law Change	1.471	1.401	0.467	0.207
	Income Group 6, Post-Law Change	2.491	2.486	0.928	0.354
Resident in Base Year, Non-Filer Previous Year					
	Income Group 1, Pre-Law Change	3.055	3.093	0.287	0.055
	Income Group 2, Pre-Law Change	3.277	3.208	0.381	0.196
	Income Group 3, Pre-Law Change	1	1	n/a	n/a
	Income Group 4, Pre-Law Change	1.077	1.110	0.186	0.062
	Income Group 5, Pre-Law Change	1.537	1.530	0.101	0.014
	Income Group 6, Pre-Law Change	1.834	1.832	0.022	0.008
	Income Group 1, Post-Law Change	2.478	2.296	1.954	0.264
	Income Group 2, Post-Law Change	3.717	3.539	4.274	0.283
	Income Group 3, Post-Law Change	1.169	1.104	1.304	0.099
	Income Group 4, Post-Law Change	1.328	1.229	1.380	0.156
	Income Group 5, Post-Law Change	1.756	1.723	1.349	0.115
	Income Group 6, Post-Law Change	2.083	1.937	2.533	0.198

Table A-7- Logit Results for Non-Resident Transition to Resident

Default Outcome - Non-Resident in Base Year, Non-Resident Next Year

Odds Ratios of Income Group x Tax Law Interactions

Mean, Median, Range and Interquartile Range over 17 Specifications of Control Variables

Outcome	Variable	Mean of Odds Ratios	Median of Odds Ratios	Range	Inter-Quartile Range
Non-Resident in Base Year, Resident or Part-Year Next Year					
	Income Group 1, Pre-Law Change	1.045	0.924	0.520	0.348
	Income Group 2, Pre-Law Change	1.498	1.496	0.039	0.007
	Income Group 3, Pre-Law Change	1	1	n/a	n/a
	Income Group 4, Pre-Law Change	0.784	0.784	0.015	0.004
	Income Group 5, Pre-Law Change	0.701	0.711	0.074	0.027
	Income Group 6, Pre-Law Change	0.300	0.300	0.009	0.001
	Income Group 1, Post-Law Change	1.195	1.183	0.161	0.048
	Income Group 2, Post-Law Change	1.289	1.291	0.100	0.034
	Income Group 3, Post-Law Change	0.789	0.785	0.077	0.036
	Income Group 4, Post-Law Change	0.619	0.619	0.047	0.017
	Income Group 5, Post-Law Change	0.493	0.492	0.038	0.014
	Income Group 6, Post-Law Change	0.251	0.250	0.016	0.007

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