Millionaire Migration in California:
Administrative Data for Three Waves of Tax Reform

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Abstract

Does taxing the rich lead to migration of top income earners? In principle, barriers to migration for the wealthy are low, suggesting that even small changes to top tax rates might set off tax flight. Since top earners are also the largest taxpayers, the potential flight of the rich can set off a race to the bottom, as states compete to attract (or retain) the rich with ever lower tax rates. We draw on big administrative data covering 25 years of all top tax filers in California, showing movement into and out of the state. We examine three waves of tax reform affecting top earners: two "millionaire taxes" passed by voters via the proposition system in 2004 and 2012, and a tax cut passed by legislation in 1996. We emphasize non-parametric, graphical analyses that reveal the evidence with as few assumptions as possible and analogous regression models that confirm the non-parametric results. Both in absolute terms, and compared to sensible control groups, we find little migration response to changes in top tax rates.

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1 Introduction

A growing number of U.S. states have adopted "millionaire taxes" in recent years (Young 2017; Young and Varner 2011). These new tax brackets on the highest income earners offer a way to address rising inequality while providing new revenues to support public goods and services that can improve economic opportunity. The downside risk, however, is the concern of millionaire tax flight – the richest residents may avoid the millionaire tax by moving to a different state. While nine states have passed millionaire taxes, there are also nine states that have no state income tax at all. How viable are millionaire taxes when lower-tax states are a short distance away? Can states sustain these new millionaire taxes without suffering out-migration of top tax payers? How attached are millionaires to the places where they currently earn their income?

In the U.S. there are no formal borders that prevent individuals from moving across state lines. Moreover, top income earners are often seen as highly mobile, and can easily bear the fixed "moving truck" costs of migration (Feldstein and Wrobel, 1998; Sklair 2001). At the same time, top earners are often late-career working professionals, and may be tied to place by the immobility of their family and professional networks: their spouses, children, friends, colleagues, investors, and clients may be reluctant to move for tax purposes (Young et al. 2016). Moreover, agglomeration economies – such as the place-based centrality of Silicon Valley in the global technology industry – are important considerations for state fiscal policy (Baldwin and Krugman 2004). Thus, a key question is whether – and by how much – top earners move away when states enact a millionaire tax. Can states sustain these new revenue sources without losing their top tax filers?

To address this question, we use big administrative data on all top earners in the state of California, over 25 years. During this time period, California enacted two distinct millionaire taxes (in 2004 and 2012), as well as a tax cut on top income earners (in 1996). We treat these as a series of natural experiments in how sensitive millionaires are to changes in the 'tax price' of living in California. We use difference-in-differences methods to see how a millionaire tax affects those in the new tax bracket, compared to other high-income-earners who are just outside the bracket. Roughly speaking, we examine tax changes affecting the top one percent, using the 95^{th} to 99^{th} percentiles as a control group.

This may seem like an exacting criteria, so we show each part of the analysis and offer flexible sensitivity analyses at each stage.

1.1 The Fiscal Policy Tradeoff in Question

Millionaire taxes tend to be modest in magnitude, but can have significant impacts on state budgets. In California, the 2004 Mental Health Services Tax ("2004 MHST") raised the tax rate on income above $1 million by one percentage point. Although just 0.3 percent of California tax filers reported more than $1 million in the year it came into effect, these filers accounted for more than 21 percent of all income in the state.[1] Taxes on top earners have an outsized effect on public revenues. At the same time, the migration of individuals in top tax brackets can have an outsized negative impact on state finances.

For the wealthy, however, returns to human capital are one of several potential income sources. In addition to wage and salary income, the wealthy may also draw on substantial capital resources. To the extent that these resources are not tied to a particular place, some people at the top of the income distribution may face fewer geographic constraints on earning capacity. If this is the case, their residential decisions may depend more on the 'tax price' of a given jurisdiction.

However, the presumption that exceptionally skilled, monied, and entrepreneurial individuals are also exceptionally mobile is debatable. Certainly, some millionaires do have the luxury of greater mobility, and recent studies verify Mirrlees' (1982) proposition in specific cases. For example, Kleven, Landais, and Saez (2013) show that European football stars prefer to play for teams in countries with lower tax rates. Yet, as the authors note, professional sport requires minimal place-specific investment of human capital. In fact, the game itself moves around, often across international borders. Kleven et al. (2013) provide an important upper bound estimate on the migration responsiveness of the highly skilled. Nevertheless, their estimated tax-elasticity of residential location is still only 0.4, suggesting that place considerations are significant even for the most mobile top earners.

Wealthy tax filers may also be quite immobile. Positions in the most highly-skilled and most highly-remunerated professions are concentrated in particular places. Consider technological expertise in Silicon Valley or financial expertise on Wall Street. The agglomeration economies in these regions are important considerations for state fiscal policy

[1] Source: Franchise Tax Board, 2006 Annual Report, p. 82.

(Baldwin and Krugman 2004). To be sure, there are top-income earners who do not depend on labor income. Yet even members of this group will have invested significant economic and social resources in a particular place in order to make their fortunes (Glaeser and Gottlieb 2009).

But taxes may be consequential for wealthy households. In absolute terms, the wealthy pay more taxes. They may also be able to "time" income and more easily withstand any interruption of earnings associated with an interstate move. Indeed, the potential tax effect on migration is at the center of a largely separate literature on regional tax competition. In short, the threat of greater migration responsiveness among the wealthy suggests a policy tradeoff between the "millionaire taxes" that are often popular with voters, and the loss of wealthy tax filers. If millionaires are in fact more mobile, state policymakers may be forced to "curse" the less-mobile middle with the largest tax bills (Simula and Trannoy 2011).

Young and Varner (2011) examined the migration response to a millionaire tax in New Jersey, which raised its income tax rate on top-income earners by 2.6 percentage points. In many ways New Jersey was an ideal testing ground, given its close proximity to lower-tax states (Connecticut and Pennsylvania) with whom New Jersey shares two multi-state cities (New York and Philadelphia metropolitan areas). The geography of New Jersey makes it relatively easy to arbitrage state tax systems without leaving one's city.

Drawing on the complete New Jersey state tax micro data (a virtual census of millionaires), that study found little responsiveness to the tax increase, with semi-elasticities generally below 0.1. There was evidence of modest tax-induced migration among some small segments of the millionaire population: millionaires past retirement age and those living primarily on investment income rather than wages (i.e., people not tied to their state by an employer or business). Overall, the New Jersey tax raises roughly $1 billion per year and modestly reduces income inequality. This research was later replicated by Cohen, Lai, and Steindel (2015) who were critical but reported new estimates that were largely within the confidence intervals of the original study (Young and Varner 2015).

More recent work on elite populations comes from Akcigit et al. (2016) and Moretti and Wilson (2017) studying star scientists internationally and in the U.S. These studies show a range of estimates. Akcigit et al. (2016) use similar methods to Kleven et al. (2013) and find large effects for foreign-born elites, but small effects for those living in their country of birth. It should be noted that in both studies, only a very small fraction of their samples are foreign-born (around

five percent). Moretti and Wilson (2017) find larger effects of tax changes on star scientists within the U.S., and conclude that taxes on the rich are one important factor driving location choices of elite scientists and perhaps "other well-educated, productive, and high-income workers" (1861).

1.2 California Income Tax Rates

In California, the personal income tax rate structure has changed many times since its introduction in 1935. From the beginning, California had a progressive rate structure. In the early years, the income tax started at 1 percent on income below $5,000, rising to a 15 percent top marginal rate on income above $250,000 (not adjusted for inflation).

Since 1935, the top marginal rate has changed 9 times, with 6 increases and 3 cuts. Figure 1.1 places these changes in economic context. It shows the top marginal tax rate against the backdrop of the business cycle, with recessions indicated by the shaded columns. The top tax rate has ranged between 6 percent and 15 percent. After a very large tax cut in 1942, the long-term trend has been towards higher top tax rates in the state. Since 1973, the top rate has fluctuated between 9.3 percent and 13.3 percent – and this is the magnitude of policy difference we observe in our current data.

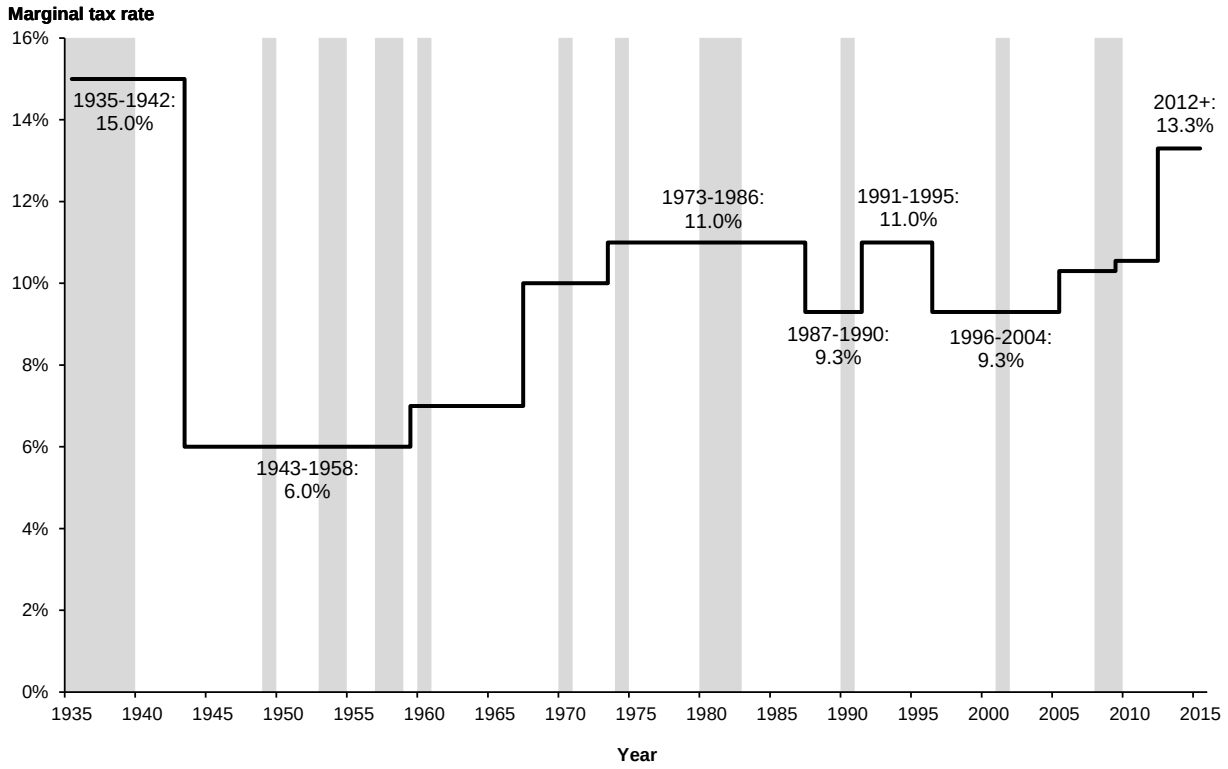
It is worth noting that, compared to states like Nevada, Texas, or Florida, California has had high taxes on the rich for some eight decades. Relatively high taxes on top income in California are older than Silicon Valley, the modern computer, or the Golden Gate Bridge. When taxes on high income earners were first established in California, movies with sound were called "talkies" and the famous LA sign read "Hollywoodland." We do not know how California's socio-economic history might have unfolded differently if, like Texas, it never had an income tax.

Over the last 25 years, tax rates on top incomes in California have gone up and down within a range of four percentage points. Our empirical question is limited to asking: does it matter whether a state's top tax rate is 9.3 or 13.3 percent? If a state raises its top tax rate on this type of scale, would top income earners leave the state?

This is a question that generates very heated policy debates. In California, top Republican lawmakers argued that "nothing is more portable than a millionaire and his money" (Yamamura

2011). In Oregon, Phil Knight – the CEO of Nike and the state's richest resident – warned that a millionaire tax would "set off a death spiral" of top earners fleeing the state (Knight 2010).

Figure 1.1 California top marginal tax rate, 1935–present

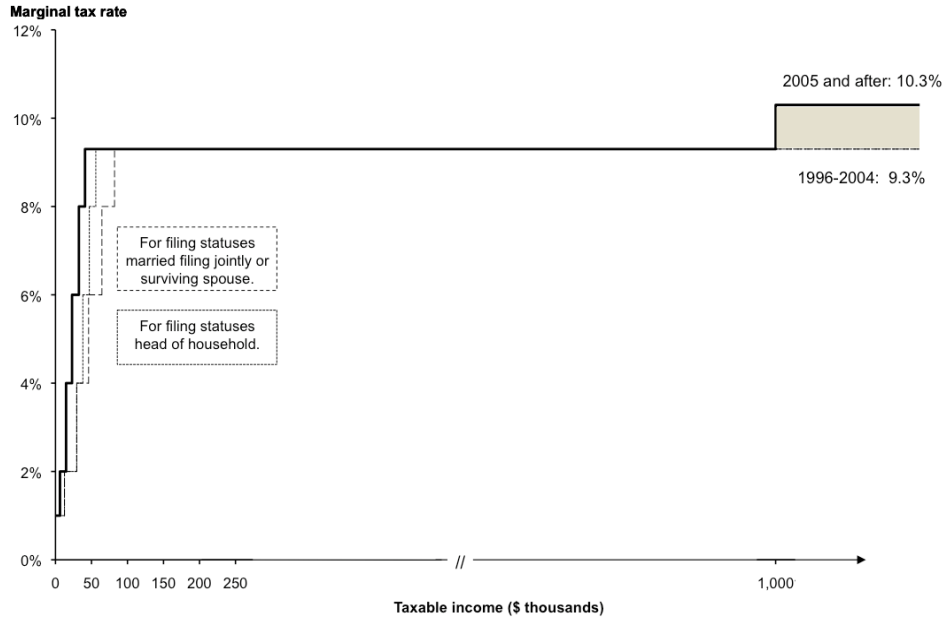


Note: Recession years shaded in grey. Source: California Franchise Tax Board.

In this paper, we analyze three specific episodes of tax reform. First, we focus on two "millionaire taxes" passed in 2004 and 2012, respectively. These reforms introduced new tax brackets and higher rates for high income earners.

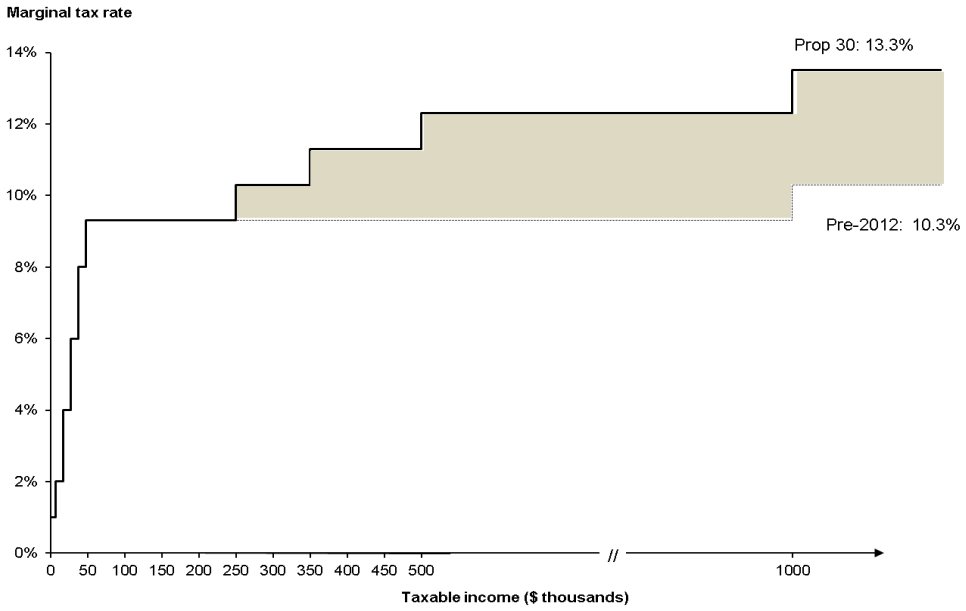
Figure 1.2 (below) shows the rate schedule before and after the 2004 Mental Health Services Tax came into effect. In November 2004, voters approved Proposition 63, which added 1 percentage point on income above $1 million effective January 1, 2005. Before this, marginal rates were progressive at low and middle income levels, but topped out at about $40,000 for single filers or $80,000 for joint filers. Between 1996 and 2004, the marginal rate was the same (9.3 percent) for the top one-fifth of all income earners. Since the 2004 increase, income earners at the very top paid 10.3 percent on income above $1 million.

Figure 1.2 The 2004 Mental Health Services Tax



In 2012, voters approved a larger set of tax increases on high income earners, starting at $250,000 for single filers and $500,000 for married couples. Proposition 30 added three new tax brackets, as shown in Figure 1.3. It is worth noting that the Proposition 30 tax schedule was originally set to expire in 2019, but was re-approved by voters under Proposition 55 in 2016 to extend to the year 2030.

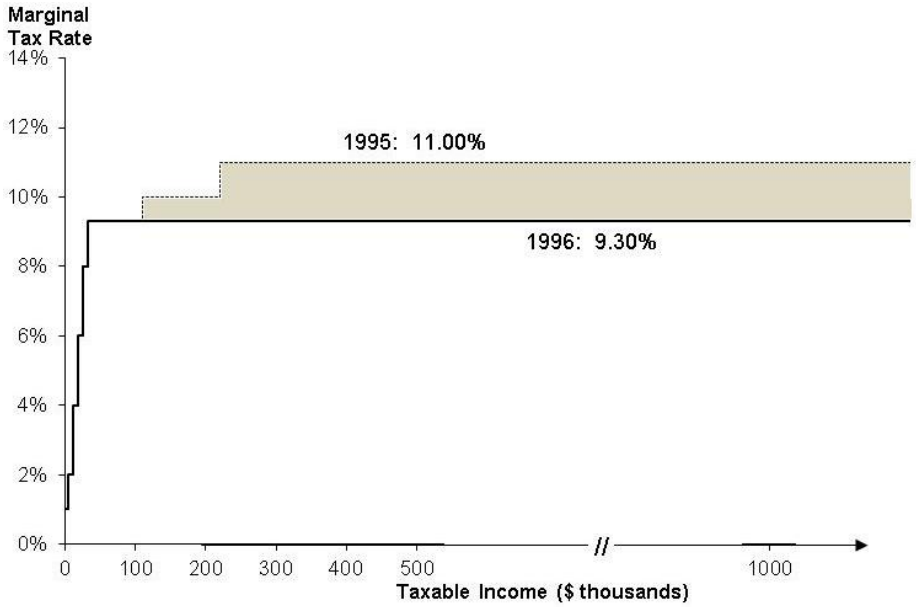
Figure 1.3 The 2012 (Proposition 30) Tax Increases



Note: Brackets shown are for single filers. Bracket cut points were doubled for joint filers.

Figure 1.4 (below) provides a similar picture for the 1996 tax cuts, which returned the top marginal rate to its 1990 level. One important difference is that the 1996 changes applied to a much wider income range. The 1996 changes were not "middle class tax cuts," but any single filer above $109,936 or joint filer above $219,872 received a tax cut of up to 1.7 percentage points.

Figure 1.4 The 1996 Tax Cuts



Note: Brackets shown are for single filers. Bracket cut points were doubled for joint filers.

1.3 California's Wealthy Population

Have tax policy reforms altered California's ability to cultivate, attract, or retain the wealthy? If tax rates are important factors in the state residency decisions, we would expect to find two patterns in California's wealthy population. The number of top income earners would fall after a tax increase and rise after a tax cut.

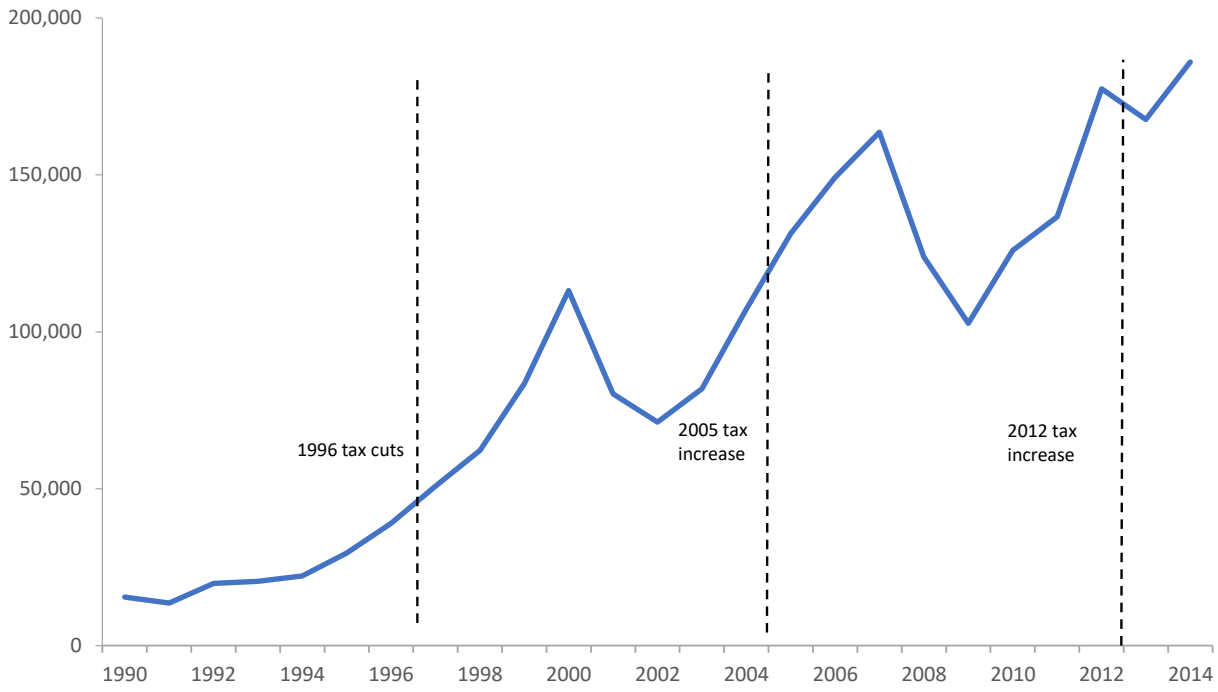
Figure 1.5 (below) shows the number of millionaires in the California tax data since 1990. The millionaire population grew from 15,000 in 1990 to more than 150,000 in 2007, and nearly 200,000 in 2014.[2] None of the tax changes we study has a visually-perceptible effect on the general upward trend in the number of millionaires filing taxes in California. After the 2004 MHST came into effect, the number of millionaires continued to rise for three years, falling only during the 2008 financial crisis. This pattern does not indicate that the recent tax changes were of major concern to top-income earners.

If the population of top earners were determined mostly by tax rates, the basic population graph could be quite informative. However, population changes for other reasons. The strength

[2] These counts include all California residents and nonresidents who had income greater than $1 million.

of financial markets is critical, with the two peaks in Figure 1.5 corresponding to the dot-com boom (1999-2000) and the more recent stock market run-up (2007-08). These economic trends greatly increased the number of Californians earning very high incomes. Analytically, other drivers of the top-income population (particularly income growth) overshadow migration, which occurs on a smaller scale.

Figure 1.5 Number of Millionaires Filing California Tax Returns, 1990–2014



Source: FTB microdata.

In the results that follow in this paper, we interpret migration effects relative to the base population of millionaires. Yet, as Figure 1.5 makes clear, the size of that population changes dramatically over the business cycle.

Thus, though the net migration and millionaire population trends indicate that the tax changes had no effect on California's attractiveness to the wealthy, we need to examine migration data for top-income earners in order to identify any potential tax effect on migration. It is this analysis to which we turn now. The rest of the paper has four sections. Section 2 defines

migration events in the FTB data and illustrates the intuition guiding our difference-in-differences models. Section 3 presents our main non-parametric graphical analysis of the 2004 Mental Health Services tax, the 2012 Proposition 30 tax, as well as basic results for the 1996 tax cut. In Section 4, we estimate regression models for the two millionaire taxes and conduct a sensitivity analysis of the average effect across top earner socio-demographic groups. Section 5 provides extensions and robustness tests. Section 6 concludes.

2 Data and Identification Strategy

Administrative tax data have unique value for the study of top-income migration behavior. For this study, the California Franchise Tax Board (FTB) granted us access to a longitudinal panel of de-identified tax records. Using data from California personal income tax returns, the FTB created data sets for the tax years 1990-2014. Resident tax returns (Forms 540, 540A, 540EZ, and 5402EZ) and part-year / non-resident tax returns (Forms 540NR Long and 540NR Short) were included.

FTB then conducted three data processing steps necessary for the creation of a reliable longitudinal data set. First, because it is possible to file a tax return for a tax year other than the filing year, it was necessary to transfer the information from these returns to the appropriate tax year. Second, for each tax year, data on joint filers was replicated. The designation of the primary and secondary filers was switched on the replicated record. Third, the replicated tax year datasets were merged to create a panel dataset. This method creates an observation with time series data for each adult taxpayer regardless of changes in marital or filing status. After perfecting the data set, FTB removed identifying information such as names and SSNs from the data file to preserve taxpayer confidentiality.

The data set we received from FTB provides a virtual census of high-income earners, with information on income, taxes paid, and some limited demographic data reported on a standard tax form (such as marital status). Our analysis of the 2004 Mental Health Services tax includes the filing history for any filer who reported annual adjusted gross income above $500,000 at least once in the FTB data. There are an average of 750,000 records per year, giving roughly 13.5 million records in total for the 2004 MHST analysis.

2.1 Migration Definitions

In this section, we discuss how migration is defined using the FTB data. Individuals in the tax data can have one of three basic filing statuses in any given year:

F = Full-year resident tax return

P = Part-year / non-resident tax return

M = Missing (no tax return)

We add subscripts to the notation to indicate the year relative to the reference year. So, if the reference year is 2004, then subscript -1 means 2003, 0 means 2004, and +1 means 2005.

In-Migration

Three year definition: $MPF = M_{-1}P_0F_{+1}$

This definition of in-migration refers to the following sequence of tax filing: no tax return filed (M_{-1}), then a part-year return in the reference year (P_0), then a full-year return (F_{+1}). Though these individuals file their first full-year resident return in year +1, they arrived in California in the reference year 0.

Out-Migration

Three year definition: $FPM = F_{-1}P_0M_{+1}$

This is the opposite sequence from in-migration: beginning with a full-year resident return (F_{-1}). In the reference year a part-year return is filed (P_0), followed by no tax return filed in the following year (M_{+1}). These tax filers are coded as leaving the state when they filed their part-year tax return, which is reference year 0.[3]

Net Migration

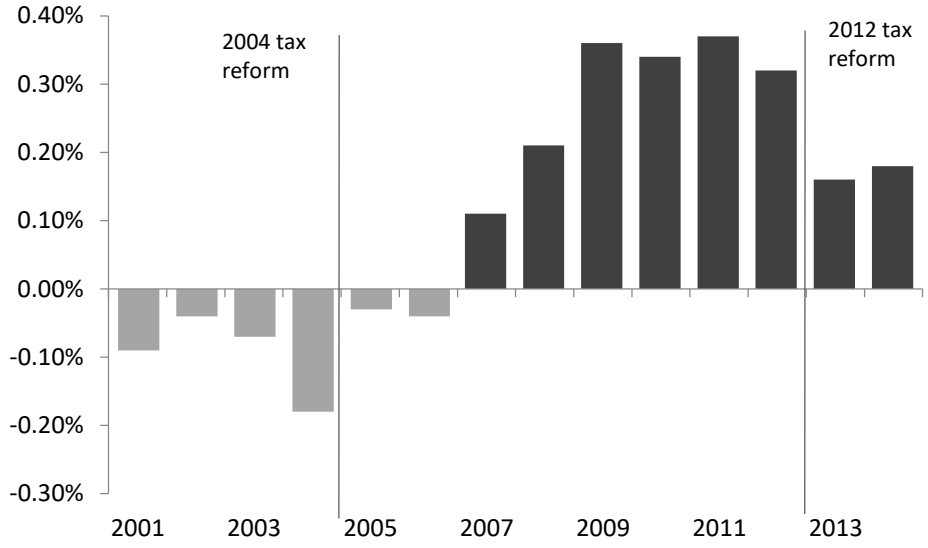
We define net migration as the difference of in-migration minus out-migration, or MPF – FPM. Net migration gives the overall change in the millionaire population due to migration flows.

[3] In Appendix B, we discuss using alternative four-year migration definitions, such as $F_{-1}P_0M_{+1}\,M_{+2}$ to define out-migration, and robustness tests are available on request.

2.2 Basic Facts on Millionaire Migration

As a baseline descriptive analysis, we examine the trends in net migration to California for taxpayers with annual incomes of $1 million or more, i.e. those whose income would be exposed to both the 2004 and 2012 tax increases. Figure 2.1 shows net migration rates from 2001 through 2014.[4] It is clear that there is *not* a pattern of millionaire out-migration in recent years despite the 4 percentage point tax increase on income above $1 million since 2004 (rising from a rate of 9.3% to 13.3% in 2012). If anything, the trend has run counter to the tax-flight expectation. There was a small net outflow of millionaires leaving California in the years prior to the first tax increase, but this outflow decreased in 2005 and 2006, and then shifted to a positive inflow of millionaires to California in 2007. This net migration of millionaires into the state has remained positive since 2007 even in the years since the much larger 2012 tax increase, though the inflow rate slowed somewhat in 2013 and 2014.

Figure 2.1 Millionaire Net Migration to California, 2001-2014



Note: Estimates show net migration as a percent of the base millionaire population.

In this first look at the data, we do not compare millionaires' migration rates to the rates of a control group. We will do that in a moment. However, it is worth emphasizing that, on net, millionaires have been moving into California at a greater pace *after* two tax reforms that increased the state's tax price. We also reiterate here, before turning to our main difference-in-

[4] Net migration is defined as (in-migrants – out-migrants) / base population.

differences models, that migration comprises a very small portion the year-to-year change in millionaire population. Appendix Table A.1 shows the raw counts of base population, in-migrants, and out-migrants in each year, for millionaires and for similar high-income earners between $500,000 and $1 million. One can see that the net migration counts (in particular) are very small relative to the base population.

The population of full-year resident millionaires has ranged from about 42,000 to 93,000, while out-migration has ranged from about 300 to about almost 600. Net migration has ranged from -116 to 150. One standard deviation in the population of millionaires is 18,750; the corresponding number for net migration is 85. Migration accounts for less than one-half of one percent of the variation in the number of millionaires in California.

To make this point more intuitively clear, Table 2.1 shows the annual change in the population of California millionaires, along with the annual change in the net migration of millionaires, before and after the 2004 MHST. The number of millionaires has gone up or down, on average, by 11,772 people a year. The net migration of millionaires has gone up or down by 59 people.[5] Migration accounts for just one-half of one percent (0.5%) of the changes in the millionaire population.

Table 2.1 Millionaire Population Changes

	Change in Number of Millionaires	Change in Net Migration of Millionaires
2002	-7,663	26
2003	6,671	-12
2004	15,419	-86
2005	13,280	93
2006	8,625	-11
2007	7,680	135
2008	-23,067	49
Average of Absolute Changes	11,772	59

[5] Absolute changes ignore the signs (i.e., whether the population change was positive or negative) and focuses simply on the magnitude of typical year-to-year changes.

Some 99.5 percent of fluctuation in the size of the millionaire population is driven by something other than migration – mostly, income dynamics at the top – California residents growing into the millionaire bracket, or falling out of it again.

Despite the limited importance migration plays for the size of California's millionaire population, the central goal of the paper is to identify the responsiveness of migration to top tax rates.

2.3 Identification Strategy

How does one identify the effect of a millionaire's tax on migration? We use two complementary strategies. First, we look simply at annual migration rates for treatment and control groups. The treatment group is composed of individuals who earn enough to place them inside the tax bracket – i.e., people who pay more under the new tax rate. For the 2004 MHS tax, the treatment group is individuals who earned more than $1 million in a year after 2004. The control group is composed of high-income individuals who are not subject to the tax increase. We define the control group to be those earning $500,000 to $1 million in a year.

There may well be differences in the migration rates between the treatment and control group. This is acceptable, since we are looking for a divergence between these groups' migration rates that occurs after the tax was introduced. Thus, we do not require that the treatment and control groups have the same baseline migration rates. We simply expect that the tax creates a new difference between the groups after 2004. Specifically, the net migration rate should increase for those affected by the tax relative to those in the control group.

The principal purpose of the control group is to capture (non-tax) social, political, and macroeconomic trends that affect the migration behavior of top-income earners. The effect of the tax is observed by a new decrease in net migration (in-out) among the treatment group, but not among the control group.

Our first strategy models the tax increase as if it were a lump sum fee that falls equally on all individuals with more than $1 million in income. However, with a marginal tax rate, all income up to $1 million is exempt from the higher rate. The new rate only applies to earnings above $1 million. Thus, for individuals earning $1,000,001, their tax increase is 1 penny. For those making $10,000,000, their tax increase is $90,000. Thus, the magnitude and the effective rate of the tax increase grows with the amount earned above $1 million. Our second

identification strategy takes this into account. Thus, we not only expect a net migration response for the treatment group relative to controls. We also expect that any effect of the tax change would increase as income increases within the treatment group.

If the tax were to have an effect on out-migration, Figure 2.2 illustrates the change we would expect, by detailed income levels. (Using real data, we break up the control and treatment groups into income deciles; the income levels depicted here reflect our income deciles.) The solid line shows the income-migration profile for the pre-tax years, depicted here as completely flat: as income grows, out-migration rates remain constant. The dashed line shows the expected income-migration profile after the tax increase. On the left-hand side of the graph, we see that migration rates were unaffected for those earning less than $1 million. The right-hand-side shows a steadily increasing out-migration rate. This reflects the fact that those in the treatment group with the highest incomes experienced the largest tax increases – both in dollar terms, and in their effective tax rate.

Figure 2.2 Expected Effect on Out-migration Rates after the 2004 MHST

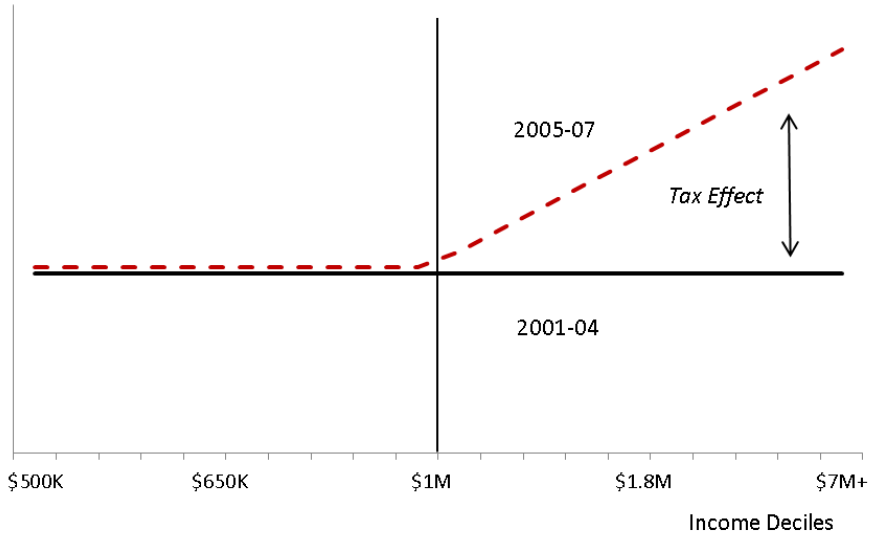
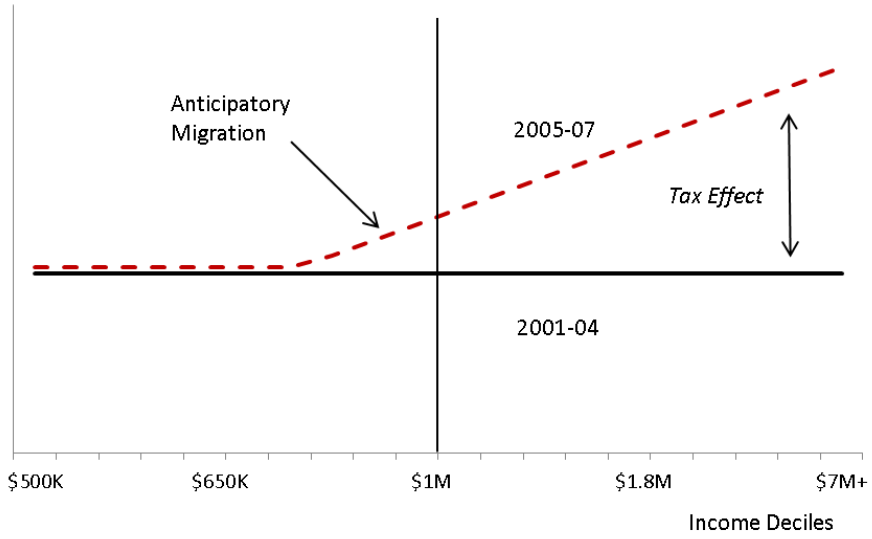


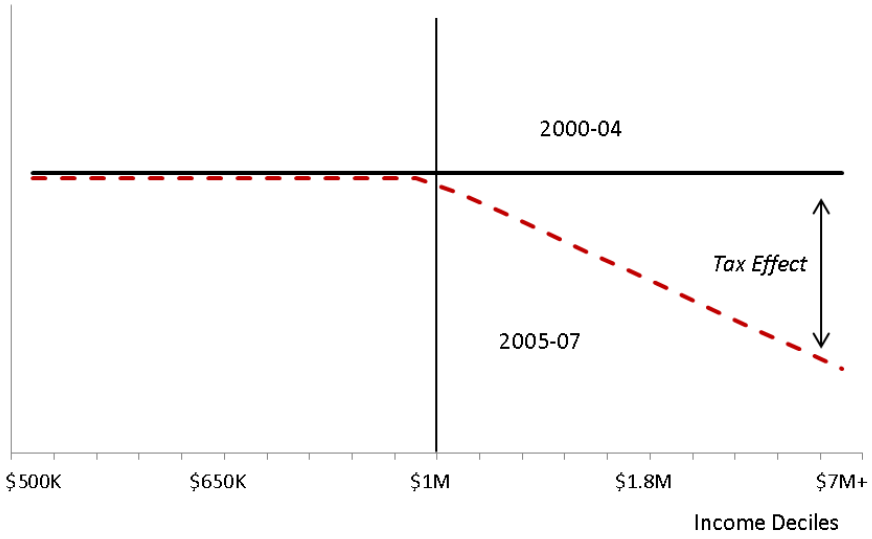
Figure 2.3 Expected Out-migration Effect, with Anticipatory Migration



One criticism of this design is that there may be some anticipatory migration by people just below the tax bracket. Suppose that people in the control group anticipate future income growth, and migrate in response to the new tax even though they are not yet affected by it. Such anticipatory migration should be readily observable in our analysis. It simply means that we would expect to see migration rates begin to increase at incomes below the $1 million bracket. The highest earners of the "control group" believe that they are better understood as being "treated" by the tax (not yet, but very soon). Figure 2.3 shows a pattern of anticipatory migration.

For in-migration, the prediction is that the tax increase will reduce in-migration rates among those exposed to the tax. So, in Figure 2.4 (below) the pre-tax period (2001-04) again provides baseline migration rates, represented by the solid flat line. The figure assumes that in-migration rates are constant as income increases, but the analysis can accommodate any income-migration profile. In the post-tax period (2005-07) migration rates should not be affected for incomes up to $1 million; for higher incomes, in-migration rates should be declining, and the effect should grow stronger as more and more income is subjected to the higher tax rate. In other words, above $1 million, in-migration rates should start dropping as income increases (as illustrated by the dashed line). Note that any anticipatory migration effects can be observed in much the same way as for out-migration.

Figure 2.4 Expected Effect on In-migration Rates, after the 2004 MHST



The 2012 (Prop 30) tax reform was more complex than the 2004 MHST, as it involved several new brackets, which also depended on filing status (e.g., higher brackets for those married filing jointly than for single individuals). However, the basic form of the identification strategy is similar: there is a control group of high-earners not affected (below the new brackets), and a treatment group for whom the tax bite rises with income above the new bracket. Thus, we will be similarly looking for a tax effect that grows in magnitude as income rises in the treatment group.

3 Graphical Analysis

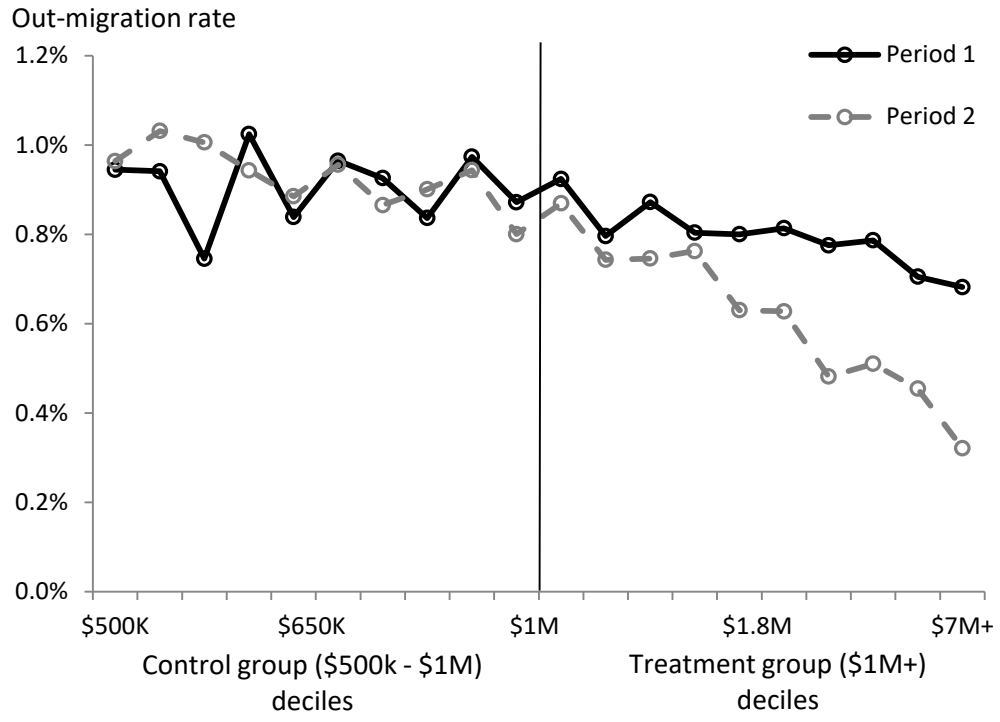
In this section, we describe the graphical analysis of millionaire migration in the wake of tax increases on top income earners. This provides a purely non-parametric analysis. Specifically, this shows the average migration rates by deciles of top income earners for treatment and control groups, both before and after the three tax reforms we consider. First, we examine the 2004 Mental Health Services Tax. Then, we apply a similar analysis to the 2012 (Proposition 30) tax increase and the 1996 tax decrease.

3.1 The 2004 Mental Health Services Tax

We begin simply, looking at migration rates by detailed income group before and after the 2004 tax reform. On the left-side of Figure 3.1, we show the control group ($500,000 to $1

million) divided into ten income deciles. The solid line shows out-migration rates at each control group decile's income in period 1 (before the millionaire tax passed), while the dashed line shows out-migration rates in period 2, after the tax was passed. For those with incomes up to $1 million, who were not affected by the tax change, there is no shift in out-migration rates. Overall, out-migration among the control group was 0.9 percent in both periods. The right-side of Figure 3.1 shows out-migration rates by deciles of treatment group income. In both periods, out-migration rates decline with income, indicating that the highest earners are more attached to the state. Moreover, out-migration rates are notably lower in period 2, after the millionaire tax had passed. This is a wrong-signed effect. The tax flight argument anticipates increasing out-migration among the highest earners ($1 million+) after a tax increase. However, after the 2004 MHST, we observe the opposite. For the treatment group, out-migration falls from 0.8% to 0.6%. The difference-in-differences estimate is calculated as the decline for the treatment group minus the constant trend for the control group (which provides the counter-factual expected migration patterns had the MHST not come into effect). The DiD estimate is -0.2 percent.

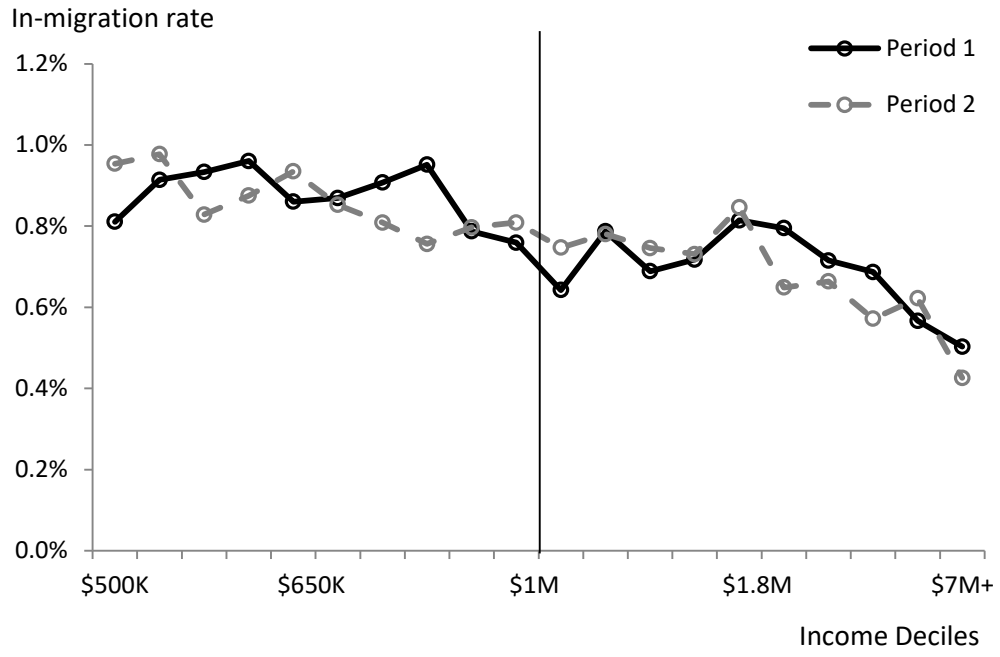
Figure 3.1 Out-migration Rates by Income, before and after the 2004 MHST



	Before	After	Diff
Control	0.9%	0.9%	0.0%
Treatment	0.8%	0.6%	-0.2%
Diff	-0.1%	-0.3%	-0.2%

Figure 3.2 turns the focus to in-migration from other states. It follows the general pattern of decline with income: high-income individuals are less likely to be new in-migrants. However, the pattern is the same both before and after the 2004 MHST. Support for the tax flight argument would require declining in-migration among those exposed to the tax after it was passed. The simple DiD estimate is zero.[6]

Figure 3.2 In-migration Rates by Income, before and after the 2004 MHST

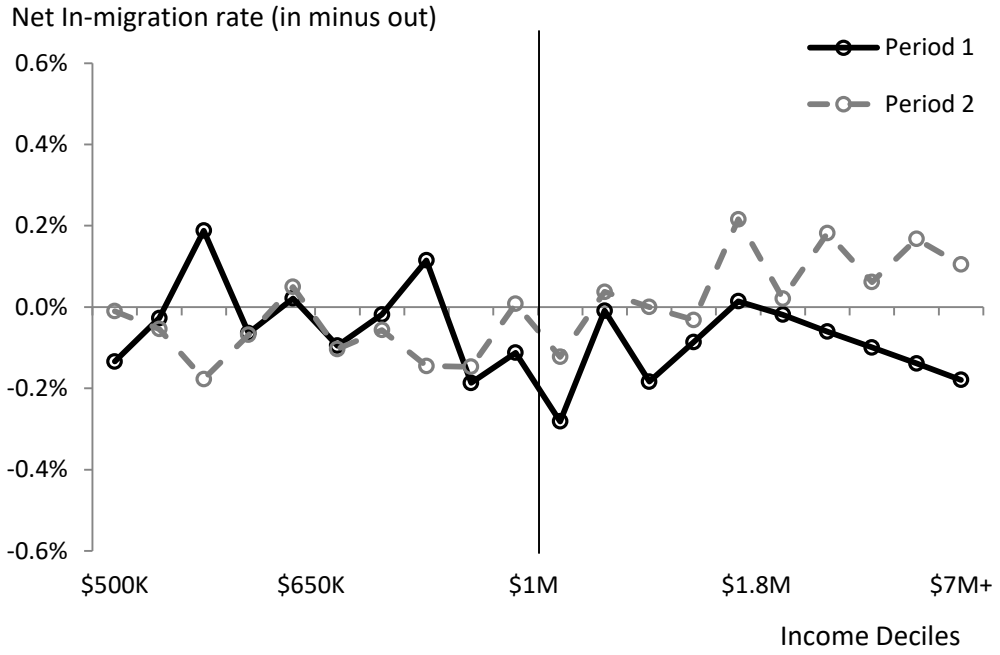


	Before	After	Diff
Control	0.9%	0.9%	0.0%
Treatment	0.7%	0.7%	0.0%
Diff	-0.2%	-0.2%	0.0%

[6] Appendix Table A.2 shows the decile cut points for both the control and treatment groups, and shows the in- and out-migration rates at each level (as plotted in Figures 3.1 and 3.2).

Finally, Figure 3.3 plots net in-migration rates (in-migration minus out-migration, divided by population). Overall, net-migration of top earners over this period was close to zero: out-migrations are evenly matched by in-migrations at each income level. However, Figure 3.3 also shows net in-migration rising slightly in period 2, after the millionaire tax had taken effect. Clearly, the effect size is small, but wrong-signed: net in-migration of millionaires rose after the tax was passed, by an amount equal to 0.2 percent of the base millionaire population. As noted above, this pattern is driven entirely by declining out-migration of millionaires in period 2; patterns of in-migration did not change.

Figure 3.3 Net In-migration by Income, before and after the 2004 MHST



	Before	After	Diff
Control	0.0%	-0.1%	0.0%
Treatment	-0.1%	0.1%	0.2%
Diff	-0.1%	0.1%	0.2%

This analysis shows that in the years after the tax took effect, net migration for the treatment group (those exposed to the tax) increased relative to migration rates for the control group. The magnitude of difference is very small. Nonetheless, net migration of millionaires turned positive, while net migration of half-millionaires turned negative in the years after the tax.

A reasonable interpretation is that, for both groups, net migration was "zero-plus-noise" over the whole period. But from an accounting perspective, there was a gain in millionaires after the tax.

3.2 The 2012 (Proposition 30) Tax Increase

In 2012, California voters approved Proposition 30, which raised taxes on top incomes by upwards of three percentage points.[7] Specifically, the tax provided new brackets starting at $250,000 (10.3%), $300,000 (11.3%), $500,000 (12.3%) and retained the additional 1 percent marginal tax above $1 million (13.3%).[8] The proposition passed in November, 2012, but applied retroactively to income earned since January of that year. Thus, we treat 2013 as the first year top earners could behaviorally respond to the new tax rates.

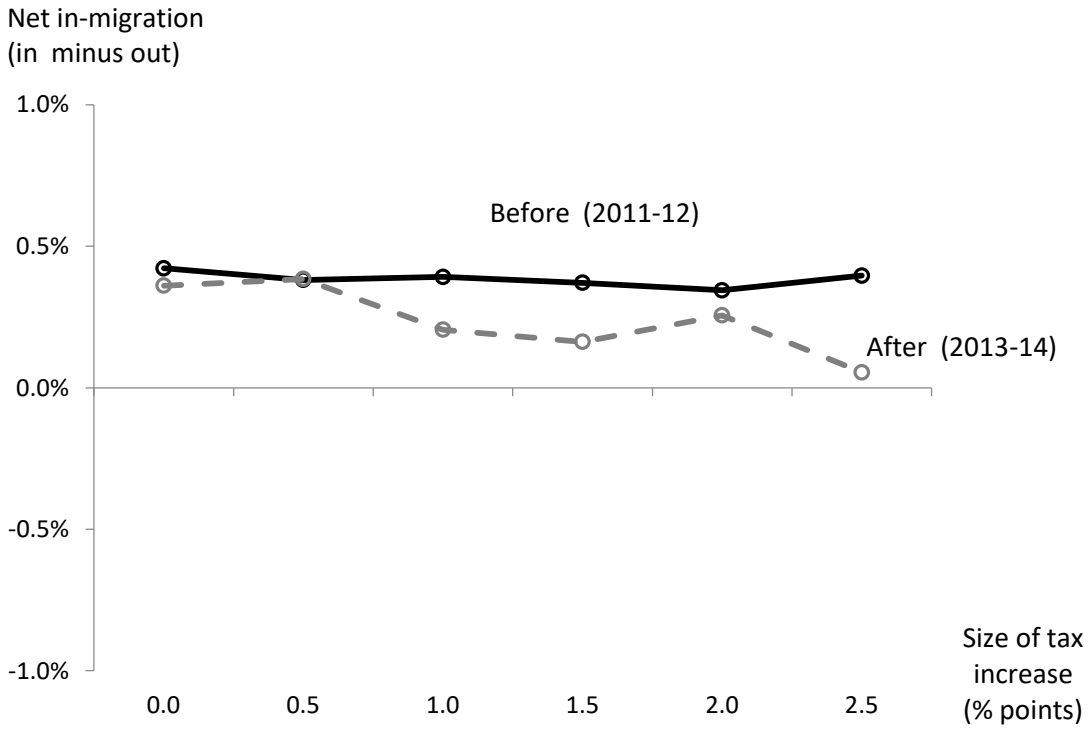
Figure 3.4 (below) shows net in-migration of millionaires before and after the 2012 tax increase, by tax bracket (i.e., percentage point tax increase). For this analysis, we grouped tax filers by the effective tax increase they experienced (defined by income and filing status), and calculated net in-migration for those groups before and after the passage of Proposition 30.

The leftmost points in Figure 3.4 represent the control group – high income earners who were just below the cut point for any tax increase. Moving rightward along the graph shows groups that saw increasingly larger effective tax increases. The rightmost observations show people who saw a 2.5 to 3 percentage point effective tax increase. Net in-migration was positive and roughly constant across these income brackets in the two years before the tax increase (2011-12). However, after 2012, net in-migration declines for those facing an effective tax increase of 0.5 percentage points or higher. The net-migration decline is largest for the group facing the highest effective tax increase. Overall, this is consistent with a tax flight response that is roughly linear in the magnitude of the tax increase (albeit with noise).

On average, the difference-in-difference estimates from Figure 3.4 give a semi-elasticity of -0.04 percent, meaning a loss equal to 0.04 percent of the millionaire population, or roughly one-twenty-fifth of one percent, for a percentage point increase in the effective top tax rate.

[7] Proposition 30 passed by a margin of 55 percent in favor, 45 percent opposed.
[8] These are the new brackets for single and separate filers. The new brackets for married and widowed filers started at twice these income levels. For heads of households, the new brackets began at $340,000 (10.3%), $408,000 (11.3%), and $680,000 (12.3%). These income levels have been adjusted upwards each year since 2012 for inflation.

Figure 3.4 Net In-migration of Top Earners, by Tax Bracket

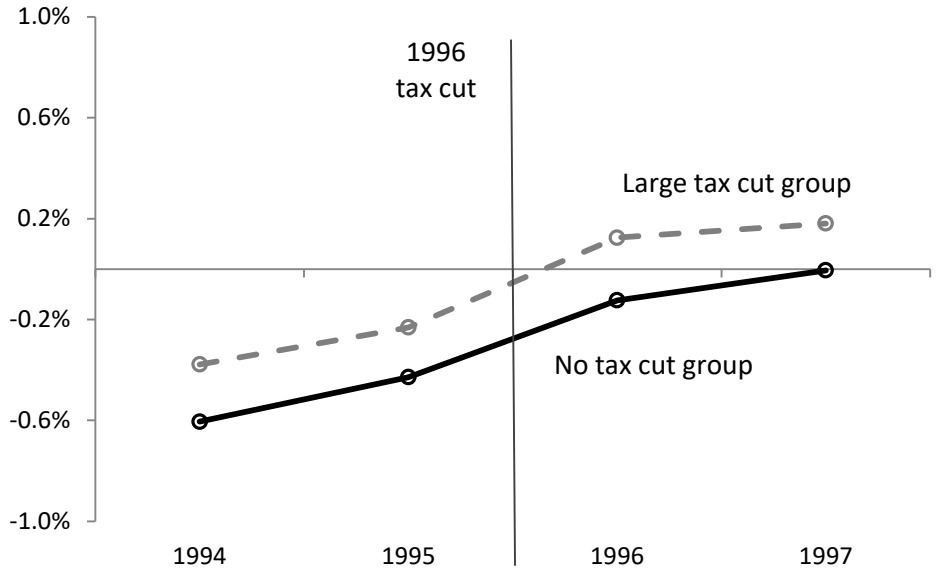


Notes: *California Franchise Tax Board micro-data, 2011-2014. N = 4,591,082*

3.3 The 1996 Tax Cuts

Migration response to changes in tax policy is of course also relevant for policymakers considering tax cuts. The 1996 tax cuts included two changes, a smaller 0.7 percentage point cut and a larger 1.7 percentage point cut. Here we provide a very simple analysis comparing tax filers in the bracket facing the "large" tax cut (single earners making $212k+) with upper-middle class earners who did not see a tax cut ($80k-$107k). We focus on two years before the tax cuts, and two years after (1994-95, versus 1996-97).

Figure 3.5 Net In-migration Rates, 1994-97



Source: FTB Microdata. N = 9,048,672

Net migration was trending positive for all groups during this period, as shown in Figure 3.5. These were economic boom times for California. Net out-migration of the early 1990s was turning towards net in-migration in the late 1990s. However, what is most striking about Figure 3.5 is the parallel trend between the top earners enjoying a "large" tax cut, and the control from of upper-middle earners that received no tax break at all. For the tax flight hypothesis, the "large tax cut" group should have a growing divergence from the controls after 1995. These results give no evidence of a migration effect of the 1996 tax cut.

This is a preliminary analysis of the 1996 tax cuts, and in the next version of this paper we will present more detailed analysis. For now, Appendix C provides table summaries of the control and treatment groups, including their population and migration data, as well as basic difference-in-difference estimates of tax migration.

4 Regression Analysis

In this section, we estimate analogous regression models for the 2004 and 2012 tax reforms.[9] As in the graphical analysis, the outcome of interest is the net (in–out) migration rate to California, which provides a measure of state's attractiveness to top earners. The focus of each regression is on the change in top earner migration after the tax change.

The first model in Table 4.1 gives the simple before-after comparison of net migration among millionaires facing the 2004 tax increase. Migration status is coded as 1 for in-migrants, 0 for non-migrants, and –1 for out-migrants, and scaled by 1,000 for ease of interpretation. At baseline, the intercept in Model 1 shows the small net outflow of millionaires from California before the 2004 reform. In these years, the net migration rate was –1.0 per 1,000 millionaires (or –0.10%). Contrary to expectation, the net migration rate increased by 1.6 per thousand after 2004, a shift to *net inflows* of millionaires after the tax increase.

But to properly assess the effect of the tax change on migration, we develop a series of difference-in-differences estimators (Young and Varner 2011). The first step in this analysis is to define a sensible control group, which we do here using a similar group of high income earners between $500,000 and $1 million just below the new tax bracket. Thus, the tax change should not have affected this group's migration trends before and after 2004.

Formally, both treatment and control groups experience two time periods, before (period 1) and after the tax change (period 2). The analysis allows the treatment and control groups to have different baseline migration propensities. However, it assumes the difference in these trends over time would be the same 'but for' the tax reform. Modeled in this way, the coefficient on the interaction term between the period 2 measure and the treatment group measure yields the difference-in-difference estimator (DiD), which identifies the tax effect.

In Model 2, these key period and treatment group parameters are entered as dummy variables, which provide estimates of the mean migration rates for each group both before and after the tax change. Average net migration in the control group was –0.3 per 1,000 before the change, declining an additional 0.4 per thousand after the change. In comparison, millionaires had a lower baseline (i.e. before-tax-change) average net migration rate, and their rate rose considerably after the tax increase, by 2.0 per 1,000 more than expected (i.e. relative to the

[9] Regression analysis of the 1996 tax cuts is in development and will be included in a future version of this paper.

Table 4.1. Regressions for Millionaire Migration, 2004 Tax Reform

	Model 1	Model 2	Model 3	Model 4
	Before-After	Mean DiD	DiD per Tax Point Change	DiD per Tax Point Change with Controls
Period 2 (2013-14)	1.616*	-0.387	-0.197	-0.148
	(0.318)	(0.507)	(0.455)	(0.454)
Treatment Group		-0.715	-1.077	-1.123
		(0.504)	(0.967)	(0.975)
x Period 2 (DiD)		2.003**	4.673***	4.688***
		(0.581)	(1.102)	(1.100)
Age 65+				-2.534***
				(0.577)
Number of Dependent Children				0.845***
				(0.107)
Marital Status				
Married filing jointly				*Reference*
Single				-1.111*
				(0.471)
Separated				1.519
				(1.765)
Head of Household				-1.002
				(0.779)
Widowed				4.395
				(5.032)
Intercept	-1.019	-0.304	-0.447	-0.843
	(0.362)	(0.388)	(0.370)	(0.412)
N	536,460	1,376,216	1,376,216	1,376,216

* p<0.05 ** p<0.01 *** p<0.001. California Franchise Tax Board micro-data, 2000-08. Robust standard errors clustered by 28 income categories in parentheses. Outcome variable is migration status, coded as 1 (in-migrant), -1 (out-migrant), 0 (non-migrant), and scaled by 1,000 for ease of interpretation (coef. of 1 = 1 millionaire migrant per 1,000 millionaires). The 2004 reform introduced a new tax bracket $1M for all tax payers. Model 1 looks only at those earning $1M+ per year ("millionaires"). Models 2 - 4 use those earning $500k - $1M as a control group for the difference-in-difference estimates. Models 1-2 use a treatment dummy for the DiD estimation, while models 3-4 use the change in effective tax rate for each individual for the DiD.

decrease seen in the control group). This is the mean DiD estimator for the tax-migration effect. It is statistically significant, but as we also saw in the graphical analysis, it is 'wrong-signed.'

Whereas Model 2 provides a single measure of the tax effect for all members of the treatment group, we can generalize the basic model to allow the migration trends to vary with the size of the tax increase that individual treatment group members face given the tax reform. Instead of entering a dummy variable equal to 1 for the treatment group and 0 otherwise, we enter the actual size of the tax increase, i.e. the treatment 'dosage.' In this more general approach, the coefficient on the interaction term gives the DiD estimator per unit of tax increase. In Model 3, we estimate a marginal effect on net migration of 4.7 (per thousand population) per percentage point increase in the effective tax rate. This provides a linear summary measure of the widening gap seen before in the graphical analysis (see right side of Figure 3.3).

An advantage of regression models is that they also allow us to more easily control for other factors that may affect net migration. For example, demographic factors such a marital status, number of children, and age may differentially affect migration into and out of a state, and these variables are available on tax returns. Controlling for these variables allows us to adjust for demographic compositional differences that may obtain between the treatment and control groups and within the treatment group. Model 4 includes these available control variables, but the 'wrong-signed' DiD estimator for the 2004 reform changes very little.

Table 4.2 provides a comparable analysis for the 2012 reform. Again, we begin with the simple before-after comparison for top earners exposed to the tax change. Recall that the 2012 tax change applied to a broader group of top incomes – starting at $250,000 for single tax filers and $500,000 for married tax filers – so the treatment group in the 2012 analysis is larger than the group of million-dollar annual incomes subject to the 2004 MHST.

At baseline, Model 5 shows that the average net migration rate among filers whose income would place them in the new Prop 30 brackets was 3.7 per thousand (.37%) before the 2012 reform. After 2012, the "Period 2" coefficient indicates that the mean migration rate in the treatment group decreased 0.8 per thousand to 0.29%.

Since the new 2012 brackets start at lower income levels, we similarly adjust our control group, which we define as those with incomes greater than $200,000 but just below the new brackets. In Model 6, the mean migration rate among the control group also decreased after the tax change, by 0.6 per thousand. However, average migration declined slightly more in the

Table 4.2. Regressions for Millionaire Migration, 2012 Tax Reform

	Model 5	Model 6	Model 7	Model 8
	Before-After	Mean DiD	DiD per Tax Point Change	DiD per Tax Point Change with Controls
Period 2 (2013-14)	-0.816*	-0.602**	-0.527**	-0.453*
	(0.363)	(0.206)	(0.187)	(0.186)
Treatment Group		-0.419	-0.375	-0.613**
		(0.326)	(0.211)	(0.207)
x Period 2 (DiD)		-0.214	-0.799*	-0.913**
		(0.411)	(0.303)	(0.313)
Age 65+				-6.082***
				(0.262)
Number of Dependent Children				-0.392***
				(0.0975)
Marital Status				
Married filing jointly				*Reference*
Single				0.839
				(0.714)
Separated				20.00***
				(2.905)
Head of Household				-2.459***
				(0.496)
Widowed				-4.630
				(3.671)
Intercept	3.717***	4.136***	4.091***	5.321***
	(0.218)	(0.219)	(0.190)	(0.267)
N	1,179,544	4,591,082	4,591,082	4,591,082

* p<0.05 ** p<0.01 *** p<0.001. California Franchise Tax Board micro-data, 2011-14.
Robust standard errors clustered by 28 income categories in parentheses.
Outcome variable is migration status, coded as 1 (in-migrant), -1 (out-migrant), 0 (non-migrant), and scaled by 1,000 for ease of interpretation (coef. of 1 = 1 millionaire per 1,000 millionaires).
The 2012 reform introduced new tax brackets starting at $250k for single and separated, $340k for head of household, and $500k for married and widowed filers respectively.
Model 5 uses all tax filers in the treatment groups. Models 6-8 use everyone with income of $200,000 or greater in the reference year (but below the new brackets) as a control group for the difference-in-differences estimates. Model 5-6 use a treatment dummy for DiD estimation, while model 7-8 use the change in effective tax rate for each tax filer in the treatment group.

treatment group, yielding a mean difference-in-differences estimate of 0.2 per thousand. However, this estimate is not statistically different from zero. Although the 2012 reform increased the top marginal tax rate by 3 times than the 2004 MHST, the absence of a significant mean migration response is understandable. A large majority of top earners in the new brackets have incomes just above the new bracket cut points. 70 percent of the treatment group saw a tax increase of less than 0.5 percentage points, with new tax liabilities ranging from 1 cent to $5700. For these tax filers, moving costs alone would outweigh the benefit of the avoiding the new tax.

However, while the size of the tax change increases with income, the mean DiD in Model 6 does not capture the potential effect that this rising dosage may have on millionaires. As seen in the graphical analysis, net migration did in fact decrease more among top earners facing larger increases (in the range of 0.5 to upwards of 3 percentage points, see Figure 3.4). Although there is some noise, this pattern is consistent with the tax flight hypothesis. The sign is correct for the larger-magnitude Proposition 30 tax increase.

Here again, the 'widening gap' observed within the treatment group can be summarized with a linear DiD estimator, which gives the predicted marginal change in net-migration per unit of tax increase (in percentage points). Model 7 provides this estimator. In the graphical analysis, we saw that net migration rates were lower in top income groups (i.e. those subject to larger tax increases) before the reform became effective. Model 7 also accounts for this pre-existing pattern, and identifies the tax effect by the interaction of the treatment (this time modeled as a continuous function of the treatment dosage) and an indicator variable for the period after the reform. For each 1 point increase in the tax rate, we find that the net migration rate decreases 0.8 per thousand population.

Explained in another way, Model 7 estimates the before and after linear trend lines from the graphical analysis. The difference at any point along these lines gives the predicted DiD for any discrete tax increase increment. The difference in the slopes of these lines gives the DiD per unit of tax increase. Model 8 adds our battery of demographic control variables, yielding a slightly larger DiD of 0.9 per thousand population.

Finally, in Table 4.3 we provide a sensitivity analysis of the 2012 millionaire tax reform. We treat the difference-in-difference analysis from Model 8 as our preferred model, and then examine how the results vary by socio-demographic groups among top earners: by age, marital status, and presence of children at home (i.e., dependent children).

Our overall estimate from Model 8 indicates that California losses 0.9 millionaires per thousand millionaire population for each percentage point increase in the top tax rate. There are two differences in this effect that seem noteworthy. First, married people with children are less sensitive to the tax than married people without children. The marginal effect among married couples with children (-0.62) is half that of married couples without children (-1.32). Second, and much more striking, is that married taxpayers who file separately have much higher tax sensitivity (-14.2) than all other taxpayers. For a one percentage point increase in the effective rate, the state loses 14 per thousand married filing separately millionaires, compared to just under one-per-thousand among the vast majority of millionaires who are married filing jointly. Notably, however, for state fiscal policy, married filing separately taxpayers comprise just 2 percent of California top earners who pay the tax.

Table 4.3. 2012 Tax-Migration Effects by Socioeconomic Groups

	Marginal Effect (per 1,000 millionaires)	Standard Error	Treatment Group Net Migration Rate (%)	Share of Treatment Group
All	-0.91	0.31	0.33	100%
Family status				
Single	-0.54	0.73	0.26	19%
Married	-0.90	0.38	0.30	76%
with dependent childrer	-0.62	0.44	0.40	47%
no dependent children	-1.32	0.38	0.14	29%
Separated	-14.16	5.35	2.18	2%
Head of household	-0.55	2.26	0.24	2%
Age				
Under age 65	-0.90	0.33	0.45	81%
Age 65+	-0.97	0.43	-0.19	19%

Note: The marginal effect is the change in the population (per 1,000 millionaires) for a one-point increase in the effective tax rate

5 Discussion and Analysis Checks

We have found little observable effect of three California tax reforms on the migration behavior of high-income earners. We show, using a reverse placebo test, that the FTB data are capable of detecting migration responses to a well-established migration cause: divorce. Finally, we explain one reason why there is no migration responsiveness to the two tax changes we study here: most millionaires earn top-bracket income only for a few years.

5.1 Divorce Analysis

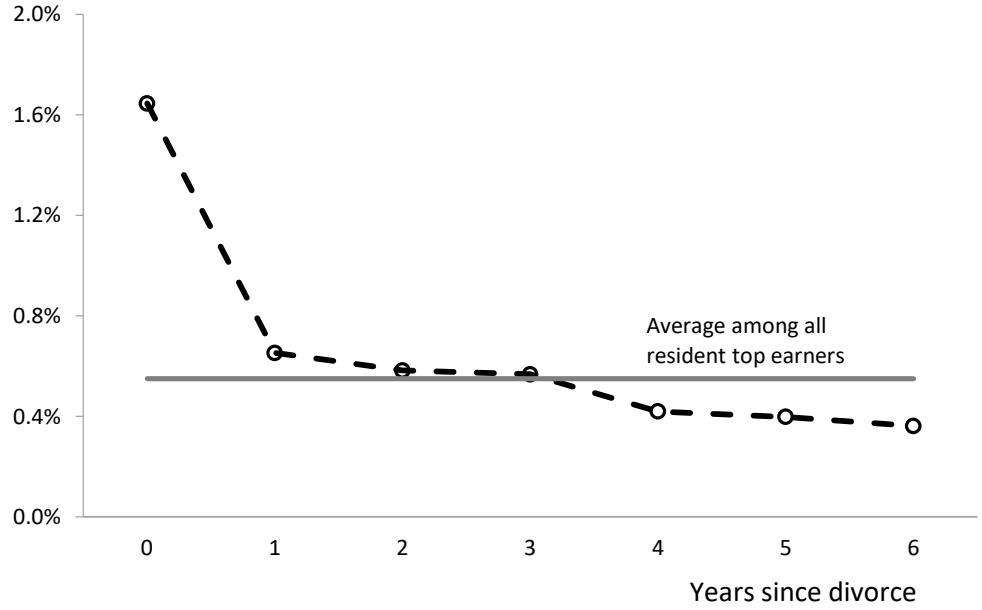
Both the main results and the sensitivity check on partial migration find no responsiveness to the tax changes. This could indicate that the migration measures in the data are just too noisy to detect a response. To check this possibility, we estimate responsiveness to a very probable migration cause—divorce. At least one member of the divorcing couple is changing residency, and is often seeking distance and a new start in life. We expect divorce to significantly increase the probability of migration.

We identify episodes of divorce when individuals changing their filing status from "married filing jointly" in year (-1) to "single" in year (0). In other words, these are individuals who filed as married in the previous year, and filed as single in the current (focal) year.

Figure 5.1 compares the out-migration rates among recent divorcees to the top-income earner population average out-migration rate. Divorced individuals are grouped by the number of years that have elapsed since divorce. Recent divorce has a clear effect on migration propensity. The more recent the divorce, the stronger is the migration response. Relative to the population average, divorces that occurred in the past year more than double the out-migration rate, from 0.5 to 1.2 percent. This "divorce effect" falls off as time passes and is fairly flat for divorces that happened more than three years ago. In short, divorce increases the likelihood of migration for the first three years – though much of this effect occurs in the first year. After three years, migration propensity returns to population-wide levels.

The basic conclusion from this analysis is that the FTB data can clearly detect factors that influence migration. Divorce is something that has a very clear effect on migration; modest changes in the tax rate for high-income earners do not.

Figure 5.1 Percent out-migrant, by years elapsed since a divorce



Note: Includes focal years 1999-2007. Includes individuals earning $500,000 + in focal year. N = 116,931 divorced individuals.

5.2 Income Profile Analysis

If a person is a millionaire in a given tax year, how many years should they expect to earn more than $1 million in income? This is a key question for someone considering whether to migrate for tax purposes. We took people who were in the bracket in a given year, and looked at their income six years before and six years after. As shown in Figure 5.2, people would be in the $1 million+ tax bracket for 7 out of 13 years, or 54 percent of the time.

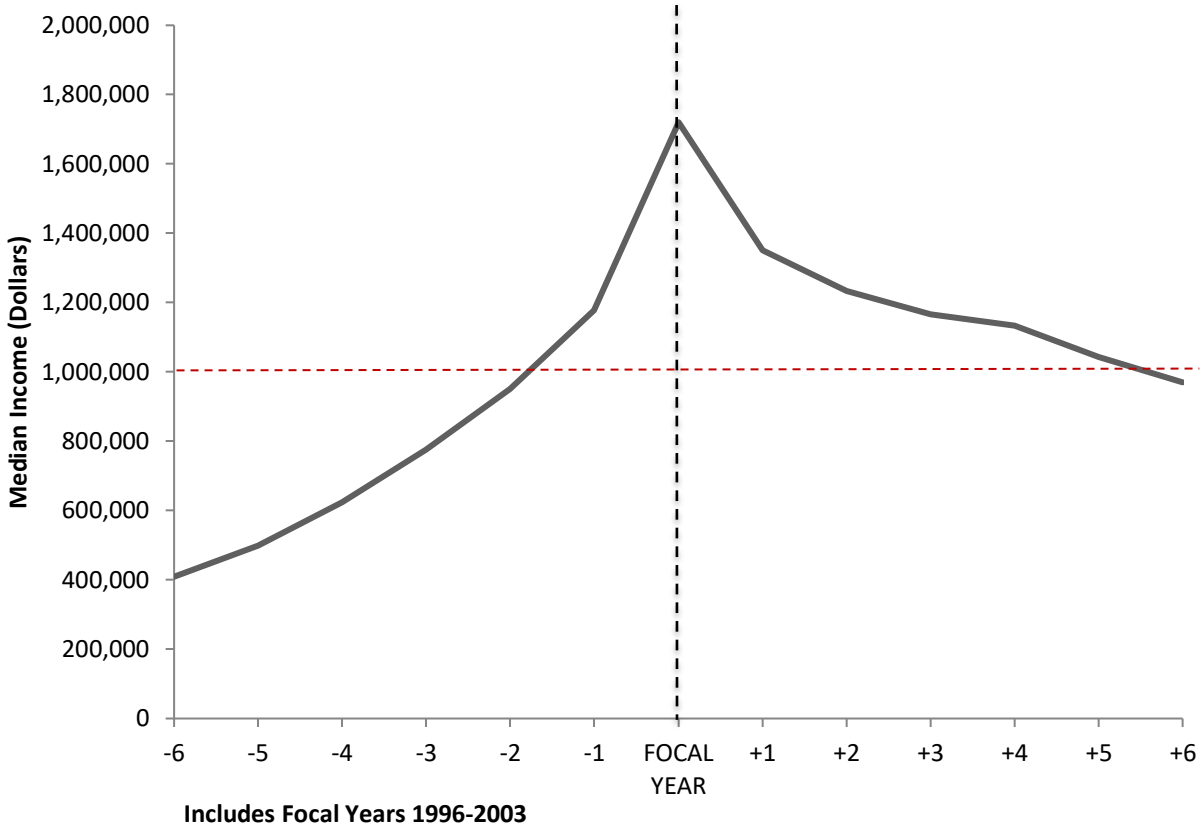
This varies based on the business cycle. But in general and for most people, earning a million dollars a year is a temporary situation. It is more of a spike in earnings than their usual, year-to-year income.

In this analysis, annual median income aggregated over 13 years is roughly $13 million. Of that, only $1.8 million fell inside the millionaire tax bracket. This means that only 14% of their "lifetime" (13-year) income would fall into the very top tax bracket (if the tax had been in place all years).

In summary, the long-term view shows that a representative millionaire earns enough to be in the very top tax bracket in only half of their prime income-earning years, and over this

period only 14% of their income is subject to the extra marginal tax rate. For most people, the tax falls on a few unusually good years of earnings. This helps explain why we see so little responsiveness to the tax.

Figure 5.2 Median Income Profile of People Making $1M+ in Focal Year



6 Conclusion

We use big administrative data from California income tax records to assess how top income earners respond to changes in top tax rates. It is important to note from the outset that migration is a very small component of changes in the number of millionaires in California. While the millionaire population sees a typical year-to-year fluctuation of more than 10,000 people, net migration sees a year-to-year fluctuation in a range of 50 to 120 people. At most, migration accounts for 1.2 percent of millionaire population change. The remaining 98.8 percent of fluctuation in millionaire population is due to income dynamics at the top – California residents growing into the millionaire bracket, or falling out of it again.

However, our core question is whether raising taxes on the rich reduces their net migration into the state. We have addressed this question across three waves of income tax reform in California, using a series of difference-in-differences estimators which compare migration trends of the group experiencing the tax increase to a group of comparable high-income earners *not* facing a tax change.

For the largest and most recent of these reforms—a 2012 voter-enacted tax increase, the largest top marginal rate increase by any U.S. state over the past three decades—we observe a statistically significant effect in the expected direction. Even so, as we have seen previously for other smaller tax rate differences across U.S. states, the magnitude of the effect on California's population of top earners is quite small. Taking the simple difference-in-difference estimates from our non-parametric analysis as entirely attributable to the tax change, we estimate that California lost 0.04 percent (i.e. one twenty-fifth of one percent) of its top earner population over the two years following the tax change.

On the other hand, neither in-migration nor out-migration show a tax flight effect after the introduction of the 2004 Mental Health Services Tax. In fact, on net, the estimated effect for the 2004 tax was 'wrong-signed,' as net migration *into* California increased among millionaires after the 2004 tax was passed (both in absolute terms and compared to the control group). The 1996 tax cut for high-income earners likewise had no consistent effect on migration. There was a small effect for those experiencing the small (0.7%) tax cut, but no effect at all for those experiencing the large (1.7%) rate cut. While we are planning to analyze the 1996 tax cut in greater detail, the overall picture is one of no consistent effect.

In contrast to these small, null, or wrong-signed tax-migration effects, we find a strong migration effect for high-income earners who become divorced. In the year of divorce, the migration rate more than doubles, and remains slightly elevated for two years after the event. This shows that there are circumstances that do generate millionaire migration. The tax policy changes examined in this report are very modest compared to the life-impact of marital dissolution.

We also show that most people who earn $1 million or more are having an unusually good year. Income for these individuals was notably lower in years past, and will decline for most in future years as well. A representative "millionaire" will only have a handful of years in the $1 million+ tax bracket. The somewhat temporary nature of very-high earnings is one reason why the tax changes examined here generate little observable tax flight. It is difficult to migrate away from an unusually good year of income.

On balance, while the power big administrative data do allow us to detect a very slight tax-migration effect—on the order of a fraction of one percent of the population even among those seeing the very largest effective tax increase—from the largest state millionaire tax increase in recent U.S. history, the evidence presented here suggests that California was consistently becoming a more attractive place for millionaires over the period we study.

Perhaps this is simply that California – and especially Silicon Valley – was becoming a "winner-take-all" economy. We often think that the only way for a state to be "competitive" is to be like Texas—a low-tax, low-infrastructure, low-services state. But the reality is that the most competitive places in the U.S., the leading drivers of the economy, and the centers for top talent are New York and California—and they have been for generations, despite higher taxes on top incomes.

Appendix A

Table A.1 Population and Migration Counts, 2001-08

Control Group ($500k - $1M)

	Pop	In-mig	Out-mig	Net	Net Rate
2001	77,815	712	766	-54	-0.07%
2002	70,513	681	626	55	0.08%
2003	79,532	663	691	-28	-0.04%
2004	98,468	802	875	-73	-0.07%
2005	116,710	951	1269	-318	-0.27%
2006	128,113	1,035	1270	-235	-0.18%
2007	138,102	1,137	1200	-63	-0.05%
2008	115,792	1,163	898	265	0.23%
Std Dev	25,285	205	262	176	
Min	70,513	663	626	-318	
Max	138,102	1,163	1,270	265	

Treatment Group ($1M+)

	Pop	In-mig	Out-mig	Net	Net Rate
2001	49,293	438	482	-44	-0.09%
2002	41,630	306	324	-18	-0.04%
2003	48,301	306	336	-30	-0.06%
2004	63,720	372	488	-116	-0.18%
2005	77,000	509	532	-23	-0.03%
2006	85,625	564	598	-34	-0.04%
2007	93,305	666	565	101	0.11%
2008	70,238	500	350	150	0.21%
Std Dev	18,750	127	109	85	
Min	41,630	306	324	-116	
Max	93,305	666	598	150	

Table A.2 Decile Definitions and Migration Rates

Decile Label	Greater than:	Less than / equal to:	In-migration rate		Out-migration rate	
	Control Group		2001-04	2005-08	2001-04	2005-08
1	$500,000	$523,401	0.8%	1.0%	0.9%	1.0%
2	$523,402	$549,708	0.9%	1.0%	0.9%	1.0%
3	$549,709	$579,636	0.9%	0.8%	0.7%	1.0%
4	$579,637	$613,628	1.0%	0.9%	1.0%	0.9%
5	$613,629	$652,954	0.9%	0.9%	0.8%	0.9%
6	$652,955	$698,873	0.9%	0.9%	1.0%	1.0%
7	$698,874	$752,860	0.9%	0.8%	0.9%	0.9%
8	$752,861	$818,440	1.0%	0.8%	0.8%	0.9%
9	$818,441	$898,938	0.8%	0.8%	1.0%	0.9%
10	$898,939	$1,000,000	0.8%	0.8%	0.9%	0.8%
	Treatment Group					
11	$1,000,001	$1,089,977	0.6%	0.7%	0.6%	0.9%
12	$1,089,978	$1,201,659	0.8%	0.8%	0.8%	0.7%
13	$1,201,660	$1,343,321	0.7%	0.7%	0.7%	0.7%
14	$1,343,322	$1,530,325	0.7%	0.7%	0.7%	0.8%
15	$1,530,326	$1,785,974	0.8%	0.8%	0.8%	0.6%
16	$1,785,975	$2,162,740	0.8%	0.6%	0.8%	0.6%
17	$2,162,741	$2,762,379	0.7%	0.7%	0.7%	0.5%
18	$2,762,380	$3,911,684	0.7%	0.6%	0.7%	0.5%
19	$3,911,685	$6,992,323	0.6%	0.6%	0.6%	0.5%
20	$6,992,324	> $1B	0.5%	0.4%	0.5%	0.3%

Appendix B Supplemental Migration Definitions

It is also possible that migration occurs without an episode of filing a part-year return. Some people who migrate very close to the beginning or end of the year, for example, will not be required to file a part-year return. Such individuals will simply disappear from the tax records. To measure this, we examine supplemental definitions of "migration", for individuals who simply shift from full-year filers to not filing at all:

In-Migration (supplemental definition): $MMFF = M_{-2}M_{-1}F_{0}F_{+1}$

Out-Migration (supplemental definition): $FFMM = F_{-1}F_{0}M_{+1}M_{+2}$

These supplemental "migration" definitions include "births" into the tax system, and more problematically, deaths. Filing for a time and then disappearing from the tax records is exactly the filing sequence of individuals who die. We do not currently have any way of otherwise identifying deaths from the tax records. In our data, we observe 70,000 instances of sudden (FFMM) "out-migration," which is roughly the number of deaths we expect to find for these income groups over this time period. Thus, we believe the supplemental definitions largely do not capture migration behavior. However, as a further check, the FTB is in the process of gathering the available data on filer deaths.

Table B.1 Comparison of Migration Definitions

1994 – 2007. Tax Filers $500,000+						
Core Definition	**In-Migration**			**Out-Migration**		
3-year	mpf	90,230	100%	fpm	51,336	100%
4-year	mmpf	81,676	91%	fpmm	41,918	82%
	Not mmpf	8,554	9%	Not fpmm	9,418	18%
Supp. Definition						
3-year	mff	185,792	100%	ffm	164,558	100%
4-year	mmff	80,985	44%	ffmm	70,751	43%
	Not mmff	104,807	56%	Not ffmm	93,807	57%

We use four-year definitions to ensure that an incidence of M is not error. A tax filer could be missing either because they were not in the state, or because their tax return was miscoded in a given year. In the latter case, even though the individual filed taxes and remains in California, they would appear to have migrated. Using two years of missingness, in our view, identifies individuals who have truly migrated (rather than having been misplaced in the tax data for a year).

Appendix C Tables of Migration Effects for 1996 Tax Cuts

Table C.1 Population and Migration Counts, 1994-97

Control Group ($80,000 to $106,899)

	Pop	In-Mig	Out-Mig	Net-Mig	Net Rate
1994	910,007	4,967	10,470	-5,503	-0.6%
1995	980,134	5,882	10,083	-4,201	-0.4%
1996	1,068,998	7,669	8,994	-1,325	-0.1%
1997	1,180,908	9,310	9,366	-56	0.0%
Growth	30%	87%	-11%		

Treatment Group 1 ($106,900 to $212,379)

	Pop	In-Mig	Out-Mig	Net-Mig	Net Rate
1994	716,401	7,133	11,917	-4,784	-0.7%
1995	808,737	8,654	12,097	-3,443	-0.4%
1996	936,001	10,740	11,190	-450	0.0%
1997	1,103,190	13,470	12,518	952	0.1%
Growth	54%	89%	5%		

Treatment Group 2 ($212,380 +)

	Pop	In-Mig	Out-Mig	Net-Mig	Net Rate
1994	220,915	2,129	2,963	-834	-0.4%
1995	260,204	2,903	3,505	-602	-0.2%
1996	307,368	3,913	3,530	383	0.1%
1997	373,597	4,743	4,066	677	0.2%
Growth	69%	123%	37%		

Table C.2 1994-97 Difference-in-Differences Estimates

Net migration

	Control	Small tax cut	Large tax cut	
1994	-0.6%	-0.7%	-0.4%	
1995	-0.4%	-0.4%	-0.2%	
1996	-0.1%	0.0%	0.1%	
1997	0.0%	0.1%	0.2%	
Before	-0.52%	-0.55%	-0.30%	
After	-0.06%	0.02%	0.15%	
Difference	**0.45%**	0.57%	**0.46%**	
DiD		0.11%	**0.01%**	-0.11%

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