The Housing Crisis and State and Local Government Tax Revenue: Five Channels

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State and local government tax revenues dropped steeply following the most severe housing market contraction since the Great Depression. We identify five main channels through which the housing market affects state and local tax revenues: property tax revenues, transfer tax revenues, sales tax revenues (including a direct effect through construction materials and an indirect effect through the link between housing wealth and consumption), and personal income tax revenues. We find that property tax revenues do not tend to decrease following house price declines. We conclude that the resilience of property tax receipts is due to significant lags between market values and assessed values of housing and the tendency of policy makers to offset declines in the tax base with higher tax rates. The other four channels have had a relatively modest effect on state tax revenues. We calculate that these channels jointly reduced tax revenues by $22 billion from 2006 to 2009, which is about 3 percent of total state own-source revenues in 2006. We conclude that the recent contraction in state and local tax revenues has been driven primarily by the general economic recession, rather than the housing market per-se.

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I. Introduction

The housing market contraction of the past four years was the largest since the Great Depression, and it arguably played an important role in the ensuing downturn in economic activity. State and local tax revenues have suffered considerably during this episode. In this paper we seek to disentangle the impact of the housing market downturn on state and local tax revenues from the broader impact of the economic recession.

The housing market influences state and local tax revenues in many ways. We focus on five channels that we argue are the most important. The first two channels, the property tax and the real estate transfer tax, are a direct function of the value of real estate and the volume of real estate transactions. The third and fourth channels involve the sales tax. Sales of materials used in new construction and the renovation of existing structures directly affect sales tax revenues. We also consider an indirect effect on sales tax revenues related to general household expenditures: if changes in housing wealth affect homeowners' consumption, then a large drop in real estate values can reduce the sales tax revenues from all types of goods and services. Finally, personal income tax revenues will be affected by the reduction in employment related to construction and real estate activity. A few of these channels incorporate commercial as well as residential real estate, but in most cases data limitations prevent us from examining the commercial real estate market directly.

Our main purpose is to provide national estimates of the impact of each channel by aggregating across all states and localities.[1] State and local governments exhibit significant heterogeneity in their tax systems, so the impact of each channel will clearly vary across

[1] There are studies examining the link between housing cycles and state and local tax revenues for a specific state or locality (e.g. Doerner and Ihlandeldt 2010 provide a detailed examination of Florida). To our best knowledge, however, this paper is the first to study all states and localities.

locations (e.g. for a given fall in home sales, a state with a greater reliance on real estate transfer tax revenues will see a larger fall in total tax revenue than a less reliant state). Nevertheless, it is informative to estimate the overall national impact of each of the five channels because it reveals the effect on the average state or local government. Moreover, aggregate data on tax revenues are available on a much more-timely basis than detailed tax data for individual state and local governments, allowing for a better assessment of the current condition of tax revenues. The national estimates also provide a baseline from which to view the experiences of individual states and localities. This baseline is particularly useful in preventing the natural tendency to extrapolate from the most visible – typically the most negative – experiences to the nation as a whole. After presenting our national estimates, we examine the heterogeneity across governments by performing simulations for each state, based on the national estimates and the individual parameters of each state's tax system.

Our analysis can be broken into two primary components: the first examines local government tax revenue and the second examines state tax revenue. The local government section focuses exclusively on the property tax channel, which is the primary source of tax revenue in most localities. Perhaps surprisingly, property tax receipts continued to grow at a robust pace through the end of 2009, even though house values had plunged in the previous three years. We ask why the property tax has been so resilient to these house price declines, and examine whether this resilience is likely to continue. We conclude that the resilience is a function of significant lags in the effect of changes in the market value of property on changes in taxable assessments, as well as of the propensity of local policy makers to offset declines in property values by increasing the property tax rate. Analysis of historical data and case studies

of the current situation in individual states suggest that, on average, it is unlikely that property tax revenues will fall sharply in the near future.

The second component of the analysis seeks to assess the extent to which the housing market downturn has contributed to the plunge in state revenues through the four non-property tax channels. We estimate that the four channels reduced total state tax revenues by only $22 billion (in year 2005 dollars) from 2006 to 2009, a relatively small fraction of the $700 billion in state tax revenues in (fiscal year) 2006. Although a net decline of this magnitude is by no means trivial, it is only about one standard deviation of changes in annual total state tax revenues from 1990 to 2006, and it was spread out over four years. However, the drop in revenue was more severe in some states. For example, we estimate that total state tax revenues in Florida were reduced by $4 billion, or 10 percent of its 2006 tax revenues. By contrast, housing-related revenues in a number of states did not fall much between 2006 and 2009. Over half of the drop in housing related revenues from 2006 to 2009 is due to the sales tax channels.

Because 2006 marked the peak of a strong housing market boom, comparing 2009 to 2006 might exaggerate the negative effect on tax revenues. Therefore, we also compare state tax revenues in 2009 to their predicted level had housing market variables continued to increase at their 1995-2002 trends, instead of first booming and then contracting. We estimate that state tax revenues in 2009 were $37 billion lower than predicted, which is equivalent to 6 percent of the actual state tax revenues in 2009. In this case, the sales tax and income tax channels make the largest contributions to the deficit between actual and predicted revenues.

While our intent is to quantify the main channels through which the housing market affects state and local tax revenues, it is important to point out several limitations to our analysis.

Our methods do not identify the causal effect of exogenous house price declines on state and local tax revenues. We attribute all fluctuations in economic activity in housing-related sectors to the housing market, even though the recession likely intensified the depth of the housing market downturn. Furthermore, the downturn may have influenced non-housing sectors through general equilibrium channels – e.g. events in the housing market may have been one cause of the broader economic downturn – and we do not account for these effects. Thus, our analysis is best viewed as a *partial equilibrium* estimate of the amount of revenue that would be needed to offset the direct effects of the housing market downturn. Finally, we acknowledge that the events in the housing market may have had a direct effect (as opposed to a general equilibrium effect) on non-housing sectors and we do not capture these effects. For instance, the fall-off in home sales may have reduced employment at Home Depot. However, because these workers are in the retail sales sector, we do not capture this effect.

II. Background Information

Housing Market

According to many different measures, the housing market expansion and contraction of the past eight years has been the most severe in the post-War period. House prices rose by 64 percent in the four years prior to their peak in 2006:Q1 and then plunged by nearly 30 percent in the subsequent four years. Existing home sales rose by 34 percent in the four years prior to their peak (in 2005:Q3) and then fell by 37 percent. The supply of housing also exhibited large swings: the number of new housing starts rose 25 percent in the four years prior to their peak in 2006:Q1 before falling by 71 percent since then.

Although the severity of the housing market cycle varied across locations, most states experienced a noticeable swing. The top panel of Figure 1 shows the 10th, 25th, 50th, 75th and 90th percentiles of distribution of annual changes in house prices across states (the source of the data will be discussed later). House price appreciation increased from 2002 to 2005 even at the 10th percentile, and house prices fell in all but a few states in 2008 and 2009. The bottom panel shows a similar chart for the distribution of changes in existing home sales across states.

State and Local Tax Revenue

Total state and local tax revenues have been hit hard during the recession.[2] As shown in Figure 2, nominal state and local tax revenues fell by 5½ percent in 2009 after slowing markedly in 2008. 2009 marked the first year that state and local tax revenues had fallen in nominal terms since the Great Depression, and only the third year since then that revenues did not increase by at least 2 percent (the other two years were 2002 and 2008). The decline in 2009 is attributable to two taxes collected primarily by state governments – the personal income tax and the sales tax. Income tax revenue plunged 18 percent in 2009, reflecting falling wage and salary income as well as a decline in capital gains realizations. Sales tax revenue fell by 8 percent due to a decline in retail sales.

In contrast, property tax receipts—the primary source of local tax revenues—have held up remarkably well as they grew a bit over 5 percent on average in 2008 and 2009. Property tax receipts were the sole source of strength in state and local tax revenue in 2008 and 2009 and have

[2] Analyzing the sum of state and local tax revenue, rather than each level of government separately, captures the extensive fiscal links between the two levels of government: In fiscal year 2007 almost 40 percent of general local government revenue was provided by state governments in the form of intergovernmental grants. These linkages imply that a change in state government revenue will likely impact local government revenue, and vice versa. For instance, during the state fiscal crisis of 2002 – 2004, localities responded to cuts in education aid from the states by increasing property tax revenues in order to prevent cuts in education budgets (Dye and Reschovsky 2008).

significantly buffered the decline in other tax sources: Had property taxes been flat in 2009, the decline in overall tax revenue would have been 7½ percent instead of 5½ – a 30 percent more severe tax revenue slump.

As is visible in Figure 2, property tax revenues generally tend to be less volatile than other forms of tax revenue. This stability has long been seen as one of the primary virtues of the property tax (Brunori 2003; Giertz 2006). The magnitude of the collapse in the housing market, however, raises the possibility that property tax revenues might fall. In the analysis below we explain why revenues had not yet fallen through the end of 2009 and we assess the likelihood that they will fall in the near future.

III. Local Government Results: Property Tax

This section focuses on local governments and examines the resilience of the property tax in the face of the steep home price declines of the last several years. First, drawing on Lutz (2008) we discuss the relationship between house price changes and property tax revenues. The discussion is important because Lutz's results motivate the analytic approach taken in this paper. Second, we assess the impact of house price declines on property tax collections using state-level panel data. Finally, because the historical data may have limited relevance for the current extraordinary situation in the housing market, we conduct case studies of recent changes in property tax revenues in eight states, including states such as Arizona, California, Florida and Nevada that experienced unusually large declines in house prices.

The Historical Relationship between Real Estate Prices and Property Tax Collections

Property taxes are by far the most important tax at the local level, accounting for around three-fourths of local government tax revenue. The tax is assessed on the value of residential real property (i.e. personal real estate), commercial, business and farm real property, and personal property (e.g. automobiles). Residential real property accounts for approximately 60 percent of taxable assessments and is the largest component of the tax base by a significant margin; commercial, industrial and farm property account for around 30 percent and personal property accounts for less than 10 percent.[3]

Abstracting from the significant heterogeneity across jurisdictions, property tax revenue can be defined as being equal to the effective tax rate times the market value of property

$$R = \tau * V \tag{1}$$

where R is property tax revenue; V is the market value of taxable property and τ is the effective tax rate (which should be distinguished from the statutory rate that is applied to the assessed value of property as opposed to the market value of property). When the market value of property increases, tax revenue will mechanically increase. However, policy makers may choose to offset some or all of the mechanical change by adjusting the effective tax rate.[4] The change in tax revenue is therefore equal to the sum of the mechanical and policy offset components:

$$\Delta R = \underbrace{\tau * \Delta V}_{\text{mechanical}} + \underbrace{\Delta \tau * V}_{\text{policy offset}} \tag{2}$$

[3] Authors' calculations based on the 1987 and 1991 *Census of Governments*' accounting of the assessed value of taxable property. These are the most recent available data from which these calculations can be made. Residential real property includes vacant platted land.

[4] The effective tax rate can be adjusted by altering the statutory tax rate or by altering the way in which property is assessed for tax purposes.

Lutz (2008) explores two aspects of this relationship. First, he assesses the *magnitude* of the change in property tax revenues produced by a change in house prices. This analysis sheds light on the average magnitude of the policy offset. If there is no policy offset, then the elasticity of property tax revenue with respect to house prices will equal 1 and if there is complete policy offset, the elasticity will equal 0. Second, he examines the *timing* of the relationship between house price appreciation and property tax revenue.

Using both time-series data and micro-level panel data from individual governments, Lutz (2008) concludes that the elasticity of property tax revenue with respect to home prices equals 0.4, indicating that policy makers tend to offset 60 percent of house price changes by moving the effective tax rate in the opposite direction of the house price change. The effect of house price changes on property taxes does not occur until three years following the change in house prices. This extensive lag likely reflects three institutional features of the property tax. First, the property tax is assessed in a backward looking manner, as the current year's taxes are based on the assessed value of property in the previous year. Second, assessed values often lag market values. In some cases this lag is by design or legal mandate and in others it is due to "poor" administration. Poor administration may sometimes be intentional, particularly in jurisdictions which elect their tax assessor.[5] Third, most states have some form of cap and/or limit on increases in property tax rates, tax revenues or taxable assessments. During periods of rapid house price growth, these limits will prevent assessments or revenues from growing at the same pace as market values. Thus, a 'stock' of untaxed appreciation will develop. Assessments

[5] Sharp changes in house prices may intensify the propensity of officials to delay incorporating changes in market values into taxable assessments. When house prices are rising rapidly, officials may view it as politically prudent to incorporate the gains into the tax base with a lag. When house prices decline sharply, there may be a strong incentive to delay incorporating the new market values in order to avoid a decline in tax revenues (Bennett and Perry 2009).

will catch-up to market values only when house price growth slows below the limit and the 'stock' of untaxed appreciation is incorporated into taxable assessments.

Both aspects of the relationship – the elasticity and the lag – are visible in Figure 3, which displays the annual growth rate of property tax revenue and house values from 1989 to 2009. Focusing first on the lag, the growth rate of both series declined in the early 1990s. Although house price appreciation reached a trough in 1991, property tax revenue growth did not bottom out until 1995, implying that property taxes track real estate prices with a considerable lag. Similarly, in the more recent period, house price appreciation collapsed from 2006 to 2008, but the growth in property taxes barely slowed. Turning to the elasticity, the growth rate of property tax revenues increased at a much slower pace than that of house price appreciation from the mid-1990s to 2005. This observation is consistent with the notion that policy makers tend to offset changes in house prices by adjusting tax rates.

Most relevant for this paper, Lutz (2008) estimates a much smaller relationship between house price declines—as opposed to the typical change in house prices, which is positive—and property taxes. The results are fairly imprecise, but suggest that policy makers buffer negative house price shocks by raising property tax rates. Updated results from Lutz (2008) that add several more years of data to the sample (unreported), though, produce even less precise results from which it is impossible to draw any conclusions concerning the relationship between house price declines and home values. (The point estimates continue to suggest policy makers raise tax rates in response to house declines.) Even were they more precise, these estimates would continue to have serious limitations in regards to assessing the current situation: There are relatively few instances of falling house prices in the sample and these declines are small relative

to the declines which have occurred over the last several years.[6] Since the standard econometric approach used in Lutz (2008) is largely uninformative for assessing how the housing market downturn is affecting the property tax, we turn to other methods.

State-level Panel Data Evidence

We first present an analysis that focuses explicitly on episodes of falling house prices using annual state-level panel data on total local government property tax collections from 1976 to 2007.[7] Figure 4 displays the distribution of the annual percent change in property tax receipts over this period. Declines in property tax collections are rare – only 7 percent of the distribution falls below 0. Furthermore, large declines are extremely rare. Only one-and-a-half percent of the annual changes in property tax collections since 1976 exceed negative 10 percent. Many of these extremely large declines are associated with policy changes, such as Proposition 13 in California, that are not directly related to fluctuations in home values.

Using an event study framework, Figure 5 plots the distribution of changes in property tax revenues in the year of a decrease in home prices and the four subsequent years. We restrict the sample to the state-year combinations for which property tax data are available for all five years displayed. This restriction ensures that the evolution of the distribution of price changes does not reflect changes in the sample composition. We measure house prices using repeat-sales indexes computed by CoreLogic. These indexes are similar to those published by the Federal Housing Finance Agency (FHFA), but unlike the FHFA they include homes financed with non-

[6] The sample used in Lutz (2008) ends in the 2005 fiscal year, whereas the updated results include data through 2008. The updated sample, however, continues to contain only relatively small house price declines for two reasons. First, the data is organized on a fiscal year basis, so the tax data ends in the second quarter of calendar year 2008 in most cases. Second, the methodology in Lutz (2008) uses the lag of house prices. As a result, the last house price change data point used in the analysis is the second quarter of 2007. Although house prices had begun to decline by this time, the magnitudes were quite small compared to what followed.

[7] 2001 through 2004 are missing from the sample because the property tax data are not available for 2001 and 2003 and the use of first-differences prevents use of 2002 and 2004.

conforming loans and cash. The indexes are based on transactions of single-family homes, condos, coops, foreclosed properties and short sales. We take annual averages of the monthly index for each state.

We view this analysis as heavily tilted toward finding an effect of house price declines on property tax revenues. Most episodes of house price declines are associated with events that would tend to depress demand for public goods, and hence for tax collections, independently of the change in home prices. For instance, an adverse shock to an industry with a major presence in a state would reduce incomes and cause out-migration, simultaneously reducing the demand for public spending and house prices. We do not account for this omitted variable bias, which should cause us to overstate the positive correlation between house prices and tax revenues. Furthermore, the sample size is quite small. As a result, we do not compute standard errors around the moments of the distribution.

Panel A of Figure 5 displays the event study results using all episodes of house price declines in the sample (of which there are 153 with a mean decline of around 3 percent). The horizontal axis indexes the year relative to the house price decline. For example, year 0 denotes the year of the decline and year 1 denotes the year following the decline.[8] The vertical axis displays the average, 25th percentile and 75th percentile of the percent change in property tax revenues in that year. In the year of a house price decline, property taxes rose by an average of 6½ percent – quite close to the mean change for the sample as a whole (i.e. including years in which houses prices both increase and decrease). The pace of growth slows only slightly in the two years following the house price decrease and then stabilizes by the third year at around 5

[8] Property taxes are based on assessments and tax rates set in the prior year. Therefore, tax collections in year 0 are highly unlikely to reflect the impact of the house price decline and can be considered as establishing a baseline *prior* to the negative house price shock.

percent. States at the 25th percentile experience an increase in property taxes of around 2½ percent and states at the 10th percentile (not shown) experience a rate of growth of 0 percent. House price decreases may slow the pace of property tax growth a bit, but the magnitude of the impact is small and there is absolutely no evidence that house price declines produce a fall in property tax receipts. These results are especially striking given the positive correlation between house prices and tax revenues that should exist for other reasons (discussed above).

Panel B performs the same exercise, but limits the sample to episodes where house prices fell by more than 5 percent. The sample becomes somewhat thin, as there are only 26 cases when house prices declined by this amount (the mean decline in this subsample is 7.2 percent). In the year of a large house price decline, property tax collections rose by a robust 9%. This strong increase may reflect rapid house price appreciation in the years preceding large declines in prices. Although property tax growth fell by roughly 3 percentage points in the year following the house price decline, tax collections continued to expand at the healthy pace of around 6 percent.

Panel C limits the sample to episodes of house price declines which can be categorized as "busts." Carlson (2010) defines a housing bust as a period in which the change in house prices fall significantly in excess of what would be predicted by fundamentals such as personal income, the unemployment rate, and mortgage rates for five consecutive quarters.[9] The sample contains 62 such "busts" that also involved a decline in house prices. (A bust may occur when prices

[9] Specifically, Carlson (2010) regresses the growth rate of houses price on the following: the contemporaneous and lagged values of growth in real income per capita, the unemployment rate, changes in the real mortgage rate, the growth rate of residential construction costs, and the population growth rate. House prices are considered to grow abnormally slowly if the regression residual falls below the mean by more than 0.9 of a standard deviation. A housing "bust" occurs when house price growth is abnormally slow for at least five consecutive quarters. The regressions are estimated using the same state-level Loan Performance house price data used here. However, the sample starts in 1982 and the estimation occurs at the quarterly frequency, as opposed to the annual frequency employed here. We define a house price bust as any year with at least one quarter indentified by Carlson as a bust.

continue to rise, but at a slower pace than predicted by fundamentals.) These bust episodes are arguably more relevant to current housing market conditions than typical house price declines. The pace at which property tax receipts grow tails off somewhat following house price busts, but the magnitude of this deceleration is not large and receipts continue to rise at a reasonably-rapid pace. Since some "busts" occur even when house prices fall only modestly, Panel D restricts the sample to busts in which house prices fell in excess of 10 percent. These busts are associated with a drop in the growth of tax collections of around 5 percentage points, but growth remains relatively strong.

Figure 6 is similar to Figure 5 but attempts to control for a few things that are correlated with house prices and property tax revenues. First we regress growth in property tax collections on a state-specific constant and contemporaneous and lagged population growth. The state-specific constant controls for long-term differences in the rate at which tax revenues increase across states, while population growth is a very rough control for the demand for public goods. The regression is estimated over the entire sample (i.e. not just the portion of the sample with house price decreases). Then we plot the residuals in the years following house price declines and/or busts. The sample mean of the residual is 0 by construction.

The residuals provide even less evidence that house price declines significantly reduce property tax collections. House price declines are associated with an eventual slowing in the residual growth rate of tax collections, but the magnitudes are quite small, typically 1 percentage point or less. Calculating the residuals based on a larger set of covariates (unreported) tends to further reduce the magnitude of the effect.

Contemporaneous Case Studies

Case studies of individual states in recent years provide direct evidence on why property tax collections have held up so well through the end of 2009. This analysis is also useful because the historical data used in the prior two sections may be of limited relevance to the current situation. Furthermore, it provides insight into the possibility that property taxes may start falling in the near future in a very delayed response to the drop in house prices. The case studies use data collected from individual state sources such as departments of taxation.[10,11]

Figure 7 presents the cases studies graphically. For each state there are four time-series, the first three of which are indexed to equal 100 in 2000. The first series is the market value of residential real estate based on the CoreLogic house price indexes and, to account for changes in the stock of housing, on the Census Bureau's housing unit estimates. The second series is the assessed value of all real estate, collected from individual state sources. To the extent possible, this value captures the aggregate taxable value of real estate (e.g. the value of exemptions is removed from the total). The third series is total property tax collections, also from state sources. The final series is the property tax rate, defined as total collections divided by aggregate assessed value (right axis). We call this tax rate the "average assessed tax rate" to avoid confusion with the "effective tax rate," which we define as based on market values rather than assessed values. All series are shown for fiscal years with the specific years displayed for a given state reflecting data availability.

[10] Many of the state data sources were located using the Lincoln Institute of Land Policy and George Washington Institute of Public Policy's Significant Features of the Property Tax website (http://www.lincolninst.edu/subcenters/significant-features-property-tax/).

[11] Unlike the data used in the event-study analysis, which solely reflects local government property tax collections, the case study data includes both state and local government collections. However, because 97 percent of property taxes are collected at the local level, the case studies should be viewed as reflecting the experience of local governments.

Our first four case studies examine the four states with the most extreme housing market cycles. Starting with Nevada, the market value of real estate soared from 2000 to 2006 and fell sharply starting in 2008. Assessed values appear to lag market values by at least two years and only began to turn down in 2010. The assessed tax rate held roughly steady until 2006 when it began to fall with the introduction of a tax abatement program. It then reversed course in 2009 as the growth in assessed values slowed and turned sharply upward in 2010 as assessed values began to plunge. Combining the evolution of assessed values and tax rates, property tax revenues rose by 6 percent from 2008 to 2010 even though the market value of real estate collapsed by almost 40 percent during this period. Thus, the lags in assessed values and offsetting movements in the tax rate substantially muted the impact of the housing downturn on tax revenues in Nevada. Although tax revenues did fall by 4½ percent in 2010, it seems that the willingness of policy makers to adjust tax rates will make the ultimate effect of the housing downturn on tax revenues much smaller than suggested by a straight read of the decline in the market price of housing.

Our next two case studies examine Florida and Arizona. In Florida, house prices more than doubled from 2000 to 2006. Assessed values did not increase as fast as house prices and the assessed tax rate declined during this period, which caused property tax revenues to rise at a much slower pace than house prices. The assessed tax rate began increasing in 2008 as assessed values began falling, again working to blunt the impact of the housing market contraction on tax collections. Arizona displays trends broadly similar to Nevada and Florida. House prices soared and then collapsed, with assessed values lagging the movement in market values. The assessed tax rate began moving upward in 2009, buffering the impact of the housing market on tax collections.

The next case study is California. Although the trajectory of housing prices is similar to Arizona, Florida, and Nevada, local governments in California face a different set of challenges because of Proposition 13. Approved by voters in the late 1970s, Proposition 13 dictates that assessed values cannot grow by more than 2 percent per year or the inflation rate, whichever is smaller, unless the house is sold and the assessed value is reset to the market value. Proposition 13 also limits property taxes not to exceed 1 percent of the assessed value. As expected, Figure 7 shows that the assessed tax rate held constant at about 1 percent. Due to this constant rate, growth in property tax collections mirrors that of assessed values, which continued to climb even after house prices fell sharply after 2007. Because Proposition 13 has created a large wedge between market values and assessed values, it will likely take a very long time for assessed values to catch up with market values. If that does occur, the legislated cap on the tax rate would cause property tax revenues to fall.

Our next four case studies consider states with less pronounced movements in the housing market than Arizona, California, Florida, and Nevada. New York is the first; it is a more typical state than the previous case studies because it experienced a housing cycle similar to the national average and it does not have stringent property tax limitations. Figure 7 shows that assessed values lagged house prices, as they continued to rise through 2008 and only flattened out in 2009. Property tax revenues rose more slowly than assessed values over the decade because the assessed tax rate trended down. In 2009, the assessed tax rate increased notably which contributed to an increase in property tax revenues of 6 percent.

Our final three cases studies consider Minnesota, Georgia, and Colorado, which are meant to reflect other types of housing market experiences. Unlike the previous case studies, assessed values and market values rose at the same pace during the upswing in the housing

market in these states. Once the downturn took hold, though, assessed and market values diverged sharply, with assessed values continuing to rise even as market values fell. Thus, in these states as well property tax revenues to-date have been buffered from the drop in house values. Although assessed tax rates did not increase in these states, an apparent lag between assessed and market values has likely allowed property tax revenues to diverge from the market value of housing.

Taken together, the cases studies shown in Figure 7 reveal a number of facts about the impact of the current housing downturn on state and local property tax revenues. First, there is a significant amount of heterogeneity across states in their experience of the housing cycle, the institutional features of their property tax assessment and collection practice, and their responses to the housing downturn. Second, assessed values lag market values in many states, which helps to support property tax revenues when house prices fall. This support is particularly useful because state and local governments usually face sharp declines in other tax revenues when house prices fall (due to deteriorating economic conditions). Third, when assessed values do catch up with market values, local officials appear to be willing to at least partially offset the decreases in assessed values with increases in tax rates. However, continuing to offset price declines by raising tax rates may eventually become politically impossible (Bennett and Perry 2009, Wiseman 2010). Overall, though, we read the evidence from the historical data and the case studies as suggesting it is quite unlikely that property tax collections will fall steeply in the next few years. Even if property taxes do decline by a large amount, the significant lag between this event and the housing market downturn will have provided the state and local government sector time to at least partially recover from the plunge in other revenue sources (Figure 2).

IV. State Government Results: Four Non-Property Tax Channels

Simulation Approach for Remaining Four Channels

In the remainder of the paper, we assess the impact of the housing market downturn on several forms of state government tax revenue: transfer taxes, sales taxes on construction materials, sales taxes on other goods and services, and personal income taxes. Although these taxes are also collected at the local government level in some states, we lack the data required by our methodology to examine these taxes at the local level. Additionally, most of these collections occur at the state level: Two-thirds of transfer tax receipts are attributable to state governments and eighty and ninety percent, respectively, of state and local government sales and income taxes are collected by state governments.

For each channel we quantify the effect in two ways. First, we calculate the drop in tax revenue in real terms from 2006—the peak of home prices in most states—to 2009.[12] Specifically, we calculate the change in the relevant housing-related tax base from 2006 to 2009 for each state (e.g. for the transfer tax effect the tax base is the total value of real estate transactions). We then estimate the implied change in tax revenue arising from the change in the base using state-specific tax rates. We call this simulation the "peak year" method because it uses revenues at the housing market peak as a starting point.

It could be argued that in 2006 the housing market was out of equilibrium and that quantifying revenue losses relative to such unsustainable levels is problematic. Therefore, we

[12] We deflate nominal dollar values by the chain-price index for personal consumption expenditures reported in the *National Income and Product Accounts*. Unless otherwise specified, all real values are reported in 2005 dollars. The peak in house prices was in 2006 for 92 percent of states. The peak in home sales was less uniform, with 14 percent in 2004, 56 percent in 2005 and 30 percent in 2006. Results are similar if we use 2005 as the peak year instead of 2006.

also quantify the effect of the housing market on state revenues relative to state-specific trends, which we call the "trend growth" method. This method involves extrapolating each housing-related tax base using its average growth rate from 1995 to 2002. Although it would be preferable to estimate the trend starting earlier than 1995, some of the required components are not available prior to that year. We stop the trend in 2002 in order to avoid including the housing boom. By comparing the implied counterfactual level of taxes in 2009 to actual tax collections in 2009, we gauge the level of revenue in 2009 relative to a world in which the housing market grew at trend instead of experiencing a boom-bust cycle.

Transfer Taxes

The real estate transfer tax, sometimes referred to as a deed recordation tax or a realty conveyance tax, is collected when real estate changes hands and is typically based on the value of the real property being transferred (Behrens and Gravelle 2004). The tax rate is generally the same for all transfers, although in some instances it is progressive in the sense that the tax rate rises with the value of the transfer. Currently, 37 states and the District of Columbia assess the tax. In 24 states the tax is collected only by the state, in 11 states it is collected by both state and local governments, and in 2 states it is purely a local tax. In 2007, roughly two-thirds of total collections occurred at the state level.

Transfer taxes have typically comprised a negligible share of total state tax revenues. As can be seen in Panel A of Figure 8, transfer taxes were less than 1 percent of total state revenues from 1994 through 2001.[13] As the housing market boom got underway, however, the transfer tax

[13] The data used in this figure are from the Census Bureau's *Quarterly Survey of State and Local Government Tax Revenue* and include all forms of documentary taxes. Although collections on real estate transactions are by far the most significant component of documentary tax, collections from other sources, such as stock and bond transfers, are also included. The empirical focus on state transfer taxes in this section (as opposed to local) reflects the fact that

share began to grow sharply, reaching a peak of nearly 1.8 percent in 2005 before falling back to around 0.7 percent by 2009. Panel B shows the run-up in the transfer tax share from 2000 to 2005 on a state-by-state basis. The horizontal axis displays the transfer tax as a share of state and local government taxes in fiscal year 2000 and the vertical axis displays the share as in fiscal year 2005 (near the peak of transfer tax collections). Almost all of the states are above the 45 degree line, indicating that the transfer tax grew in importance over this period. The growth was particularly notable in New York, Delaware, Washington state, Washington DC and Florida.

Transfer tax revenues, $T_{trans,t}$, can be separated into two components: the tax rate, $\tau_{trans,t}$, times the value of real estate transactions, $V_{trans,t}$ (which is itself equal to the number of real estate transactions, $N_{trans,t}$, times the average sales price, $\overline{P}_{real\ estate,t}$):

$$T_{trans,t} = \tau_{trans,t} * V_{trans,t} = \tau_{trans,t} * (N_{trans,t} * \overline{P}_{real\ estate,t}) \quad (3)$$

Taking logs and first-differencing yields:

$$\Delta \log T_{trans,t} = \Delta \log \tau_{trans,t} + \Delta \log N_{trans,t} + \Delta \log \overline{P}_{real\ estate,t} \quad (4)$$

Equation (4) makes clear that the elasticity of transfer tax revenues with respect to both the number of real estate transaction and the average value of real estate transactions equals 1: $\frac{\Delta \log T_{trans,t}}{\Delta \log N_{trans,t}} = \frac{\Delta \log T_{trans,t}}{\Delta \log \overline{P}_{real\ estate,t}} = 1$.

The relationship between transfer tax receipts and the housing market is visible in the aggregate time-series data shown in Figure 9. (The series are indexed to equal 100 in 2000 and a log scale is used). As both the volume of real estate transactions and home prices surged in the

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the state data is available through calendar 2009, but the local figures have only been released through fiscal year 2008 (which ends in mid-calendar year 2008) – too early to assess the full impact of the housing market downturn.

first half of the decade, transfer taxes rose 200 percent. Tax receipts then turned downward in 2006 when the volume of real estate transactions began falling. The decrease in collections intensified in 2008 as housing prices began to slide.

In order to implement our simulations, we first set $\Delta \log \tau_{trans,t}$ in equation (4) to equal 0 because we aim to isolate changes in transfer tax revenues driven by changes in the housing market, as opposed to policy induced changes. We measure the log change in home sales, $\Delta \log N_{trans,t}$, by taking annual averages of quarterly data published by the National Association of Realtors. These data include sales of existing single-family homes and condos, but exclude sales of new homes.[14] The log change in house prices, $\Delta \log \overline{P}_{real\ estate,t}$, is calculated using the CoreLogic index described above. Finally, the state-level transfer tax data are from the Census Bureau's Quarterly Summary of State and Local Government Tax Revenue.

The "peak year" approach suggests that the downturn in housing market caused state government transfer tax revenue to decline by $4¾ billion (real 2005 dollars) from 2006 to 2009, equal to 43 percent of such revenues in 2006. The estimate is close to, but somewhat smaller than, the actual decline over this period of $6½ billion. Some of the difference between the estimated and actual decline in revenue is likely explained by commercial real estate. Although the transfer tax typically applies to both residential and commercial real estate transactions, the housing market measures used here pertain only to the residential side of the market (as commercial measures at the state-level are unavailable). Note, though, that commercial real

[14] Nationally, new homes sales were 17 percent of total home sales from 2000 to 2005. They fell more steeply than existing home sales during the housing market contraction and were only 7 percent of total home sales by the end of 2009. Consequently, we are understating both the level and rate of decrease of home sales. New home sales data are unavailable at the state level.

estate accounts for a much smaller share of transfer tax revenues than does residential real estate. Our inability to measure new home sales also likely contributes to the difference.

Turning to our second simulation method, the "trend growth" approach, we estimate that transfer tax receipts in 2009 were $5 billion lower than they would have been if house prices and transactions volumes had continued to expand at their 1995-2002 average growth rates.

Direct Sales Tax Channel

Builders typically pay either sales tax on construction materials that they purchase or the equivalent use tax if the materials are purchased out of state. When the construction sector shrinks, states lose sales tax revenue from numerous construction inputs ranging from lumber and concrete to durable goods like washing machines. To estimate the sales tax revenue generated by the residential construction industry, we consider sales of materials that are used in new construction and renovation. We estimate the materials input cost of new construction by multiplying the number of new housing units built in each state by the cost of construction materials in that state. Single-family and multifamily housing estimates are calculated separately. We use the number of building permits issued for new housing units (reported by the Census Bureau) to proxy for the number of newly-constructed housing units in each state, and we estimate the cost of construction materials as the cost per square foot of construction materials multiplied by the average square footage of new housing units from the "Characteristics of New Housing" report of the Census Bureau. The square footage data are reported annually for the four Census regions (and separately for single-family and multifamily structures).

We obtain data on single-family materials costs from *Residential Cost Data*, a publication by R.S. Means, which is a well-known construction cost estimator. For each census region, we determine the cost in 2009 of materials used in an average-quality 2-story house with square footage equal to the average square footage of new housing units in that region. Then we multiply this cost by the average cost index for each state and year, which generates variation both across states and over time.[15] R.S. Means does not separate multifamily construction costs into materials and labor costs, so for the multifamily sector we assume that materials are 50 percent of the reported cost of materials and installation.[16] The cost of materials and installation is based on the estimated cost of a 3-4 story apartment building, which was the typical height of new multi-family buildings in all 4 census regions in the American Housing Survey.[17] As with the single-family costs, we multiply the 2009 cost estimate by the cost indexes for each state and year. Finally, we multiply the state-level estimates of materials costs for new single-family and multifamily units by state-level sales tax rates to obtain sales tax revenues.

Data on residential renovation do not exist annually at the state level. Therefore, we estimate state-level renovation expenditures by multiplying the total number of building permits (for new housing units) issued in the state by the national ratio of spending on residential improvements relative to the aggregate number of building permits. The residential improvement data are nominal expenditures on owner-occupied and rental units as estimated by the BEA. We assume that materials inputs are 1/3 of improvement expenditures in each state.[18]

[15] R.S. Means publishes cost indexes for 67 cities so we take a simple average across all reported cities in a given state.
[16] The BEA estimates that materials inputs were roughly ½ of the cost of materials plus compensation of employees from 1998 to 2008 (reported in the Gross Output by Industry accounts).
[17] This cost estimate is reported in the *Square Foot Costs* publication by R.S. Means.
[18] According to the BEA's Gross Output by Industry tables, materials inputs were roughly 1/3 of gross construction output from 1998 to 2008.

As with the materials costs for new construction, we multiply the state-level estimates of renovation materials costs by state-level sales tax rates to obtain sales tax revenues.

Figure 10 shows our estimates of real sales tax revenues from the materials used in new single-family construction, new multifamily construction, and improvements. The largest component is single-family, which peaked at $8.2 billion in 2005 and had plunged 71 percent by 2009. Multifamily materials inputs show a similarly-large percentage drop during this period, although they make up a much smaller share of total construction materials spending. Our estimates suggest that revenues related to materials used in residential renovation only declined by 16 percent in real terms from their peak in 2006 to 2009. Adding these three pieces together and using the peak year method, total state revenues from sales of construction materials fell by 53 percent ($6.1 billion) from 2006 to 2009. Although this decrease is large in percentage terms, it is only 3 percent of the roughly $230 billion (real) in general state sales tax revenues generated in 2006.

To evaluate the level of sales tax revenues in 2009 using the trend growth method, we estimate trend expenditures on construction materials for each of the three components (single-family, multi-family and improvements) assuming that after 2002 the real level of spending continued to increase at its 1995-2002 average growth rate. Then we apply the actual sales tax rate in each state and year to obtain trend sales tax revenues. Summing across all three categories, aggregate sales tax revenues were 68 percent lower ($11.3 billion) in 2009 than they would have been had spending continued at its 1995-2002 trend. Even this seemingly-large gap was only 6 percent of total state sales tax revenues in 2009.

Indirect Sales Tax Channel

Housing is the most important component of wealth for many households. According to the 2007 Survey of Consumer Finances (SCF), housing value accounted for at least half of total assets for 47 percent of households. Booms and busts in the housing market can induce increases and decreases in personal consumption through two channels. The first channel is the conventional wealth effect. Similar to financial assets, increases in house values can raise consumption by increasing the amount of resources available for households. The second channel is through providing collateral against which liquidity-constrained households can borrow. If the current housing downturn has reduced consumption through either of these two channels, it will have reduced the sales tax revenues of state governments.

A large number of studies have examined the size of the housing wealth effect using macro and micro data, and the estimates vary significantly from study to study. For example, Case, Quigley, and Shiller (2005) find a large effect of housing wealth on household consumption, but Attanasio, Blow, Hamilton, and Leicester (2009) argue that changes in house prices do not directly influence the spending of homeowners. Cooper (2009) examines the 1996-2005 wave of the Panel Study of Income Dynamics (PSID) and finds a marginal propensity to consume (MPC) of 3.5 cents per dollar increase in housing wealth. Mian and Sufi (2009) use credit report data and estimate a MPC of 25 to 30 cents. Dynan (2010) examines data from the Consumer Expenditure Survey (CE) and finds no link between growth in house prices and growth in homeowners' consumption of nondurable goods. In this paper, we choose a middle ground and assume a MPC of 3 cents for every dollar increase in housing wealth. We allow the housing wealth effect to phase-in over three years: 60 percent in the first year, 90 percent in the second year, and 100 percent in the third year.

To estimate the housing wealth effect on state tax revenues, we assemble data on house prices, housing units, state sales tax rates, state sales tax exemptions of grocery food and clothes, and expenditure fractions of grocery food and clothes. We obtain 1995-2009 state-level total housing wealth by inflating the aggregate value of housing in each state from the 2000 Census with the real house price appreciation rate suggested by the CoreLogic house price indexes and the change in the Census Bureau's estimates of the number of housing units in each state. The 1995-2009 state sales tax rate data are from the State Tax Handbook. In many states, grocery food and clothes are exempt from sales taxes. As a result, the changes in the consumption of grocery food and clothes will not affect sales tax revenues in these states. We obtain data on whether each state exempts grocery food or clothes from the 2008 State Tax Handbook and we estimate that on average grocery food and clothes account for 7.4 and 3.6 percent of total consumption, respectively, using the 2008 CE data. We calculate the housing wealth effect by multiplying the aggregate value of housing in a state by the MPC out of housing wealth, adjusting the resulting consumption estimates for grocery food and clothing expenditures in states where these expenditures are not taxed, and then multiplying the result by the state sales tax rate.

Figure 11 shows our estimates of the housing wealth effect on state sales tax revenues from 2000 to 2009. House prices and construction activity increased in the late 1990s and early 2000s, boosting state sales taxes through the housing wealth effect. As the housing boom accelerated from 2003 to 2005, our estimate of the indirect sales tax effect also surged (from about $1.3 billion to $2.5 billion). House prices began to decline in 2006. However, aggregate housing wealth continued to expand due to continued inflows from new construction. Housing

wealth started to fall in 2007, and we estimate that housing wealth-related sales tax revenues fell significantly in 2008 and 2009.

We estimate that sales tax revenue generated by housing wealth declined by $6.5 billion from 2006 to 2009. To carry out the "trend growth" simulation, we predict real house prices and the number of housing units based on their average growth rates from 1995 to 2002. In this counterfactual, state sales tax revenues induced by housing wealth continue to grow steadily from 2003 to 2009. Actual housing wealth-related sales tax revenues in 2009 were $6.1 billion lower than revenues predicted by these trends.

Personal Income Tax Channel

The housing downturn has reduced labor income in housing-related industries. We assess the impact of these declines on personal income tax receipts at the state level by focusing on two housing-related industries: construction (NAICS 23000) and real estate (NAICS 53100). The construction industry includes residential and nonresidential construction of buildings, heavy and civil engineering construction, and specialty trade contractors.[19] The real estate industry includes real estate agents and brokers, lessors of real estate, property managers, and appraisers. It does not include mortgage brokers, who cannot be separated out from the other workers in the credit intermediation category in the state-level data.

For each sector, we calculate the average wage per job by state from the BEA's Regional Economic Accounts. Both full-time and part-time workers are included in these estimates. Wage and salary disbursements include commissions, tips, bonuses, and voluntary contributions

[19] Although it would be interesting to divide this category into separate components for residential and nonresidential construction, the state-level data do not report this split. Moreover, distinguishing between residential and nonresidential construction employment can be difficult because some workers do both types of construction.

to deferred compensation plans, but do not include the employers' contributions to pension and insurance funds or to social insurance. They are based primarily on state unemployment insurance records. Using the NBER's Taxsim module, we estimate the total state income tax payments that would be paid by an individual earning the average wage in that state and industry. We assume that the individual has no non-wage income, is married, has two children, and that the spouse's labor income is 70 percent of construction workers' income and 80 percent of real estate workers' income.[20]

Total personal income tax revenues attributable to labor income from each industry are equal to the income tax per worker times the total number of employees in each industry. We use estimates of total employment by state and industry from the BEA's Regional Economic Accounts, which includes both employees and self-employed workers.

Figure 12 shows total income tax revenues attributable to labor income from the construction and real estate industries aggregated across all states. Income tax revenues from the construction industry peaked at $24 billion in 2007 and decreased to $20 billion in 2009. This time series is largely driven by changes in employment, which fell from 11½ million in 2007 to 9 million in 2009. By contrast, average tax payments per job in the construction industry continued to increase in real terms through 2009. One reason why the drop in housing-related income tax revenues was not more severe is that construction employment was supported in 2007 and 2008 by the nonresidential sector, which peaked several years after the residential sector. In addition, the drop in residential construction employment has been larger than that in the nonresidential sector. Consequently, if we were able to disaggregate the state-level data into

[20] These ratios are consistent with national statistics from the 2000 Census and 2006 and 2008 American Community Surveys. They were roughly the same in each sample, so we assume constant ratios over time. We do not estimate state-specific ratios due to small sample sizes.

these two components, we would likely find that the contraction in income tax revenues from residential construction began earlier and was more severe than that of the nonresidential sector.

In the smaller real estate industry, income tax revenues peaked at $15.5 billion in 2007 and stepped down to $12.8 billion in 2009. This decline was about the same (in percentage terms) as the decrease in the construction industry. However, unlike the construction industry, it was due to a combination of a contraction in employment and a decrease in average tax payments per job.

Adding the two industries together and using the peak year method, income tax revenues from housing-related industries were 13 percent ($4.8 billion) lower in 2009 than they had been in 2006 at the peak of the housing market boom. As illustrated by the figure, much of this decrease occurred in 2009 even though the housing market started to contract several years earlier.

Turning to the trend growth simulation, we assume that real average wages and employment in each industry increased at their 1995-2002 trends and use Taxsim to calculate the implied counterfactual personal income tax revenue in 2009 attributable to each industry. The counterfactual level of collections is $47.8 billion—45 percent ($14.8 billion) higher than our estimates of actual 2009 tax revenues. Although this gap seems large, aggregate real state income tax revenues were $216 billion in 2009. Thus, aggregate income tax revenues would only have been 7 percent higher had revenues from housing-related industries increased at trend through 2009.

V. Combining the Channels

In this section, we combine the estimated effects of each channel to obtain a total effect on all forms of revenue. Because property tax revenues appear to be unresponsive to declines in house prices (at least through the end of 2009), we focus on changes in state revenues due to the other four channels.

Table 1 reports the change in housing-related revenues from 2006 to 2009 (the peak method). Focusing first on the national estimates (final row), the transfer tax, the direct sales tax, the indirect sales tax, and the income tax effects reduce total revenue by about $5 billion, $6 billion, $6 billion and $5 billion, respectively. The sum of these effects reduced state revenues by $22 billion. Columns 6 through 10 of the table compare these estimates to total 2006 tax revenues from each source. The transfer tax fell by 43 percent during this period. The large magnitude of this percentage effect is not surprising because residential housing comprises a large portion of the transfer tax base. By contrast, the other effects are more modest. The direct sales tax and the indirect sales tax channels reduced sales tax revenues each by 3 percent from 2006 to 2009, and the income tax effect reduced sales tax revenue by 2 percent. Adding the components together, total tax revenues (including corporate income and other taxes not included in our analysis) were reduced by 3 percent from 2006 to 2009. Although a reduction in total revenue of this magnitude is not insignificant, the decline occurred over several years which likely reduced the impact on state governments. For comparison, total revenues fell by 5 percent in 2009, likely as the result of the broader economic recession.

The table also reveals considerable heterogeneity across states. Not surprisingly, Florida, Arizona, and Nevada suffered the largest losses in percentage terms. Tax revenues in California also decreased substantially (the largest drop in billions of dollars), but this decrease was only the 8th largest as a percent of total tax revenues. Other states that experienced relatively large

declines are Washington state, Georgia, South Carolina and Virginia. On the other hand, some states have not experienced any notable drop in tax revenue. We estimate that the housing channels either boosted total tax revenues or reduced them by less than 1 percent in 13 states.

Table 2 reports similar results for the "trend growth" simulation method. Total tax revenues in 2009 were $37 billion lower than predicted by trend. All four channels contribute noticeably to this deficit, although the direct sales tax and personal income tax effects are larger than the other two channels. To estimate the percentage effect of this deficit, we predict what total tax revenues would have been had the housing components expanded at trend. We find that total state tax revenues in 2009 were 6 percent lower than they would have been had the housing market continued at its 1995-2002 trend.

V. Conclusions

State and local tax revenues have suffered a sharp downturn in the past several years, at the same time as the housing market contracted appreciably. In this paper we attempt to disentangle the direct impact of the housing market downturn on state and local tax receipts from the impact of the general economic recession. We come to two primary conclusions. First, we find that property tax collections have been surprisingly resilient due to both the long lags between changes in the market value of property and changes in taxable assessments and the tendency of policy makers to insulate revenues from housing price declines by raising tax rates. This propensity makes it unlikely that property tax revenues will fall sharply in coming years. Second, although the housing market downturn has reduced states' collections of transfer taxes, sales taxes and personal income taxes, the magnitude of this effect is relatively modest,

particularly when viewed against the recent plunge in aggregate tax receipts. Thus, the downturn in state and local tax revenues was likely driven by the economic recession rather than the direct influence of the housing market downturn.

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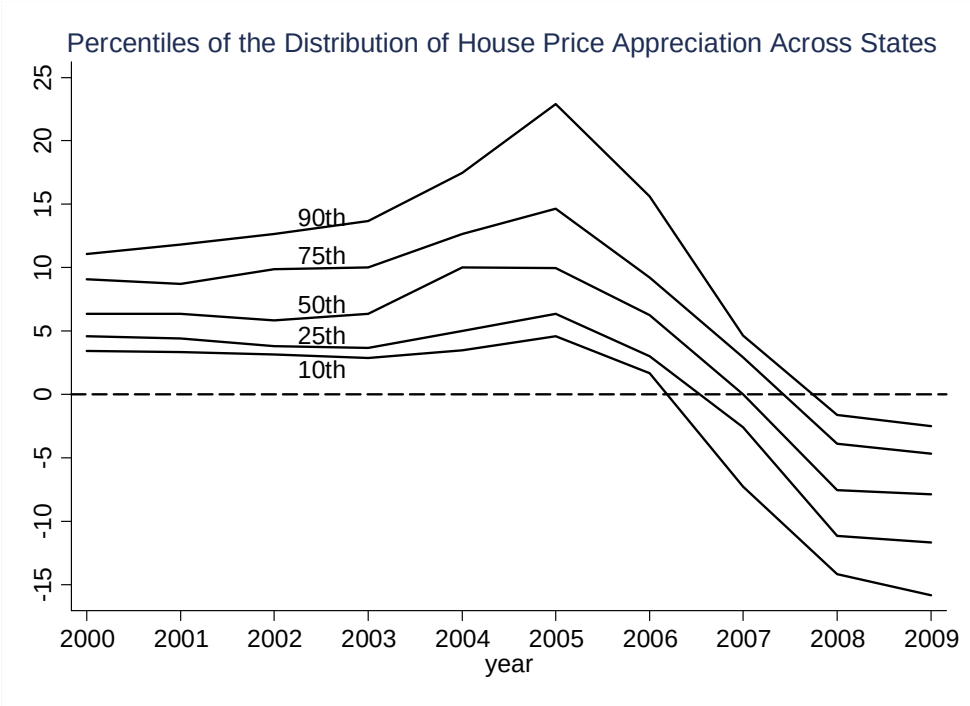
Figure 1

Percentiles of the Distribution of Housing Market Fluctuations Across States



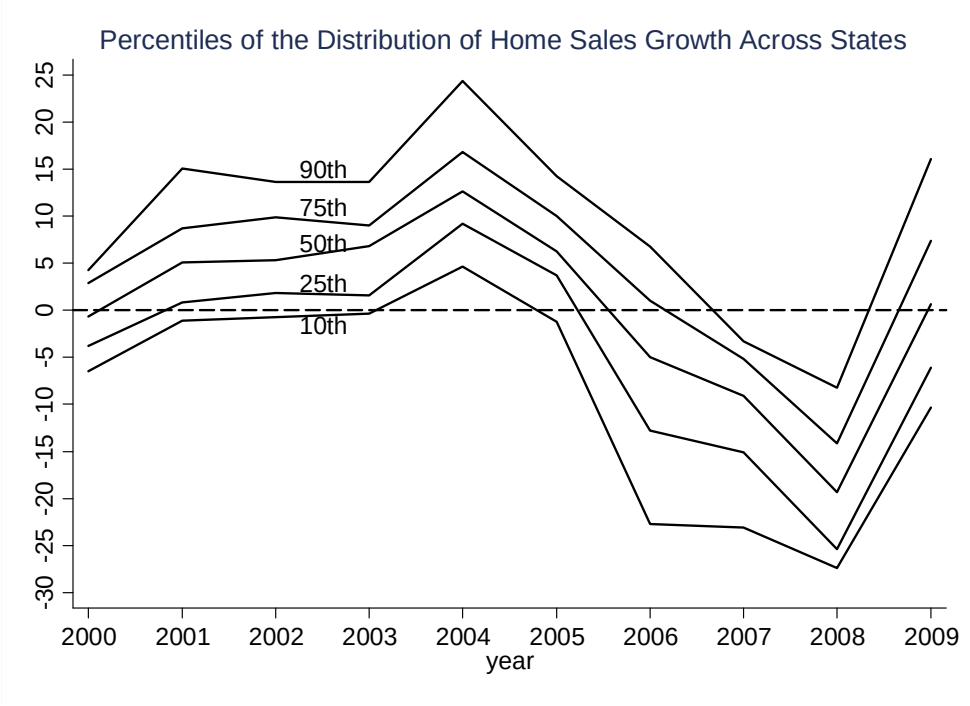
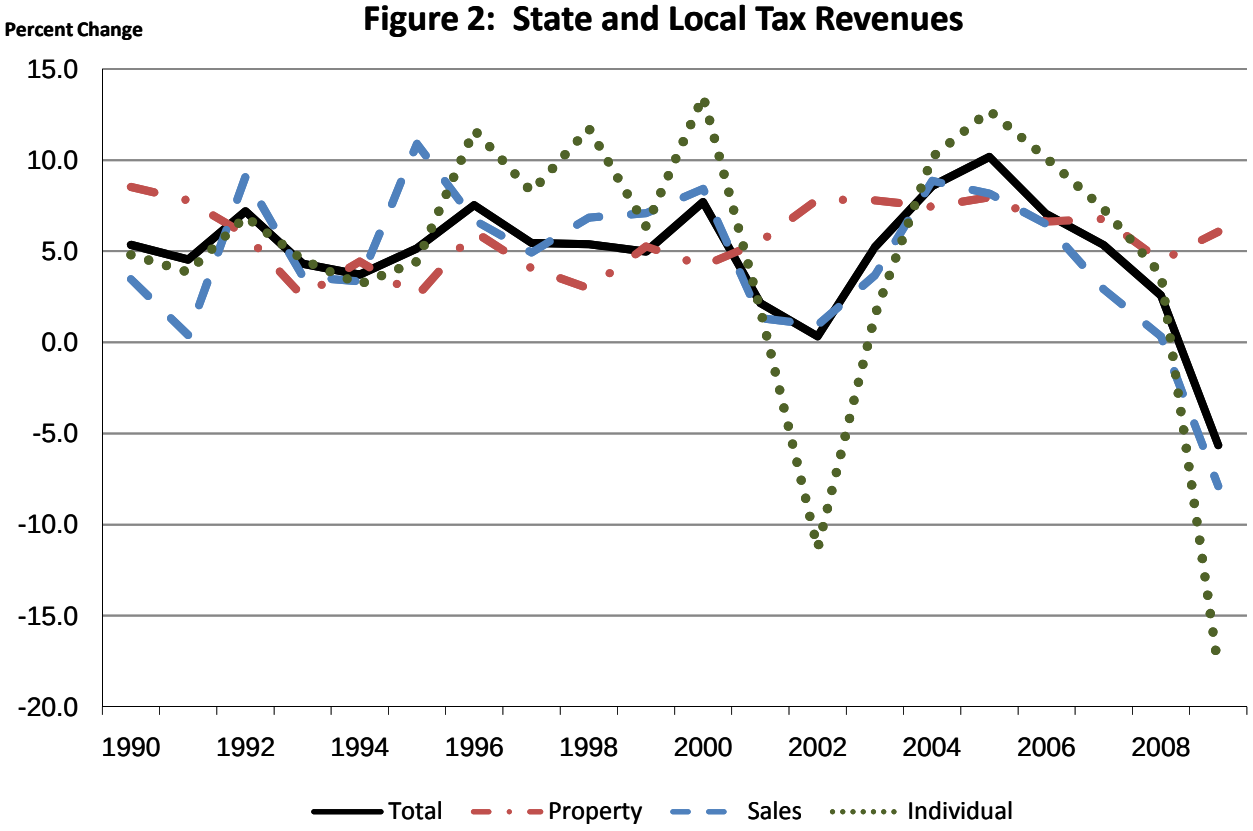
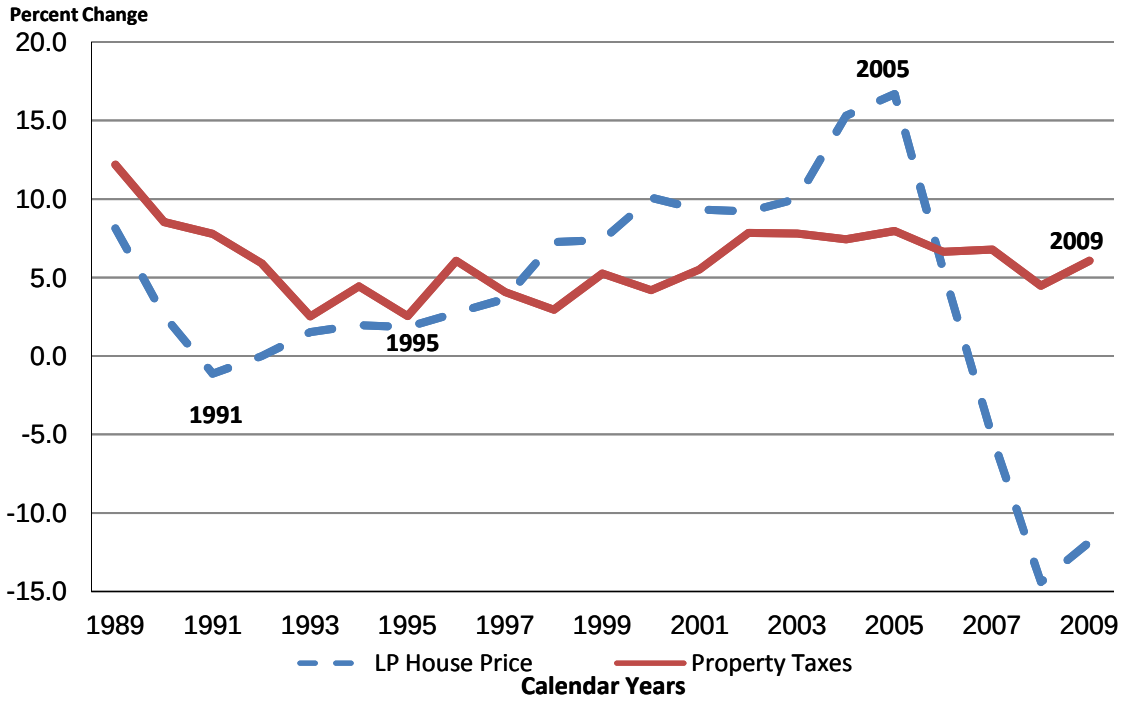


Figure 2: State and Local Tax Revenues



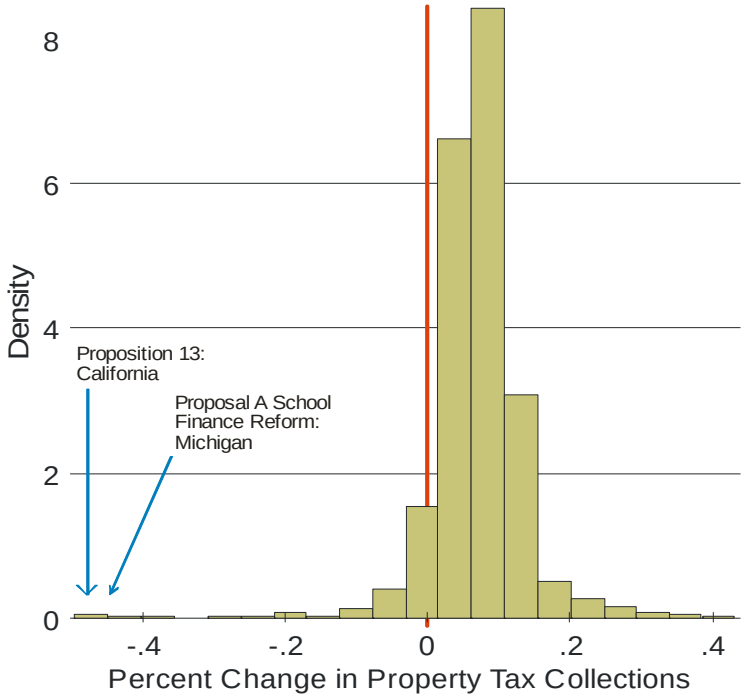
Source. Census Bureau, *Quarterly Summary of State and Local Tax Revenue*.
The 2008 and 2009 property tax data have been adjusted by the authors to account for changes in the local government sampling frame introduced by the Census Bureau in the fourth quarter of 2008 (see Schilling, Couzens and Barth 2010).

Figure 3: House Price Appreciation and Property Taxes



Source. CoreLogic; Census Bureau, *Quarterly Summary of State and Local Tax Revenue*..
Note. 2002:Q2 property tax value is an estimate. The 2008 and 2009 property tax data have been adjusted by the authors to account for changes in the local government sampling frame introduced by the Census Bureau in the fourth quarter of 2008 (see Schilling, Couzens and Barth 2010).

Figure 4: Distribution of Change in Property Tax Collections



Note: The state is the unit of observation. Property tax collections include only local government revenue. The data span 1976 to 2007.

Figure 5: Percent Change in Property Tax Collection Following House Price Declines

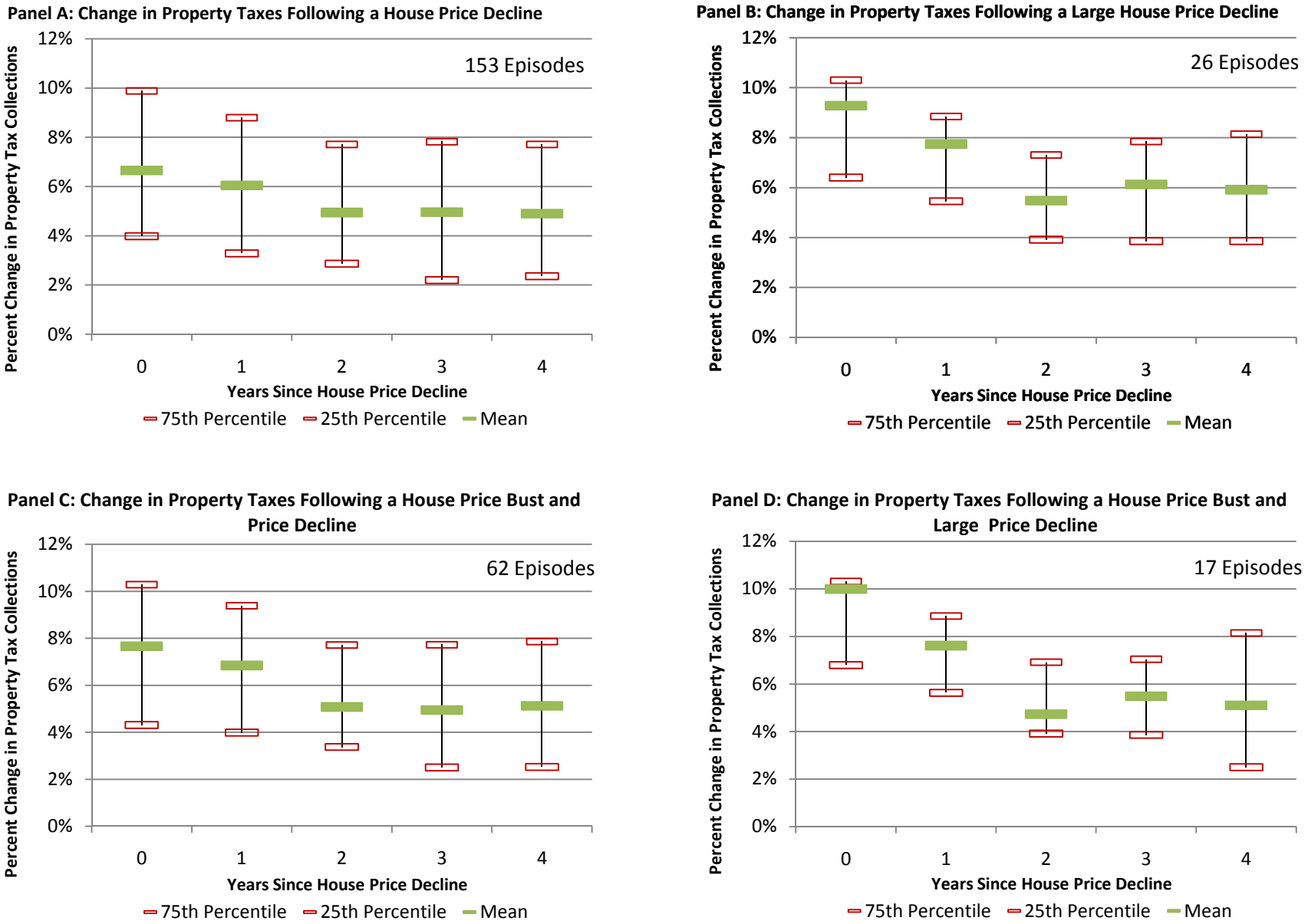
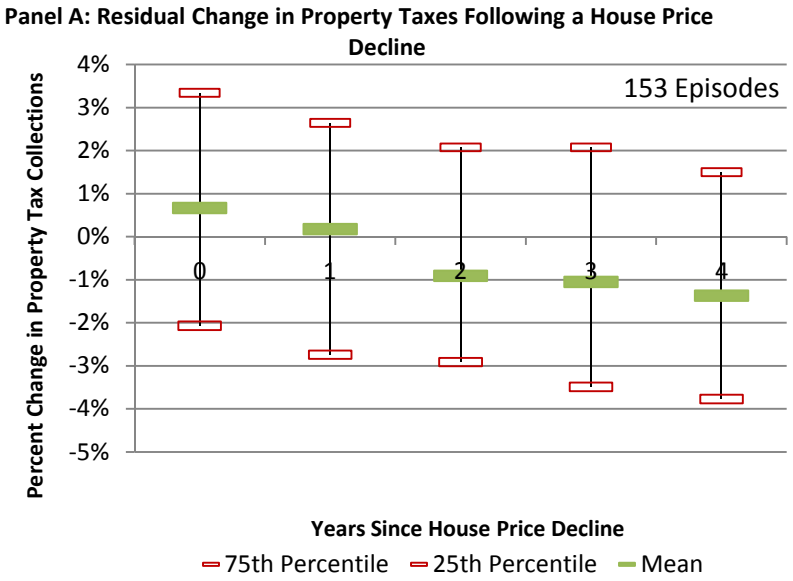
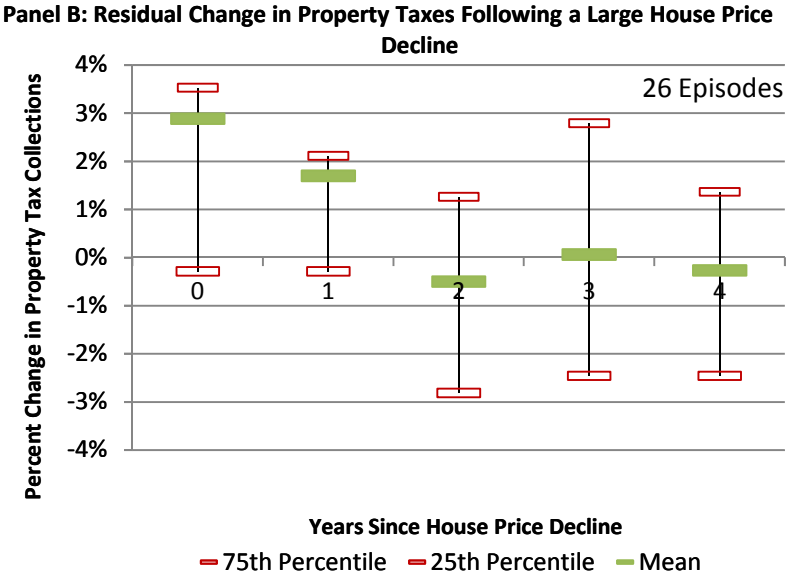
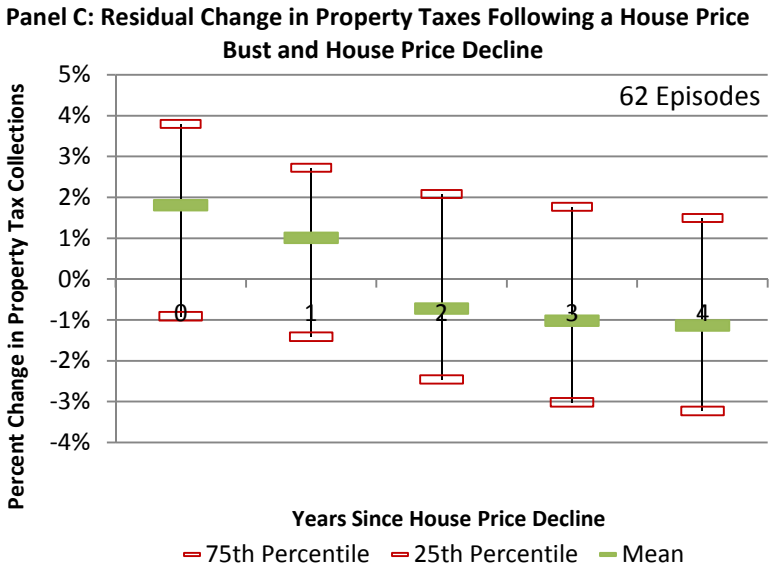


Figure 6: Residual Percent Change in Property Tax Collection Following House Price Declines







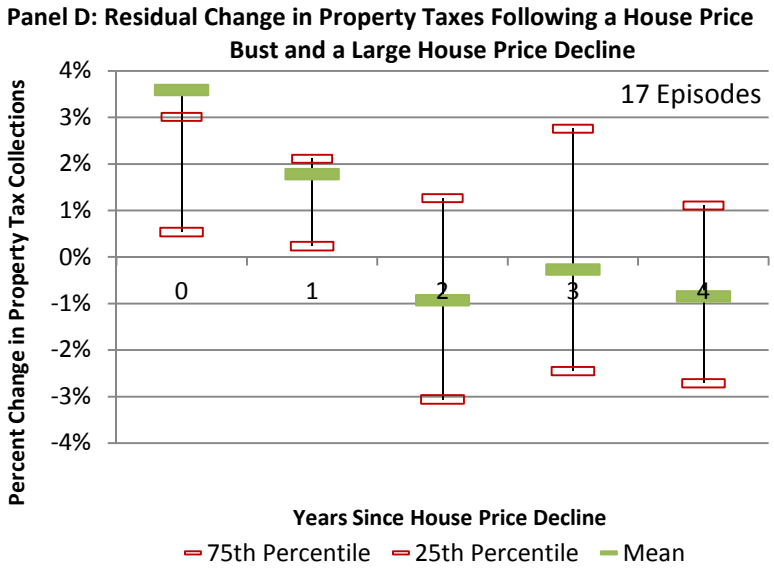
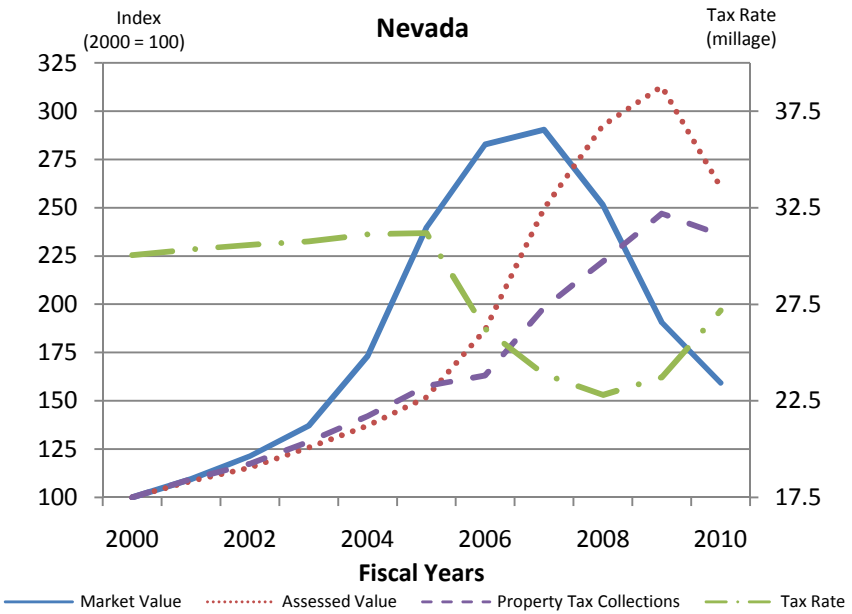
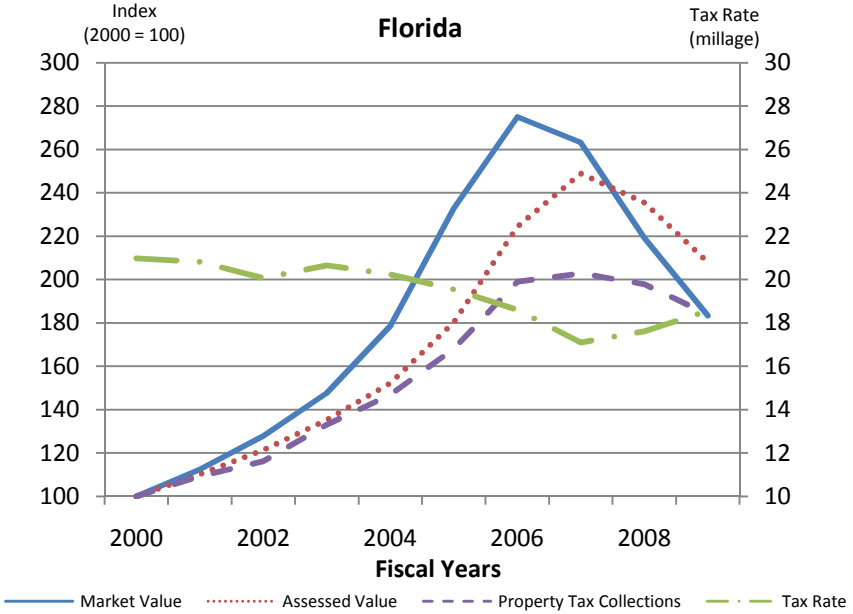
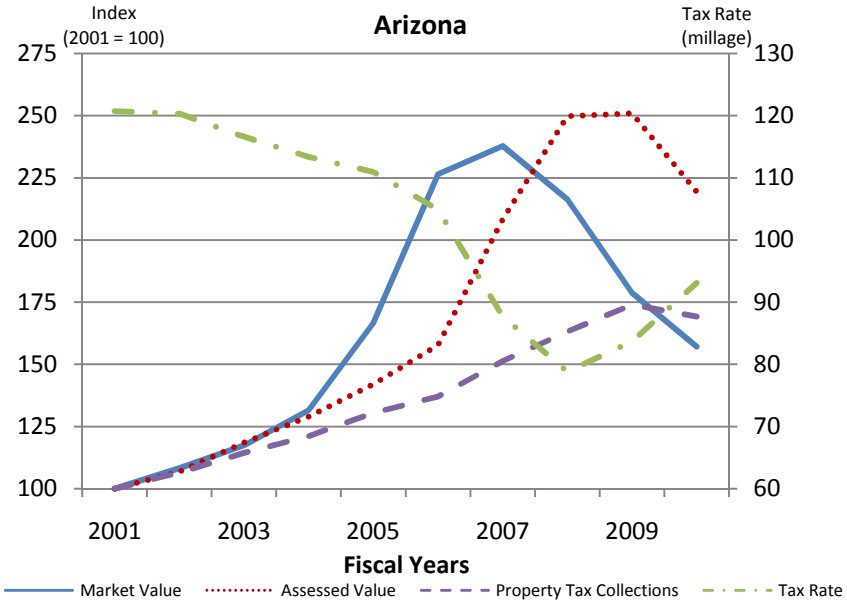


Figure 7: Property Tax Case Studies







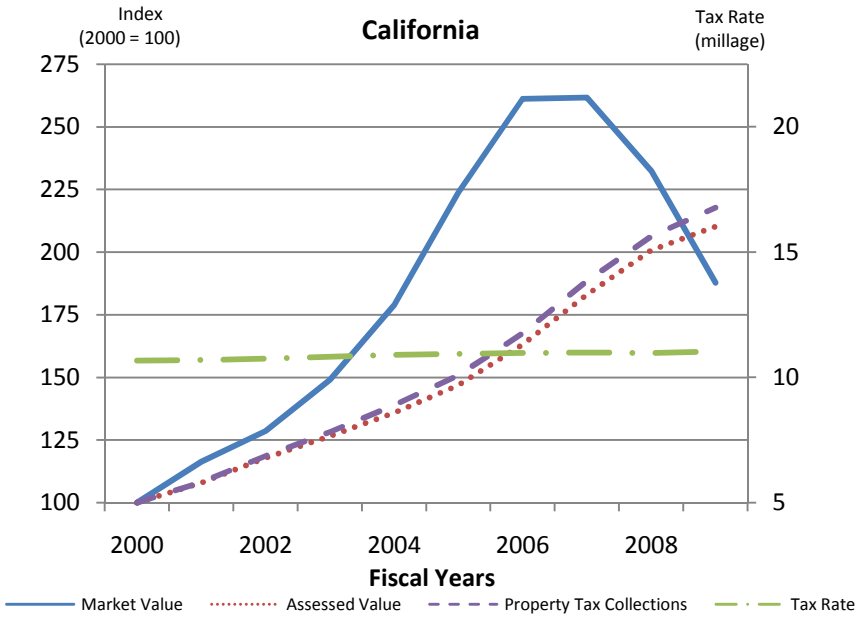
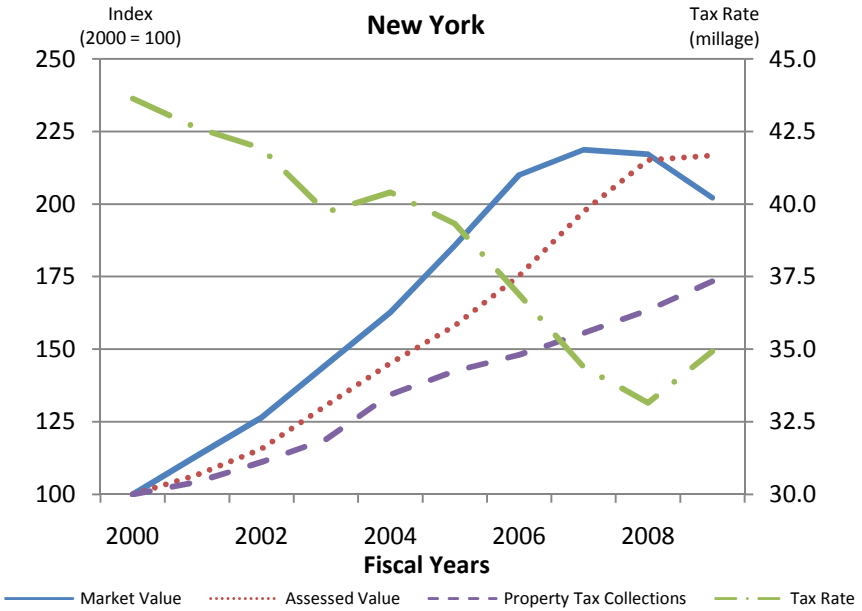
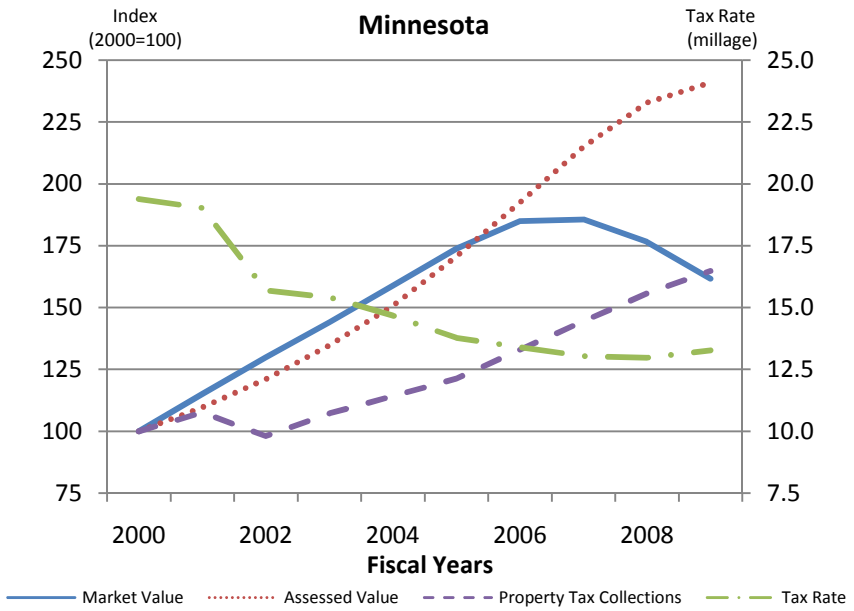
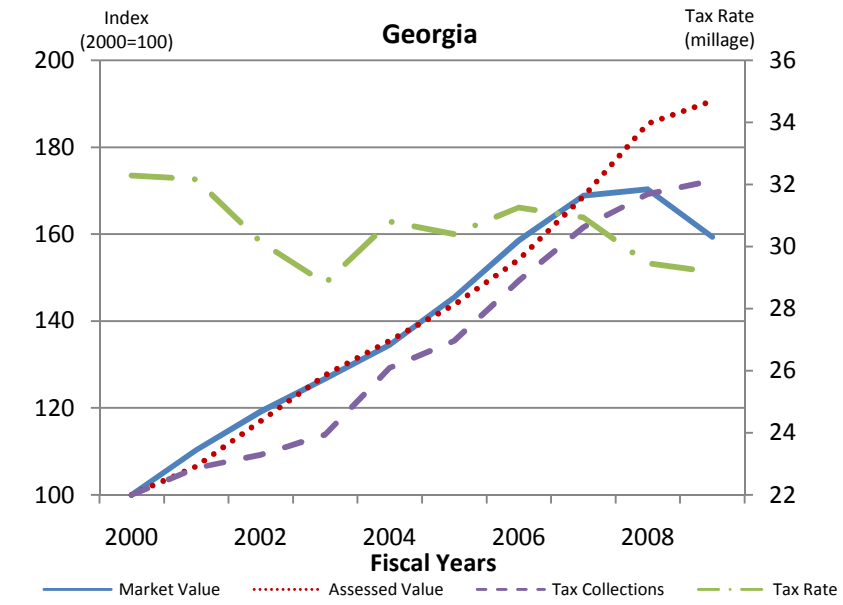


Figure 7: Property Tax Case Studies (continued)







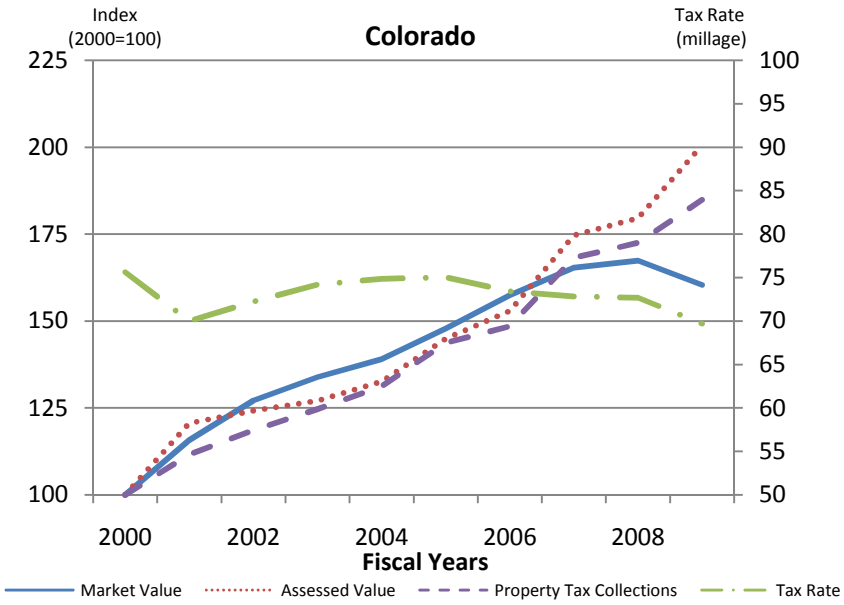
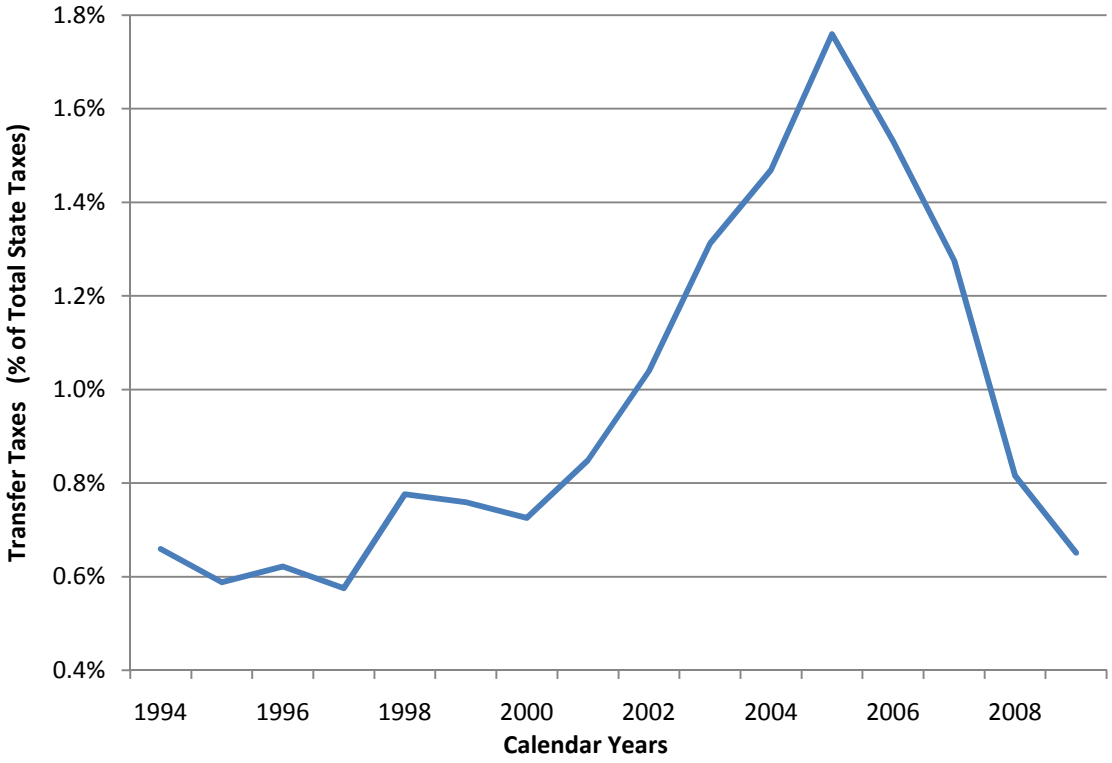


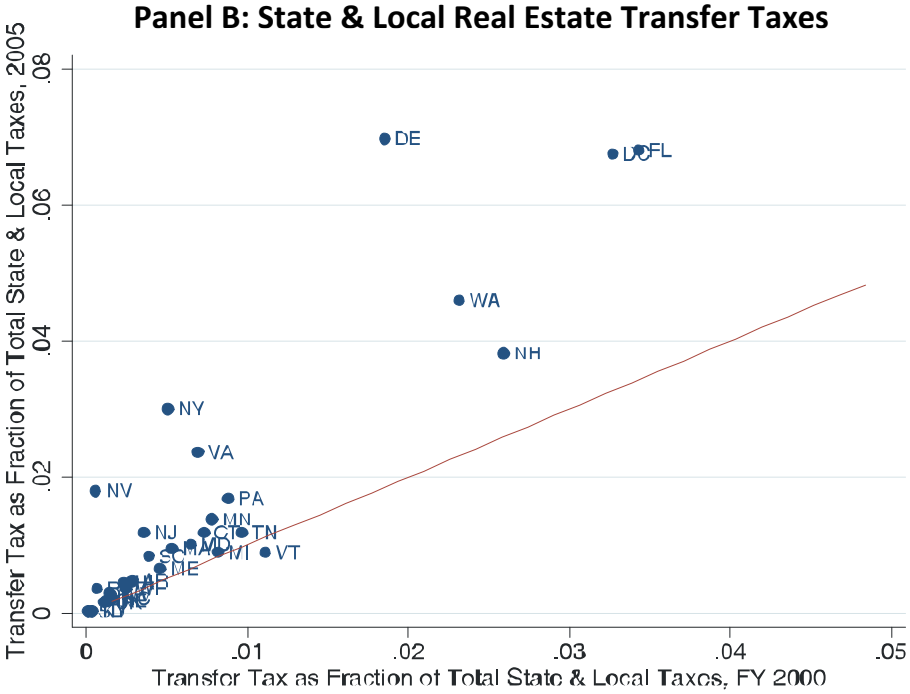
Figure 8: Transfer Taxes

Panel A: State Real Estate Transfer Taxes



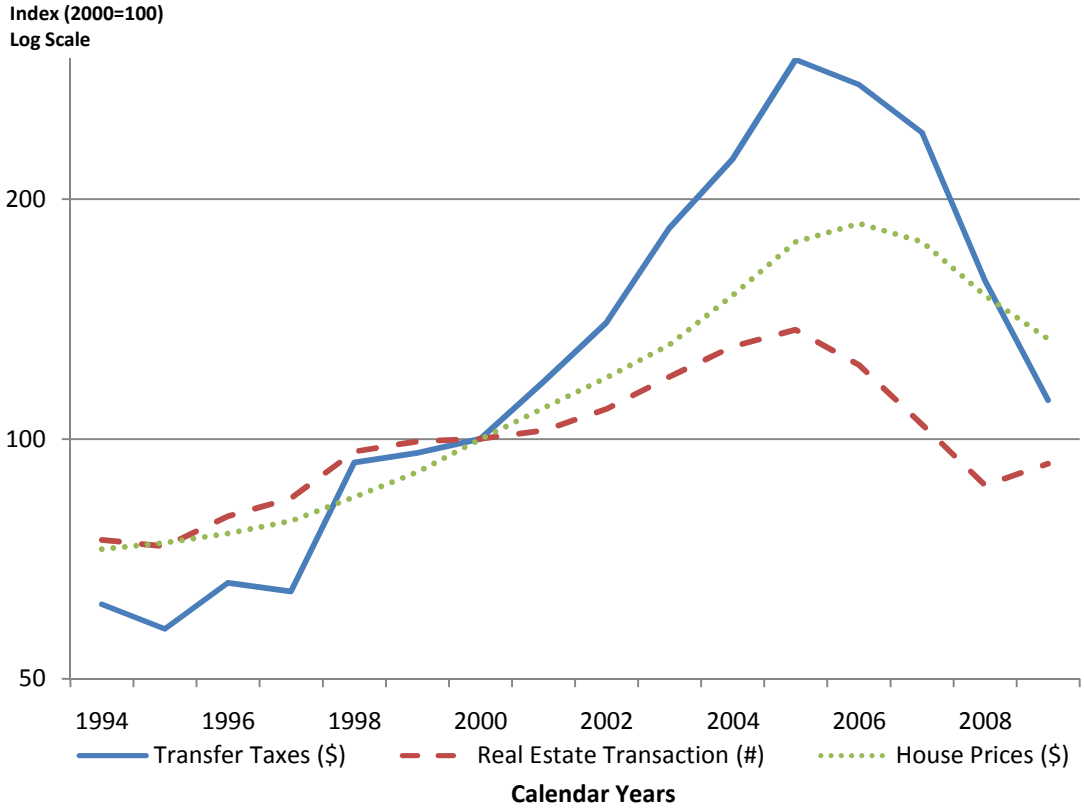
Source. Census Bureau, *Quarterly Summary of State and Local Tax Revenue*.

Panel B: State & Local Real Estate Transfer Taxes



Source. Census Bureau, *State and Local Government Finance Data*.

Figure 9: State Real Estate Transfer Taxes



Source. Census Bureau, *Quarterly Summary of State and Local Tax Revenue*; The National Association of Realtors; CoreLogic.

Figure 10: State Sales Tax Revenues from Materials Inputs to Residential Construction

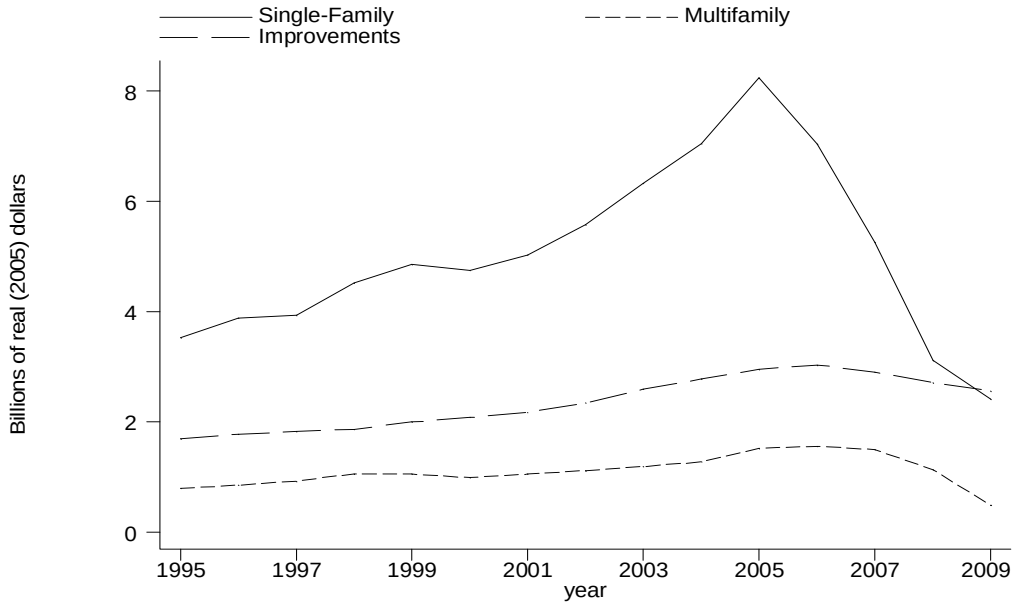


Figure 11: Housing Wealth Effect on Sales Taxes

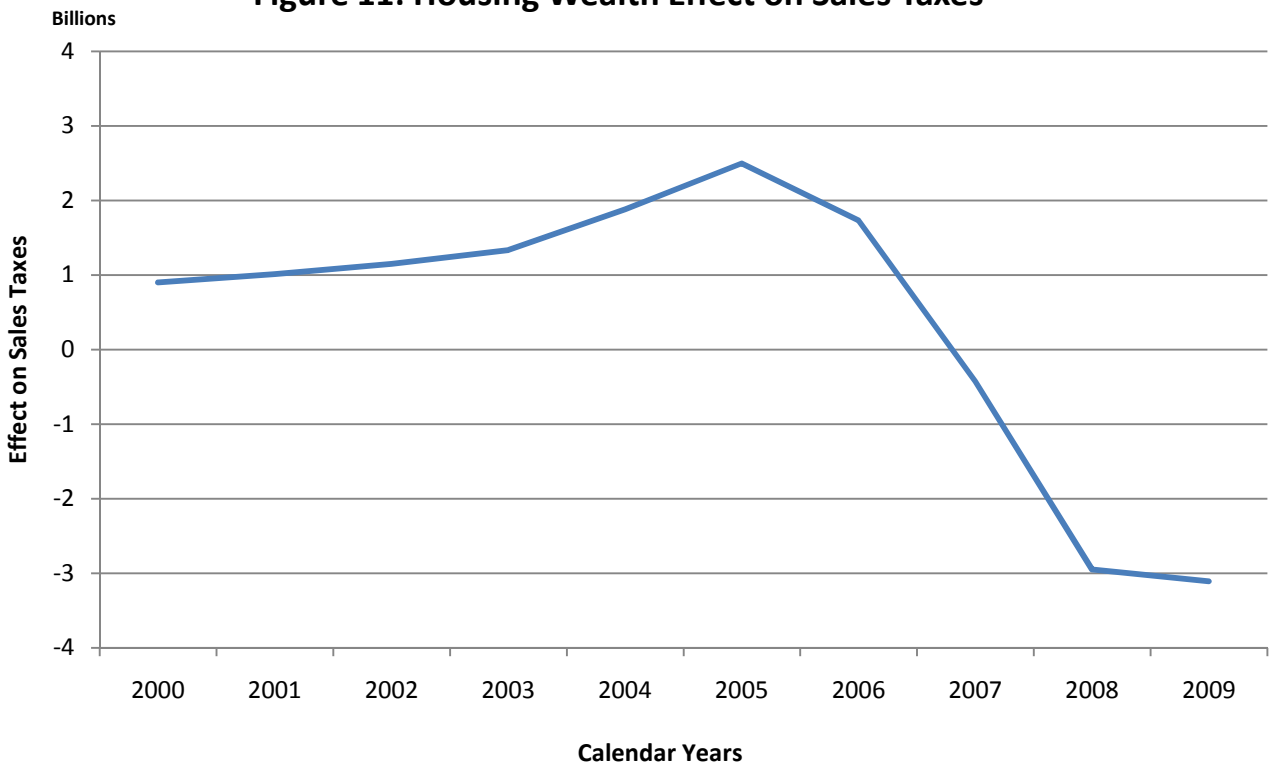


Figure 12: State Income Tax Revenues from the Construction and Real Estate Industries

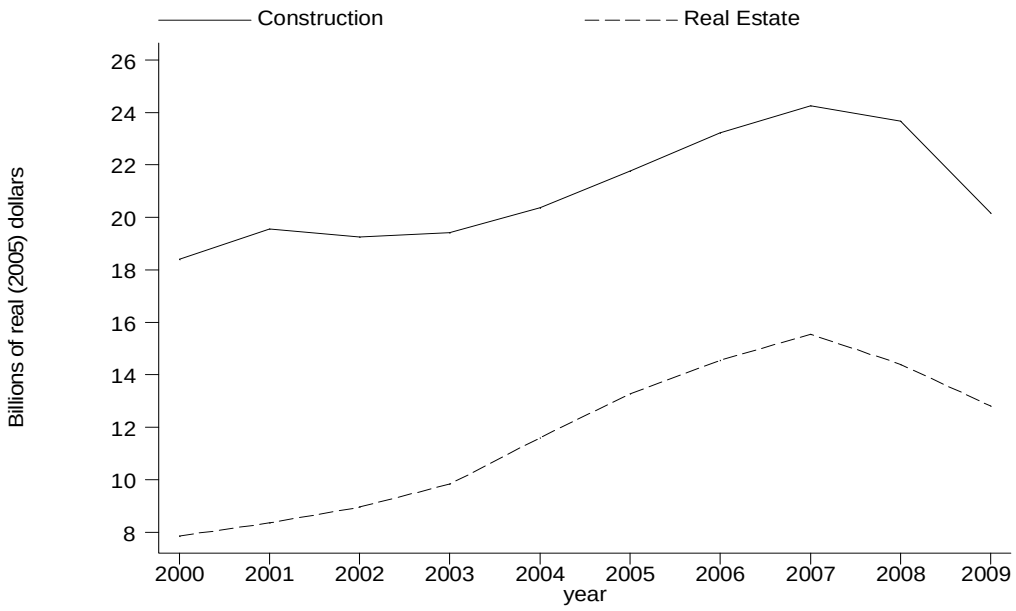


Table 1: Simulation with the Peak Year Method

	2009 housing - 2006 housing ($millions)					(2009 housing - 2006 housing)/ (2006 total) (%)				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
State	transfer	direct sales	indirect sales	income	total	transfer	direct sales	indirect sales	income	total
AL	-23	-61	-10	-45	-138	-42	-3	0	-2	-2
AK	0	0	0	0	0	.	.	.	.	0
AZ	0	-319	-219	-262	-801	.	-6	-4	-8	-7
AR	-12	-29	-10	13	-38	-29	-1	0	1	-1
CA	0	-786	-2,461	-1,273	-4,521	.	-2	-7	-2	-4
CO	0	-88	-33	-146	-267	.	-4	-2	-3	-3
CT	-86	-29	-97	-50	-261	-53	-1	-3	-1	-2
DE	-47	0	0	-29	-76	-40	.	.	-3	-3
DC	-83	-2	-12	-57	-153	-26	0	-1	-5	-4
FL	-2,145	-1,048	-835	0	-4,028	-51	-5	-4	.	-10
GA	0	-378	-79	-350	-807	.	-6	-1	-4	-5
HI	-25	-18	-20	-47	-110	-50	-1	-1	-3	-2
ID	0	-53	-23	-65	-141	.	-5	-2	-5	-4
IL	-59	-291	-268	-312	-930	-55	-4	-3	-4	-3
IN	0	-54	-65	-68	-187	.	-1	-1	-2	-1
IA	-3	2	-10	-43	-54	-23	0	-1	-2	-1
KS	0	-30	-16	-1	-46	.	-1	-1	0	-1
KY	-1	-43	-20	4	-61	-28	-2	-1	0	-1
LA	0	-51	-5	115	59	.	-2	0	4	1
ME	-10	-18	-11	-24	-62	-32	-2	-1	-2	-2
MD	-131	-25	-166	-184	-506	-57	-1	-5	-3	-4
MA	-82	-44	-176	-258	-560	-36	-1	-4	-2	-3
MI	0	-138	-303	-129	-570	0	-2	-4	-2	-3
MN	-81	-93	-136	-147	-457	-30	-2	-3	-2	-3
MS	0	-57	-16	4	-69	.	-2	-1	0	-1
MO	-1	-67	-52	-47	-167	-51	-2	-2	-1	-2
MT	0	0	0	-23	-23	.	.	.	-3	-1
NE	-2	-3	-8	-18	-31	-14	0	-1	-1	-1
NV	-6	-222	-144	0	-372	-4	-7	-5	.	-6
NH	-47	0	0	0	-47	-33	.	.	0	-2
NJ	-251	-85	-278	-88	-701	-41	-1	-4	-1	-3
NM	0	-43	-11	-10	-65	.	-2	-1	-1	-1
NY	-353	-109	-182	134	-511	-30	-1	-2	0	-1
NC	-31	-287	-16	-263	-598	-42	-6	0	-3	-3
ND	0	7	1	9	16	.	1	0	3	1
OH	0	-94	-133	-169	-396	.	-1	-2	-2	-2
OK	-3	-19	-2	-49	-74	-18	-1	0	-2	-1
OR	-5	0	0	-169	-175	-49	.	.	-3	-2
PA	-170	-98	-73	-127	-468	-29	-1	-1	-1	-2
RI	-5	-8	-46	-18	-78	-42	-1	-5	-2	-3
SC	-37	-143	-33	-157	-370	-46	-5	-1	-5	-5
SD	0	0	-1	0	0	-2	0	0	.	0
TN	-96	-215	-35	0	-346	-42	-3	-1	0	-3
TX	0	-689	-116	0	-806	.	-4	-1	.	-2
UT	0	-74	-13	-56	-143	.	-4	-1	-2	-3
VT	-6	-5	-7	-7	-26	-35	-2	-2	-1	-1
VA	-252	-79	-197	-260	-788	-42	-2	-6	-3	-4
WA	-584	-195	-69	0	-848	-57	-2	-1	.	-5
WV	-4	-18	-21	7	-36	-31	-2	-2	1	-1
WI	-29	-62	-53	-133	-277	-39	-2	-1	-2	-2
WY	0	-2	-3	0	-5	.	0	0	.	0
TOTAL	-4,671	-6,163	-6,483	-4,797	-22,114	-43	-3	-3	-2	-3

Table 2: Simulation with the Trend Growth Method

	2009 housing - predicted 2009 housing ($millions)					(2009 housing - predicted 2009 housing)/ (2009 total) (%)				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
State	transfer	direct sales	indirect sales	income	total	transfer	direct sales	indirect sales	income	total
AL	-17	-13	-13	-38	-82	-51	-1	-1	-2	-1
AK	0	0	0	0	0	.	.	.	.	0
AZ	0	-515	-92	-263	-871	.	-11	-2	-14	-9
AR	-9	-28	-13	-47	-97	-38	-1	-1	-2	-1
CA	0	-2057	-1,923	-3,088	-7,067	.	-7	-7	-8	-7
CO	0	-184	-125	-738	-1,046	.	-10	-7	-19	-14
CT	-73	-48	-107	-351	-579	-95	-2	-4	-6	-5
DE	-4	0	0	-54	-59	-9	.	.	-7	-2
DC	-393	-2	-14	-69	-479	-259	0	-2	-7	-11
FL	-1,985	-1570	-358	0	-3,913	-178	-10	-2	.	-14
GA	0	-558	-155	-626	-1,339	.	-10	-3	-9	-9
HI	-7	-15	49	92	118	-27	-1	2	8	3
ID	0	-88	1	-32	-119	.	-8	0	-3	-4
IL	-55	-497	-353	-733	-1,637	-177	-8	-6	-9	-7
IN	0	-245	-92	-201	-538	.	-5	-2	-5	-4
IA	-5	-66	-22	-94	-187	-45	-4	-1	-4	-3
KS	0	-37	-30	-89	-156	.	-2	-1	-4	-3
KY	-2	-105	-40	-121	-268	-54	-4	-2	-4	-3
LA	0	-32	-21	110	56	.	-1	-1	4	1
ME	-20	-58	-16	-111	-204	-122	-6	-2	-9	-7
MD	-122	-133	2	-275	-528	-118	-4	0	-5	-4
MA	-211	-50	-412	-1,027	-1,700	-171	-1	-11	-11	-10
MI	-320	-348	-591	-853	-2,111	-278	-4	-7	-16	-10
MN	-352	-391	-281	-804	-1,829	-231	-10	-7	-13	-12
MS	0	-35	-3	-51	-88	.	-1	0	-4	-2
MO	-6	-112	-81	-280	-478	-72	-4	-3	-7	-5
MT	0	0	0	-12	-12	.	.	.	-2	-1
NE	-4	-32	-21	-80	-137	-37	-3	-2	-6	-4
NV	-3	-285	-51	0	-339	-6	-12	-2	.	-6
NH	-112	0	0	0	-112	-158	.	.	0	-6
NJ	-118	-260	-232	-678	-1,287	-45	-4	-3	-7	-5
NM	0	-54	14	-65	-105	.	-3	1	-10	-3
NY	-364	-299	-190	-1,416	-2,269	-69	-3	-2	-5	-4
NC	-25	-324	-44	-452	-844	-86	-7	-1	-5	-4
ND	0	5	-4	9	10	.	1	-1	3	0
OH	0	-307	-229	-434	-970	.	-5	-3	-5	-4
OK	-5	-38	-16	-30	-88	-45	-2	-1	-1	-1
OR	-2	0	0	-246	-248	-17	.	.	-5	-4
PA	-58	-273	24	-295	-603	-20	-4	0	-3	-2
RI	-5	-21	-38	-116	-180	-88	-3	-5	-14	-8
SC	-32	-216	-56	-294	-597	-143	-9	-2	-14	-10
SD	0	-13	-3	0	-17	-41	-2	-1	.	-1
TN	-105	-135	-72	0	-313	-90	-2	-1	0	-3
TX	0	-1157	-315	0	-1,472	.	-6	-2	.	-4
UT	0	-45	4	-28	-69	.	-3	0	-1	-1
VT	-3	-20	-7	-29	-58	-47	-7	-2	-6	-3
VA	-225	-247	-84	-537	-1,093	-79	-8	-3	-7	-7
WA	-493	-180	-26	0	-700	-144	-2	0	.	-5
WV	-2	-33	-12	19	-27	-25	-3	-1	1	-1
WI	-46	-191	-88	-387	-712	-145	-5	-2	-7	-6
WY	0	2	-2	0	0	.	0	0	.	0
TOTAL	-5,181	-11,310	-6,137	-14,814	-37,441	-126	-6	-3	-7	-6