The Impact of the Taxpayer Relief Act of 1997 on Housing Turnover in the U.S. Single Family Residential Market

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Changes in the Internal Revenue Code create and remove tax-induced trading constraints on homeowners. The Taxpayer Relief Act of 1997 replaced a one-time, post- age 55 capital gain exclusion with a larger gain exclusion option that could be exercised every two years. We develop a simple demand-based specification of housing turnover and use it to determine whether the Taxpayer Relief Act of 1997 led to changes in the percentage of the existing housing stock that was sold in the U.S. and the four geographic regions defined by the U.S. Census Bureau (Northeast, Midwest, South and West). We find that our macro measure of housing turnover increased significantly after the 1997 Act was passed. We augment this macro level analysis with household-level data to determine if these impacts were heterogeneous across age groups, across trading up and trading down, and across geography. The surprising result is how broad based the change in trading behavior is, appearing across all age ranges and impacting both trading up and trading down.

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Introduction

It has long been documented that tax policy can have profound impacts on US housing markets (e.g., Poterba, 1984; Poterba et al, 1991). Many scholars have described the negative impact of the Tax Reform Act of 1986 on real estate markets (e.g., Goulder, 1989; Ling, 1992), but less research has explored the impact of the Taxpayer Relief Act of 1997 (TRA97) on residential housing markets. The literature that examines TRA97 focuses on the changes in the size of the capital gains exclusion (Shan, 2011) or on the elimination of the inability to trade down without paying capital gains tax for those under age 55 (Cunningham and Engelhardt, 2008; Biel and Hoyt, 2009).

We argue in this paper that the previous literature has focused, potentially unduly, on differences in housing turnover across narrow age groups or in single markets. The evidence in our analysis suggests that changes in trading behavior in housing markets were much broader based than has been suggested by the previous research. To document these changes in housing markets, we first develop a simple demand-based econometric specification of housing turnover. We then test the implications using time series data. In the time series analysis, we first test the model on an earlier major change in income tax legislation (the Tax Reform Act of 1986) that impacted homeowners, and then use the model to determine whether the TRA97 led to an increase in the percentage of the U.S. housing stock that was sold after the Act was passed.

We then test for the impact of TRA97 using microdata from the Panel Study of Income Dynamics (PSID). The PSID has some important advantages over previous analysis using the Current Population Survey (Cunningham and Engelhardt, 2008) or the American Community Survey (Biel and Hoyt, 2009). The PSID allows us to distinguish among types of housing turnover to estimate the likelihood that households will trade up or trade down for a sample of

owners from 1987-2007. Using multinomial logit models, we also test for different impacts across trading type and across location.

Results from both the times series and the microdata suggest that there was significantly different housing turnover behavior after the passage of TRA97. The time series evidence indicates that there was a structural shift in the data coincident with the passage of the Act. Housing turnover began to increase significantly almost immediately after the 1997 income tax legislation became effective, and continued through the rest of the study period. The evidence from the PSID found more trading up and trading down after the passage of TRA97 across all of the age groups in the sample. Interestingly, if we restrict our sample to households age 45-55 and age 56-65, then our results replicate the predictions in Cunningham and Engelhardt (2008) and Biel and Hoyt (2009) quite nicely. These authors found that trading down is higher among those age 45-54 than those age 55-64 after the passage of TRA97. We show that trading up and trading down behavior is higher across *all* age groups after 1997. Therefore, it is important to understand how TRA97 altered the trading incentives of all homeowners.

The Impact of TRA97 on Housing Markets

Prior to the passage of the Taxpayer Relief Act of 1997, homeowners were entitled to a one-time capital gains exclusion that sheltered a significant portion of the accumulated price increases on their primary residences, but the exclusion required that the primary wage earner be over 55 years of age. Younger taxpayers could only avoid taxation on gains when changing primary residences by continually trading up in housing because sales proceeds that were not reinvested in a more expensive residence were subject to taxation at the capital gains rate. In

addition, the capital gains tax rate had been raised from 20% to 28% by the Tax Reform Act of 1986.

TRA97 contained three important changes in the way that taxes were assessed on capital gains on residential real estate. First, it removed any age-preference restrictions so that all homeowners were subject to the same capital gains treatment. Second, it allowed capital gains to be realized and excluded from taxation as often as every two years, regardless of whether or not the proceeds were reinvested in residential real estate. Finally, the maximum capital gains *exclusion* was raised from $125,000 to $500,000, ($250,000 for single taxpayers). Taken together, these changes were among the most significant alterations in U.S. tax policy towards the housing market in more than twenty years.[1]

The impact of tax laws on homeownership decisions has long interested researchers. For example, Hoyt and Rosenthal (1990;1992) show that provisions in the Tax Reform Act of 1986 (TRA86) that removed the 60% exclusion on all capital gains (raising the effective tax rate on trading down in housing dramatically), heightened the importance of the monetary capital gains exclusion for taxpayers who might consider trading down in houses. As a result, those homeowners faced a non-linear budget constraint when making housing consumption and investment decisions. Goulder (1989) notes that there are substantial differences between the short and long run effects of TRA86 and his general equilibrium model predicts that the long-term effects would be negative. Ling (1992) shows that while TRA86 caused declines in real property values, these effects could be muted in the long run by changes in the local labor market.

[1] Dai,Shackelford and Zhang (2010) study the impact of TRA97 on the return volatility of stocks. They find that stocks that had a greater degree of recent appreciation and stocks that did not pay dividends exhibited a significant increase in return volatility immediately after the 1997 law became effective. These classes of shares are most likely to have benefitted from the change in capital gains taxation created by TRA97.

One of the provisions of TRA97 was to create an exclusion limit of $500,000 per couple ($250,000 for single taxpayers). This enabled households whose capital gains were below this threshold to avoid capital gains tax. Shan (2011) points out that this should increase the likelihood of trading down, but could actually reduce trading up if households were above this threshold. To determine the dominant factor, Shan (2011) compares single family home sale patterns in 16 towns within the Boston metropolitan area from 1982 to 2006 and finds that the rate of home sales increased after 1997, at least temporarily, for homeowners with capital gains less than $500,000. In contrast, taxpayers facing gains greater than the exclusion amount became less mobile after the passage of TRA97.

Other studies have focused on the relaxation of the under-55 age constraint implied by TRA97. Recognizing that homeowners just below the age threshold of 55 would be most likely to be influenced by this change, Cunningham and Engelhardt (2008) use data from the 1996 and 1998 editions of the Current Population Survey to compare mobility patterns between homeowners aged 52-54 and 56-58 before and after the passage of TRA97. The authors find that mobility rates among taxpayers aged 52-54 increased by 20% to 30% after the tax reform became effective. Segmented sample results indicate that mobility rates increased by more if the homeowners could be classified as highly mobile, e.g. were divorced, had no children living at home, faced higher marginal capital gains tax rates or lived in states that experienced higher nominal rates of house price appreciation. Biel and Hoyt (2009) find similar results using the American Housing Survey when comparing a sample of 45-54 year olds and a sample of 56-65 year olds. Their results suggest that trading behavior among the younger group was higher after TRA97 was passed, but their data cannot distinguish between trading up and trading down.

In related work, Richards (2009) argues that capital gains taxes on housing assets constrain the ability of labor to move for job-related reasons. He estimates a housing survival model using data from the 1990 – 2005 Panel Study of Income Dynamics and finds that households with large gains are more likely to move after the passage of TRA97 than before. In fact, some of the political discussions surrounding the housing provisions of TRA97 highlighted the desire to eliminate job lock by allowing households to buy lower priced homes if they moved from an expensive state to a lower priced state.[2]

The previous literature is limited in two ways. First, the previous papers did not distinguish between households that were trading up and households that were trading down. As we will discuss below, TRA97 could spur increases in both types of behavior. Second, the previous literature either had no demographic information on the households (Shan, 2011) or focused only on ages between 45-65 (Cunningham and Engelhardt, 2008; Biel and Hoyt, 2009). While the biggest effects of trading down are likely to be among those just under 55 who had previously been waiting to trade down to avoid capital gains taxes, we show that the impact of the law was not limited to that population. Below we describe two tests to document the breadth of the impact of TRA97.

Time Series Evidence

National and Regional Measures for Housing Turnover

Our first way of assessing the impact of TRA97 on the single family residential market will document how trends in housing turnover have changed nationwide and regionally since the passage of TRA97. If the impact of TRA97 is limited to hastening trading down by heads of

[2] This insight is based in part on discussions with Richard Green who participated in the advisory panel prior to the adoption of TRA97.

households aged 52-54 then we would not expect to see large changes in nationwide turnover.

We use the American Housing Survey (AHS) for the period 1980-2006 to address this issue. The (AHS) surveys a sample of units in the national housing stock and four geographic regions on a bi-annual basis. We use the bi-annual results as a baseline and project values for months between survey dates with the housing starts series, (Federal Reserve Bank of St. Louis, FRED database) for the nation or region. The National Association of Realtors (NAR©) monthly series of national and regional home sales in units serves as an indicator of trading volume so we can compute housing turnover by dividing sales in a given month by housing stock in a given month.

The actual construction of the turnover series requires some additional assumptions. Each AHS year provides a base estimate of the units in the housing stock for that year. We augment that value monthly by adding the level of housing starts. Twenty four months later our, the estimated number of housing starts is not identical to the next AHS release. However, errors are quite small however.[3]

We adopt two different methods to adjust the housing units' series for this accumulation error. We either simply accept the new AHS level of housing units when a new survey is released or divide the amount of unexpected units by twenty-four and adjust each observation on previous housing starts upward or downward by that amount for the months between AHS surveys. In addition, the AHS contains observations for total, year-round, occupied and vacant housing units. Vacant units are further sub-divided by the reasons for the vacancy, e.g. for rent or for sale. We repeat all of our models using three housing units series: year-round, occupied and occupied and for sale, and using both methods of correcting for estimation errors in the

[3] The largest error is less than 3.2% of the estimated stock, which occurs for the 1981 edition of the survey and the national housing units sub-sample.

underlying series as housing starts are added to the base between survey dates. All of our empirical results, which are available from the authors, are quite robust to different methods of creating the turnover data series so we concentrate our discussion on the national and regional measures of housing units sold as a percentage of available year-round, owner-occupied and available for sale units.

The time series of our turnover measure for the United States and the Northeast region appears in Figure 1. Plots for the other three geographical series, (Midwest, South and West) are so similar that it is difficult to distinguish between the series if they are plotted on the same graph. While there is distinct volatility in the turnover series in the early years of the sample, an increasing trend that begins towards the end of the decade of the 1990s and continues until early 2006 is clearly visible.

An Econometric Specification of the Determinants of Housing Turnover

Existing econometric models of housing turnover are typically estimated at the housing unit level. Our initial focus here is much broader in scope so we rely instead on regional and national factors logically related to a generic household's decision to exchange its current housing unit. We hypothesize that housing sales are a function of demand by existing households and new entrants in a given market. Thus, we expect turnover to increase as the labor force in a given area grows and as the area unemployment rate falls. Furthermore, turnover should be negatively related to the cost of financing the purchase of a home while a weakened value of the dollar as compared to other global currencies could stimulate turnover by inducing demand from foreign investors. These hypotheses lead to a four variable demand-driven model of housing turnover as follows:

TURN = f (UNEMP, LABGRW, NATMTG, DOLRATE)

Where:

UNEMP = the unemployment rate in the nation or region (Bureau of Labor Statistics)

LABGRW = the quarter over quarter growth in the labor force in the nation or region (BLS)

NATMTG = the Freddie Mac 30 year conventional mortgage rate series

DOLRATE = the Real Exchange Rate Index for the U.S. Dollar – 100 (New York Fed)

In a demand-based framework, homeowners will move into new units as the population rises and move less often when the cost of financing rises or their employment prospects pale. This suggests that estimated regression coefficients on LABGRW > 0, UNEMP < 0 and NATMTG <0. If a weak dollar attracts bargain-hunting foreign investment flows into residential markets then we expect DOLRATE < 0. Given the long lead time required to construct new housing or to complete a home sale, the turnover data contain both autocorrelation and heteroskedasticity, so we utilize a GARCH (1) specification.

Housing Turnover Model Estimates

The top panel of Table 1 presents regression results using our national and regional Housing Turnover Series as dependent variables and our four economic control variables as independent variables. Sample observations are available monthly between January 1980 and December 2006. The control variables have their expected sign for UNEMP, LABGRW and NATMTG, but an unexpected sign for DOLRATE. Overall, these control variables explain 32% to 63% of the variation in the turnover series.

We next test the model on an earlier major change in income tax legislation that impacted homeowners by including a dichotomous variable that will be significant if there was a structural break in the error terms of the turnover series before and after the Tax Reform Act of 1986. Our

Pre-1986 Law takes on the value of one for observations before June of 1986. Given that TRA86 increased the tax rate on realized house appreciation by removing the 60% capital gains exclusion, we expect the Pre-1986 Law variable to have a positive sign.

The results of our exploration of the impact of the Tax Reform Act of 1986 on our macro-level housing turnover series are in the bottom panel of Table 1. The coefficient on the dichotomous variable for pre-1986 observations is significant only for the southern region, and is negative for that sample. Thus, we conclude that allowing for a single structural break in June of 1986 does not have a measurable impact on the explanatory power of the model.

In order to test directly for the impact of TRA97 on national or regional housing turnover we re-estimate the regressions of Table 1 while incorporating two new variables. First, we include a dummy variable for all observations after June of 1997, when the new legislation was signed into law. We expect the TRA97 variable to have a positive sign because we believe that the 1997 Act relaxed a tax-induced trading constraint, which should lead to an increase in housing turnover. Second, we also allow for anticipation effects in the twelve months prior to June of 1997. If Congressional debate about potential changes in the tax treatment of appreciation earned on housing investments led homeowners to postpone sales in order to wait for better tax treatment, then a dummy variable that takes on the value of 1 in the twelve months prior to June 1997 will have a negative sign.

Results in Table 2 are congruent with our expectations and the explanatory power of the model increased dramatically for the full sample and all four regional sub-samples. The control variables retain the signs and significance and the size of the individual coefficients on UNEMP, LABGRW and NATMTG is remarkably stable between Tables 1 and 2. Furthermore, the coefficient on the independent variable DOLRATE is now negative, as expected, indicating that

a weak dollar is accompanied by higher turnover, ostensibly because of increased demand from foreign investors. In addition, the Pre-TRA86 variable is now positive, as expected, and is quite significant all five regressions. Last, but certainly not least, the PostTRA97 variable is strongly significant and positive for the United States regression and all four regional regressions. Also evident is the fact that the coefficient on the variable denoting the period twelve months prior to the formal implementation of TRA97 is small and insignificant in the national sample and three of the four regional regressions. This is consistent with the argument in Dai, Shackelford, and Zhang (2010) that the political process surrounding the passage of TRA97 was very quick and uneventful, and that the passage of the law itself was something of a surprise to the market.

An Alternative Test for Structural Breaks in the Housing Turnover Samples

In order to further investigate the issue of structural breaks in the turnover series induced by changes in the Internal Revenue Code's treatment of the taxation of gains on investments in housing, we follow Butler, Grullon, and Weston (2006) and employ a series of rolling F-tests. The tests compare the sum of the squared regression residuals over the whole sample and sub-samples of various lengths. The actual test statistic is:

$$F_r\left(\frac{r}{T}\right) = \frac{SSR_{1,T} - \left(SSR_{1,r} + SSR_{r+1,T}\right)}{\left(SSR_{1,r} + SSR_{r+1,T}\right)/\left(T-2k\right)}$$

where:

SSR = the sum of the squared deviations from the mean,

r = the potential structural break date, and

T = the number of periods in the sample.

$F_r\left(\frac{r}{T}\right)$ rises when the sum of the squared regression residuals over the two sub-periods (1,r) and (r+1, T), (each having different structural characteristics), is appreciably smaller than the mean of the entire sample. Figure 2, Part A, presents the rolling F-tests for combinations of the early and late segments of the entire 1980 – 2006 sample over the section of the sample that precedes and follows June 1997. Note the obvious rise in each of the series of F- statistics that begins in mid-1997, the point when TRA97 became effective. This spike indicates that turnover observations that occur post June 1997 are structurally different than those drawn from the earlier sub-sample.

To test the robustness of these results, we employ the same strategy over the January 1980 to June 1997 sub-sample. Panel B of Figure 2 graphs the segments of the F-test series before and after mid-1986, when the Tax Reform Act of 1986 became effective. The F-statistics for all series reach a maximum in late 1985 or early 1986, suggesting that homeowners anticipated the detrimental impact TRA86 would have on the taxation of capital gains on housing and traded units before the new tax law became effective. Further results available from the authors demonstrate that the 1997 structural break was precise enough and dramatic enough to appear in the entire 1980 to 2006 series while the 1986 break was so weak that its impact emerges only when the sample is constrained to observations before the stronger, 1997 shift occurred.

Evidence from household data (PSID)

While the time series evidence demonstrates that housing turnover increased after TRA97, the specific provisions of the law suggest that trading up and trading down behavior may differ across various segments of the population. Specifically, as the model in Cunningham

and Engelhardt (2008) predicts, homeowners under age 55 or over age 55 but with capital gains higher than the old exclusion of $125,000 would be more likely to trade down after TRA97 was passed. While Cunningham and Engelhardt (2008) find evidence of high rates of housing turnover for those under 55 compared with those over age 55, there is reason to believe that the trading down behavior would increase among other age groups as well. In addition, less attention has been paid to the fact that the exclusion of $250,000 for singles and $500,000 also gives an incentive for households to trade-up more frequently. Shan's (2011) analysis implies that households traded more frequently if their capital gain was below the exclusion threshold. What has not been emphasized is that the rise in the exclusion threshold itself increases the incentive for households to trade up more frequently. In doing so, they reset the basis that determines future excludable capital gains calculations. This strategy implies that trading up behavior should be greatest in states that had the highest nominal price appreciation.

To assess the impact of TRA97 on the likelihood that households will either trade up or trade down, we estimate a multinomial logit model (Greene, 1997) where homeowners choose to either trade up, trade down, or remain in the same home. Deciding to become a renter is considered a trade down. We use data from the PSID from 1987-2007 to observe how households respond to tax and market incentives in the post TRA-1986 period. Control variables incorporate a broad set of socioeconomic characteristics as explanatory variables, including race/ethnicity, age, gender of householder, education level, number of children and family members living in the home, marital status, employment status, income, and wealth variables (home equity, financial wealth, and other wealth). Also included as controls in the model are area economic characteristics, (the unemployment rate, state GDP and state GDP growth rates,

average wage rates, and recession indicators). Appendix 1 presents the summary statistics for the dependent and independent variables used in the various models.

We are most interested in the effects of TRA97 on the likelihood of trading up and trading down. Because these effects are likely to differ by age, we study both the complete sample of PSID data (Table 3) and age-segmented sub-samples (Table 4 Panels A and B). As mentioned previously, we also hypothesize that trading up will be more frequent in the highest appreciation areas because homeowners there need to move frequently in order to avoid going over the exclusion on capital gains. To test this conjecture, we include a dichotomous indicator variable that takes on the value of one for residence in one of the "sand states"- Florida, California, Nevada, and Arizona – where house price appreciation was highest.

Appendix 2 contains the full results of the multinomial logit models. Conditional on being a homeowner, household heads with higher levels of education are more likely to move while households headed by blacks or females are less likely to relocate. Divorced household heads and the unemployed are more likely to trade down. With respect to the economic variables, people are less likely to trade up in recessions. Regional average wages have a slightly negative impact on trading down although incomes are not predictive of trading behavior. Households in smaller cities are more likely to trade up and age-related relocations are most prevalent in the early years of household formation.

We highlight results with respect to our variables of interest in the main body of the paper. The simple post-TRA97 variable is strongly predictive of both trading up and trading down (Table 3). This suggests that the increases in housing turnover documented in the time series analysis reflect more than the actions of younger households trading down after 1997 because they no longer had to pay the capital gain tax. We do not have direct evidence that the

documented increase in trading up behavior was due to a desire to reset one's basis for capital gains calculations, but the increase in trading up cannot be ignored. We also find evidence that there was more trading up and trading down behavior when a family lives in one of the four "Sand States." Finally, we interacted the TRA97 variable with residence in the sand states. This effect is not statistically significant, suggesting that TRA97 did not alter behavior in these states as was originally hypothesized.

We next stratifies the PSID sample into five different age groups and by trading up and trading down decisions in order to further investigate the scope of the effect of TRA97 on trading behavior (Table 4). The most remarkable fact in the table is the consistency of estimated impact of TRA97 across all age sub-samples. This was true for both trading up and trading down with one exception and indicates that homeowners were more likely to relocate post-TRA97, regardless of the age of the household head.

The one exception to these results is interesting. In the age cohort above 55, but below 64, the impact of TRA97 on trading down behavior is much smaller and only marginally statistically significant. This suggests that a similar number of household heads were trading down before and after TRA97. Unlike Cunningham and Engelhardt (2008) and Biel and Hoyt (2009), we do not find significant differences (test not shown) in trading down after the passage of TRA97 between the households aged 45-54 and aged 55-64, but the lack of significance may be due to the small number of observations in this segment of the PSID.

We also find that trading up by residents of the four sand states is most prevalent among those age 35-44 and those over 65 while residents age 55 and over were most likely to trade down in these states in the sample period. These impacts are not different after TRA97 was passed, however. In sum, the results in Tables 3 and 4 indicate that the impact of the Tax

Reform Act of 1997 on the trading decisions of affected households was much broader than indicated by the work of previous authors (e.g. Cunningham and Englehardt, 2008, Shan 2011 or Biel and Hoyt, 2009).

Additional tests

As we discussed earlier, part of the reason that TRA97 was passed was to increase labor market mobility by allowing households that were moving from a market with more expensive housing to purchase a less expensive home without paying capital gains taxes. To test for these effects, we estimated a multinomial logit model with 5 choices: an owner could stay in his or her own house (omitted category), trade up within the same state, trade down within the same state, or trade up or down while moving to another state. These results are presented in Table 5. Here, the impact of TRA97 is slightly stronger for within-state trades but the TRA97 variable retains its significance in all four specifications and the differential impact of TRA97 is not statistically significant across type of trade or location of move. At the same time, living in one of the four highest appreciation states is likely to induce trades (both up and down) out of those states across the entire sample period. It is also interesting to note that TRA97 has a positive marginal impact on trading down while staying within state for residents of one of the four highest appreciation states but a negative marginal impact on trading down when moving to another state. While it makes sense that households might prefer to live closer when trading down from a high cost state, we expected households to be more likely to trade down across states also.

Shan (2011) discusses another type of behavioral change that could have been caused by the passage of TRA97 in that it may have decreased trading by households whose nominal capital gain was above $500,000 for a married couple or above $250,000 for a single person. Prior to the passage of TRA97, these households could have avoided capital gains taxation as

long as they traded up. Because Shan's (2011) analysis was limited to a single metropolitan area, we tested whether there was a post-TRA97 reduction in trading across the country by households who believed they had accrued capital gains exceeding the new threshold, and whether there were any differences in trading up or trading down. Our results confirm Shan's findings, but the results are not statistically significant, ostensibly because of the small number of households in our data with capital gains above the threshold.

One concern that might be raised regarding our empirical strategy is that we could be attributing the increase in trading behavior from 1997-2007 to TRA97 when there were other factors in the decade of the 2000s that contributed to heavier trading volumes. We shortened our post TRA97 period to stop at 2001 to address these concerns. When we did this, the estimated impact of TRA97 on trading up was unchanged, but the impact of TRA97 on trading down was cut in half. Thus, we are confident that our results are not due to other factors that occurred in the decade of the 2000s because TRA97 had an immediate effect as well as a long lasting impact on trading behavior.

Finally, we noted in our previous discussion that households that lived in places with highest nominal appreciation should have the incentive to trade up more after the passage of TRA97 to avoid crossing the capital gain exclusion threshold. In the multinomial logit models of tables 3 - 5, we use a simple categorical variable to denote the "Sand States" that experienced high rates of appreciation. There can be variation in the housing appreciation rate within states, however, and there are a number of metropolitan areas in non-sand states that experienced high rates of appreciation. Because of that, we tried a number of different specifications where we noted households that lived in high appreciation metros. The results were the same as we observed in our specifications in table 3-5.

Concluding Remarks

This study presents evidence that housing turnover increased significantly after 1997. The times series analysis demonstrates that there was a structural change in the percentage of existing homes sold each month after the passage of TRA97, and that there is no hint that the impact of the various provision of the law was anticipated by the market. Evidence from the PSID data, which can more directly test the provisions of the law, demonstrates that trading down and trading up increased significantly among households of all ages post-TRA97. Our results are consistent with previous literature (e.g. Cunningham and Engelhardt, 2008; Shan, 2011), but the fact that these changes were so broad based has not yet been recognized. Also new are the findings that changes in trading behavior were fairly constant across age groups, and that older residents were much more likely to trade up and down after TRA97 was passed. The latter response may have due to the fact that TRA reduced the incentive to wait to transfer a home through an estate to avoid capital gains taxation.

One potential, interesting implication of the increase in trading activity is the fact that TRA97 might have played a small role in the formation of the house price bubble. While the main causes of the housing bubble are likely a combination of innovation in housing financial instruments and changes in financial regulation, among other factors, we argue that changes in the Internal Revenue Code contained in the TRA97 can be viewed as the removal of a tax-induced trading constraint on homeowners of all ages.

On the one hand, it may seem strange that a small number of additional traders could have been part of the impetus for such a dramatic increase in house prices. On the other hand, Piazzesi and Schneider (2009) show that a small number of purchasers can have a large impact on housing prices even though they purchase a small share of the housing stock. Furthermore,

Novy-Marx (2009) demonstrates in a theoretical model that a small shock in the housing market can generate large impacts through a feedback mechanism. Therefore a tax-induced change in demand caused by the Taxpayer Relief Act of 1997 may have been one of the sources of the initial price appreciation that led to the housing bubble.

Even if there is no connection between the changes in TRA97 and the formation of the housing bubble, it is clear from our analysis that TRA97 had significant impacts on the trading behavior of households across the entire population. While we demonstrated that trading up increased significantly after the passage of TRA97, we did not find clear evidence that this was due to the fact households were trading to reset their basis for the capital gains exclusion. Because we do not find the expected stronger impacts of TRA97 in the areas that experienced the highest appreciation rates, it remains a subject for future research to determine why trading up increased after the passage of TRA97.

References

Biel, A. and W. Hoyt (2009): "The Taxpayer Relief Act of 1997 and Homeownership: Is Smaller Now Better?" Institute for Federalism and Intergovernmental Relations Working Paper 2009-04.

Butler, A.W., G. Grullon and J. P. Weston. "Can Managers Successfully Time the Maturity Structure of Their Debt Issues?" *Journal of Finance*, Volume 61, (August 2006), 1731-1758.

Cunningham, C. R. and G. V. Engelhardt "Housing Capital Gains Taxation and Homeowner Mobility: Evidence from the Taxpayer Relief Act of 1997" *Journal of Urban Economics*, Vol. 63, (2008), 803-815.

Dai, Z., D.A. Shackelford and H. H. Zhang. "Capital Gains Taxes and Stock Return Volatility", Working Paper, March 2010, Http://ssrn.com/abstract=972349.

Goulder, L. (1989): "Tax policy, housing prices, and housing investment," *Regional Science and Urban Economics*, 19(2), 281-304.

Greene, W. (1997). *Econometric Analysis*. 3rd ed. Upper Saddle River, NJ: Prentice-Hall.

Hoyt, W. H. and S. S. Rosenthal , "Owner-Occupied Housing, Capital Gains and the Tax Reform Act of 1986", *Journal of Urban Economics*, Volume 32, (1992), 119-139

Hoyt, W. H. and S. S. Rosenthal. "Capital Gains Taxation and the Demand for Owner- Occupied Housing" , *Review of Economics and Statistics*, Volume 72, (1990), 45-53.

Ling, D. (1992). "Real Estate Values, Federal Income Taxation, and the Importance of Local Market Conditions." *Journal of the American Real Estate and Urban Economics Association* 20(1), 125-139.

Poterba, J. (1984): "Tax Subsidies to Owner-Occupied Housing: An Asset Market Approach," *Quarterly Journal of Economics*, 99, 729-745.

Poterba, J., D. Weil, and R. Shiller (1991): "House Price Dynamics: The Role of Tax Policy and Demography." *Brookings Papers on Economic Activity*, 1991 (2), pp. 143-203.

M. Piazzesi and M. Schneider. "Momentum Traders in the Housing Market: Survey Evidence

and a Search Model." *American Economic Review Papers and Proceedings*, 99(2), 2009, 406-411.

R. Novy-Marx (2009). "Hot and Cold Markets." *Real Estate Economics*, 37(1), 1-22.

Richards, Z. W. "Does the Exclusion of Capital Gains Taxes on Housing Really Promote Labor Mobility?" Center for Business and Economic Research, University of Tennessee, May 2009.

Shan, H. (2011) "The Effect of Capital Gains Taxation on Home Sales: Evidence from the Taxpayer Relief Act of 1997".*Journal of Public Economics*, 95, 177-188.

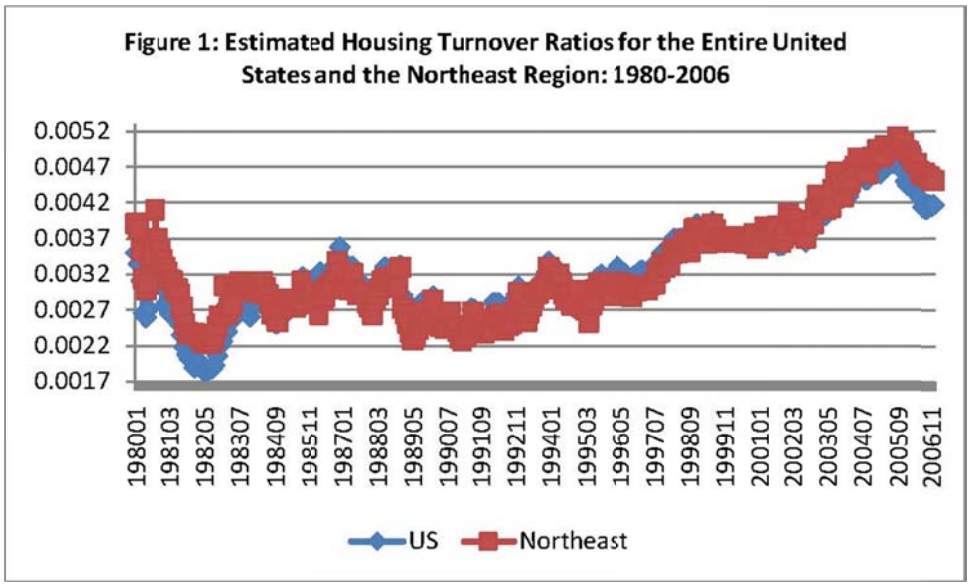
Figure 1: Estimated Housing Turnover Ratios for the Entire United States and the Northeast Region: 1980-2006
0.0052
0.0047
0.0042
0.0037
0.0032
0.0027
0.0022
0.0017
198001
198103
198205
198307
198409
198511
198701
198803
198905
199007
199109
199211
199401
199503
199605
199707
199809
199911
200101
200203
200305
200407
200509
200611
US
Northeast

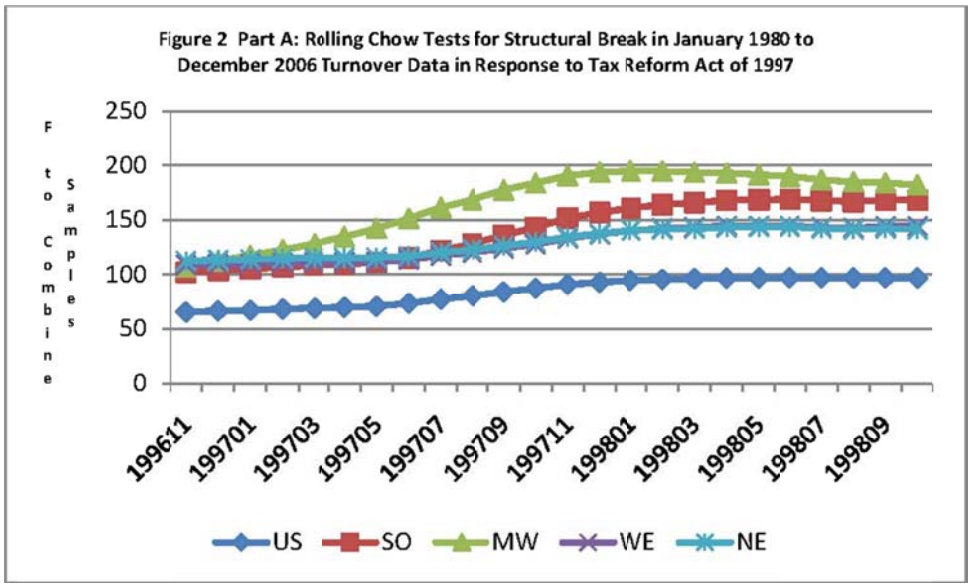
Figure 2 Part A: Rolling Chow Tests for Structural Break in January 1980 to December 2006 Turnover Data in Response to Tax Reform Act of 1997
F to Combine Samples
250
200
150
100
50
0
199611
199701
199703
199705
199707
199709
199711
199801
199803
199805
199807
199809
US
SO
MW
WE
NE

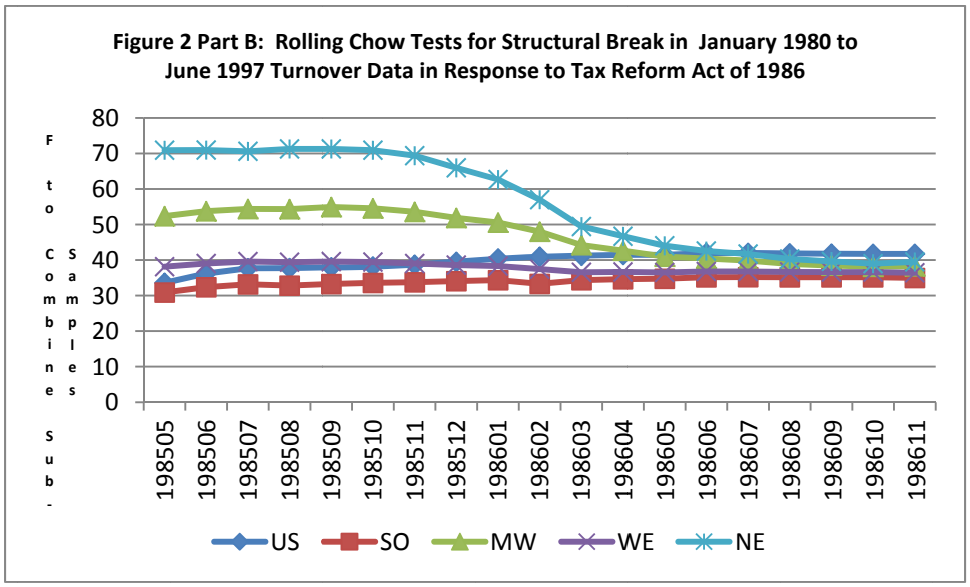
Figure 2 Part B: Rolling Chow Tests for Structural Break in January 1980 to June 1997 Turnover Data in Response to Tax Reform Act of 1986
F to Combine Sub-Samples
80
70
60
50
40
30
20
10
0
198505
198506
198507
198508
198509
198510
198511
198512
198601
198602
198603
198604
198605
198606
198607
198608
198609
198610
198611
US
SO
MW
WE
NE

Table 1.A: Control GARCH (1) Regressions Explaining the Percentage of Existing Housing Inventory Turned over Each Year: 1980-2006

Variables	United States		Southern Region		Midwest Region		Western Region		Northeast Region	
	Coef.	Std. Err	Coef.	Std. Err	Coef.	Std. Err	Coef.	Std. Err	Coef.	Std. Err
Intercept	0.004***	0.000	0.004***	0.000	0.004***	0.000	0.004***	0.000	0.004***	0.000
Unemployment Rate	-0.862***	0.132	-0.008***	0.001	-0.004	0.001	-0.004***	0.001	-0.005***	-0.001
Quarterly Growth in Labor Force	0.004***	0.0017	0.005***	0.002	0.002	0.002	0.006***	0.002	0.004***	0.001
National Mortgage Rate	-0.001***	0.0001	-0.009***	0.001	-0.008***	0.001	-0.011***	0.001	-0.010***	0.001
% Over or Under-Valuation of the $	0.002***	0.0001	0.003***	0.000	0.003***	0.000	0.003***	0.000	0.003***	0.000
ARCH 0	1.846***	0.483	1.731***	0.495	2.049***	0.531	1.957***	0.473	1.453***	0.296
ARCH 1	0.787***	0.243	0.8581***	0.155	0.833***	0.194	0.834***	0.168	0.870***	0.221
Total R-Square	63.1%		43.4%		33.6%		43.7%		37.8%	

* indicates P < 0.10, **: P < 0.05 and ***: P < 0.01. The ARCH0 coefficient should be multiplied by 10^{-8}

Table 1.B: Control GARCH (1) Regressions Explaining the Percentage of Existing Housing Inventory Turned over Each Year: 1980-2006

Testing the Impact of TRA86

Variables	United States		Southern Region		Midwest Region		Western Region		Northeast Region	
	Coef.	Std. Err	Coef.	Std. Err	Coef.	Std. Err	Coef.	Std. Err	Coef.	Std. Err
Intercept	0.004***	0.000	0.004***	0.000	0.004***	0.000	0.004***	0.000	0.004**	0.000
Unemployment Rate	-0.928***	0.136	-0.005***	0.001	-0.004***	0.001	-0.003**	0.001	-0.007***	0.001
Quarterly Growth in Labor Force	0.004***	0.001	0.006***	0.002	0.002	0.002	0.006***	0.002	0.004***	0.001
National Mortgage Rate	-0.012***	0.001	-0.006***	0.001	-0.007***	0.001	-0.010***	0.001	-0.012***	0.001
% Over or Under-Valuation of the $	0.002***	0.000	0.003***	0.000	0.003***	0.000	0.003***	0.000	0.003***	0.000
Dichotomous Variables										
Pre-1986 Law	0.000	0.000	-0.0002***	0.000	-0.0001	0.000	-0.0001	0.000	0.0002	0.000
ARCH 0	1.290***	0.487	1.774***	0.452	2.020***	0.507	1.572***	0.367	1.592***	0.331
ARCH 1	0.844*	0.499	0.859***	0.147	0.840***	0.162	0.874***	0.175	0.861***	0.243
Total R-Square	63.0%		38.9%		31.8%		40.1%		42.1%	

* indicates P < 0.10, **: P < 0.05 and ***: P < 0.01. The ARCH0 coefficient should be multiplied by 10^{-8}

Table 2: GARCH (1) Regressions Explaining the Percentage of Existing Housing Inventory Turned over Each Year: 1980-2006

Testing the Impact of TRA86 and TRA97

Variables	United States		Southern Region		Midwest Region		Western Region		Northeast Region	
	Coef.	Std. Err	Coef.	Std. Err	Coef.	Std. Err	Coef.	Std. Err	Coef.	Std. Err
Intercept	0.005***	0.000	0.005***	0.00017	0.004***	0.000	0.005***	0.000	0.005***	0.000
Unemployment Rate	-1.467***	0.148	-0.009***	0.00188	-0.003**	0.001	-0.009***	0.001	-0.013***	0.001
Growth in Labor Force	0.004***	0.001	0.009***	0.00207	0.007***	0.001	0.004***	0.001	0.004***	0.001
National Mortgage Rate	-0.020***	0.001	-0.012***	0.00112	-0.018***	0.001	-0.020***	0.001	-0.021***	0.001
% Over or Under-Valuation of the $	-0.001***	0.000	-0.001***	0.00022	-0.002***	0.000	-0.002***	0.000	-0.003***	0.000
Dichotomous Variables										
Pre-1986 Law	0.003***	0.000	0.001***	0.00011	0.0025***	0.000	0.002***	0.000	0.002***	0.000
12 Months to 0 Months Prior to 1997 Act	0.0001	0.000	0.000	0.00000	0.000	0.000	0.000	0.000	0.0001***	0.000
Post 1997 (Taxpayer Relief) Act	0.001***	0.000	0.001***	0.00006	0.001***	0.000	0.001**	0.000	0.001***	0.000
ARCH 0	1.809***	0.444	1.909***	0.40183	1.645***	0.537	1.975***	0.339	1.658***	0.331
ARCH 1	0.775***	0.225	0.851***	0.17544	0.870	0.451	0.477***	0.087	0.865***	0.139
Total R-Square	76.97%		74.83%		74.71%		74.79%		76.53%	

* indicates P < 0.10, **: P < 0.05 and ***: P < 0.01. The ARCH0 coefficient should be multiplied by 10^{-8}

Table 3 Multinomial Results for Trading Up and Down (Whole Sample)

Variables	Trade Up		Trade Down	
	Coef.	Std. Err.	Coef.	Std. Err.
TRA97	1.042***	0.069	0.967***	0.105
"Sand States"	0.394***	0.121	0.426**	0.175
TRA97*"Sand States"	-0.077	0.153	-0.165	0.227
No. Obs	36150		36150	
Pseudo R2	0.0708		0.0708	

Note: Staying in one's same home is the omitted category. All control variables listed in Appendix 1 are included in the models. The "Sand states" are Florida, California, Nevada, and Arizona

* indicates P < 0.10, **: P < 0.05 and ***: P < 0.01.

Table 4 Multinomial Results for Trading Up and Down in Different Age Groups

Trade Up	**Age<34**		**Age 35-44**		**Age 45-54**		**Age 55-64**		**Age>65**	
	Coef.	Std.Err	Coef.	Std.Err.	Coef.	Std.Err.	Coef.	Std.Err.	Coef.	Std.Err.
TRA97	0.998***	0.202	0.880***	0.112	0.901***	0.189	1.162***	0.248	1.080***	0.293
"Sand States"	-0.454	0.477	0.494***	0.185	-0.17	0.460	0.352	0.408	1.189***	0.379
TRA97*"Sand States"	-0.940	0.824	-0.337	0.263	0.629	0.497	0.368	0.478	0.233	0.461
Observation	6243		10228		7206		5466		7007	
Pseudo R	0.0711		0.0458		0.0507		0.1061		0.0619	
Trade Down	**Age<34**		**Age 35-44**		**Age 45-54**		**Age 55-64**		**Age>65**	
	Coef.	Std.Err.	Coef.	Std.Err.	Coef.	Std.Err.	Coef.	Std.Err.	Coef.	Std.Err.
TRA97	1.306***	0.122	1.008***	0.205	1.115***	0.236	0.598*	0.331	1.086***	0.303
"Sand States"	0.015	0.234	0.382	0.314	-0.043	0.488	1.367***	0.461	0.700*	0.386
TRA97*"Sand States"	-0.371	0.320	-0.517	0.515	-0.427	0.604	0.427	0.521	-0.176	0.485
Observation	6243		10228		7206		5466		7007	
Pseudo R	0.0711		0.0458		0.0507		0.1061		0.0619	

Note: Staying in one's same home is the omitted category. All control variables listed in Appendix 1 are included in the models. The "Sand states" are Florida, California, Nevada, and Arizona

* indicates P < 0.10, **: P < 0.05 and ***: P < 0.01.

Table 5 Multinomial Results for Trading Up and Down Within and Outside the Initial State of Residence

Variable	TU, Stay within State		TD, Stay within State		TU, Move outside State		TD, Move outside State	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
TRA97	1.123***	0.203	1.191***	0.291	1.030***	0.073	0.934***	0.113
"Sand States"	0.686*	0.363	-0.680	0.629	0.338***	0.128	0.525***	0.187
TRA97*"Sand States"	0.316	0.419	1.717***	0.680	-0.155	0.165	-0.574**	0.261
No. Obs	36150		36150		36150		36150	
Pseudo R2	0.0744		0.0744		0.0744		0.0744	

Note: Staying in one's same home is the omitted category. All control variables listed in Appendix 1 are included in the models. The "Sand States" are Florida, California, Nevada, and Arizona

* indicates $P < 0.10$, **: $P < 0.05$ and ***: $P < 0.01$.

Appendix 1.

Summary statistics

Variable	Mean	Std. Dev.
Dependent Variables		
Trade Up	0.040318	0.196706
Trade Down	0.017214	0.13007
Trade Up within State	0.004867	0.069597
Trade Down within State	0.00258	0.050726
Trade Up outside State	0.035451	0.184917
Trade Down outside State	0.014635	0.120086
Independent Variables		
"Sand States"	0.160623	0.367186
TRA97	0.261345	0.439371
TRA97*"Sand States"	0.037268	0.189419
Control Variables		
Family Variables		
Female Head	0.195879	0.396879
Race		
Black	0.214099	0.410199
Latino	0.005776	0.07578
Education		
High School	0.348987	0.476654
Some College	0.202188	0.401635
College	0.242054	0.42833
No. of Family	2.973976	1.454406
No. of Child	0.913458	1.166789

Divorce/Separated	0.165955	0.372044
Widowed	0.102046	0.302712
Unemployed	0.172013	0.377395
Family Wealth		
Real Family Income	79.40389	436.4185
Housing Wealth	143.2223	416.3911
Financial Wealth	83.00961	475.8531
Other Wealth	130.5213	705.5461
Macro Variables		
Recession	0.193121	0.39475
Real GDP	391.3227	363.0973
Real GDP Growth	0.023346	0.025226
Unemployment	5.723847	1.477058
AverAge WAge	38.69848	5.861063
City size Variables(>=500,000=0)		
City size 100,000-499,999	0.257321	0.437163
City size 50,000-99,999	0.10483	0.306338
City size 25,000-49,999	0.119232	0.324065
City size 10,000-24,999	0.159129	0.365801
City size Under 10,000	0.200611	0.400462
Age Variables (Age>55=0)		
Age<25	0.009053	0.094718
Age25-34	0.151975	0.359
Age35-44	0.280604	0.449298
Age45-54	0.21199	0.408721
Total Obs.	36150	

Appendix 2

Multinomial Results for Trading Up and Down (Whole Sample)

Variables	Trade Up		Trade Down	
	Coef.	Std.Err.	Coef.	Std.Err.
Family Variables				
Female Head	-0.179	0.144	-0.498***	0.147
Race				
Black	-0.500***	0.085	-0.510***	0.124
Latino	0.361	0.321	0.173	0.514
Education				
High School	0.020	0.098	0.248*	0.140
Some College	0.219**	0.104	0.439***	0.151
College	0.453***	0.102	0.564***	0.150
No. of Family	0.013	0.054	-0.206**	0.085
No. of Child	-0.009	0.059	0.170*	0.095
Divorce/Separated	-0.184	0.132	0.756***	0.151
Widowed	-0.236	0.204	0.178	0.223
Unemployed	-0.012	0.104	0.385***	0.126
Family Wealth				
Real Family Income	0.00005**	0.00002	0.00007***	2.6E-05
Housing Wealth	0.00005	0.00006	-0.0002	0.00018
Financial Wealth	-0.00006	0.00009	0.00002	0.00005
Other Wealth	0.00007**	0.00003	0.00007	0.00006
Macro Variables				
Recession	-0.175**	0.074	0.007	0.108

Real GDP	-0.0002*	0.00012	-0.0001	0.0002
Real GDP Growth	0.179	1.481	-1.445	2.252
Unemployment	-0.019	0.022	0.039	0.032
AverAge WAge	-0.004	0.007	-0.030***	0.011
City size Variables(>=500,000=0)				
City size 100,000-499,999	0.193**	0.096	0.026	0.146
City size 50,000-99,999	0.132	0.115	-0.100	0.183
City size 25,000-49,999	0.219**	0.110	0.224	0.164
City size 10,000-24,999	0.057	0.109	0.257	0.156
City size Under 10,000	0.224**	0.105	0.111	0.157
Age Variables(Age>55=0)				
Age<25	1.524***	0.259	1.571***	0.295
Age25-34	1.556***	0.109	0.833***	0.152
Age35-44	1.120***	0.106	0.417***	0.148
Age45-54	0.285***	0.112	0.347***	0.141
TRA97 Variables				
"Sand States"	0.394***	0.121	0.426**	0.175
TRA97	1.042***	0.069	0.967***	0.105
TRA97*"Sand States"	-0.077	0.153	-0.165	0.227
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Note: Staying in one's same home is the omitted category. All control variables listed in Appendix 1 are included in the models. The "Sand states" are Florida, California, Nevada, and Arizona

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