A Comment on "Tax Rates and Implicit Rates of Return on Owner-Occupied Single-Family Housing"

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Michael A. Sklarz**

Abstract. In the Webb and Rubens article on homeowner rates of returns (Journal of Real Estate Research 2:2), they use a model that tends to underestimate the true returns to housing. Both their model and assumptions are reviewed in the discussion below, and modified using the identical data, to show the extent of the bias, and a more realistic result.

Introduction

Using data from 1967 through 1984, collected from a variety of sources and graciously provided in the body of the text, Webb and Rubens in an earlier article in this Journal [4] estimate single-family owner-occupied holding period returns. Over various holding periods from 1967 through 1984, they develop annual rates of return, and display the geometric mean for various tax brackets and leverage assumptions. They conclude that "returns to average, owner-occupied single-family housing have been much smaller than generally assumed over the last decade and a half."

Webb and Rubens, using a model similar to that used by Alberts and Kerr [1] and Hendershott and Hu [2], developed annual holding period returns, \( r \), as follows:

\[
r = \frac{IR + APP - OE - (PT + INT)(1 - TP) - CC(1 - TP)(.125)}{DP + IFC(1 - TP)}
\]

where \( APP \) = appreciation, \( CC \) = closing costs, \( DP \) = downpayment, \( IFC \) = initial fees and charges, \( INT \) = interest payment, \( IR \) = imputed rent, \( OE \) = operating expenses, \( PT \) = property taxes, \( TP \) = personal marginal tax rate, and .125 equals the average tenure in a house (8 years) divided into 1 in order to show the average annual burden of transactions or selling costs.

The purpose of this comment is to first point out the source of biases in the Webb and Rubens approach, and secondly, through an internal rate-of-return type of model compare

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some of the results. It is concluded that homeowner returns at tax rates of 40% or below, have not been unusually low compared to other low-risk capital market investments, over the 1967 to 1984 time period.

Flaws in Methodology

First, the Webb and Rubens model has a significant omission in that equity buildup from mortgage principal repayment is not explicitly accounted for. This creates a bias that increases as the holding period increases. This bias will be even greater if the interest calculation in each period does not adjust for principal repayment, especially for lower tax bracket owners. For higher tax bracket owners, the effect will be to overestimate the tax benefits from leveraged homeownership.

A second problem with the model used is the lack of a behavioral rule for refinancing decisions. When interest rates drop more than a percent and a half or two from the rate assumed in the start of any given holding period, refinancing at the new market rates should be assumed. While this bias is less likely to be a problem, when rates are continually rising, it will be a severe problem when they decline, as they did slightly in 1983 and 1984 and significantly in 1985 and 1986. Homeowners who purchased in 1981, at an average rate of 14.78, had often refinanced as early as the middle of 1983, when rates had declined by over two hundred basis points.

Another bias in the geometric means approach is that average transactions costs, assumed to be 1.25% each year by Webb and Rubens, are low for shorter-term holding periods and high for long-term holding periods. This distortion is eliminated in a multi-period return model.

The last problem with the model is simply a distortion of the present values of the variable flows. While the geometric mean approach can result in values identical to the internal rate-of-return approach, they will not be equal if the timing of the actual flows are not matched. Selling costs occur only at the end of the holding period, as does any appreciation received. Using an internal rate-of-return type of after-tax model, which recognizes that equity buildup occurs and is received upon sale along with appreciation and transactions costs, results in significantly different estimates of annual holding period returns for owner-occupied single-family housing.

An Internal Rate-of-Return Holding Period Model

High liquidity and transactions costs imply multiple period tenure expectations on the part of most homebuyers. Most buy versus rent models have demonstrated that renting is economically the most rational choice when short tenures are expected, primarily because of these high transactions costs. It seems appropriate to view the expected single-family-owner-occupied holding period returns over a several-year period. Using the internal rate-of-return, IRR, model shown below:

\[
0 = \frac{-UFC_0}{(1 + r)^6} + \sum_{t=1}^{n} \frac{ACAT_t}{(1 + r)^t} + \frac{EPR_n}{(1 + r)^t}
\]

(2)
where:

\[ r = \text{the after-tax internal rate-of-return for the holding period from 1 to } n. \]

\[ UFC_0 = \text{up-front costs at time 0, where:} \]

\[ UFC_0 = PP(1 - lvr) + IFC(PP)(1 - lvr)(1 - TP) \]  

(3)

\[ PP = \text{purchase price, and} \]

\[ lvr = \text{loan-to-value ratio}. \]

Annual carrying costs after tax and with imputed rent = \( ACAT \), where:

\[ ACAT = IR - OE - MP - PT(1 - TP) + INT(TP) \text{ for each year } i \]

(4)

End Period Returns, \( EPR = SP(1 - .06) - MB_n \)  

(5)

where:

\[ SP = \text{the selling price based on the purchase price along with the sum of all appreciation, .06 is assumed to be the transaction costs, and } MB \text{ is the mortgage balance in year } n. \text{ The proceeds are further assumed to be used in the next house purchased, unless the once in a lifetime exclusion from capital gains taxation rule is used. This is consistent with the residual tax assumption used by Webb and Rubens.} \]

Using this model which is more closely aligned with the actual timing of the cash flows results in the following comparison with Webb and Rubens:

The Webb and Rubens results contrast most with the IRR results for low tax rate homeowners. From 1967 through 1984, the geometric mean results were .59% and 4.23% with 70% loan to value, for the 20% and 30% tax rates respectively. These certainly are "low" returns by any capital market comparison, such as 4.86% for government bonds, 5.83% for corporate bonds, or 6.67% for inflation. However, the IRR results for these same 20% and 30% tax rate owners are 11.46% and 12.38% respectively, which compare much more favorably with the returns shown for other capital market investments.

### Exhibit 1

**Selected Comparative Holding Period Returns**

<table>
<thead>
<tr>
<th>Holding Period</th>
<th>Tax Rate</th>
<th>IRR result</th>
<th>Webb &amp; Rubens</th>
</tr>
</thead>
<tbody>
<tr>
<td>1967-1984</td>
<td>0%</td>
<td>9.75</td>
<td>-6.62</td>
</tr>
<tr>
<td>1967-1984</td>
<td>10%</td>
<td>10.59</td>
<td>-3.02</td>
</tr>
<tr>
<td>1967-1984</td>
<td>20%</td>
<td>11.46</td>
<td>.590</td>
</tr>
<tr>
<td>1967-1984</td>
<td>30%</td>
<td>12.38</td>
<td>4.23</td>
</tr>
<tr>
<td>1967-1984</td>
<td>40%</td>
<td>13.35</td>
<td>7.89</td>
</tr>
<tr>
<td>1967-1984</td>
<td>50%</td>
<td>14.38</td>
<td>11.57</td>
</tr>
<tr>
<td>1977-1984</td>
<td>20%</td>
<td>6.78</td>
<td>-3.78</td>
</tr>
<tr>
<td>1977-1984</td>
<td>30%</td>
<td>8.54</td>
<td>.43</td>
</tr>
<tr>
<td>1977-1984</td>
<td>40%</td>
<td>10.34</td>
<td>4.68</td>
</tr>
<tr>
<td>1977-1984</td>
<td>50%</td>
<td>12.20</td>
<td>8.97</td>
</tr>
<tr>
<td>1981-1984</td>
<td>30%</td>
<td>-11.82</td>
<td>-14.04</td>
</tr>
<tr>
<td>1981-1984</td>
<td>40%</td>
<td>-8.27</td>
<td>-9.64</td>
</tr>
<tr>
<td>1981-1984</td>
<td>50%</td>
<td>-4.68</td>
<td>-5.18</td>
</tr>
</tbody>
</table>

1989
Conclusions

The Webb and Rubens results significantly underestimate the returns to homeownership for all homeowners, but especially for those in lower tax rates. For a marginal tax rate homeowner of 30%, this bias averaged 8% absolute (not relative), i.e., 12% compared to 4%, for almost all combinations of homeownership tenure periods.

Based on the sample of results shown here, homeownership returns have not been low during the last two decades, when compared to other capital market alternatives. In fact, they have fared rather well. However, as Webb and Rubens point out, returns estimates are sensitive to imputed rents assumptions. Using an IRR type of model better reflects the returns across tax rates, and allows for a better comparison with investments that do not suffer (or benefit) from the unique tax aspects of homeownership. Models that build in a refinancing rule would be even more realistic since they would allow a homeowner to escape the burden of relatively high mortgage rates, at times when rates have dropped significantly. Since the rates had dropped only during the last few years of the period used by Webb and Rubens, this later omission did not distort their results as much as it would in studies that use periods extending well into the 1980s.

Notes

1The authors consider tax rates of 10% and 0% as unrealistic for most homeowners. During most of the study period considered, tax rates began at the 14% tax rate.
2With the analysis of homeowner returns stopping in 1984, only one year or so would be at the new lower rates from a refinancing decision rule. An example of the effect of such a rule, set at refinancing when rates dropped over 2%, would be to reduce the negative IRR for someone in the 30% tax rate from −11.82% for 1981-1984, to −11.06%, a relative decline of 6.4%. The effects would be even greater if the holding period was extended beyond 1984. A refinancing rule may not have been critical for Webb and Rubens based on their data, but would be more important for data covering the periods of the mid-1980s.

References