Appendix for “How the Housing and Financial Wealth Effects have changed over Time”\(^1\)

June 2011

Abstract

This appendix includes results referred to in Brady and Stimel (2011) but not included in the text for brevity. Included are results from unit root tests on the variables in Brady and Stimel (2011); a figure showing the residuals on which cointegration tests were performed; impulse response functions (IRFs) generated from VAR estimation with typical standard error bands (corresponding to Figures 2 through 5 in Brady and Stimel (2011)); both linear projection IRFs and VAR IRFs of the variables in response to a shock to consumption; and results of break tests and IRFs for alternative versions of our model, for example, with labor income in place of disposable income.

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Table A1: Unit Root Test Statistics, 1952:1 to 2009:4

<table>
<thead>
<tr>
<th>Test: Ho: Variable is I(1)</th>
<th>Augmented Dickey-Fuller Test</th>
<th>Phillips-Perron Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Intercept or Trend</td>
<td>Intercept Only</td>
</tr>
<tr>
<td></td>
<td>No Intercept or Trend</td>
<td>Intercept Only</td>
</tr>
<tr>
<td>Variable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumption</td>
<td>3.43</td>
<td>-1.28</td>
</tr>
<tr>
<td></td>
<td>[0.99]</td>
<td>[0.64]</td>
</tr>
<tr>
<td>Liabilities</td>
<td>1.69</td>
<td>-1.52</td>
</tr>
<tr>
<td></td>
<td>[0.98]</td>
<td>[0.52]</td>
</tr>
<tr>
<td>Tangible Assets</td>
<td>1.69</td>
<td>-1.24</td>
</tr>
<tr>
<td></td>
<td>[0.98]</td>
<td>[0.66]</td>
</tr>
<tr>
<td>Financial Assets</td>
<td>2.55</td>
<td>-0.71</td>
</tr>
<tr>
<td></td>
<td>[0.99]</td>
<td>[0.84]</td>
</tr>
<tr>
<td>Disposable Income</td>
<td>7.13</td>
<td>-1.88</td>
</tr>
<tr>
<td></td>
<td>[1.00]</td>
<td>[0.34]</td>
</tr>
<tr>
<td>Test: Ho: Variable is I(2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-1.89</td>
<td>-4.03</td>
</tr>
<tr>
<td></td>
<td>[0.06]</td>
<td>[0.00]</td>
</tr>
<tr>
<td>Liabilities</td>
<td>-1.99</td>
<td>-2.67</td>
</tr>
<tr>
<td></td>
<td>[0.05]</td>
<td>[0.08]</td>
</tr>
<tr>
<td></td>
<td>[0.00]</td>
<td>[0.00]</td>
</tr>
<tr>
<td>Financial Assets</td>
<td>-11.77</td>
<td>-12.19</td>
</tr>
<tr>
<td></td>
<td>[0.00]</td>
<td>[0.00]</td>
</tr>
<tr>
<td>Disposable Income</td>
<td>-4.39</td>
<td>-16.84</td>
</tr>
<tr>
<td></td>
<td>[0.00]</td>
<td>[0.00]</td>
</tr>
</tbody>
</table>

Notes: The null hypotheses of both unit root tests are that the series contains a unit root. T-statistics and adjusted t-statistics with associated p-values (in brackets). Augmented Dickey-Fuller test with Schwarz criterion selection of up to 8 Lags. Phillips-Perron test with automatic bandwidth selection using Newey-West bandwidth.
Table A2: Structural Breaks on Alternative Specifications: 1952:1 to 2009:4

<table>
<thead>
<tr>
<th>Specified Variables</th>
<th>Break Dates</th>
<th>(95% Confidence Interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(1985:3, 1986:2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1996:4, 1997:2)</td>
</tr>
<tr>
<td>With Real Estate Assets</td>
<td>1973:3</td>
<td>(1972:2, 1973:4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1984:4, 1985:2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1983:4, 1984:2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1996:4, 1997:2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1984:4, 1985:2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1984:4, 1985:2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1984:4, 1985:2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1983:4, 1984:2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1996:4, 1997:2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1984:3, 1985:1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1998:3, 1999:1)</td>
</tr>
</tbody>
</table>

Notes: Break dates (in bold) and associated 95 percent confidence intervals (in parantheses) are estimated using the Qu and Perron (2002) method. Each row designates a different specification with alternative variables substituted in to our main specification; for example "With Real Estate Assets and Labor Income" means the five-variable system includes consumption, labor income, liabilities, financial wealth, and real estate wealth. The last row displays results for a six-variable system, with our main variables plus the Federal Funds rate. See main text for variable definitions and sources.
Notes: Residuals generated from single-equation ordinary least squares regressions; the variables in each regression are listed in the legend above. The sample for each regression spans 1952 through 2009. See text for variable definitions.
Figure A2: Impulse Responses from a one percent shock to Consumption

Notes: The impulse response functions (IRFs) are estimated using Jordà’s (2005) linear projection technique. The solid line represents the impulse response function; the dashed lines are Jordà’s (2009) 95 percent conditional confidence bands. The horizon for each IRF is measured in quarters. See text for variable definitions.
Figure A3: VAR-generated Impulse Responses: A one percent shock to Consumption

Notes: Impulse responses generated from a five-variable VAR with short run restrictions imposed (variable order is as shown across the columns). The solid line represents the IRF, the dashed lines represent the asymptotic plus and minus two-standard error bands. The horizon is measured in quarters. See text for variable definitions and sample divisions. Each sub-sample estimated with two lags.
Figure A3 continued: A one percent shock to Liabilities

Notes: See notes to Figure A3.
Figure A3 continued: A one percent shock to Tangible Assets

Notes: See notes to Figure A3.
Figure A3 continued: A one percent shock to Financial Assets

Notes: See notes to Figure A3.
Figure A3 continued: A one percent shock to Income

Notes: See notes to Figure A3.
Figure A4: Impulse Responses with Labor Income: A one percent shock to Consumption

Notes: The impulse response functions (IRFs) are estimated using Jordà's (2005) linear projection technique. The solid line represents the impulse response function; the dashed lines are Jordà’s (2009) 95 percent conditional confidence bands. The horizon for each IRF is measured in quarters. Labor Income is used in place of disposable income in the five-variable system. Labor income is defined as compensation of employees, available from the Bureau of Labor Statistics. See text for additional variable definitions.
Figure A4 continued: Impulse Responses with Labor Income:
A one percent shock to Liabilities

Notes: See notes to Figure A4.
Figure A4 continued: Impulse Responses with Labor Income:
A one percent shock to Tangible Assets

1952:1 to 1966:1

1966:2 to 1984:4

1985:1 to 1997:1

1997:2 to 2009:4

Notes: See notes to Figure A4.
Figure A4 continued: Impulse Responses with Labor Income:
A one percent shock to Financial Assets

1952:1 to 1966:1

1966:4 to 1984:4

1985:1 to 1997:1

1997:2 to 2009:4

Notes: See notes to Figure A4.
Figure A4 continued: Impulse Responses with Labor Income:
A one percent shock to Labor Income

1952:1 to 1966:1

1966:2 to 1984:4

1985:1 to 1997:1

1997:2 to 2009:4

Notes: See notes to Figure A4.
Figure A5: Impulse Responses with Real Estate Assets:
A one percent shock to Consumption

Notes: The impulse response functions (IRFs) are estimated using Jordà's (2005) linear projection technique. The solid line represents the impulse response function; the dashed lines are Jordà's (2009) 95 percent conditional confidence bands. The horizon for each IRF is measured in quarters. The variable “Real Estate Assets” is used in place of tangible assets in the five-variable system. Real Estate Assets is defined from tangible assets excluding durables and software and equipment of non-profit organizations (Table B.100 in the Flow of Funds). See text for additional variable definitions.
Figure A5 continued: Impulse Responses with Real Estate Assets: A one percent shock to Liabilities

1952:1 to 1973:3

1973:4 to 1985:1

1985:2 to 1998:2

1998:3 to 2009:4

Notes: See notes to Figure A5.
Figure A5 continued: Impulse Responses with Real Estate Assets:
A one percent shock to Real Estate Assets

1952:1 to 1973:3

1973:4 to 1985:1

1985:2 to 1998:2

1998:3 to 2009:4

Notes: See notes to Figure A5.
Figure A5 continued: Impulse Responses with Real Estate Assets:
A one percent shock to Financial Assets

Notes: See notes to Figure A5.
Figure A5 continued: Impulse Responses with Real Estate Assets:
A one percent shock to Disposable Income

1952:1 to 1973:3

1973:4 to 1985:1

1985:2 to 1998:2

1998:3 to 2009:4

Notes: See notes to Figure A5.
Figure A6: Impulse Responses with Real Estate Assets and Labor Income: A one percent shock to Consumption

1952:1 to 1972:3

1972:4 to 1984:1

1984:2 to 1997:1

1997:2 to 2009:4

Notes: The impulse response functions (IRFs) are estimated using Jordà's (2005) linear projection technique. The solid line represents the impulse response function; the dashed lines are Jordà's (2009) 95 percent conditional confidence bands. The horizon for each IRF is measured in quarters. The variable “Real Estate Assets” is used in place of tangible assets in the five-variable system. Real Estate Assets is defined from tangible assets excluding durables and software and equipment of non-profit organizations (Table B.100 in the Flow of Funds). Labor Income is used in place of disposable income in the five-variable system. Labor income is defined as compensation of employees, available from the Bureau of Labor Statistics. See text for additional variable definitions.
Figure A6 continued: Impulse Responses with Real Estate Assets and Labor Income: 
A one percent shock to Liabilities

Notes: See notes to Figure A6.
Figure A6 continued: Impulse Responses with Real Estate Assets and Labor Income:
A one percent shock to Real Estate Assets

1952:1 to 1972:3

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>consumption</td>
<td>liabilities</td>
<td>real estate assets</td>
<td>financial assets</td>
</tr>
<tr>
<td>Percent (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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</tr>
</tbody>
</table>

Notes: See notes to Figure A6.
Figure A6 continued: Impulse Responses with Real Estate Assets and Labor Income:
A one percent shock to Financial Assets

Notes: See notes to Figure A6.
Figure A6 continued: Impulse Responses with Real Estate Assets and Labor Income:
A one percent shock to Labor Income

1952:1 to 1972:3

1972:4 to 1984:1

1984:2 to 1997:1

1997:2 to 2009:4

Notes: See notes to Figure A6.
Figure A7: Impulse Responses with Stock Market Assets: A one percent shock to Consumption

1952:1 to 1973:3

1973:4 to 1985:1

1985:2 to 1998:2

1998:3 to 2009:4

Notes: The impulse response functions (IRFs) are estimated using Jordà's (2005) linear projection technique. The solid line represents the impulse response function; the dashed lines are Jordà's (2009) 95 percent conditional confidence bands. The horizon for each IRF is measured in quarters. The variable “Stock Market Assets” is used in place of financial assets in the five-variable system. Stock Market Assets is defined from financial assets excluding household deposits and credit market instruments (Table B.100 in the Flow of Funds). See text for additional variable definitions.
Figure A7 continued: Impulse Responses with Stock Market Assets:
A one percent shock to Liabilities

Notes: See notes to Figure A7.
Figure A7 continued: Impulse Responses with Stock Market Assets:
A one percent shock to Tangible Assets

1952:1 to 1973:3

1973:4 to 1985:1

1985:2 to 1998:2

1998:3 to 2009:4

Notes: See notes to Figure A7.
Figure A7 continued: Impulse Responses with Stock Market Assets:
A one percent shock to Stock Market Assets

Notes: See notes to Figure A7.
Figure A7 continued: Impulse Responses with Stock Market Assets: A one percent shock to Disposable Income

1952:1 to 1973:3

consumption
liabilities
tangible assets
stock market assets
disposable income

1973:4 to 1985:1

consumption
liabilities
tangible assets
stock market assets
disposable income

1985:2 to 1998:2

consumption
liabilities
tangible assets
stock market assets
disposable income

1998:3 to 2009:4

consumption
liabilities
tangible assets
stock market assets
disposable income

Notes: See notes to Figure A7.
Figure A8: Impulse Responses with Stock Market Assets and Labor Income: A one percent shock to Consumption

Notes: The impulse response functions (IRFs) are estimated using Jordà's (2005) linear projection technique. The solid line represents the impulse response function; the dashed lines are Jordà’s (2009) 95 percent conditional confidence bands. The horizon for each IRF is measured in quarters. The variable “Stock Market Assets” is used in place of financial assets in the five-variable system. Stock Market Assets is defined from financial assets excluding household deposits and credit market instruments (Table B.100 in the Flow of Funds). Labor Income is used in place of disposable income in the five-variable system. Labor income is defined as compensation of employees, available from the Bureau of Labor Statistics. See text for additional variable definitions.
Figure A8 continued: Impulse Responses with Stock Market Assets and Labor Income:
A one percent shock to Liabilities

Notes: See notes to Figure A8.
Figure A8 continued: Impulse Responses with Stock Market Assets and Labor Income:
A one percent shock to Tangible Assets

Notes: See notes to Figure A8.
Figure A8 continued: Impulse Responses with Stock Market Assets and Labor Income:
A one percent shock to Stock Market Assets

Notes: See notes to Figure A8.
Figure A8 continued: Impulse Responses with Stock Market Assets and Labor Income:
A one percent shock to Labor Income

1952:1 to 1973:3

1973:4 to 1985:1

1985:2 to 1998:2

1998:3 to 2009:4

Notes: See notes to Figure A8.
Figure A9: Impulse Responses with Real Estate Assets and Stock Market Assets: A one percent shock to Consumption

Notes: The impulse response functions (IRFs) are estimated using Jordà's (2005) linear projection technique. The solid line represents the impulse response function; the dashed lines are Jordà’s (2009) 95 percent conditional confidence bands. The horizon for each IRF is measured in quarters. The variable “Real Estate Assets” is used in place of tangible assets in the five-variable system. Real Estate Assets is defined from tangible assets excluding durables and software and equipment of non-profit organizations (Table B.100 in the Flow of Funds). The variable “Stock Market Assets” is used in place of financial assets in the five-variable system. Stock Market Assets is defined from financial assets excluding household deposits and credit market instruments (Table B.100 in the Flow of Funds). See text for additional variable definitions.
Figure A9 continued: Impulse Responses with Real Estate Assets and Stock Market Assets:
A one percent shock to Liabilities

1952:1 to 1973:3

1973:4 to 1985:1

1985:2 to 1998:2

1998:3 to 2009:4

Notes: See notes to Figure A9.
Figure A9 continued: Impulse Responses with Real Estate Assets and Stock Market Assets: A one percent shock to Real Estate Assets

Notes: See notes to Figure A9.
Figure A9 continued: Impulse Responses with Real Estate Assets and Stock Market Assets: A one percent shock to Stock Market Assets

Notes: See notes to Figure A9.
Figure A9 continued: Impulse Responses with Real Estate Assets and Stock Market Assets: A one percent shock to Disposable Income

1952:1 to 1973:3

1973:4 to 1985:1

1985:2 to 1998:2

1998:3 to 2009:4

Notes: See notes to Figure A9.
Figure A10: Impulse Responses with Real Estate Assets, Stock Market Assets and Labor Income: A one percent shock to Consumption

Notes: The impulse response functions (IRFs) are estimated using Jordà's (2005) linear projection technique. The solid line represents the impulse response function; the dashed lines are Jordà's (2009) 95 percent conditional confidence bands. The horizon for each IRF is measured in quarters. The variable “Real Estate Assets” is used in place of tangible assets in the five-variable system. Real Estate Assets is defined from tangible assets excluding durables and software and equipment of non-profit organizations (Table B.100 in the Flow of Funds). The variable “Stock Market Assets” is used in place of financial assets in the five-variable system. Stock Market Assets is defined from financial assets excluding household deposits and credit market instruments (Table B.100 in the Flow of Funds). Labor income is defined as compensation of employees, available from the Bureau of Labor Statistics. See text for additional variable definitions.
Figure A10 continued: Impulse Responses with Real Estate Assets, Stock Market Assets and Labor Income: A one percent shock to Liabilities

1952:1 to 1972:3

Notes: See notes to Figure A10.
Figure A10 continued: Impulse Responses with Real Estate Assets, Stock Market Assets and Labor Income: A one percent shock to Real Estate Assets

1952:1 to 1972:3

Consumption

1972:4 to 1984:1

Consumption

1984:2 to 1997:1

Consumption

1997:2 to 2009:4

Consumption

Notes: See notes to Figure A10.
Figure A10 continued: Impulse Responses with Real Estate Assets, Stock Market Assets and Labor Income: A one percent shock to Stock Market Assets

1952:1 to 1972:3

1972:4 to 1984:1

1984:2 to 1997:1

1997:2 to 2009:4

Notes: See notes to Figure A10.
Figure A10 continued: Impulse Responses with Real Estate Assets, Stock Market Assets and Labor Income: A one percent shock to Labor Income

Notes: See notes to Figure A10.
Figure A11: Impulse Responses with Federal Funds Rate: A one percent shock to Consumption

Notes: The impulse response functions (IRFs) are estimated using Jordà’s (2005) linear projection technique. The solid line represents the impulse response function; the dashed lines are Jordà’s (2009) 95 percent conditional confidence bands. The horizon for each IRF is measured in quarters. The Federal funds rate is added to our main specification reported in the paper. The sample for this model begins in 1954—based on availability of the Federal Funds rate—later than the main model in the paper. See text for variable definitions.
Figure A11: Impulse Responses with Federal Funds Rate:
A one percent shock to Liabilities

1954:1 to 1971:1

1971:2 to 1984:4

1985:1 to 1998:4

1999:1 to 2009:4

Notes: See notes to Figure A11.
Figure A11 continued: Impulse Responses with Federal Funds Rate:
A one percent shock to Tangible Assets

Notes: See notes to Figure A11.
Figure A11 continued: Impulse Responses with Federal Funds Rate:
A one percent shock to Financial Assets

Notes: See notes to Figure A11.
Figure A11 continued: Impulse Responses with Federal Funds Rate:
A one percent shock to Income

Notes: See notes to Figure A11.
Figure A11 continued: Impulse Responses with Federal Funds Rate: A 0.5 percent shock to the Federal Funds Rate

1954:1 to 1971:1

1971:2 to 1984:4

1985:1 to 1998:4

1999:1 to 2009:4

Notes: See notes to Figure A11.