COMPARING WEALTH EFFECTS:
THE STOCK MARKET VERSUS THE HOUSING MARKET

BY

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Comparing Wealth Effects:
The Stock Market Versus the Housing Market

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ABSTRACT

We examine the link between increases in housing wealth, financial wealth, and consumer spending. We rely upon a panel of 14 countries observed annually for various periods during the past 25 years and a panel of U.S. states observed quarterly during the 1980s and 1990s. We impute the aggregate value of owner-occupied housing, the value of financial assets, and measures of aggregate consumption for each of the geographic units over time. We estimate regressions relating consumption to income and wealth measures, finding a statistically significant and rather large effect of housing wealth upon household consumption.

Keywords: Consumption, nonfinancial wealth, housing market, real estate

JEL Classification: E2, G1

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I. Introduction

The dramatic increase in stock values during the recent economic expansion in the U.S. has led to renewed policy and scientific interest in the effects of household wealth upon consumption levels. To the extent that the inflation of stock prices increased consumption pressures during the decade-long boom, there are well known reasons to fear that constant or declining share prices may exacerbate a slowdown in the economy by depressing the consumption spending of households.

There is every reason to expect that changes in housing wealth exert analogous effects upon household behavior, and institutional innovations (such as second mortgages in the form of secured lines of credit) have made it as simple to extract cash from housing equity as it is to sell shares or to borrow on margin.[1]

More generally, it has been widely observed in the U.S. and elsewhere that changes in national wealth are associated with changes in national consumption. In regression models relating changes in log consumption to changes in log wealth, the estimated relationship is generally positive and statistically significant. Under a standard interpretation of these results, from a suitably specified regression, the coefficient measures the "wealth effect" — the causal effect of exogenous changes in wealth upon consumption behavior. These simple regressions do admit other interpretations which may be hard to disentangle. Nevertheless, the interpretation of these results as a "wealth effect," even as an approximation, justifies careful examination of these statistical relationships.

Wealth may take many forms, and as noted below, there is ample reason to think that the tendency to consume out of stock market wealth is different from the tendency to consume out of housing wealth.

In this paper, we provide empirical evidence on the issue by relying upon two bodies of data: a panel of annual observations on 14 countries measuring aggregate consumption, the capitalization of stock market wealth, and aggregate housing wealth; and an analogous panel of

[1] Indeed, in a speech to the Mortgage bankers Association, Federal Reserve Chairman Alan Greenspan has ruminated: "One might expect that a significant portion of the unencumbered cash received by [house] sellers and refinancers was used to purchase goods and services… However, in models of consumer spending, we have not been able to find much incremental explanatory power of such extraction. Perhaps this is because sellers' extraction [of home equity] is sufficiently correlated with other variables in the model, such as stock-market wealth, that the model has difficulty disentangling these influences" (Greenspan, 1999).

quarterly observations on U.S. states estimating consumption, stock ownership, and aggregate housing wealth. These data exploit the geographical distribution of stock market and housing market wealth among the U.S. states and the substantial variations in the timing and intensity of economic activity across developed countries.

Section II below provides a brief theoretical motivation for the distinction between housing and financial wealth and a review of the limited evidence on the effects of housing wealth on consumption and savings behavior. Section III describes the data sources, imputations, and computations used to create the two panels. Section IV presents our statistical results; Section V is a brief conclusion.

II. Differential Wealth Effects: Theories and Evidence

A simple formulation of the life cycle savings hypothesis suggests that consumers will distribute increases in anticipated wealth over time and that the marginal propensity to consume out of all wealth, whether from stocks, real estate, or any other source, should be the same small number, something just over the real interest rate. Clearly, such a proportional effect must exist in the long run. However, a number of concerns have been raised about the identification of the short-run effects of changes in wealth on household spending.

There are, in fact, many reasons why consumption may be differently affected by the form in which wealth is held. First, increases in measured wealth of different kinds may be viewed by households as temporary or uncertain. Second, households may have a bequest motive which is strengthened by tax laws that favor holding appreciated assets until death. Third, households may view the accumulation of some kinds of wealth as an end in and of itself. Fourth, households may not find it easy to measure their wealth, and may not even know what it is from time to time. The unrealized capital gains held by a household in asset markets may be transitory, but they can be measured with far more precision in thick markets with many active traders. Fifth, people may segregate different kinds of wealth into separate "mental accounts," which are framed quite differently. The psychology of framing may dictate that certain assets are more appropriate to use for current expenditures while others are earmarked for long-term savings (Shefrin and Thaler, 1988).

Each of these concerns suggests a distinction between the impact of housing wealth and stock market wealth on consumption. The extent to which people view their currently-measured wealth as temporary or uncertain may differ between the two forms of wealth. People may have quite different motives about bequeathing their stock portfolios and bequeathing their homesteads to heirs. The emotional impact of accumulating stock market wealth may be quite different from that of real estate wealth. People are likely to be less aware of the short-run changes in real estate wealth since they do not receive regular updates on its value. Stock market wealth can be tracked daily in the newspaper.

Differential impacts of various forms of wealth on consumption have already been demonstrated in a quasi-experimental setting. For example, increases in unexpected wealth in the form of lottery winnings lead to large effects on consumption. Responses to surveys about the uses put to different forms of wealth imply strikingly different "wealth effects." By analogy, it is entirely reasonable to expect that there should be a different impact of real estate wealth, as compared with stock market wealth, on consumption.

The effect of housing wealth on consumption has not been widely explored. An early study by Elliott (1980) relied upon aggregate data on consumer spending, financial wealth, and nonfinancial wealth, finding that variations in the latter had no effect upon consumption. Elliott's analysis suggested that "houses, automobiles, furniture, and appliances may be treated more as part of the environment by households than as a part of realizable purchasing power. (1980:528)." These results were challenged by Peek (1983) and by Bhatia (1987) who questioned the methods used to estimate real non-financial wealth. More recently, Case (1992) found evidence of a substantial consumption effect during the real estate price boom in the late 1980's using aggregate data for New England.

Using data on individual households from the Panel Study of Income Dynamics (PSID), Skinner (1989) found a small but significant effect of housing wealth upon consumption. Sheiner (1995) explored the possibility that home price increases may actually increase the savings of renters who then face higher down payment requirements to purchase houses. Her statistical results, however, were quite inconclusive. Engelhardt (1996) provided a direct test of the link between house price appreciation and consumption, also using the PSID. He estimated that the marginal propensity to consume out of real capital gains in owner-occupied housing is about 0.3, but this arose from an asymmetry in behavioral response. Households experiencing real gains did not change their savings and consumption behavior appreciably, while those experiencing capital losses did reduce their consumption behavior.

Much of the limited evidence on the behavioral response to changes in housing wealth has arisen from consideration of the "savings puzzle." During the late 1990's, personal savings as measured in the National Income and Product Accounts fell sharply to practically zero in 2000. But it was shown that if unrealized capital gains in housing were included in both the income and savings of the household sector (as suggested by the Haig-Simons criteria), then the aggregate personal savings rates computed were much higher (Gale and Sabelhaus, 1999).

Similarly, Hoynes and McFadden (1997) used micro (PSID) data to investigate the correlation between individual savings rates and rates of capital gains in housing. Consistent with the perspective of Thaler (1990), the authors found little evidence that households were changing their savings in non-housing assets in response to expectations about capital gains in owner-occupied housing.

The only other study of the "wealth effect" which has disaggregated housing and stock market components of wealth is an analysis of the Retirement History Survey by Levin (1998). Levin found essentially no effect of housing wealth on consumption.

All of these micro studies of consumer behavior rely upon owners' estimates of housing values. Evidence does suggest that the bias in owners' estimates is small (see below), but these estimates typically have high sampling variances (Kain and Quigley, 1972; Goodman and Ittner, 1992). This leaves much ambiguity in the interpretation of statistical results.

III. The Data

We address the linkage between stock market wealth, housing wealth, and household consumption using two distinct bodies of panel data that have been assembled in parallel for this purpose. The data sets have different strengths and weaknesses, which generally complement each other for the study of these relationships.

The first data set consists of a panel of quarterly data constructed for U.S. states from 1982 through 1999. This panel exploits the fact that the distribution of increases in housing values has been anything but uniform across regions in the U.S., and the increases in stock market wealth have been quite unequally distributed across households geographically. This panel offers the advantage that data definitions and institutions are uniform across geographical units. In addition, the sample size is large. One disadvantage of this data set arises because one key variable must be imputed to the various states on the basis of other data measured at the state level. Another disadvantage of these data is that the U.S. stock market has trended upwards during the entire sample period, and the period may have been unusual (Shiller, 2000).

The second body of data consists of a panel of annual observations on 14 developed countries for various years during the period of 1975-1999. This data set relies upon consumption measures derived from national income accounts, not our imputations, but we suspect that housing prices and housing wealth in this panel are measured less accurately. In addition, the sample of countries with consistent data is small. Finally, there are substantial institutional differences among countries, for example, variations in the taxation of wealth and capital gains and in institutional constraints affecting borrowing and saving.

Both data sets contain substantial time series and cross sectional variation in cyclical activity and exhibit substantial variation in consumption and wealth accumulation.

A. U.S. State Data

We estimate stock market wealth, housing market wealth and consumption for each U.S. state, quarterly, for the period 1982-1999.

Estimates of aggregate financial wealth were obtained annually from the Federal Reserve Flow of Funds (FOF) accounts and compared to the aggregate capitalization of the three major U.S. stock markets. From the FOF accounts, we computed the sum of corporate equities held by the household sector, pension fund reserves, and mutual funds. The FOF series has risen in nominal terms from under $2 trillion dollars in 1982 to $18 trillion in 1999. It is worth noting that more than half of the gross increase between 1982 and 1999 occurred during the four years between 1995 and 1999. The total nominal increase for the 13 years between 1982 and 1995 was $7.5 trillion; the total nominal increase during the 4 years between 1995 and 1999 was an astonishing $8.4 trillion. Nearly all variation in the FOF aggregate arises from variation in the capitalization of the stock market. Figure 1 summarizes the course of U.S. stock market wealth during the period 1982-1999.

To distribute household financial assets geographically, we exploit the correlation between holdings of mutual funds and other financial assets. We obtained mutual fund holdings by state from the Investment Company Institute (ICI). The ICI data are available for the years 1986, 1987, 1989, 1991 and 1993. We assumed that for 1982:I through 1986:IV, the distribution was the same as it was in 1986; similarly we assumed that the 1993 distribution held for the period 1993-99. We further assumed that direct household holdings of stocks and pension fund reserves were distributed in the same geographical pattern as mutual funds. These are clearly strong assumptions, but there are no alternative data.

Estimates of housing market wealth were constructed from repeat sales price indexes applied to the base values reported in the *1990 Census of Population and Housing* by state. Weighted repeat sales (WRS) indexes (See Case and Shiller, 1987, 1989) constructed by Case Shiller Weiss Inc. are available for this entire period for only 16 states. However, the Office of Federal Housing Enterprise Oversight (OFHEO) publishes state level repeat value indexes quarterly. These indexes are produced by Fannie Mae and Freddie Mac and are available for all states.

The Case-Shiller indexes are the best available for our purposes and wherever possible we use them.[2] The WRS and the OFHEO indexes are highly correlated, however, and we use the OFHEO indexes where WRS indexes are not available.

Equation (1) indicates how the panel on aggregate housing wealth was constructed for each state:

$$(1) \qquad V_{it} = R_{it} N_{it} I_{it} V_{io} \ ,$$

where,

V_{it} = aggregate value of owner occupied housing in state i in quarter t,

R_{it} = homeownership rate in state i in quarter t,

N_{it} = number of households in state i in quarter t,

I_{it} = weighted repeat sales price index, WRS or OFHEO, for state i in quarter t (I_{i1} = 1, for 1990:I),

V_{io} = mean home price for state i in the base year, 1990.

The total number of households N as well as the homeownership rates R were obtained from the *Current Population Survey* conducted by the U.S. Census Bureau annually and interpolated for quarterly intervals. Aggregate wealth varies as a result of price appreciation of the existing stock as well as additions to the number of owner-occupied dwellings.

The baseline figures for state level mean home prices V_{io} are derived from estimates of house values reported in the *1990 Census of Population and Housing*. As noted, several studies

[2] While OFHEO uses a similar index construction methodology (the WRS method of Case and Shiller, 1987), their indexes are in part based on appraisals at the time of refinancing rather than on arms-length transactions. The Case-Shiller indexes use various devices to filter out non-arms-length sales data.

have attempted to measure the bias in owner estimates of house values. The estimates range from minus 2 percent (Kain and Quigley, 1972, and Follain and Malpezzi, 1981) to plus 6 percent (Goodman and Ittner, 1992). However, Goodman and Ittner point out that for many purposes, owners' estimates may indeed be the appropriate measures of housing wealth; household consumption and savings behavior is likely to be based upon perceived home value. The aggregate nominal value of the owner-occupied stock in the U.S. grew from $2.8 trillion in 1982 to $7.2 trillion in 1999. Figure 1 also summarizes the course of aggregate wealth in owner-occupied housing during the 1982-1999 period.

Unfortunately, there are no measures of consumption spending by households recorded at the state level. However a panel of retail sales has been constructed by Regional Financial Associates (RFA, see Zandi, 1997). Retail sales account for roughly half of total consumer expenditures.[3]

The RFA estimates were constructed from county level sales tax data, the *Census of Retail Trade* published by the U.S. Census Bureau, and the Census Bureau's monthly national retail sales estimates. For states with no retail sales tax or where data were insufficient to support imputations, RFA based its estimates on the historical relationship between retail sales and retail employment. Data on retail employment by state are available from the Bureau of Labor Statistics. Regression estimates relating sales to employment were benchmarked to the *Census of Retail Trade* available at five-year intervals. Estimates for all states were within five percent of the benchmarks.

Retail sales can be expected to differ systematically from consumption spending for several reasons. Clearly, in states with relatively large tourist industries recorded retail sales per resident are high. Nevada, for example, with 26 percent of its labor force employed in tourism, had per capita retail sales of $3,022 in 1997:I, third highest among the 50 states. In addition, states with low or no sales tax can be expected to have high retail sales per resident. For example, New Hampshire with no sales tax had per capita retail sales of $3,200 in 1997:I, highest among the 50 states. Most states, however, were tightly clustered around the mean of $2,385 in 1997:I.

[3] In 1997, for example, gross domestic product was $8.08 trillion, household consumption spending was $5.49 trillion, and retail sales amounted to $2.63 trillion.

While there are systematic differences between retail sales and consumption, to the extent that differences are state specific, this can be accounted for in multivariate statistical analysis. Data on retail sales, house values, and stock market valuation, by state and quarter, were expressed per capita in real terms using the *Current Population Survey* and the GDP deflator.

B. International Data

It was possible to obtain roughly comparable data for a panel of 14 developed countries during the period 1975-1996.[4] In an analogous manner, we estimate stock market wealth, housing market wealth, and consumption for each country for each year.

Estimates of aggregate stock market wealth for each country were obtained from the Global Financial Database which reports domestic stock market capitalization annually for each country. To the extent that the fraction of the stock market wealth owned domestically varies among countries, this can be accounted for in the statistical analysis reported below by permitting fixed effects to vary across countries. Figure 2 reports the evolution of stock market wealth in each country, relative to its aggregate value in 1994. (The entry for Ireland is not an error.)

Estimates of housing market wealth were constructed in a manner parallel to those used for the panel of U.S. states which are summarized in equation (1). Indexes of annual housing prices I_{it} were obtained from the Bank of International Settlements (BIS) which consolidated housing prices reported for some 15 industrialized countries (See Kennedy and Andersen, 1994 or Englund and Ionnides, 1997). The BIS series for the United States was quite short, so the national OFHEO-Freddie Mac series described earlier is used for the U.S.

Consistent data on housing prices for a benchmark year, V_{io}, were not available for the panel of countries. This means that regression estimates without fixed effects for each country (which control for country-specific benchmarks) are meaningful only under very restrictive assumptions.

Data on the number of owner-occupied housing units was obtained from various issues of the *Annual Bulletin of Housing and Building Statistics for Europe and North America* published by the United Nations. The series describing the owner-occupied housing stock was not

[4] The countries include: Belgium (1978-1996), Canada (1978-1993), Denmark (1978-1996), Finland (1978-1996), France (1982-1996), Germany (1991-1995), Ireland (1982-1987, 1994-1995), Netherlands (1978-1996), Norway (1980-1996), Spain (1975-1996), Sweden (1975-1996), Switzerland (1991-1996), the United Kingdom (1978-1996), and the United States (1975-1997).

complete for some years in all the countries. More complete data existed for the total housing stock of each country. Where missing, the owner-occupied housing stock was estimated from the total housing stock reported for that year and the ratio of the owner-occupied housing stock to the total housing stock for an adjacent year. Missing data points were estimated by linear interpolation.[5]

Figure 3 reports the evolution of housing market wealth in the 14 countries relative to its aggregate value in 1990. The variations over time in housing market wealth are striking.

Consumption data were collected from the International Financial Statistics database. "Household Consumption Expenditure including Nonprofit-Institution-Serving Households" is used for in the European Union countries that rely upon the *European System of Accounts (ESA1995)*. "Private Consumption" is used for other countries, according to the *System of National Accounts (SNA93).* Data on aggregate consumption, housing values and stock market valuations, by country and year, were expressed per capita in real terms using UN population data and the consumer price index.

The simple correlations among these variables: consumption, housing wealth, and financial wealth are reported in Appendix Table A.

IV. Statistical Results

Table 1 presents basic statistical relationships between per capita consumption, income, and the two measures of wealth. The first three columns present regression results for the panel of countries (228 observations on 14 countries), while the next three columns report the results for the panel of states (3498 observations on 50 states and the District of Columbia).[6]

The tables report three specifications of the relationship. All include fixed effects, i.e., a set of dummy variables for each country and state. Model II also includes state and country specific time trends. Model III includes year-specific fixed effects as well as fixed effects for countries. For states, Model III also includes seasonal fixed effects, i.e., one for each quarter.

[5] In addition, we are grateful for unpublished estimates of the stock of owner-occupied housing supplied by Paloma Taltavull de La Paz (for Spain) and the value of owner-occupied housing by Barot Bharot (for Sweden).

[6] The state panel is not quite balanced. The series includes quarterly observations from 1982:I through 1999:IV for all states but Arizona. The time series for Arizona begins in 1987:I.

As the table indicates, in the simplest formulation, the estimated effect of housing market wealth on consumption is significant and large. In the international comparison, the elasticity ranges from 0.11 to 0.17. In the cross state comparison, the estimated elasticity is between 0.05 and 0.09. In contrast, the estimated effects of financial wealth upon consumption are smaller. In the simplest model, the estimate from the country panel is 0.02. In the other two regressions, the estimated coefficient is insignificantly different from zero, perhaps reflecting the more restricted ownership of non-financial wealth in Western European countries.

The table also reports the t-ratio for the hypothesis that the difference between the coefficient estimates measuring housing and financial market effects is zero. A formal test of the hypothesis that the coefficient on housing market wealth is equal to that of stock market wealth (against the alternative hypothesis that the two coefficients differ) is presented, as well as a test of the hypothesis that the coefficient on housing market wealth exceeds the coefficient on financial wealth. The evidence suggests that housing market wealth has a more important effect on consumption than does financial wealth.

Table 2 reports the results when the effects of first order serial correlation are also estimated.[7] The estimated serial correlation coefficient is highly significant and large in magnitude. The coefficients of housing market wealth change only a little. For the panel of countries, the estimated elasticity ranges from 0.11 to 0.14; for the panel of states, the estimate is 0.62.

In five of the six regressions reported, the hypothesis that the effects of housing market wealth are larger than those of financial wealth is accepted by a wide margin.

Table 3 presents results with all variables expressed as first differences. In this formulation the coefficient on housing market wealth is significant in all specifications, while the coefficient of financial wealth is essentially zero.

Table 4 presents tests for the presence of unit roots in the time series data we analyze. For most, but not all, of the state series we can reject the hypothesis of unit roots in the data. The table also presents a test for the presence of a common unit root in the four country data series

[7] These models rely on sequential estimation using the Prais-Winsten technique.

and in the four data series for U.S. states (Madalla and Wu, 1999). The presence of a common unit root is rejected by a wide margin for each of the series for both panels.[8]

Despite this, Table 5 presents the model in first differences including lagged consumption, the widely-adopted ("standard") correction for the presence of unit roots. Again, the results support the highly significant effect of housing market wealth upon consumption, especially large relative to financial wealth.

V. Conclusion

We have examined the wealth effect with a cross-sectional time-series data sets that are more comprehensive than any applied to the wealth effect before and with a number of different econometric specifications. The statistical results are variable depending on econometric specification, and so any conclusion must be tentative. Nevertheless, the evidence of a stock market wealth effect is weak; the common presumption that there is strong evidence for the wealth effect is not supported in our results. However, we do find strong evidence that variations in housing market wealth have important effects upon consumption. This evidence arises consistently using panels of U.S. states and individual countries and is robust to differences in model specification. The housing market appears to be more important than the stock market in influencing consumption in developed countries.

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[8] The specific test we report in Table 4 uses a model with no intercept and no trend in conducting the augmented Dickey-Fuller (ADF) tests. The table also relies upon a four-quarter lag for the state panel, and a one-year lag for the country panel. The conclusions presented in the table are unchanged if the ADF model includes an intercept and/or a trend; they are also insensitive to the lag structure.

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Table 1
Ordinary Least Squares
Consumption Models Based Upon Country Data: Annual Observations 1975-1999
and State Data: Quarterly Observations 1982-1999
Country/State Fixed Effects

All variables are real (deflated by GDP deflator) and measured per capita in logarithms
(t ratios in parentheses)

Dependent variable: Consumption per capita	Country Data			State Data		
	I	II	III	I	II	III
Income	0.660	0.349	0.287	0.545	0.694	0.557
	(9.69)	(5.63)	(3.27)	(29.67)	(27.84)	(22.76)
Stock Market Wealth	0.019	0.002	-0.010	0.060	0.034	0.067
	(2.05)	(0.25)	(-0.87)	(14.97)	(6.66)	(10.92)
Housing Market Wealth	0.131	0.110	0.166	0.089	0.051	0.087
	(5.33)	(7.35)	(6.90)	(12.22)	(7.42)	(11.71)
Country/State Specific Time Trends	No	Yes	No	No	Yes	No
Year/Quarter Fixed Effects	No	No	Yes	No	No	Yes
R^2	0.9991	0.9998	0.9993	0.9246	0.9588	0.9306
t-Ratio	4.664	7.090	6.987	4.039	2.047	2.187
DF	211	197	190	3445	3394	3425
p-value for H_0	0.000	0.000	0.000	0.000	0.041	0.029
p-value for H_1	1.000	1.000	1.000	1.000	0.980	0.986

Note: H_0 is a test of the hypothesis that the coefficient on housing market wealth is equal to that of stock market wealth.
H_1 is a test of the hypothesis that the coefficient on housing market wealth exceeds that of stock market wealth.

Table 2
Generalized Least Squares Consumption Models with Serially Correlated Errors
Country/State Fixed Effects
All variables are real (deflated by GDP deflator) and measured per capita in logarithms
(t ratios in parentheses)

Dependent variable: Consumption per capita	Country Data			State Data		
	I	II	III	I	II	III
Income	0.679	0.309	0.388	0.545	0.422	0.337
	(12.30)	(4.84)	(5.07)	(29.12)	(17.56)	(13.92)
Stock Market Wealth	0.007	-0.004	-0.003	0.070	0.020	0.043
	(1.16)	(-0.69)	(-0.33)	(15.98)	(3.28)	(6.51)
Housing Market Wealth	0.108	0.115	0.136	0.062	0.062	0.062
	(4.62)	(6.52)	(5.92)	(6.50)	(6.92)	(6.97)
Serial Correlation Coefficient	0.854	0.564	0.817	0.881	0.785	0.868
	(23.77)	(9.57)	(19.49)	(109.47)	(73.89)	(102.30)
Country/State Specific Time Trends	No	Yes	No	No	Yes	No
Year/Quarter Fixed Effects	No	No	Yes	No	No	Yes
R^2	0.9998	0.9999	0.9998	0.9844	0.9856	0.9864
t-Ratio	4.282	6.525	5.987	-0.770	3.780	1.743
DF	210	196	189	3444	3393	3424
p-value for H_0	0.000	0.000	0.000	0.441	0.000	0.081
p-value for H_1	1.000	1.000	1.000	0.221	1.000	0.959

Note: H_0 is a test of the hypothesis that the coefficient on housing market wealth is equal to that of stock market wealth.
H_1 is a test of the hypothesis that the coefficient on housing market wealth exceeds that of stock market wealth.

Table 3
Ordinary Least Squares
Consumption Models in First Differences
Country/State Fixed Effects

All variables are real (deflated by GDP deflator) and measured per capita in logarithms
(t ratios in parentheses)

Dependent variable: Change in Consumption per capita	Country Data			State Data		
	I	II	III	I	II	III
Change in Income	0.266	0.239	0.254	0.328	0.321	0.274
	(4.06)	(3.49)	(3.34)	(13.84)	(13.47)	(11.14)
Change in Stock Market Wealth	-0.008	-0.010	-0.007	0.006	0.006	0.008
	(-1.37)	(-1.67)	(-0.97)	(0.95)	(0.97)	(1.22)
Change in Housing Market Wealth	0.128	0.147	0.141	0.039	0.035	0.034
	(6.21)	(6.56)	(6.37)	(3.96)	(3.48)	(3.58)
Country/State Specific Time Trends	No	Yes	No	No	Yes	No
Year/Quarter Fixed Effects	No	No	Yes	No	No	Yes
Regression R^2	0.3943	0.4346	0.4807	0.0734	0.0817	0.1453
Durbin-Watson	1.718	1.847	1.705	2.428	2.448	2.484
t-Ratio	6.341	6.725	6.518	2.756	2.356	2.231
DF	196	182	176	3394	3343	3374
p-value for H_0	0.000	0.000	0.000	0.006	0.019	0.026
p-value for H_1	1.000	1.000	1.000	0.997	0.991	0.987

Note: H_0 is a test of the hypothesis that the coefficient on housing market wealth is equal to that of stock market wealth.
H_1 is a test of the hypothesis that the coefficient on housing market wealth exceeds that of stock market wealth.

Table 4

Fisher Test of H_o: There is a common unit root vs H_a: At least one series is stationary

No Intercept, No Trend in ADF Specifications

All variables are real (deflated by GDP deflator) and measured per capita in logarithms

A. U.S. States

p-Values from ADF Test with 4 Lags

	Variable			
State	Consumption	Income	Stock Wealth	Housing Wealth
AL	0.0000	0.1510	0.0072	0.0005
AK	0.0026	0.0054	0.0062	0.0000
AZ	0.0357	0.1690	0.0010	0.0026
AR	0.0301	0.0641	0.0050	0.0092
CA	0.0073	0.1059	0.0033	0.0888
CO	0.0209	0.2336	0.0232	0.0880
CT	0.0120	0.1685	0.0084	0.0901
DE	0.0254	0.2457	0.0013	0.0277
DC	0.0066	0.1439	0.0044	0.0125
FL	0.0157	0.0978	0.0114	0.0017
GA	0.0095	0.1882	0.0028	0.0759
HI	0.0713	0.0305	0.0124	0.1300
ID	0.0139	0.0623	0.0033	0.0060
IL	0.1293	0.0445	0.0042	0.0921
IN	0.1171	0.0319	0.0032	0.0962
IA	0.0318	0.0010	0.0067	0.1044
KS	0.0476	0.0652	0.0031	0.0008
KY	0.0344	0.0095	0.0049	0.0524
LA	0.0426	0.0265	0.0099	0.1276
ME	0.0345	0.1453	0.0029	0.0091
MD	0.0190	0.2702	0.0019	0.0367
MA	0.0111	0.1587	0.0085	0.1339
MI	0.1242	0.0829	0.0049	0.2064
MN	0.0592	0.0100	0.0008	0.0410
MS	0.0045	0.0884	0.0127	0.0153
MO	0.0485	0.1360	0.0026	0.1033
MT	0.0001	0.0005	0.0065	0.0027
NE	0.1397	0.0156	0.0052	0.0659
NV	0.0106	0.0724	0.0035	0.0158
NH	0.0082	0.1407	0.0019	0.1359
NJ	0.0367	0.1388	0.0085	0.0734
NM	0.0023	0.0797	0.0059	0.0127
NY	0.0519	0.1017	0.0072	0.0412
NC	0.0212	0.1267	0.0032	0.0399
ND	0.0175	0.0000	0.0086	0.0016
OH	0.1298	0.0993	0.0050	0.1776
OK	0.0044	0.0007	0.0055	0.1084
OR	0.0256	0.1112	0.0022	0.1417

Table 4

Fisher Test of H_o: There is a common unit root vs H_a: At least one series is stationary

No Intercept, No Trend in ADF Specifications

All variables are real (deflated by GDP deflator) and measured per capita in logarithms

PA	0.0474	0.2258	0.0038	0.1836
RI	0.0020	0.0907	0.0027	0.0677
SC	0.0407	0.0198	0.0032	0.0104
SD	0.0914	0.0026	0.0034	0.0000
TN	0.0301	0.1416	0.0056	0.0003
TX	0.0005	0.0280	0.0034	0.0125
UT	0.0410	0.2396	0.0042	0.1884
VT	0.0064	0.1099	0.0068	0.0931
VA	0.0551	0.2422	0.0019	0.0512
WA	0.0456	0.3260	0.0023	0.0280
WV	0.0282	0.0137	0.0043	0.0001
WI	0.0904	0.0626	0.0092	0.0302
WY	0.0216	0.0006	0.0033	0.0306
Fisher's λ	**413.8610**	**317.9160**	**554.1330**	**403.1180**
DF	102	102	102	102
P-Value	0.0000	0.0000	0.0000	0.0000

B. Individual Countries

p-Values from ADF Test with 1 Lag

Country	Variable: Consumption	Income	Stock Wealth	Housing Wealth
Belgium	0.0182	0.1921	0.0400	0.1588
Canada	0.1651	0.0247	0.0010	0.1248
Denmark	0.0288	0.1645	0.0230	0.0156
Finland	0.2856	0.0088	0.0057	0.0145
France	0.0929	0.1069	0.0072	0.0316
Germany	--	--	--	--
Ireland	0.2177	0.2726	--	0.2011
Netherlands	0.0990	0.1411	0.0339	0.1195
Norway	0.0189	0.1602	0.0031	0.0347
Sweden	0.2233	0.1851	0.0454	0.0377
Spain	0.0579	0.0102	0.0276	0.0462
Switzerland	0.0041	0.0779	0.0117	--
United Kingdom	0.1684	0.0429	0.0563	0.0295
United States	0.3281	0.0462	0.0299	0.0316
Fisher's λ	**67.0677**	**68.5220**	**101.3580**	**72.3881**
DF	26	26	24	24
P-Value	1.76E-05	1.09E-05	1.76E-11	9.45E-07

Note: Missing data preclude meaningful computations in cells marked "--".

Table 5
Ordinary Least Squares
Consumption Models in Differences Using Lagged Consumption on RHS
Country/State Fixed Effects

$$\text{Model}: \Delta C_t = \alpha C_{t-1} + \beta_1 \Delta Inc_t + \beta_2 \Delta Stock_t + \beta_3 \Delta House_t + \gamma FixedEffects + \varepsilon_t$$

All variables are real (deflated by GDP deflator) and measured per capita in logarithms
(t ratios in parentheses)

Dependent variable: Change in Consumption per capita	Country Data			State Data		
	I	II	III	I	II	III
Change in Income	0.262	0.108	0.244	0.321	0.308	0.266
	(4.01)	(1.62)	(3.19)	(13.66)	(13.67)	(11.13)
Change in Stock Market Wealth	-0.007	-0.016	-0.007	0.004	-0.003	0.004
	(-1.25)	(-2.89)	(-0.89)	(0.55)	(-0.43)	(0.61)
Change in Housing Market Wealth	0.129	0.167	0.139	0.047	0.056	0.047
	(6.31)	(8.02)	(6.31)	(4.77)	(5.84)	(5.05)
Lagged Consumption	-0.024	-0.244	-0.031	-0.026	-0.162	-0.093
	(-1.84)	(-6.01)	(-1.08)	(-8.18)	(-20.23)	(-14.77)
Country/State Specific Time Trends	No	Yes	No	No	Yes	No
Year/Quarter Fixed Effects	No	No	Yes	No	No	Yes
R^2	0.4047	0.5286	0.4841	0.0914	0.1819	0.1972
Durbin-Watson	1.702	1.758	1.669	2.426	2.353	2.421
t-Ratio	6.399	8.375	6.418	3.634	5.042	3.768
DF	195	181	175	3393	3342	3373
p-value for H_0	0.000	0.000	0.000	0.000	0.000	0.000
p-value for H_1	1.000	1.000	1.000	1.000	1.000	1.000

Note: H_0 is a test of the hypothesis that the coefficient on housing market wealth is equal to that of stock market wealth.
H_1 is a test of the hypothesis that the coefficient on housing market wealth exceeds that of stock market wealth.

Figure 1
US Stock Market and Owner-Occupied Housing Wealth
(Trillions of Current Dollars)

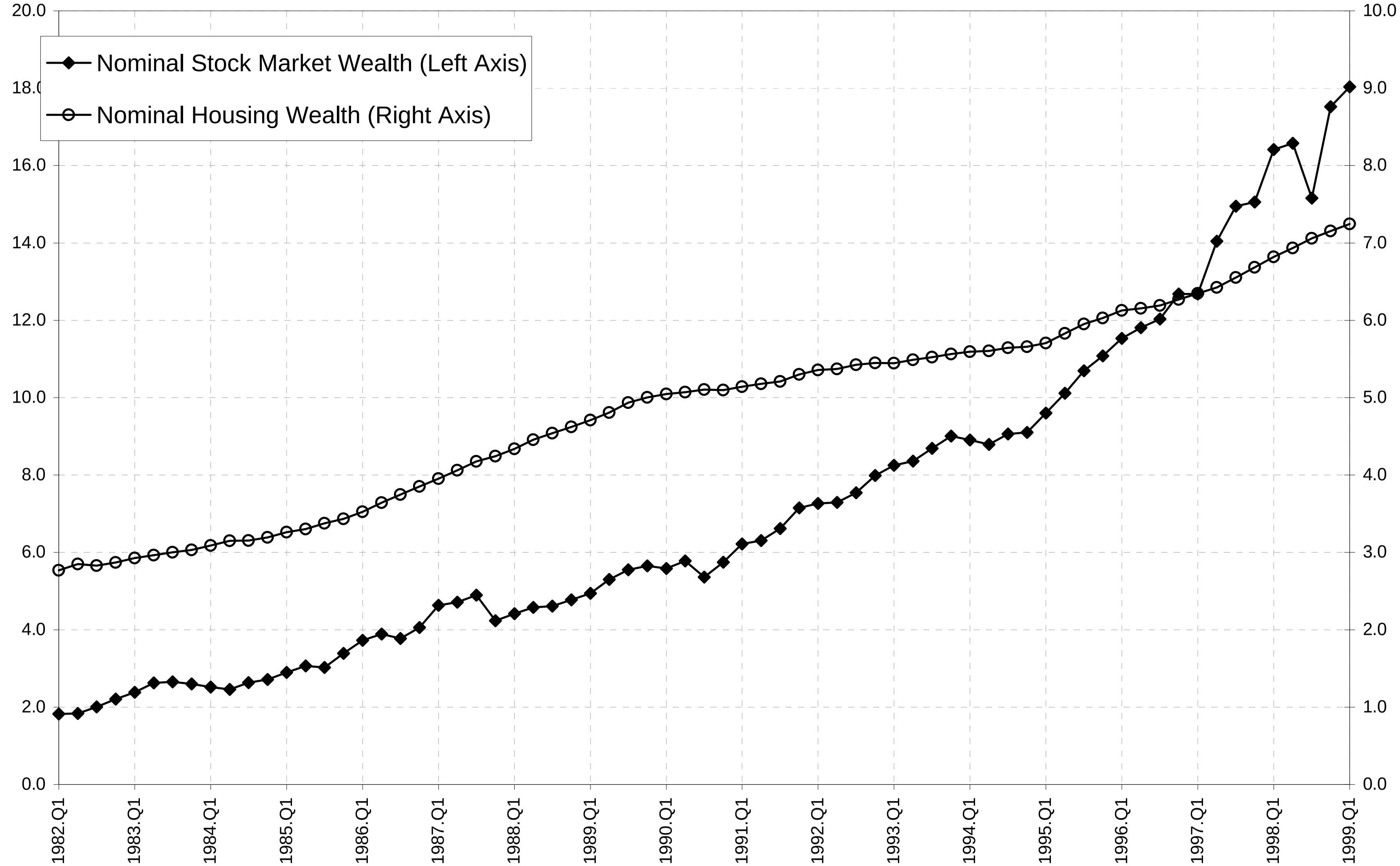


Figure 2
Evolution of Nominal Stock Market Wealth
(1994 = 100)

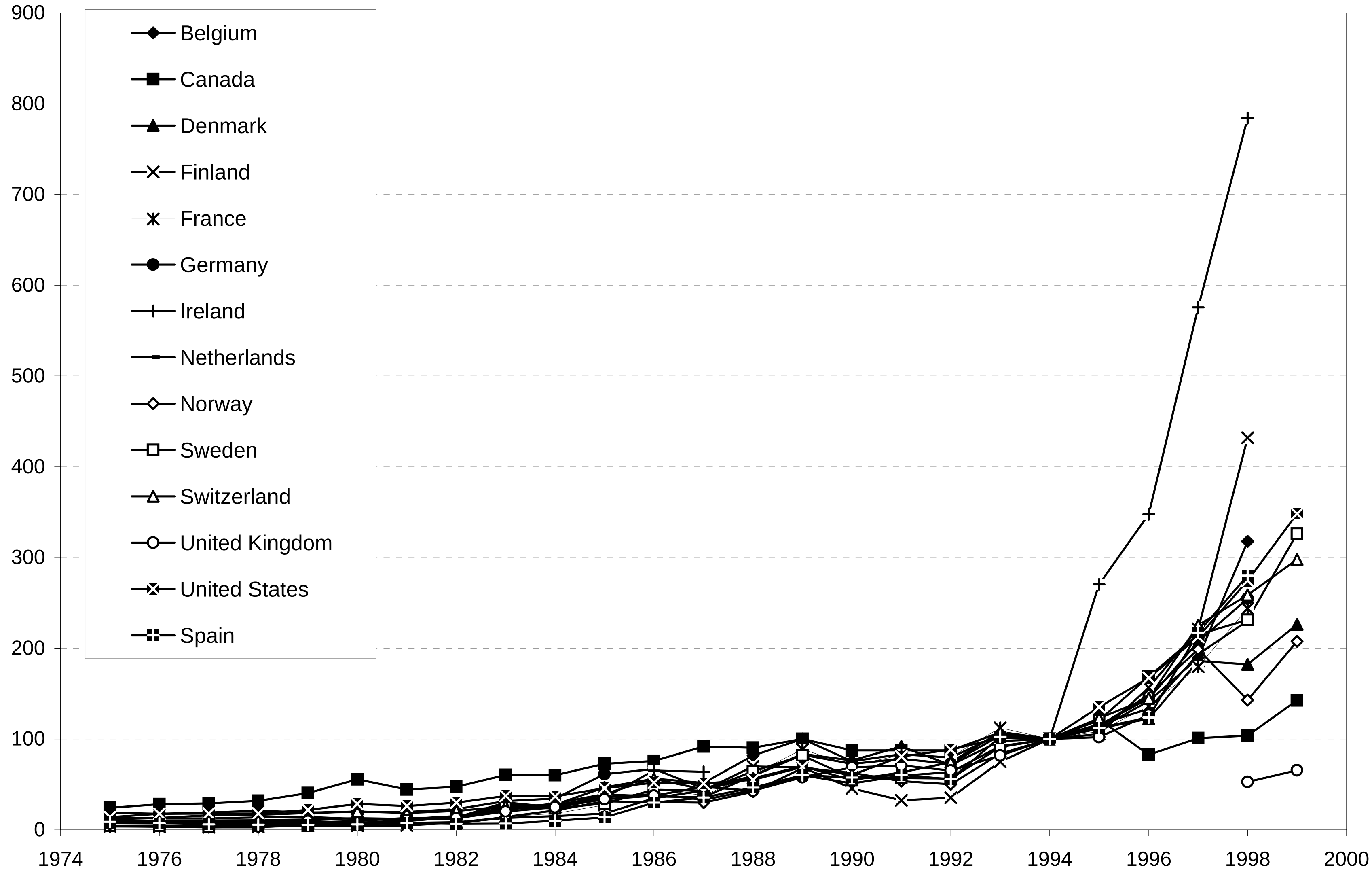
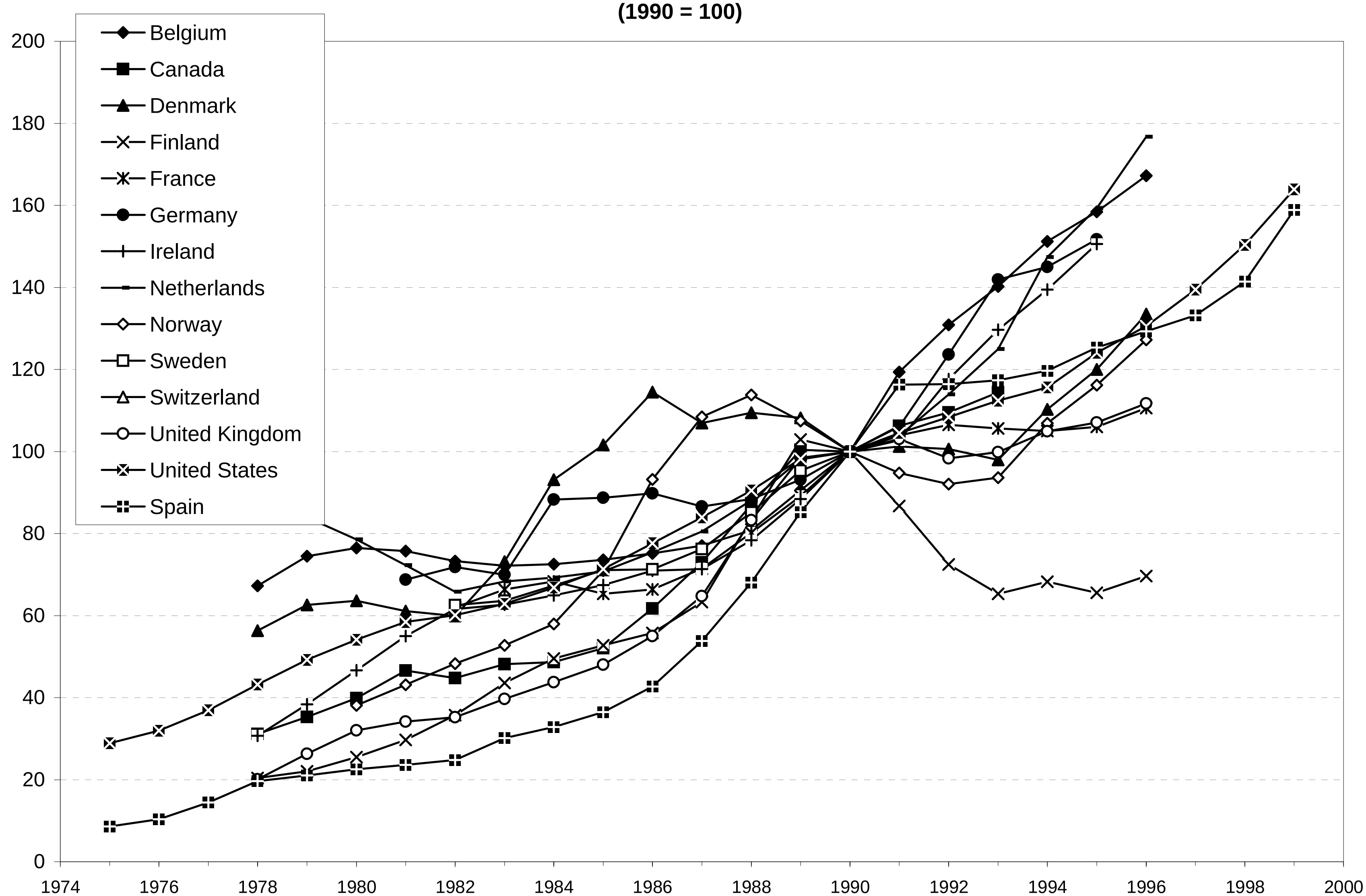


Figure 3
Evolution of Nominal Owner-Occupied Housing Wealth
(1990 = 100)



Appendix Table A
Correlations Among Consumption, Stock Market and Housing Market Wealth

A. U.S. States	Correlation Between Log Real Consumption Per Capita and		Correlation Between Change in Log Real Consumption Per Capita and	
	Log Real Stock Wealth Per Capita	Log Real Housing Wealth Per Capita	Change in Log Real Stock Wealth Per Capita	Change Log Real Wealth Values Per Capita
Alabama	0.9502	0.8736	0.1761	0.1770
Alaska	0.1168	0.3975	-0.0549	0.0784
Arizona	0.8777	0.5679	0.0775	-0.0499
Arkansas	0.9711	0.5865	0.0314	0.0620
California	0.3674	0.5184	-0.0031	0.3611
Colorado	0.9424	0.6121	0.1161	0.3082
Connecticut	0.7832	0.7030	0.0546	0.2846
Delaware	0.9194	0.8131	-0.0498	0.0655
District of Columbi	0.9286	0.6271	0.0177	-0.1262
Florida	0.9129	0.4021	-0.0403	0.4300
Georgia	0.9388	0.8571	-0.0215	0.2660
Hawaii	0.9836	0.7541	0.0187	-0.0958
Idaho	0.9432	0.7869	0.0948	0.2364
Illinois	0.9096	0.9298	-0.1724	0.1854
Indiana	0.9759	0.8605	-0.0906	0.0683
Iowa	0.9782	0.7877	-0.0210	0.0599
Kansas	0.9427	-0.0577	-0.0292	0.1768
Kentucky	0.9177	0.9015	-0.0727	-0.1333
Louisiana	0.8384	-0.2522	-0.0237	0.1714
Maine	0.8529	0.8546	-0.0491	0.0518
Maryland	0.8975	0.6001	-0.0270	-0.0593
Massachusetts	0.4704	0.9078	0.0286	0.3601
Michigan	0.9647	0.9011	-0.0815	-0.0277
Minnesota	0.9462	0.7675	0.1618	0.2080
Mississippi	0.9502	0.5652	-0.1160	-0.0170
Missouri	0.9719	0.8275	-0.0227	0.1224
Montana	0.8055	0.9176	0.1440	0.2407
Nebraska	0.9611	0.5313	-0.0343	-0.1100
Nevada	0.8342	0.5341	0.1993	0.6012
New Hampshire	0.7311	0.6819	0.0857	0.3841
New Jersey	0.8650	0.7630	0.0320	0.1939
New Mexico	0.9548	0.6116	0.0251	-0.0922
New York	0.8823	0.7866	0.0019	0.1880
North Carolina	0.9532	0.9554	-0.0840	0.3265
North Dakota	0.9035	0.0611	-0.0341	0.0171
Ohio	0.9576	0.9495	-0.0841	0.1916

Appendix Table A
Correlations Among Consumption, Stock Market and Housing Market Wealth

Oklahoma	0.6214	-0.3891	-0.1123	0.2031
Oregon	0.9640	0.8819	-0.0790	0.0376
Pennsylvania	0.9318	0.8985	-0.0105	0.1676
Rhode Island	0.0964	0.6658	0.0295	0.1902
South Carolina	0.9738	0.9437	0.0725	0.0373
South Dakota	0.9581	0.6354	-0.0339	-0.3147
Tennessee	0.9736	0.8457	-0.0399	0.0699
Texas	0.7691	-0.4984	-0.0182	0.2025
Utah	0.9582	0.6292	0.1403	0.2994
Vermont	0.7709	0.7821	0.1586	0.3477
Virginia	0.9007	0.8625	-0.1049	0.1689
Washington	0.9729	0.9380	-0.0714	0.0835
West Virginia	0.9595	0.6674	-0.1267	0.1312
Wisconsin	0.9853	0.9551	-0.1700	0.0202
Wyoming	0.5024	0.2866	-0.0441	0.2517

	Correlation Between Log Real Consumption Per Capita and		Correlation Between Change in Log Real Consumption Per Capita and	
B. Individual Countr	Log Real Stock Wealth Per Capita	Log Real Housing Wealth Per Capita	Change in Log Real Stock Wealth Per Capita	Change Log Real Wealth Values Per Capita
Belgium	0.3284	0.4057	-0.3960	0.2354
Canada	0.5582	0.8738	0.2120	0.5803
Denmark	0.8323	0.1327	-0.1711	0.6598
Finland	0.9101	0.7103	0.1880	0.6588
France	0.8984	0.5428	-0.0609	0.2662
Germany	0.4846	0.6076	-0.5461	-0.5813
Ireland	0.8864	0.8955	0.2923	0.5258
Netherlands	0.9328	0.6843	-0.0020	0.5000
Norway	0.9381	0.7596	-0.0123	0.7627
Spain	0.8210	0.9398	0.0212	0.5583
Sweden	0.9312	0.9251	-0.0347	0.1077
Switzerland	-0.1889	0.1190	-0.2450	-0.1335
United Kingdom	0.9575	0.9276	0.3340	0.6861
United States	0.9382	0.8889	0.0778	0.5581