HOUSING CAPITAL GAINS AND HOMEOWNER CONSUMPTION: SOME ESTIMATES FROM THE CANADIAN SURVEY OF HOUSEHOLD SPENDING

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Abstract

This paper derives estimates of the marginal propensity to consume (MPC) out of accrued capital gains on owner-occupied housing for Canada. It is the first such study based on the micro data in the Survey of Household Spending (SHS). The key idea, suggested by the Permanent Income Hypothesis (PIH) is that permanent capital gains affect household consumption decisions. From the SHS data on house purchases, a series of hedonic regression equations are estimated to compute accrued capital gains or the "pure price appreciation" of housing wealth. Permanent capital gains are then estimated as a distributed lag of current and past gains. The results suggest that households spend an additional 8.4 cents on total consumption for every dollar of permanent capital gains. The corresponding MPC out of current accrued gains is about 0.02.

1 Introduction

How movements in house prices affect household spending decisions has been a topic of extensive research which began long before the recent turmoil in real estate markets. Economic theory can give us some priors for wealth effects from all wealth but probably not for one component of it, be that real estate or holdings of corporate stock. Comparing the marginal propensity to consume (MPC) out of these two asset-types has led to a lot of heuristic discussion and econometric analysis (Englehardt (1996); Carroll (2004); Bostic , et al. (2009), among others). That topic, per se, is not of interest here, for the focus is on estimating the MPC out of housing capital gains for Canada. This literature nonetheless will be useful for comparative purposes, especially for comparing the effects of different treatments of value and price data for real estate. Empirical estimation is at the heart of the matter, and it takes on added importance because housing is the largest single asset-type in household balance sheets in several countries. Housing markets tend to be local in character, and procedures for financing and structuring real estate transactions vary widely, so it is not surprising to learn that econometric studies for a number of countries (U.S.A., U.K., Spain, Canada, among others), relying on a variety of specifications, statistical techniques and data sets (time series, surveys, panel data) have produced conflicting estimates of MPC out of housing wealth. To mention a few results, among studies using aggregate data, for U.S.A., Elliott (1980) suggested that housing capital gains had no effect on consumer spending, whereas Bhatia (1987) reported a positive and statistically significant MPC estimate, and more recent research has suggested MPC estimates between 0.03 (Dvornak and Kohler (2007)) and 0.09 (Benjamin et al. (2004)). From micro data, typical MPC estimates are zero (Juster et al. (2004)) to 0.14 (Engelhardt (1996)), and several points in between (e.g., 0.02 for Spain, Bover (2005), which also provides a

comprehensive survey of recent theoretical and empirical literature in this area). Lastly, Case, Quigley, and Shiller - CQS (2005) - report an MPC estimate of 0.15 for a panel of 14 OECD countries, and between 0.05 and 0.09 for a panel of U.S. states. All in all, empirical evidence from macroeconomic, regional, international, and microeconomic data seems to suggest a small but statistically significant MPC out of housing wealth.

In this context, the present study offers some estimates of MPC out of housing capital gains for Canada based on the micro data collected in the Survey of Household Spending (SHS). The SHS contains comprehensive data on consumer expenditures, income, household composition, and, most important for the results presented in this paper, information about the characteristics of individual housing units (more on that in a moment). It is the first such analysis of this data set and suggests an MPC estimate of 0.08 for all consumption expenditures and 0.06 if durables purchases are excluded (pooled sample, 2004-2006). More generally, it is argued that one reason for the wide ranging and often conflicting results in this important area of research might be the disparate methods of estimating capital gains, home values, and price movements which have been used in the literature. The list includes perpetual inventory aggregations of construction cost (Elliott (1980), also employed in Flow-of-Funds and Census of Housing compilations), homeowners' own estimates of house value (the US Panel Study of Income Dynamics (PSID) for instance), price indices of various sorts (Campbell and Coco (2007), for U.K.), and so on.

The mainstay of the analysis here is a rather innovative application of the hedonic technique which deconstructs the actual purchase price of a house to permit estimation of implicit prices for individual housing characteristics. By repeating this exercise for successive years, we get a measure of accrued capital gains which, arguably, reflects price movements better than local or regional house price indices and other proxies. It is a measure of pure price change, and when micro data are used, it takes into account the specific housing characteristics of each household. It also facilitates computing "expected" or "permanent" capital gains which heretofore has been done only with aggregate time-series data. Both theoretical and practical considerations suggest that "expected gains" are better than "current" gains in explaining household decisions.[2]

The rest of the paper is organized as follows: Section 2 deals with theoretical considerations and some aspects of estimating accrued capital gains. Section 3 describes the SHS data and discusses the methodology. The principal results are presented in Section 4. An appraisal of the specifications and results is in Section 5.

[2]As a practical matter, a household is not likely to respond to every move in house prices especially if non-trivial transaction costs or credit constraints are involved. Bhatia (1972) provides a theoretical justification for "expected gains," based on the Permanent Income Hypothesis.

2 Theoretical Considerations and Empirical Issues

In the rather extensive literature on household-wealth effects, especially among studies designed to inform econometric work, two ideas seem to predominate: First and foremost, that consumption decisions are affected by "expected" or "permanent" rather than current period gains; and second, what matters is appreciation in asset prices (accrued capital gains) rather than gains actually realized through the selling of appreciated assets. Realization decisions and their timing often depend on complex considerations involving portfolio balance, credit market conditions, and tax matters, even the execution of an expenditure decision made earlier. Accordingly, in specifications of a consumption function, as discussed in Bhatia (1972), expected accrued gains can be included directly in income (the "income approach") or in a measure of expected wealth (the "wealth approach"). Econometric evidence offers stronger support for the latter; therefore, consumption equations based on the wealth approach continue to be used even when researchers are interested in the effects of different components of wealth or in housing wealth per se.

The advent of large bodies of survey data during the last decade or two has facilitated estimation of household-level consumption functions, with a focus on variations across households or cohorts of them (Bostic, Gabriel, and Painter (2009) provide a recent literature survey). The key questions, now specific to each household, are: which wealth variable is relevant for making expenditure decisions - own estimates of home value, market values, accrued gains estimated from a price index, or something else; and how much of the price appreciation in a given year might be regarded as permanent? As far as we can tell, these questions have never been asked in a survey even though the richness of many micro data sources is truly amazing (large sample sizes, panels of observations, and lots of information about household characteristics). Self-reported home value is usually the information made available in such data sets, but as CQS (2005) point out - generally, not referring to a particular survey - households may have difficulty in accurately measuring their wealth from time to time, especially short-run changes in real estate values, or in deciding how much of the unrealized capital gain might be transitory (p.173).

Market value versus self assessment

The jury is still out on how well survey respondents assess the market value of their own homes. Kish and Lansing (1954) provided some early evidence (verdict "uncertain"), and more recently, Englehardt (1996) cites reports of consistent overvaluation of about 10 percent by survey respondents in some areas. CQS (2005) mention two studies based on the 1990 Census of Population and Housing, one measures the bias in owner estimates of house values at minus 2 percent, the other at plus 6 percent. If this problem is serious, and it appears to be non-trivial, even the top level estimates of accrued gains will be inaccurate, before any expectations mechanism is specified (Bhatia (1970)). Selective indices of real estate prices are sometimes used

to circumvent this issue, but finding a suitable index which is accurate and also covers the range of homes and dwellings represented in a typical survey can be a challenge (Bhatia (1971)). The SHS, for example, has respondents in rural and urban areas (with different sized populations), in single family homes, apartments, condominiums, etc. For U.S.A, Englehardt (1996) mentions the results in Poterba (1991) and Case and Mayer (1996) which suggest that different homes appreciate at different rates, even across localities in metropolitan areas. The hedonic approach described in Section 3 avoids possible errors caused by using price indices as it takes into account all the information about a housing unit provided by a survey respondent. Many of the studies cited above show that for estimating wealth effects different methods of estimating capital gains can lead to very different results. This was the main difference between the regression results presented in Elliott (1980) and Bhatia (1987) noted earlier. From micro data analyses also, Englehardt's discussion of two studies, Skinner (1996) and Hoynes and McFadden (1994) is quite illuminating, for they report estimates of marginal propensity to save with opposite signs from essentially the same PSID data. One point of contrast between the two is that Skinner uses self-reported values whereas Hoynes and McFadden rely on the market price of houses.

Permanent and transitory gains

In light of the life-cycle or permanent-income hypotheses, the importance of isolating permanent and transitory components cannot be gainsaid. Since the effect of an asset appreciation is likely to be spread over several periods, a distributed lag process has been commonly employed to generate "expected" variables with time-series data. Ideally, with micro data, one would like to determine household-specific gains, much like the other variables, but such questions are seldom asked in surveys, nor is there a commonly agreed method of estimating permanent or transitory gains from survey responses. It is doubtful, though, that satisfactory measures can be constructed from just one or two data points, especially if actual market prices are not incorporated into the estimates. Englehardt (1996), for instance, tries to predict accrued gains one year hence (for 1984-85, from a regression equation incorporating variables for 1983-84 or earlier) and treats the residuals as unanticipated capital gains for that year. Another example is Campbell and Coco (2007) in which "Predictable changes in house prices" are represented by an index of house-price growth in the region where the household lives. It is difficult to judge if either approach produces a good measure of permanent or transitory capital gains for each household.

At this juncture, it seems that with most existing micro data sets one can either assume that a household's perception of wealth - hence self-reported home value, right or wrong - is all that matters for its decision making, which is a rather strong assumption indeed, or try different ways of incorporating market prices and estimating permanent gains wherever data permit. The methodology developed in the next section is one

such approach. It relies heavily on market prices and, arguably, leads to better measures of household-specific capital gains.

3 The Data and Methodology

The primary analysis in this paper is based on the SHS data for the years 2000-2006. The main consumption function regressions relate to a pooled sample covering the years 2004-2006, although accrued capital gains are estimated for the period 2000-2003 as well.

The SHS data

Each year, about 16,000 respondent households are interviewed for this survey, and the sample is representative of about 98 percent of the Canadian population. It is an independent sample each year, so it provides a sequence of cross sections rather than a panel data set. Housing is the most widely held asset-type, with 62 percent of the respondents reporting home ownership in most years. Two remarkable features of these surveys are: (i) it identifies households that bought a house in the survey year and also reports its purchase price, and (ii) it provides information on a number of attributes, such as type of housing structure, the year in which it was built, number of rooms, and location, for **all** housing units. It also has information on household composition, income, education level, employment, and demographic variables. Moreover, direct questions are asked about durables and nondurables purchases, so these do not have to be computed from data on saving, as in the US PSID or extrapolated from information about a small number of consumption categories.

The methodology

The centerpiece of the methodology is the hedonic approach which breaks down the price of a composite good into implicit or shadow prices of each of its attributes. For a simple example, consider regressing the price of a house on, say, number of bedrooms, lot size, and a dummy variable for location (urban, rural, etc.). The regression coefficients then could be interpreted, respectively, as the implicit prices per bedroom and per square meter of land, and the premium for an urban setting. Repeating this exercise for other years will yield a set of estimates for these implicit prices, one set for each year, from which one can compute the shadow price of a "constant mix of attributes" over time. The first differences in this series will provide a measure of accrued capital gains, or what Englehardt (1996) calls "passive capital gains." The same computation can be done by using first differences in the regression coefficients which can be interpreted as a vector of "pure price changes," isolated from the implicit value of other attributes ("quality," for example). Pure price change, in the present context, is a measure of accrued capital gains, and that is the crucial first step. Notice that these estimates are derived from actual purchase prices, not from self-reported home values,

and they take into account the characteristics of every household's dwelling unit. In these two respects, no regional price index or other proxy can fare better. The hedonic approach has been around for a long time, and there are dozens of hedonic analyses of housing markets (Sheppard (1999) provides a literature review), but as far as we can tell, this is the first application of hedonic techniques for estimating accrued capital gains.

The data set for the regression equations is a sub-sample which reported a house purchase in a given year (several hundred respondents). Accrued gains – G_t – are then computed for every other homeowner for a number of years. Since the exact date or month of the house purchase is not available, any price appreciation during that year has to be ignored. The procedure, moreover, is backward-looking insofar as accrued gains for all years prior to the purchase are computed. More precisely, with the SHS data, we can get four estimates of G_t for 2004, five for 2005, and six for 2006 - for each household that reported owning a home but not buying one in a given year - a non-home-buying-home-owner (typically, several thousand in each year).

The next step is to compute a measure of permanent gains, G_t^p. It is often stated, with some evidence from surveys of home-buyers, that their expectations about the future are backward looking (CQS (2003)). With aggregate data, a "backward moving average" is sometimes included (Maki and Palumbo (2001)). On the whole, though, there seems to be greater support in the time-series literature for a distributed lag approach, with weights declining over time, which implies that the most recent price appreciation has the biggest impact, and it attenuates with the passage of time. Since several estimates of G_t are available, we can implement a distributed lag function. Accordingly,

$$G_t^p = \lambda_t G_t + \lambda_{t-1} G_{t-1} + \lambda_{t-2} G_{t-2} + \lambda_{t-3} G_{t-3} \quad (1)$$

where $0 < \lambda_i < 1$, $\lambda_t > \lambda_{t-1}$, and the sum of all λ's is constrained to unity. Transitory gains - G_t^T - will be defined as $G_t - G_t^p$, and can be positive or negative.[3]

4 The Main Results

The basic consumption equations regresses consumption on current after-tax income (Y_t), permanent capital gains (G_t^p), and a number of household characteristics such as age and education level of the head of household, employment status, and so on. All nominal variables are expressed in 2006 dollars using the CPI index compiled by Statistics Canada. Data are pooled for the years 2004-2006 to smooth the effects of any extraneous changes which might be happening. Lastly, in order to have a square data matrix for the pooled

[3]This is a roundabout way of capturing some aspects of a geometric lag function which has the weights λ, $\lambda(1-\lambda)$, $\lambda(1-\lambda)^2$.... These will sum to unity in an infinite series. The number of G_t data points here, however, is too small to use that exact specification.

sample, the right-hand side of equation (1) is used, with only four G_t terms in each case even though for 2005 and 2006, respectively, we could compute five and six such terms. The final equation is:

$$C_t = \alpha + \gamma Y_t + \beta(\lambda_t G_t + \lambda_{t-1} G_{t-1} + \lambda_{t-2} G_{t-2} + \lambda_{t-3} G_{t-3}) + \theta X_t + \varepsilon_t \qquad (2)$$

$$s.t. \quad \lambda_{t-h} = \omega\delta(1-\delta)^h \quad for \quad h = 0,..,3, \quad and \quad \frac{1}{\omega} = \sum_{h=0}^{3} \delta(1-\delta)^h$$

where t denotes a household of survey year t, C_t denotes the household's annual purchases of consumption goods, Y_t denotes the household's current-period after-tax income, G_t, G_{t-1}, G_{t-2}, G_{t-3} denote our estimates of capital gains for the current period, 1st lag, 2nd lag, and 3rd lag respectively, X_t are household characteristics, ${\lambda_{t-h}}^4$ are the weights discussed above, and ε_t, is the error term.

G_t is the accrued capital gain relevant for making the consumption decision in year t. In reality, because of the assumption that capital gains in the year in which a house is purchased are ignored, the G_t terms are lagged by one period. For example, if t represents 2006, the most recent capital gain will be for 2005 even though both C and G have the same subscript, t, in equation (2).

It should be obvious that equation (2) is non-linear in the parameters: MPC (denoted by β) and the $\lambda's$ enter multiplicatively. Therefore, equation (2) is estimated by using a non-linear estimation procedure. The results are presented in Table 1.

Table 1: Permanent Housing Capital Gains

	Total Consumption	Non-Durable Consumption
Permanent Housing CG	0.084	0.060
	(0.000)	(0.000)
After Tax Income	0.269	0.178
	(0.000)	(0.000)
	λ_1 .288	λ_1 .260
	λ_3 .237	λ_1 .215

P-Values in parenthesis.

Our MPC estimates suggest that households spend an additional 8.4 cents on total consumption for every one-dollar increase in permanent housing capital gains, and approximately 6 cents on non-durable purchases.[5]

[4]The structure imposed on the λ's ensure they sum to unity and attenuate over time.

[5]The MPC estimates for after-tax income are low at approximately 27 cents for total consumption, and 17.8 cents for non-

Since the main innovation in this paper is the inclusion of permanent capital gains, it is useful to consider how the results might change if only one or two G_t terms are included (referred to as "Temporary Capital Gains," not to be confused with "transitory" gains which were defined earlier as G_t - G_t^P) . The resulting estimates are presented in Table 2 (below).

Table 2: Temporary Housing Capital Gains

	Current Gains		1-Year Lag	
Total Consumption	0.016	(0.000)	0.013	(0.000)
Non-Durable Consumption	0.010	(0.000)	0.009	(0.000)

P-Values in parenthesis.

The MPC estimates now are 0.016 for total consumption and 0.01 for non-durable consumption, much smaller than their counterparts for permanent gains.

5 An Appraisal of the Methodology and the Results

The results presented above are the first such MPC estimates for Canada derived from a micro-data set. These are based on the notion of permanent gains for which there is considerable support in economic theory as well as time-series evidence. Such ideas are expressed in the literature based on micro data as well, but such data, typically, are limited to one or two observations.[6]

The principal methodological innovation is the application of the well-known hedonic approach for this purpose. The SHS data are suitable for implementing this approach for a number of years; presumably, other existing data sets elsewhere, possibly with some extensions or additional data gathering, can be similarly used.

Although the consumption functions specified above rely on some aspects of the Permanent Income Hypothesis (PIH), equations (1) and (2) are not complete PIH specifications. That will require several observations on current income from which permanent income can be computed, perhaps analogously to how G_t^P was specified in Section 3. Current income, in effect, is being used as a proxy for permanent income. As an empirical matter, some lagged-income terms are being omitted from the estimating equation,

durable consumption only; this may have resulted from the inclusion of current income as a proxy for permanent income - this issue is discussed more fully in the main paper, and in section 5.

[6]Englehardt (1996, p.315), for example, states that ". . . in the absence of liquidity constraints, the real housing capital gains must be unanticipated and perceived to be permanent by home owners. Transitory gains would have no effect on consumption decisions . . ."

so the MPC coefficient could be biased, depending on the error terms. The same reasoning applies to the "wealth approach" noted in Section 2. Now, data on wealth lagged one period (W_{t-1}), along with several observations on non-wealth income would be required. Neither alternative, unfortunately, is feasible here because the SHS is not a panel data set, nor does it provide any information on other wealth components or total wealth. There is no information on mortgage debt or net housing equity either.

References

[1] Benjamin, J., Chinloy, P. and Jud, G., "Real Estate Versus Financial Wealth in Consumption," *Journal of Real Estate Finance and Economics*, vol. 29, no. 3, (November 2004), 341-354.

[2] Bhatia, K.,"Accrued Capital Gains, Personal Income and Saving in the United States, 1948-1964," *Review of Income and Wealth*, vol. 16, no. 4, (December 1970), 363-378.

[3] Bhatia, K.,"A Price Index for Nonfarm One-Family Houses, 1947-1964," *Journal of the American Statistical Association*, vol. 66, no. 333, (March 1971), 23-32.

[4] Bhatia, K.,"Capital Gains and the Aggregate Consumption Function," *The American Economic Review*, vol. 63, (December 1972), 866-79.

[5] Bhatia, K.,"Real Estate Assets and Consumer Spending," *Quarterly Journal of Economics*, vol. 102, (May 1987), 437-444.

[6] Bostic, R., Gabriel, S. and Painter, G., "Housing Wealth, Financial Wealth, and Consumption: New Evidence from Micro Data," *Regional Science and Urban Economics*, vol. 39, no. 1, (January 2009), 79-89.

[7] Bover, O., "Wealth Effects on Consumption: Microeconometric Estimates From the Spanish Survey of Household Finances," *Banco De Espana Working Paper*, No. 0522, (2005).

[8] Campbell, J, Cocco, J, "How Do House Prices Affect Consumption? Evidence From Micro Data," *Journal of Monetary Economics*, vol. 54, (2007) 591-621.

[9] Case, K. and Mayer, C., "Housing Price Dynamics Within a Metropolitan Area," *Regional Science and Urban Economics*, vol. 25, (1996), 397-407.

[10] Case, K., Quigley, J., and Shiller, R., "Home-Buyers, Housing and the Macroeconomy," *Berkeley Program on Housing and Urban Policy, Working Paper*, Institute of Business and Economic Research, UC Berkeley, (2003), 149-188.

[11] Case, K., Quigley, J., and Shiller, R., "Comparing Wealth Effects: The Stock Market Versus the Housing Market," *Journal of Macroeconomics: Advances in Macroeconomics*, vol. 5, no. 1, (2005) 1-32.

[12] Dvornak, N. and Kohler, M., "Housing Wealth, Stock Market Wealth and Consumption: A Panel Analysis for Australia," *The Economic Record*, vol. 83, no. 261, (June 2007), 117-130.

[13] Elliott, W., "Wealth and Wealth Proxies in a Permanent Income Model," *The Quarterly Journal of Economics*, vol. 95, (Nov. 1980), 509-35

[14] Hoynes, H. and McFadden, D., "The Impact on Demographics on Housing and Non-Housing Wealth in the United States," *NBER Working Paper*, 4666, (March 1994).

[15] Kish, L. and Lansing, J., "Response Errors in Estimating the Value of Homes," *Journal of the American Statistical Association*, vol. 49, no. 267, (September, 1954), 520-538.

[16] Maki, D. and Palumbo, M., "Disentangling the Wealth Effect: a Cohort Analysis of Houshold Saving in the 1990's," *BoG Federal Reserve System (U.S.)*, Finance and Economics Discussion Series, (2001).

[17] Poterba, M., "House Price Dynamics: The Role of Tax Policy and Demography," *Brookings Paper on Economic Activity*, vol. 2, (1991), 143-183.

[18] Sheppard, S., "Hedonic Analysis of Housing Markets," *Handbook of Regional and Urban Economics*, vol. 3. Applied urban economics. (1999), 1595-1635.

[19] Skinner, J., "Is Housing Wealth a Sideshow?," *Advances in the Economics of Aging*, (1996), 241-269.