THE UNIVERSITY OF SYDNEY

Economics Working Paper Series

2013 - 04

Housing Wealth and Household Consumption: New Evidence from Australia and Canada

Kadir Atalay, Stephen Whelan & Judith Yates

March 2013

Housing Wealth and Household Consumption: New Evidence from Australia and Canada

Kadir Atalay, Stephen Whelan and Judith Yates[*]

Abstract*: Over the past two decades a number of countries have experienced an increase in house prices at the same time that aggregate consumption has been observed to increase. Alternative hypotheses have been put forward to explain this pattern. In this paper we test these hypotheses by using repeated Household Expenditure Surveys from Canada and Australia to identify the transmission mechanism that links consumption and household wealth. The empirical analysis suggests that neither a direct wealth effect nor a common causal factor is a likely explanation for the observed correlation between wealth and consumption. Rather, indirect factors such as relaxation of credit constraints are more likely explanations.*

Keywords:house prices; household consumption; housing wealth; wealth effects; collateral constraints; pseudo-panel

JEL codes: D12; E21

1. Introduction

The relationship between household wealth and consumption behaviour has been of ongoing interest to economists following the development of life-cycle models of behaviour and the permanent income hypothesis during the 1950s. In more recent times increases in asset prices and innovations in financial markets have focussed the attention of policy makers, especially monetary authorities, on this relationship (Muellbauer and Murphy 1990). As noted by Hiebert (2006), increases in real asset prices in a range of countries in the mid 1990s to early 2000s coincided with a decrease in the aggregate saving ratio and a corresponding increase in aggregate consumption.

The principal aim of this paper is to distinguish between the alternative explanations that have been provided for any observed correlation between housing prices and household consumption. In the literature there is a broad consensus about the existence of a positive relationship between asset prices, household wealth and consumption. There is less agreement, however, about its size and its cause. Empirical estimates which attempt to identify the magnitude of the wealth consumption relationship vary widely. Similarly, the question of how consumption and wealth or more generally asset prices are linked remains unresolved. It may be that an (unanticipated) increase in wealth leads directly to an increase in consumption. Alternatively, such increases in wealth may induce higher consumption through the relaxation of credit constraints (Campbell and Coco 2007), or it may be the case that both wealth and consumption are affected by a common causal factor, such as productivity growth (Attanasio and Weber 1994).

Although all these factors may contribute to the strong consumer spending through early 2000s, they have different implications for a number of policy issues (Attanasio and Weber 1994). For this reason it is important to distinguish between those competing hypotheses for the consumption boom. Further, recent developments following large macroeconomic shocks in 2008 have focussed attention on the relationship between asset prices and consumption Asset price growth has slowed substantially following the 2008 financial crisis. Understanding the link between asset prices, especially housing, and consumption is likely to shed light on the consequences of these recent developments.

The analysis in this paper makes a number of important contributions to the empirical literature on these issues. First, it provides new evidence on the relationship between consumption and asset prices by utilising household level data from Canada and Australia spanning approximately three decades. During the period covered by the analysis, the change in house prices observed in Australia and Canada is remarkably similar. For this reason a comparative study has the potential to shed light on the underlying causal relationship. Like earlier studies that have used household level data, a key benefit of the analysis is the ability to disentangle the alternative hypotheses about transmission mechanisms linking household wealth and consumption. Unlike earlier studies that have used a similar methodology such as Attanasio *et al* (2008) and Campbell and Cocco (2007), the data used in this study contains detailed information on wealth (house prices) at the household level. This feature of the data obviates the need to rely on aggregate or regional level measures to identify the relationship between consumption and wealth and facilitates a better analysis of the wealth-consumption nexus. Throughout the analysis, the primary focus of this paper is on distinguishing between the alternative mechanisms that have been put forward to explain this nature of this relationship. Nonetheless, the empirical estimates do provide insight into the magnitude of the relationship between consumption expenditure and housing wealth.

The analysis also represents a useful comparative study of two mid-sized economies. Since the early 1990s both countries experienced periods of sustained economic growth that slowed, though in the case of Australia not completely, following the macroeconomic shock associated with the global

financial crisis. Australia and Canada share a number of characteristics including institution arrangements, the central role of immigration in driving economic growth and the importance of natural resources. Significantly for the purpose of the current analysis, the experience of both countries with respect to changes in housing prices and consumption behaviour are remarkably similar over the past two decades. An analysis of these two countries potentially sheds light on the underlying mechanism that drives the house prices and consumption relationship

The empirical analysis suggests that the increase in housing wealth experienced by households in recent years has relaxed the credit constraints experienced by some households and thereby facilitated a higher level of consumption expenditure. The econometric estimates indicate that a marginal propensity to consume out of housing wealth of around 0.01-0.016 for both Australia and Canada. That is, every additional $1 increase in housing wealth is associated with increased annual aggregate consumption of between $0.01 and $0.015. Although estimates of the effect of increased housing wealth on aggregate consumption are lower than those of other studies that have analysed aggregate data, they are consistent with those from studies using household level data.

More significantly, the results do not provide evidence consistent with either a direct wealth effect or a common causal factor explanation of an indirect relationship between wealth and household consumption. Rather, they suggest that the increase in asset prices experienced by households in Australia and Canada in recent years have relaxed the credit constraints experienced by some households and thereby facilitated a higher level of consumption expenditure.

The remainder of this paper is set out as follows. In the next section we describe the patterns of consumption and wealth that have been observed in Australia and Canada over the past three decades. In section three we describe the various mechanisms by which wealth and consumption may be related. In section four we review the extensive empirical evidence on the size of this relationship and, in more detail, review the limited evidence on the cause of the observed relationship between household wealth and consumption behaviour. Following this, we describe the Household Expenditure Surveys used in the empirical analysis and set out the empirical methodology used to distinguish between alternative transmission mechanisms. In section seven we present results. The final section sets out conclusions.

2. Household Wealth in Australia and Canada

The analysis in this paper examines the experience of households in Australia and Canada over the last three decades. During this period real household wealth per household increased significantly, primarily as a result of increases in real house prices which grew by an average of more than 3 per cent per annum in both countries. In terms of housing prices, the experience of both Australia and Canada is remarkably similar during this period (figure 1). House prices grew modestly until 1990, and then following a period of stagnation in 1990s, prices grew rapidly in the 2000s.

[Figure 1 about here]

For both countries it seems reasonable to assert that the increases experienced in the 2000s were unanticipated given the extent to which the average increases in real house prices exceeded the earlier

trend. In both countries the increase in house prices in the last decade has been attributed to a variety of factors including a combination of declining long-term effective mortgage rates, financial innovations that made investor finance both cheaper and more readily available, changes in the liquidity of the housing market and tax changes.

This increase in real house prices contributed to a significant increase in the housing wealth of households from the late 1990s. For Australia, in the five year period from 1998-99, median household wealth surged by more than 50 per cent. For Canada median household wealth increased by 25 per cent between 1999 and 2005. In 1998-99 dwelling assets represented 53 per cent of total gross wealth in Australia and 59 per cent in Canada. By 2003-04 this share had increased to 62 per cent in both countries. A range of studies have identified a negative correlation between household wealth, much of which is tied up in dwelling assets, and household saving rates. Hiebert (2006), for example, illustrates the close correlation between asset price inflation and declines in the saving rates for Australia, Canada, the United States and the United Kingdom for the period 1972 to 2002. These countries were selected because of the work of Bertaut (2002) and Barrell and Davis (2004) which shows a bigger wealth effect on consumption in these four countries than in other OECD countries. While clearly there are a number of factors that affect household saving and therefore consumption, the close relationship between these aggregate measures has led to increased interest in the question of how wealth is related to household consumption.

Figure 2 shows average per capita per week expenditure on goods and services (excluding housing costs) from the pooled household expenditure surveys of Canada and Australia at constant 2002 prices. For both countries, it is clear that strong consumption growth is observed through the late 1990s and 2000s. The fact that around these times we also observe rising 'asset prices," especially housing prices, motivates our primary research question, namely what is driving the observed relationship between asset prices and consumption in Australia and Canada?

[Figure 2 about here]

3.   Wealth and consumption – theoretical considerations

The underlying rationale for presuming a relationship between household consumption and wealth lies in the life-cycle model (LCM) or permanent income hypothesis (PIH). In the simplest version of this framework, household consumption is assumed to depend on expected life-time income. Households smooth out fluctuations in current income by borrowing against future earnings early in life; by accumulating wealth (through saving) when income is relatively high; and by drawing on that wealth (through dis-saving) when income is relatively low. Anticipated changes in wealth are built into consumption plans; unanticipated changes lead to a revision of those plans. This stylised description of the PIH may be enriched by incorporating real world considerations such as liquidity constraints, bequest motives and uncertainty about future income and expenses (Browning and Lusardi 1996).

Three explanations or transmission mechanisms that might explain the positive relationship observed between changes in household wealth and consumption have emerged in the literature. These are summarised below. The first is described here as a direct effect; the remaining two are described as indirect effects.

3.1. Direct effect: unanticipated wealth channel

The prediction of the LCM that unanticipated increases in wealth will lead to an increase in consumption provides the basis for what is termed the 'direct wealth effect'. In short, an unexpected increase in wealth allows a consumption smoothing household to increase consumption at all points in its life-cycle, *ceteris paribus*. One possible source of increased wealth, at least among home-owning households, may be the increased housing wealth derived from unanticipated increases in house prices.

In its most simple form the PIH makes no distinction between different types of wealth. There are, however, a number of reasons why changes in housing wealth might have a different impact on consumption compared to an increase in financial wealth (Dvornak and Kohler 2007; Sierminska and Takhtamanova 2007). The illiquid nature of housing assets suggests that increases in this form of wealth may have a more muted impact on consumption than changes in financial wealth. Conversely, housing assets tend to be held more widely than financial assets among lower income earners who generally have a higher propensity to consume out of income. Other factors, such as the permanency of increases in housing prices or psychological factors that lead households to earmark housing assets for long term savings may lead to greater or lower impacts of housing on consumption (Mishkin, 2007; Shefrin and Thaler, 1988).

One view of housing wealth suggests that unlike increases in financial wealth, increases in house prices do not make a household better off. Any increase in housing wealth will increase the opportunity cost of the services provided by housing so that any positive effect associated with higher house prices is offset by an increase in the cost of housing consumption. The benefit of a capital gain earned by a trading down or last-time seller is offset by the cost to a trade-up or first-time buyer (King, 1990; Buiter 2007, 2008). Notwithstanding this argument, changes in housing prices may still induce an aggregate consumption response in some circumstances when, for example, there is an asymmetry between gainers and losers from changes in housing wealth which works in favour of a positive effect on consumption from house prices (Poterba 2000).

3.2 Indirect effect: credit constraint channel

Consumption expenditures may also be affected indirectly by changes in the housing wealth of households. The first 'indirect mechanism' identified in the literature reflects the role of housing as collateral for loans. For those households unable to borrow against future income and who must instead rely on housing to provide collateral against secured loans, increases in housing wealth facilitate increased borrowing against the equity in their homes. That is, by facilitating mortgage equity withdrawal increases in housing wealth can increase household consumption. Moreover, if improvements in household balance sheets result in access to cheaper finance than would otherwise have been possible, this can give rise to a financial accelerator as changes in net worth affect external finance premiums and the cost of credit (Aoki *et al*. 2004; Klyuev and Mills 2007).

3.3 Indirect effect: common cause channel

Muellbauer (2007) highlights a second indirect channel through which wealth effects might be transmitted: namely the 'common cause' channel. For example, it may be the case that increases in house prices were stimulated by the financial or credit market liberalisation that took place in the 1990s and 2000s. This improved access not only to secured credit (which is affected by collateral constraints) but also to unsecured credit (which is not affected by collateral constraints). As a result, consumption increased because borrowing constraints were relaxed for all households, not just for those with housing wealth. In a critique of Muellbauer and Murphy (1990), King (1990) suggested

other factors also can provide a similar common cause effect. For example, changes in real interest rates or income expectations arising from productivity shocks that affect both consumption and house prices may explain the observed correlation between increases in house prices and increases in household consumption (Attanasio *et al.* 2008).

4.   Literature review – empirical evidence

Numerous studies have sought to identify the magnitude and nature of the wealth-consumption relationship. Table A.1 in the Appendix provides a summary of some of the key studies. Many of the aggregate (time series) studies claim to provide strong support for the existence of a direct wealth effect. One noteworthy feature of the aggregate studies identified in Table A.1 is the variability of the measured impact of wealth on consumption and the relative effect of changes in housing and financial wealth.

The possibility that wealth and consumption are affected via an indirect mechanism has led to a concern that aggregate data may reflect spurious relationships (Dolmas 2003). This concern lies behind attempts to introduce panel effects into aggregate time series analyses, for example, by disaggregating to a regional level as done by Case *et al.* (2005) for the United States and Dvornak and Kohler (2007) for Australia, or by undertaking cross country analyses (Labhard *et al.* 2005; Ludwig and Sløk 2004). However, aggregate studies that incorporate a panel aspect also show little consensus on the relative importance of financial and housing wealth on household consumption.

Neither aggregate time series studies, nor aggregate panel data studies, have been able to shed light on the transmission mechanisms through which household wealth might have an impact on household consumption. In comparison, the availability of household level consumption data that can be linked to measures of household wealth and characteristics provides such an opportunity. For example, consider the case where the impact of an unanticipated increase in wealth (or, in particular, in the value of housing), operates through a direct wealth effect channel. In this case, the PIH suggests that older households would be expected to increase their household consumption by more than younger households. Older households are more likely to be owners and moreover, the shorter life-span they have left in which to enjoy the benefits of the equivalent windfall gain should induce a larger consumption response (Grant and Peltonen, 2005). In a similar fashion, existing home owners would benefit from the increased value of dwellings whereas renters will not. Renters may in fact reduce consumption as higher dwelling prices require additional savings if the household anticipates entering homeownership in the future.

Alternatively, if the effects of an increase in house prices and housing wealth are transmitted indirectly by changes in credit constraints, then only credit constrained households will be affected by the increased collateral available (Aoki *et al.*, 2004; Campbell and Cocco, 2007; Disney *et al.*, 2006). Finally, if wealth effects are driven by a common factor such as a productivity shock, then the household consumption of renters should be affected as much as that of home-owners. Further, young households are more likely to be affected than the old because they have a longer period over which expectations of higher incomes have an impact (Attanasio *et al.*, 2008; Benito *et al.*, 2006).

Results from a series of studies using household level microdata (cross section and panel) are also presented in Table A1. In general these studies find that the responsiveness of consumption to changes in wealth is generally lower than that identified in the analyses that rely on macroeconomic data. Nonetheless, it remains the case that, like the aggregate studies, there is limited agreement on the relative responsiveness of consumption to changes in financial and housing wealth. It is likely that the

divergence in results reflects the variety of techniques and datasets applied to the question of interest. Some recent household level studies such as those by Berben *et al*. (2006), Bostic *et al*. (2006), Bridges *et al*. (2004) and Browning *et al*. (2008) use true panel data with repeated observations on the same set of households. In some cases, however, the data were available only for a relatively limited time period and in other cases, estimates or proxies had to be employed for some of the key variables in the analysis.

The more relevant studies for the analysis presented in this paper are those of Attanasio and Weber (1994), Attanasio *et al*. (2008) and Campbell and Cocco (2007).[1] These studies use data sourced from the UK Family Expenditure Survey (FES) to analyse the consumption behaviour of a set of households by constructing pseudo-cohorts. Although the actual households that form each cohort differ across surveys, they all share some common characteristics. Attanasio *et al*. (2008) use cohorts defined according to the year of birth of the head of the household. Campbell and Cocco (2007) use regional and tenure characteristics to supplement cohorts based on year of birth. Attanasio *et al*. (2008) control for cohort membership in their regression analysis and use the individual household as the unit of observation. Campbell and Cocco (2007), on the other hand, use cohort means as the unit of observation in a similar fashion to that described in Deaton (1985) and Browning *et al*. (1985). Importantly for the contribution made by this paper, both studies use changes in regionally defined house price indices to proxy for changes in housing wealth experienced by households.

Despite using the same dataset, the results derived from their analyses differ substantially. Attanasio *et al*. (2008) find that house price growth has the largest effect on the consumption of the youngest (most recently born) cohort and the smallest effect on that of the oldest cohort. They also find that renters have a similar consumption response to changes in house prices to home owners. They conclude their results are consistent with a common causal factor as the source of the relationship between wealth and consumption. That is, they explicitly reject the direct wealth effect and the credit constraint transmission channels. Instead expectations about higher incomes in the future are suggested as the most likely explanation for the positive correlation between measures of household wealth and consumption. Conversely, Campbell and Cocco (2007) find that house price increases have the greatest effect on consumption for older home owners and the lowest effect on the consumption for young renters. These results are consistent with the credit constraint channel being the mechanism that links housing wealth and consumption.

The divergence in their results appears to be a function of their specific methodologies. In addition to the differences outlined above in the way in which cohorts are defined and employed, there are differences in the time periods covered and in their model specifications. On the basis of a comparison exercise undertaken to examine the extent to which the results of these two studies are robust to the methodological differences between them, Cristini and Sevilla (2008) argue their tests lend support to the common cause effect postulated in Attanasio *et al*. (2008).

The analysis in this paper adds this debate by examining household behavior in Australia and Canada. As described above, the experience of Australia and Canada in terms of housing prices and consumption behaviour is similar over the study period. Furthermore, the data used for both countries contains information that in general is not available in similar studies. In particular, the Australian and Canadian data include information about owner estimated house values and hence captures these trends at a household level. A key contribution of this paper is that unlike the UK studies identified above, this obviates the need to rely on aggregate or regional level measures.

---

[1] Attanasio *et al*. (2008) updates the earlier analysis in Attanasio et al (2005) and both extend that initially undertaken in Attanasio and Weber (1994). Campbell and Cocco (2007) is a later version of Campbell and Cocco (2005). The discussion focuses on the results reported in the most recent of these publications.

Our analysis shows that relationship between house prices and consumption is stronger for middle aged rather than younger and older households in both countries. That is, we provide support for the conclusions reached by Campbell and Cocco (2007) whilst using a methodology more closely aligned to that employed by Attanasio *et al.* (2008).

5.   Data and Descriptive Statistics

The methodology in this paper can be summarised as follows. Using a series of cross-section surveys of Australian and Canadian households dating back to the 1970s we define a series of cohorts based on year of birth. Using individual household data we then estimate a series of empirical models that seek to identify how wealth, in particular house prices, influences household consumption. In this section we describe the data for both countries and present descriptive statistics. Both Australian and Canadian data are unusually good quality expenditure surveys. Barrett *et al.* (2012) provide a through international comparison of the Australian, Canadian as well as US and UK household expenditure surveys. One of the criteria they used is comparison of expenditure measures in the survey data with national accounts. They reported that for Australia the proportion of consumer expenditure in the national accounts that is accounted for in the household surveys (coverage rate) is around 70 per cent range, with no discernible trend. For Canada, the coverage rate is reported close to 1.0 for both the Family Expenditure Survey (FAMEX) (1969-1996) and the Survey of Household Spending (SHS) (1997-2009) periods.

5.1. Expenditure Data

5.1.1 Australian Expenditure Data

The data used are household level data from six Australian Household Expenditure Surveys (HES) undertaken in 1975-76, 1984, 1988-89 1993-94, 1998-99 and 2003-04. The HES collects detailed information about the expenditure, income and household characteristics of a sample of between 7,000 and 10,000 households resident in private dwellings. The empirical analysis uses virtually all of the 39,000 observations available from the HES where full information is available on a consistent basis across the six surveys. The only observations excluded were those where the reference person for the household was aged less than 20 years of age and those where consumption expenditure was negative.

Detailed expenditure data are available on over 600 items and are combined into thirteen broad groups (including current housing costs). Expenditure on durables is primarily recorded using an acquisitions approach and so is treated in the same way as expenditure on non-durables. The HES collects data on total expenditure on goods and services by broad expenditure group (including housing) and provides supplementary data on selected other payments such as income tax, mortgage principal payments for any owner-occupied dwelling and superannuation and life-insurance payments. The preferred measure employed in this paper consists of the total of expenditure on goods and services excluding current housing costs.[2] We deflated these values to 2002 AUD using the consumer price index (CPI). Current weekly household cash income is reported from a wide variety of sources including private income, government payments and private pensions. Household data have been collected on tenure type, dwelling type and size, household/family composition and size and location at a broad spatial level in each of the surveys. For individuals socio demographic data are collected on age, sex, marital status,

---

[2] Estimates using broader measures that include housing costs and the narrower measures such as non-durable consumption have also been undertaken. The results are similar and reported in the working paper version of the paper.

country of birth, year of arrival in Australia, participation in school and tertiary education, education qualifications, labour force and employment status, and occupation. In all surveys, age data are available in 5 year categories for those aged from 20 to 75 years at the time of the survey.

5.1.2 Canadian Expenditure Data

Statistics Canada conducted Family Expenditure surveys (FAMEX) in 1969, 1974, 1978, 1982, 1984, 1986, 1990, 1992 and 1996. From 1997, FAMEX is replaced by annual Survey of Household Spending (SHS).[3] The data used in the analysis contains all the FAMEX surveys as well as SHS surveys up to 2006. Both surveys are based on the Labour Force Survey frame and detailed information is collected about expenditure, income and household characteristics. Unlike most national expenditure surveys, the FAMEX and SHS do not have a diary component. Instead, face-to-face interviews are conducted in the first quarter of the year to collect income and expenditure information for the previous year. Thus the 1996 data were collected in January, February and March of 1997 but refer to the 1996 calendar year. Respondents are asked to consult bills and receipts and if necessary and multiple visits are made to a household. Canadian data is therefore an unusual kind of recall survey in which a considerable effort is made to ensure the quality of the data. The sample size for the FAMEX is around 6,000 to 10,000 households and for the SHS it is between 10,000 and 18,000. Annual expenditure and income information is converted to weekly amounts and deflated to 2002 CAD to ensure comparability with the Australian data.

Like the Australian data, information is available on tenure type, dwelling type and size, household/family composition and size and location at a broad spatial level in each of the surveys. For individuals socio-demographic data are collected on age, sex and marital status in all surveys. Education and occupation variables are available for FAMEX but eliminated in SHS. Age is available as a continuous variable for all FAMEX and SHS till 2002. Starting 2002, age is reported in 5 year categories for those aged from 25 to 75 years at the time of the survey. The only observations excluded were those where the reference person for the household was aged less than 25 years of age and those where consumption expenditure was negative. The total number of observations available for analysis is over 207,000.

5.2 Wealth and House Price Data

A key requirement of the analysis is a measure of asset prices, in particular housing wealth. Earlier studies by Attanasio and Weber (1994), Attanasio *et al*. (2008) and Campbell and Cocco (2007) have relied on aggregate house price information at the regional level. The richness of Australian and Canadian data means that it has been possible for the analysis in this study to be based on detailed household level measures of wealth not available in these other studies. Importantly, this household level wealth and house value data obviates the need to employ aggregate or regional house price data used in those UK studies.

5. 2.1 Australia

From 1993-94, respondents in HES are asked to report the estimated value of owner occupied dwellings and outstanding mortgage debt. Prior to 1993-94, debt but not asset information is available. Gross and net housing wealth data for owner-occupied housing are available at an individual

---

[3] The differences between the SHS and FAMEX are outlined in Statistics Canada (2000). The sample size increased, the survey became annual, population coverage broadened, and some minor changes to survey content were implemented. In the estimation to control for differences in surveys, we include an indicator variable for SHS surveys.

household level from 1998-99 on. An important feature of the 2003-04 HES data is the availability of detailed information on a range of household assets and liabilities.

In order to generate a 'real house price' level variable the self-reported house values are imputed for non-homeowners using regression methods. For home owners, self reported house values or net house wealth is regressed on a series of indicator variables that include dwelling type, number of bedrooms, state and household size. These regressions are used to impute house values for all non-home owners' observations. In some specifications, we also directly use the reported net housing wealth and net non-housing wealth with housing wealth imputed for the non home-owning households. The non-housing wealth information is reported for all households so we do not employ imputation process for this measure. Arguably there are some problems associated with self-reported values in the surveys, for example they may be contaminated by measurement error[4], may be subjected to endogenity problem in that values can be correlated with unobserved heterogeneity, or our imputation process might be problematic.

Given the potential problems associated with self reported household specific measures of house values, dwelling wealth and wealth in general, in some specifications we use Australian Bureau of Statistics' regional quarterly house price index (HPI). The HPI is published quarterly and reports house price changes in eight capital cities (ABS 1996b). This index provides cross sectional variation as well as time variation and is similar to the approach adopted in the studies for the United Kingdom.

5.2.2 Canada

Similar to the Australian HES, FAMEX asked respondents to report the estimated value of their dwellings With the replacement of the survey by the SHS, this question was eliminated. However, in both surveys there is information about the purchase price of houses bought in the survey year, as well as information about when the household moved to its current dwelling. In order to generate a 'real house price' level variable, we use the purchase price measure for households that moved into their current dwellings in the survey year. Hence, the purchase price linked directly to housing characteristics. And using the same imputation methodology as we employ for Australia, we generate the 'real house price level' variable . Finally, we in some specifications regional house prices acquired from the Teranet –National Bank of Canada composite price index are used.[5] This index collects information on 11 cities in Canada which we used to examine house price changes across five regions in Canada.

5.3 Descriptive Statistics

Table 1 reports the descriptive statistics for Australia and Canada. It is clear from this table that the general characteristics and general trends in both countries are similar. Homeownership rates are slightly higher in Australia (70 per cent) compare to Canada (65 per cent). In both countries, there is a similar increase in the weekly expenditure and income in the sample period (Figure 1 and Table 1).

The final HESs for Australia contain detailed information on household wealth and its components. Average net household worth is $451,000 (in $2002 AUD) in 2003-04. Of this, approximately 40 per

---

[4] One issue associated with household self-reported measures of housing wealth is the potential for measurement error. For US household survey data, Kiel and Zabel (1999) find that the average owner over-estimates the value of their house by 5 per cent. However, differences between sales prices and owner valuations are not related to household or housing characteristics. Against this, it can be argued that an owner's own assessment or perception of their housing wealth is likely to provide a better indicator of the impact that housing wealth has on household consumption than a possibly more accurate but externally imposed assessment about which the household has inaccurate information.

[5] http://www.housepriceindex.ca/

cent was held in the form of equity in owner-occupied property.[6] In 2003-04, the average value of owner-occupied housing for each owner was assessed at $260,000 and net housing wealth is approximately $193,000 (in $2002 AUD). The average loan to valuation ratio (LTV) across mortgage owners in Australia was 52 per cent in 2003-04. In Canada the average real house price level increased by over one-third in the early 2000s, from $156,000 in 2000 to $215,000 in 2006 ($2002 CAD).

[Table 1 about here]

In this study, cohorts are defined by the year of birth of the individual designated as the household reference person.[7] Our key methodology is the construction of a pseudo-panel from repeated cross sections.[8] Cohorts can be defined by any fixed characteristic. The most common choice of grouping is birth year, and that choice will be appropriate for our study, as a key comparison is between the behaviour of younger and older cohorts.

In practice, for both countries the data is 'stacked' and each household assigned into 5-year cohorts. That is those born prior to 1915 belong to cohort 1, those with a year of birth 1915-20 belong to cohort 2 and so on. The consumption and wealth of each 'birth cohort' is then followed over time through the use of repeated cross-sectional surveys. As discussed, data on age in some survey years is recorded using five year bands and for these surveys individuals are assumed to be the median age of the band to which they belong when defining cohort membership. We observe 14 birth cohorts in both countries that start from 1905 (1895) and ends in 1984 (1979) in Australia (Canada).

Descriptive data is presented in Figures 3 and 4 for each of the 14 birth cohorts defined according to the year of birth of the household reference person. Figure 3 shows real household expenditure ($2002 AUD/CAD) on goods and services for each age group over time, where household expenditure is based on total expenditure on goods and services (including housing). In Figure 3 consumption is equivalised using the modified OECD scale, thereby eliminating the effects of household structure and size.[9] The results in Figure 3 show a conventional pattern with consumption following an 'inverted U' shaped pattern. This feature of consumption expenditures is explained by liquidity constraints imposed by relatively low current incomes during early stages in the life-cycle and imperfect capital markets. Declining consumption for older households can be explained by precautionary saving on their part (Browning and Lusardi, 1996). A plot of unequivalised household consumption similar to that in Figure 3 exhibits a significantly more pronounced hump shaped pattern reflecting the effect of household size over the life-cycle.

An examination of Figure 3 indicates that real consumption expenditure increased significantly for all age groups after 2000's in both countries. This pattern is highlighted by considering the consumption expenditures by cohorts defined according to year-of-birth (Figure 4). There are two key points to be derived from Figure 4. First, the consumption profiles of younger cohorts tend to lie above those of older cohorts. This reflects the increase in income levels (and hence consumption) that has been experienced by successive generations of households. Second, for many cohorts the jump in

---

[6] An additional 10 per cent in the form of equity in other property (including rental property). Superannuation accounts (retirement accounts) for a further 14 per cent of household net worth and less than 5 per cent of net worth is liquid in the sense of being held in the form of accounts with financial institutions. The ratio of average net wealth to average gross wealth was 87 per cent.

[7] The reference person for each household is chosen by applying selection criteria based on marital status and household structure, income and age in that order.

[8] This method was initially proposed by Browning, Deaton and Irish (1985) and is commonly used in studies of consumption, savings and wealth.

[9] In the empirical analysis household size and structure is controlled for directly.

consumption in the final data point relative to the earlier pattern appears to be particularly pronounced at median age cohorts in both countries. The final points in each cohort lines in this graph correspond to the final surveys and hence time period when asset prices and housing wealth accelerated quickly relative to previous trends.

[Figure 3 about here]

[Figure 4 about here]

6. Methodology

The principal aim of this paper is to distinguish between the alternative explanations that have been provided for the observed correlation between housing prices and consumption, namely a direct wealth channel, a credit constraint channel and a common cause channel. The econometric methodology is most similar to that used in Attanasio *et al*. (2008) where the unit of observation is the individual household and the empirical analysis uses pooled cross section data. In the regression analysis, controls are included for 'year-of-birth' cohort membership and a variety of socio-demographic characteristics of the household which are believed to influence life-cycle consumption patterns.

The underlying theoretical basis for the empirical analysis in this report is the life-cycle model of consumption in which households smooth consumption over time by borrowing when young, saving in middle age and dis-saving in retirement. This behaviour generates an age-wealth profile that has the familiar 'hump shape' pattern like that observed in Figure 3. The life-cycle consumption profiles are used to determine whether the impact of unanticipated changes in wealth, in particular the increase in house prices experienced after 2000s, differ across age groups in a manner suggested by the alternative transmission mechanisms. This section summarizes a series of econometric specifications used to explore this issue.[10] The basis on which evidence for or against any of the competing hypotheses is assessed are described in detail in the notes following Table 4. In effect, the tests involve an examination of the magnitude and significance of the coefficients on 'age defined cohort – wealth' interaction terms. Of particular interest are any differences observed across different age defined cohorts as these provide evidence in favour of, or against, any particular transmission mechanism.

The baseline specification in (1) below expresses household consumption as a function of a number of observable variables that capture the broad factors that affect household consumption over the life-cycle as well as time and cohort effects.

$$X_t^{ch} = \alpha^c + f(age) + \gamma' z_t^{ch} + \varepsilon_t^c + u_t^{ch} \qquad (1)$$

---

[10]Full results for all specifications are reported in the Tables A2, A3, A4 and A5 in the Appendix

where X_t^{ch}, is the consumption expenditure of household "h" that belongs to cohort "c" at time "t"; α^c, denotes the average life-time wealth of households that belong to 'year-of birth' cohort "c" and is captured by cohort dummies. The observable variables, family size and composition, current income, occupational status of the household head, are stacked in the "z" matrix; $f(age)$ is the age of the reference person in the household entered as both linear and quadratic terms. We assume consumption innovations, ε_t^c, average out to zero over time. The term u_t^{ch} captures household h's deviation from its cohort average.

Estimating equation (1) provides a "base" consumption profile for each cohort. As in Attanasio *et al.* (2008), we interpret the deviations of observed consumption from such a profile as being determined by innovations to either life time income or to transitory income. We then incorporate additional variables such as house prices or reported wealth to capture some specific changes to life time resources. The first set of extensions to the baseline specification identify whether consumption responses of households in three age groups in 2000s differ significantly from their baseline consumption profiles (specification(2)). The age groups are captured by a series of 'age group dummies' as follows:

$$
X_t^{ch} = f(age) + \gamma' z_t^{ch} + + \alpha^c + \sum_{t=2000}^{2006} \theta_{t,Y} \cdot T_t \cdot DY_t^{ch} + \sum_{t=2000}^{2006} \theta_{t,M} \cdot T_t \cdot DM_t^{ch}
$$
$$
+ \sum_{t=2000}^{2006} \theta_{t,O} \cdot T_t \cdot DO_t^{ch} + \varepsilon_t^c + u_t^{ch}
$$

(2)

The age-group dummies define households as belonging to young, middle-aged, or older groups. Young households are defined as having a reference person aged less than 40 years of age $\left(DY_t^{ch} = 1\right)$, a middle-aged household as having a reference person aged between 40 and 60 years of age $\left(DM_t^{ch} = 1\right)$ and an older household having a reference person aged 60 years of age or more $\left(DO_t^{ch} = 1\right)$. The interest in this specification lies in the outcomes for θ_Y, θ_M and θ_O, the coefficients on the interaction terms of the age-group dummies with the time dummies (T_t) for the surveys after 2000. These coefficients show how consumption changed for these age groups in the 2000s relative to their baseline profile. In particular, they indicate how consumption patterns deviated from the underlying life-cycle pattern as captured by the baseline specification in equation (1). Following Attanasio and Weber (1994) we allow the year cohort mean of consumption to be completely unconstrained after 2000s.

In specification (2) it is important to stress that the coefficients on the 'age defined' groups indicate how consumption deviates from the baseline estimate for a series of 'year of birth' cohorts. For example, the coefficient on DY_t^{ch} effectively represents the average changes in consumption expenditure for those households who belong to the most recent 'year of birth' cohorts. All households in these 'year-of-birth' cohorts have a household head who is young (aged less than 40) in 2003-04. To explore whether there are differences in the behaviour of owners and renters ($T_{t=R,O}$), an additional specification (specification 3) is estimated that interacts the (age group $\times$ T_t) terms with a dummy variable capturing tenure status in 2000. This latter specification makes it possible to compare the 2000s consumption behaviour of households of different ages and in alternative tenures relative to their baseline patterns.

Specifications (1) and (2) capture the average behaviour of all members of age group cohorts in 2000s relative to their behaviour in the earlier data. Subsequent specifications include information on the house prices and wealth holdings of the households within each age defined cohort (the young, middle-aged and older cohorts). Moreover, it does so in a more precise way than that used by Attanasio *et al.* (2008) and Campbell and Cocco (2007) which rely on regional variation in house prices. In particular, specification (2) is extended to incorporate household level information on housing and other wealth ($g(hp_t^c)$) in the following manner:

$$
X_t^{ch} = f(age) + \gamma' z_t^{ch} + + \alpha^c + \sum_{t=2000}^{2006} \theta_{t,Y} \cdot g(hp_t^c) \cdot T_t \cdot DY_t^{ch} + \sum_{t=2000}^{2006} \theta_{t,M} \cdot g(hp_t^c) \cdot T_t \cdot DM_t^{ch}
$$
$$
+ \sum_{t=2000}^{2006} \theta_{t,O} \cdot g(hp_t^c) \cdot T_t \cdot DO_t^{ch} + \varepsilon_t^c + u_t^{ch}
$$

(3)

Equation (3) incorporates additional variables ($g(hp_t^c)$) to capture some specific changes to resources and identifies how they alter different age group-cohorts' consumption patterns. In the reported results, specifications (4) to (11) use equation (3) with different measures of household wealth, $g(hp_t^c)$. Specification (4) uses an approach similar to that of Attanasio *et al.* (2008) and Campbell and Cocco (2007) and incorporates variables capturing regional changes in house prices (measured as a percentage) into the base specification. Specification (5) replaces this regional house price measure with the level of house prices derived from homeowner's estimate of the current value of their property. Recall that this information is available in the Australian and Canadian data. It is important to stress that specifications are not designed to find the casual effect of house prices on consumption. Rather the analysis is designed to identify any differences in the correlation of consumption and

housing wealth among age-group cohorts as reflected in the magnitude of the coefficients θ_Y , θ_M and

θ_O .

If a common factor, such as productivity growth, is the driving force of the consumption boom in 2000s we expect to see a larger effect on consumption for younger cohorts who will benefit from the increased productivity over their entire lives. Older cohorts will have experienced a relatively smaller shock than younger cohorts. In contrast, a direct wealth effect should be apparent largely in the consumption of households that hold stocks or houses who are likely to be median or older aged cohorts. Comparing the results from specifications (4) and (5) provides an additional robustness check of our house value measures.

Specifications (6) and (7) show the results from the analysis controlling for homeownership status. If a common factor is the underlying explanation for the observed correlation between housing prices and consumption the behaviour of homeowner and renters should be similar. One issue to note in interpreting results from specification (6) and (7) relates to issues around sample selection and endogeneity. Arguably, in any given cohort more affluent renters may change their tenure status over time. In this sense, tenure status is not exogenous and observed behavioural changes are likely to be endogenously determined. Nonetheless, we believe that this is a useful way to validate earlier results.

A key benefit of the Australian data used for the analysis is the availability of household level measures of wealth. This obviates the need for use of either regional or house price data as a proxy for changes in wealth. To this end we estimate a series of specifications ((8)-(11)) that incorporate information on household level wealth. As when regional house price measures are used, it is the differences in the responses of the age-defined cohort groups that of central interest when identifying

the transmission mechanisms. We are especially interested to examine the effect of substituting the regional house price measures with a self-reported net housing wealth variable for homeowners (specification (8)). It is possible that those two measures are highly correlated, so we can not eliminate potential measurement error or endogenity. Nonetheless, this specification provides an additional robustness check on our main results. Subsequent specifications ((9)-(11)) extend this specification by incorporating other information available in the Australian data including indicators of household loan to value ratios and other measures of wealth. In all cases, the focus remains on differences in the estimated coefficients across the age cohorts.

7. Results and Discussion

7.1 Results

Full results from the empirical analysis are presented in the Appendix tables. The discussion here focuses on the estimates for each 'age-defined' cohort of the measured effect of wealth since these are critical for determining the implications for the alternative transmission mechanisms discussed above.[11] [12] For both countries we begin by presenting the baseline specification (1) in which consumption is modelled as a function of time and cohort effects in addition to observable variables that capture the broad factors that affect household consumption over the life-cycle (Column 1 of Appendix Table A2 and A4). Age-consumption profiles implied by this specification highlight the underlying life-cycle behaviour of each of the year of birth cohorts in the data and the 'inverted U' pattern of consumption over the life-cycle. Coefficients on the various control variables that proxy for household life-cycle, preferences and other considerations are consistent with *a priori* expectations. The coefficients on the cohort dummies indicate successively higher expenditures by younger cohorts. The coefficients on the geographic variables highlight differences in state or province' average consumption levels, *ceteris paribus*. For example, households in more (less) prosperous States (Provinces) of New South Wales (Atlantic) have somewhat higher (lower) consumption, *ceteris paribus*. The coefficient on household size indicates that household expenditure increases with household size. The coefficients on the age and age squared terms are statistically significant and give rise to the familiar 'inverted U' shape patterns of household expenditure over the life-cycle.

[Figure 5 about here]

Panels (a) and (b) of Figure 5 plot the average difference between actual and predicted consumption by year for Australia and Canada respectively from specification (1). It is clear that in both countries after the mid 1990s dip, from the beginning of 2000s the residuals become positive and actual consumption exceeds predicted levels. Our aim is to understand the driving forces of these positive residuals in 2000s As a starting point we investigate the patterns of different age groups, during these period.

In the mid 2000s the gap between actual and predicted consumption is the largest for middle-aged households and lowest for the young-aged households in both countries. Old aged households are in between and later years in Canada they approach the middle aged households (panel d Figure 5). In order to test whether these differences between age cohorts are statistically significant, we conduct F tests of pairwise comparisons of age-cohort-year interactions. Consider the results reported in Table 4, specification (2) (Age Groups). These indicate that for Canada the median aged cohort spent

---

[11] That is discussion will focus primarily on the coefficients θ_Y, θ_M and θ_O in equations (2) and (3).

[12] For the brevity of the tables, Canadian results are presented with an indicator variable for all survey years after 2000 for Canada rather than series of year dummies. We presented results from later specifications in the appendix Table A5. These results are consistent with presented results.

significantly more than both young and old aged cohorts. Further, consumption patterns for young and old aged cohorts do not significantly differ in the 2000s. In Australia, median aged cohorts spending is marginally significantly larger than young cohorts (*p-value* of 0.15) but not different than old cohorts. These findings are somewhat different to those reported in from Attanasio and Weber (1994), Attanasio *et al.* (2008) who showed the consumption boom of the late 1980s and late 1990s in UK was primarily driven by younger cohorts.

Specification (3)reported in Tables A2 and A4 interacts these age-cohorts with housing tenure dummies. In general, we expect to observe positive coefficients for renters if the consumption boom was driven by a common causal factor. Results in the column (3) of Table A2 and A4, shows that indeed this is not the case. In addition, results for Australia indicate that the consumption of young and old aged cohort of home owners' has not been increased significantly relative to pre-2000 consumption levels. Only the median aged cohort of homeowners has significantly increased their consumption. A pair wise F test confirms that the median aged cohort is significantly different than the young cohort.

Canadian results (column (3) of A4) are similar and indicate that median aged cohort of homeowners increased their spending significantly more than any other group. Further, the old cohort of homeowners increased their spending more than young cohort of homeowners. Reported results are also indicate that old and middle aged renters did not increase, and indeed decreased their spending in 2000s, whereas young aged renter cohort did not significantly change their spending. This specification provides support that consumption of homeowners, especially median aged homeowner's, increased significantly more in Australia and Canada during 2000s. This result provides some support for the wealth and collateral hypotheses.

Starting from specification (4), we incorporate house price variables in a similar manner to Attanasio *et. al.* (2008). Table 2 reports the key results, full results are set out in Tables A2 and A4

[Table 2 About here]

For both countries, column 1 of Table 2 (Specification (4) which uses regional changes in house prices) reports the percentage change in real house prices calculated from regional house price indexes. The effect of house price changes is allowed to vary across three age groups. For Australia and Canada, the largest effect belongs to the middle aged cohorts. Further, in Australia the young and old cohort's coefficients are not significantly different than zero. For Canada, the middle cohort's coefficient is significantly larger than younger cohort, but is not different than that for the older cohort. In Specification (5) (column 2 of Table 2 and column 5 of appendix tables A2 and A4), we use real house price levels rather than regional price changes. Recall that these house price levels are self-reported (SR) by respondents to the surveys. In this specification, house prices might be interpreted as a proxy for life time resources of households. It is clear that in both countries, the general picture is similar to the previous specification in which we use regional house price changes. The main difference is for Canada where the middle aged cohort's effect is now significantly larger than not only the young cohort, but also from old aged group.

In sum the analysis suggests that a common causal factor is not a likely explanation for the observed correlation between asset prices and consumption in Canada and Australia. A common causal factor would in general be associated with a large change in behaviour on the part of young households. Rather, wealth effects or indirect factors such as relaxation of credit constraint are more likely explanations.

In the final two columns of Table 2 we report some additional results for Australia using information on housing wealth available in the final HESs. In the column titled 'SR (self reported) House Wealth

(8)," we use the household's reported *net* housing wealth rather than reported *gross* house value. The results are similar to specification (5) reported in column 2 of Table 2 (SR. House Value (5)). That is, in general, higher net housing wealth is associated with higher household consumption. For example, the coefficients on the interaction terms in column (3) indicate that, *ceteris paribus*, a $100,000 increase in housing net wealth in 2003-04 is associated with an increase in weekly household expenditure of approximately $17.25 per week for a household that belongs to the middle aged cohort. The increase in consumption expenditure implied by these estimates is consistent with an annual marginal propensity to consume out of housing wealth of approximately 0.01 to 0.015. Although somewhat lower than most derived from aggregate studies reported in Table A.1, this estimate is consistent with estimates identified in other micro-econometric studies.

In the final column in Table 2 (Hybrid (9)), we specify a hybrid specification in which we use the original net housing wealth values for the home owners and use the imputed house values for non homeowners. Again, in this specification the middle cohort has the largest coefficient. Specification (10) for Australia utilizes information available on non-housing wealth. Non-Housing wealth is available for all households, including renters. Interacting this measure with age groups suggests that young cohort's coefficient is not significantly different than zero; the largest effect belongs to middle cohort and this is significantly larger than older cohort. That is, this specification shows a similar pattern to that reported for the alternative specifications reported in Table 2.

[Table 3 About here]

Key results from our final set of specifications are reported in Table 3. In specification (6) the sample is split by home-ownership status, and home-ownership status is interacted with an imputed house price level. In specification (7), we interact tenure status dummies with age group dummies and the imputed house price variable. Specifications (6) and (7) are presented for both Australia and Canada. In neither country are the results are consistent with the common causality hypothesis. The coefficients for renters are not different than zero and home owner cohorts have a positive and significant coefficient. For both countries, these differences are largely driven by middle and old aged homeowner cohorts. Again, the middle aged cohort has a significantly larger coefficient than the old cohorts.

In the final set of results, specification (11) for Australia, we incorporate information about household debt. Specifically we incorporate measures of loan to value (LTV) ratios for home owning households. The coefficients on the LTV variables indicate that households with higher LTV report higher consumption, *ceteris paribus* albeit in an insignificant manner.

6.2 Interpretation of results

To distinguish among the various house price/wealth - consumption transmission mechanisms, a series of statistical tests were undertaken on the coefficients reported in Table A2 – A4. These tests for the individual and joint significance of the interaction terms (age defined cohort terms × house prices) and for a number of pair-wise tests between specific coefficients are reported in Table 4.

[Table 4 about here]

Consider first specification (5) which is reported in Table 2. This specification includes interaction terms between age defined cohort dummies and real house price levels after 2000 in Canada and Australia. For Australia, only the coefficient on the median cohort is positive and significant. At the same time it is larger in magnitude that that for the old and young cohorts' interactions. Results from pair wise tests also indicate that it is not possible to reject the hypothesis that the coefficients on the

young and old interaction terms are different from one another. For Canada, all the coefficients are positive, and significantly different than zero. Like Australia, the median cohort has the largest coefficient and this group is significantly larger than young cohort group. Unlike Australia, the old and median age cohort's interaction variables are not significantly different than each other. Other specifications reported in Tables 2 and 3 show a similar pattern. That is, middle-aged cohorts, especially home-owners, increased consumption expenditures as house prices increased in the early part of the 2000s.

The implications of statistical tests for the various transmission mechanisms is summarised in the bottom panel of Table 4. Consider if the nexus between housing wealth and consumption was driven by a direct wealth effect. The first of the conditions for identifying a direct wealth effect is a requirement that the coefficients on the wealth variables/proxies for owners in all age cohorts are positive and significant. Based on the results summarized in Table 3, specification (7), this condition does not hold for Australia, as the response of young homeowners is not significantly different from zero. For Canada this condition does in fact hold (see Table 3). The second condition is that the coefficients on the wealth variables for owners have the following pattern: older cohort significantly greater than middle cohort (O>M) and middle cohort significantly greater than young cohort (M>Y). The pair-wise tests summarised in Table 4 indicate that the coefficient on the middle cohort wealth interaction term is greater in magnitude than that for the young cohort. Further, the pair-wise tests indicate that the coefficient on the middle cohort interaction term is greater than that for the older cohort in both Australia and Canada. Further, for Australia it is not possible to reject the hypothesis that the coefficients on the young and the older cohort interaction terms are equal to each other. Thus, the results of these pair-wise tests for both Australia and Canada are inconsistent with this second condition. Hence, the hypothesis that the observed increase in consumption that is associated with an increase in housing prices can be attributed to a direct wealth effect is rejected for Australia. Similarly, there is evidence against it in Canada too.

A similar process can be followed when considering if there is evidence that the increase in consumption that accompanied the increase in housing wealth was driven by a common causal factor. The first condition is similar to that outlined above, namely a requirement that the coefficients on the wealth variables/proxies for owners in all age cohorts are positive and significant. Further, the increase in lifetime incomes, and hence consumption, would be expected to be largest for younger households and to decrease as the time span over which such an increase can provide consumption benefits decreases, suggesting that the coefficients on the house price-cohort interaction terms should decrease in magnitude for older cohorts. The regression results for specifications (2)-(7) are not consistent with this pattern. Further cause for rejection arises from the third test which suggests that the response to a common causal factor should be the same for households regardless of their tenure (or housing wealth). The tests presented for specification (7) (Table 3), clearly show that this is not the case: the response for owners is significantly greater than that for renters. Thus the hypothesis that the observed increase in consumption that is associated with an increase in housing price can be attributed to a common cause effect is rejected.

Finally, Table 4 states that the results for all specifications provide support for the presence of a credit constraint effect. The basis of this conclusion can be illustrated as follows. The first condition listed under Table 4 is that the coefficients on wealth variable/proxy for owners in all age cohorts are non-negative. While for Canada this condition is met, for Australia the coefficient for young homeowners' coefficient is negative but not statistically different than zero (see Table 3).[13] Also the cohort-house price level terms reported in Table 2 are jointly significant, and non-negative. The second condition is

---

[13] For Australia , young homeowners' coefficient is negative, but not statistically different than zero.

that the coefficients on the wealth variable or proxy for credit constrained cohorts should be positive and significant. The coefficient on the middle cohort interaction term is larger than that for the older cohort interaction term. This pattern is to be expected if the middle cohort is more likely to be credit constrained than the older cohort. These results provide support for the credit-constraint hypothesis. Young and middle-aged cohorts are more likely to be credit constrained and take the opportunity to borrow against any increase in house prices to finance higher consumption.

The clear pattern that emerges from an examination of the regression results is that, in general, the econometric evidence is not consistent with the presence of either a direct wealth or a common causal explanation. Rather, the source of the transmission mechanism most consistent with the observed relationship between housing wealth and consumption behaviour is associated with the relaxation of credit constraints arising from the increased housing wealth. It is middle aged home-owning cohorts in both Australia and Canada for whom consumption seems most responsive to increases in household wealth, especially house prices. Such a pattern is consistent with higher house price relaxing credit constraints and thereby facilitating higher consumption.

This conclusion is supported by research into patterns of equity withdrawal in Australia which suggests that households in the middle cohort were more likely to withdraw equity from their housing wealth by increasing the debt on an existing mortgage (Schwartz *et al.*, 2008).[14] The importance of increased house prices in relaxing credit constraints for households and thereby making possible higher consumption expenditure has also been identified in recent microeconometric analysis of households in the United Kingdom and the United States. Disney, Bridges and Gathergood (2009) find evidence that increases in house prices in the UK allowed borrowing constrained households to refinance and substitute secured debt for more costly unsecured debt, thereby increasing overall consumption. Cooper (2009) similarly identifies the role of increased housing wealth for facilitating increased consumption among households that are credit constrained and would otherwise rely on unsecured credit.

8.   Conclusion

The analysis in this paper has presented new evidence on the relationship between house price and household consumption for Australian and Canadian households. The principal focus of the analysis has been distinguishing between the alternative transmission mechanisms that have been hypothesised to link housing wealth and consumption behaviour. Unlike earlier studies that have used repeated cross sections to define pseudo-cohorts, an important feature of the data used in the analysis is detailed information of self-reported house prices and household assets and liabilities. While this information obviated the need to rely solely on aggregate or regional level house price indexes, analysis using aggregated measures of house prices was also undertaken.

In general, the empirical evidence using both individual level and aggregate measures of wealth do not support the direct wealth or common causal hypotheses as being the source of the observed correlation between household wealth and consumption. Rather, the evidence is consistent with a credit constraint or collateral channel.

The analysis in this paper is consistent with recent studies from the United Kingdom and United States that have also identified the relaxation of collateral constraints as being a key factor in explaining the link between housing wealth and consumption. An important feature of the

---

[14] Wood and Nygaard (2010), using a shorter run but true panel data set, find wealth effects and credit constraints were the most important drivers of equity withdrawal in Australia in 2002 and 2003. They also point to the extent to which binding income constraints limit the extent to which young households are able to withdraw equity.

transmission mechanism identified in those studies is the potential for increases in dwelling prices to allow credit constrained households to substitute secured debt for unsecured debt. While the effect of increased housing wealth on overall consumption is likely to be more muted by allowing for this possibility, it remains the case that aggregate increases in housing wealth induce an aggregate consumption response.

There are a number of ways that the analysis in this paper might be extended to further our understanding of the consumption-wealth nexus. Firstly the empirical importance of credit channel for household consumption needs to be investigated further. A starting point could be examining the role of external financing in household consumption. Foremost; it would be useful to consider how consumption behaviour changes in response to a decrease in housing prices as experienced recently. The decline in house prices in Australia and Canada does not appear to have been as severe or as pronounced as that for other countries such as the United States and the United Kingdom. Rather, recent evidence suggests that house prices in these countries, especially Australia, continue to increase, at least relative to other countries. Moreover, this change in dwelling values appears to be driven by fundamentals related to migration and real income growth. In this setting, continued large increases in house prices might not be unanticipated. Analysis of consumption behaviour in this setting may prove useful to understanding more fully the consumption-wealth relationship.

REFERENCES

Aoki, K., Proudman, J. and Vlieghe, G. (2004) "House prices, consumption, and monetary policy: a financial accelerator approach," *Journal of Financial Intermediation*, 13(2004):414-435.

Attanasio, O., Blow, L., Hamilton, R and Leicester, A. (2008) "Booms and busts: consumption, house prices and expectations," *Economica*, Published Online: 15 Jul 2008.

Attanasio, O., Blow, L., Hamilton, R and Leicester, A. (2005), "Consumption, house prices and expectations," Bank of England Working Paper No 271.

Attanasio, O. and Weber, G. (1994) "The UK consumption boom of the late 1980s: Aggregate implications of microeconomic evidence," *Economic Journal*, v104(427): 1269-1302.

Australian Bureau of Statistics (2006a) *Household Expenditure Survey and Survey of Income and Housing User Guide*, 2003-04, ABS Cat No 6503.0.

Australian Bureau of Statistics (2006b) *Household Wealth and Wealth Distribution*, 2003-04, ABS Cat No 6554.0.

Australian Bureau of Statistics (2006b) *A Guide to House Price Indexes, Australia ,*2006, ABS Cat. No. 6464.0.

Barrett, G., Levell P. and Milligan K. (2012), "A comparison of micro and macro expenditure measures across countries using differing survey methods," in Christopher Carroll, Thomas Crossley, and John Sabelhaus (eds.) Improving the measurement of expenditure measures. NBER-CRIW conference volume.

Benito, A., Thompson, J., Waldron, M. and Wood, R. (2006) "House prices and consumer spending," *Bank of England Quarterly Bulletin*, Summer, 142-154.

Benjamin, J. and Chinloy, P. (2008), "Home equity, household savings and consumption," *Journal of Real Estate Finance and Economics*, 37(1): 21-32.

Berben, R., Bernoth, K. and Mastrogiacomo, M. (2006) "Households' response to wealth changes: do gains or losses make a difference?," DNB Working Papers 090, Netherlands Central Bank, Research Department.

Bertaut, C. (2002) "Equity prices, household wealth, and consumption growth" Board of Governors of the Federal Reserve System, International Finance Discussion Papers, Number 724.

Boone, L. and Girouard, N. (2002) "The stock market, the housing market and consumer behaviour," *OECD Economic Studies* No. 35, 2002/25.

Bostic, R., Gabriel, S. and Painter, G. (2006) "Housing wealth, financial wealth and consumption: New evidence from micro data," mimeo.

Bover, O. (2005) "Wealth effects on consumption: microeconometric estimates from the Spanish survey of household finances," *Banco de España Working Paper* 05-22.

Bridges, S., Disney, R., and Henley, A. (2004) "Household wealth and the accumulation of financial debt: Evidence from UK households," in G. Bertola, R. Disney and C. Grant (eds) (2006) *The Economics of Consumer Credit*, Cambridge, MA, MIT Press.

Browning, M., Deaton, A. and Irish, M. (1985) "A profitable approach to labor supply and commodity demands over the life-cycle," *Econometrica*, 53(3): 503-544.

Browning, M., Gørtz, M. and Leth-Petersen, S. (2008) "House prices and consumption: A micro study," paper presented at ECB/CFS-conference, Goethe University, Frankfurt, Tyskland, September 2008.

Browning, M. and Lusardi, A. (1996) "Household saving: micro theories and micro facts," *Journal of Economic Literature*, 34(4): 1797-1855.

Buiter, W. (2008) "Housing wealth isn't wealth," NBER Working Paper 14204.

Campbell, J. and Cocco, J. (2007) "How do house prices affect consumption? Evidence from micro data," *Journal of Monetary Economics*, 54(3): 591-621.

Campbell, J. and Cocco, J. (2005) "How do house prices affect consumption? Evidence from micro data," Harvard Institute of Economic Research Discussion Paper No. 2083, July 2005.

Carroll, C. (2004), "Housing wealth and consumption expenditure," unpublished manuscript, Johns Hopkins University.

Case, K., Quigley, J. and Shiller, R. (2005) "Comparing wealth effects: The stock market versus the housing market," *Advances in Macroeconomics,* 5(1): Article 1.

Cooper, D. (2009) "Impending spending bust? The role of housing wealth as borrowing collateral," Federal Reserve Bank of Boston, Public Policy Discussion Paper 09-9.

Cristini, A. and Sevilla, A. (2007) "Do house prices affect consumption and why? A replication and comparison exercise," mimeo, Oxford University.

Davis, M. and Palumbo, M. (2001) "A primer on the economics and time series econometrics of wealth effects," Federal Reserve Board Finance and Economics Discussion Series 2001-09.

Deaton, A. (1985) "Panel data from time series of cross sections," *Journal of Econometrics*, 30(1):109-126.

Disney, R., Bridges, S. and Gathergood, J. (2009) "House price shocks and household indebtedness in the United Kingdom," *Economica* 76, pp. 1–25.

Disney, R., Bridges, S. and Gathergood, J. (2006) "Housing wealth and household indebtedness: Is there a household 'financial accelerator'?," mimeo.

Disney, R., Henley, A. and Jevons, D. (2003) "House price shocks, negative equity and household consumption in the UK in the 1990s," mimeo.

Dolmas, J. (2003) "A note on the potential pitfalls in estimating a 'wealth effect' on consumption from aggregate data," *Economics Letters*, 78(3): 437-441.

Dvornak, N. and Kohler, M. (2007) "Housing wealth, stock market wealth and consumption: A panel analysis for Australia," *Economic Record*, 83(261): 117-130.

Dynan, K. and Maki, D. (2001) "Does stock market wealth matter for consumption?," Federal Reserve Board Finance and Economics Discussion Series 2001-23.

Girouard, N., Kennedy, M. and André, C. (2006) "Has the rise in debt made households more vulnerable?" OECD Economics Department Working Paper 535.

Grant, C. and Peltonen, T. (2005) "Housing and equity wealth effects of Italian households," *DNB Working Paper* No. 43 / May 2005.

Groenewold, N. (2003) "Consumption and stock prices: can we distinguish signalling from wealth effects," University of Western Australia Discussion Paper 03.22.

Guiso, L., Paiella, M. and Visco, I. (2005)"'Do capital gains affect consumption? Estimates of wealth effects from Italian households' behaviour," Bank of Italy Working Paper No. 555, Final version published in 2006 in: E. Santarelli (ed.), *Entrepreneurship, Growth, and Innovation: the Dynamics of Firms and Industries*, New York, Springer.

Hiebert, P. (2006) "Household saving and asset valuations in selected industrialised countries," Research Discussion Paper RDP 2006-07, Reserve Bank of Australia.

Himmelberg, C., Mayer, C. and Sinai, T. (2005) "Assessing high house prices: bubbles, fundamentals and misperceptions," *Journal of Economic Perspectives*, 19(4):67-92.

Juster, F., Lupton, J., Smith, J and Stafford, F. (2006) "The decline in household saving and the wealth effect," *Review of Economics and Statistics*, 88(1): 20-27.

King, M. (1990) "Discussion*," Economic Policy,* 5(2):383-387.

Kishor, N. (2007) "Does Consumption respond more to housing wealth than to financial market wealth? If so, why?," *Journal of Real Estate Finance and Economics*, 35(4): 427-448.

Klyuev, V. and Mills, P. (2007) "Is housing wealth an ''ATM''? The relationship between household wealth, home equity withdrawal, and saving rates," *IMF Staff Papers*, 54 (3): 539-561.

Labhard, V., Sterne, G. and Young, C. (2005) "Wealth and consumption: an assessment of the international evidence," Bank of England Working Paper No 275.

Lehnert, A. (2004) "Housing, consumption, and credit constraints," Divisions of Research & Statistics and Monetary Affairs. Federal Reserve Board, Washington, D.C.,

Ludvigson, S. and Steindel, C. (1999) "How important is the stock market effect on consumption?," *Federal Reserve Bank of New York Economic Policy Review*, 5(2): 29-51,

Ludwig, A. and Sløk, T. (2004) "The relationship between stock prices, house prices and consumption in OECD countries," *Topics in Macroeconomics*, 4 (1): Article 4.

Maki, D. and Palumbo, M. (2001) "Disentangling the wealth effect: A cohort analysis of household saving in the 1990s," Federal Reserve Board Finance and Economics Discussion Series 2001-21.

Mehra, Y. (2001) "The wealth effect in empirical life-cycle aggregate consumption equations," *Federal Reserve Bank of Richmond Economic Quarterly*, 87(2): 45-68, Mishkin, F. (2007) "Housing and the Monetary Transmission Mechanism", NBER Working Paper No. 13518, Issued in October 2007.

Muellbauer, J. (2007) "Housing, credit and consumer expenditure," paper prepared for the *Federal Reserve Bank of Kansas City's symposium on "Housing Finance and Monetary Policy"* at Jackson Hole, Wyoming, August 30-September.

Muellbauer, J. and Murphy, A. (1990) "Is the UK balance of payments sustainable?," *Economic Policy*, 5(2): 347-395.

Paiella, M. (2007) "Does wealth affect consumption? Evidence for Italy," *Journal of Macroeconomics*, 29: 189-205.

Palumbo, M. Rudd, J. and Whelan, K. (2002) "On the relationships between real consumption, income, and wealth," *Federal Reserve Board Finance and Economics* Discussion Series 2002-38.

Pichette, L. and Tremblay, D. (2003) "Are wealth effects important for Canada?," Bank of Canada Working Paper 2003-30.

Poterba, J. (2000) "Stock market wealth and consumption," *Journal of Economic Perspectives*, 14(1): 99-118.

Productivity Commission (2004) *First Home Ownership*, Report no. 28, Melbourne: Productivity Commission.

Ramakrishnan, U (2003) "Housing, consumption and output," part II of *Australia: selected Issues, IMF Country Report*, International Monetary Fund, Washington, DC.

Reserve Bank of Australia (RBA) (2002) "Recent developments in housing: prices, finance and investor attitudes," *Reserve Bank Bulletin*, July 2002.

Schwartz, C., Lewis, C., Norman, D. and Hampton, T. (2008) "Factors influencing housing equity withdrawal: Evidence from a microeconomic survey," *Economic Record*, 84(267): 421-433.

Shefrin, H. and Thaler, R. (1988) "The behavioral life-cycle hypothesis," *Economic Inquiry,* 26(4): 609-643.

Sierminska, E. and Takhtamanova, Y. (2007) "Wealth effects out of financial and housing wealth: Cross-country and age group comparisons," FRB San Franciso, Working Paper 2007-01.

Smith, M (2007), "Microeconomic analysis of household expenditures and their relationship with house prices," *Reserve Bank of New Zealand Bulletin*, 70(4): 39-45.

Statistics Canada (2000), "Note to former users of data from the Family Expenditure Survey," Income Statistics Division, Statistics Canada, Catalogue No. 62F0026MIE-00002.

Statistics Canada (2001), "Methodology of the Survey of Household Spending," Income Statistics Division, Statistics Canada. Catalogue No. 62F0026MIE-01003.

Tan, A. and Voss, G. (2003) "Consumption and wealth in Australia," *Economic Record,* 79(244): 39-56.

Tang, K-K. (2006) "The wealth effect of housing on aggregate consumption," *Applied Economics Letters*, 13(3/20): 189-193.

Teranet –National Bank of Canada (2012) *National Composite Price Index , Canada* http://www.housepriceindex.ca/

Wood, G. and Nygaard, C. (2010) "Housing equity withdrawal and retirement: Evidence from the Household, Income and Labour Dynamics in Australia Survey (HILDA)," in Smith, S. and Searle, B. (eds) *The Blackwell Companion to the Economics of Housing: The Housing Wealth of Nations*, Oxford: Blackwell.

TABLE 1: Summary Statistics

Summary Statistics - Australia

	Pooled	2003-04	1975 to 98
Expenditure- $ 2002 AUD/pw			
Total Expenditure	861	1160	851
Expenditure on goods and servicess exc. housing	655	710	654
Income- $ 2002 AUD/pw			
Household Disposable Income	801	865	777
Wealth			
Net Total Wealth		450,964	
Net Other Wealth		252,709	
Net Dwelling Wealth		198,255	
Tenure status dummies			
Outright owner	0.40	0.35	0.40
Owner purchaser	0.31	0.35	0.30
Renter and other tenures	0.29	0.30	0.30
Loan to Value Raio		0.52	
Demographics			
Single	0.26	0.28	0.26
Couple	0.62	0.60	0.62
Lone Parent	0.06	0.06	0.06
Other	0.06	0.06	0.06
Household Size	2.71	2.52	2.72
KidsPresent	0.39	0.35	0.39
Age of reference person (years)	47	49	47
State of residence dummies			
New South Wales	0.34	0.33	0.34
Victoria	0.26	0.25	0.26
Queensland	0.17	0.20	0.17
South Australia	0.09	0.08	0.09
Western Australia	0.09	0.10	0.09
Tasmania	0.03	0.30	0.03
ACT and Northern territory	0.02	0.20	0.02
Observations	39,146	6,919	32,227

Continues on the next page

TABLE 1: Summary Statistics

Summary Statistics -Canada

	Pooled	2006 to 2000	1999 to 90	1969 to 89
Expenditure- $2002 CAD/pw				
Total Expenditure	816	860	785	769
Expenditure on goods and servicess exc. housing	643	672	615	622
Income - $2002 CAD/ pw				
Household Disposable Income	933	980	902	879
Tenure status dummies				
Outright owner	0.28	0.29	0.29	0.28
Owner purchaser	0.37	0.39	0.35	0.34
Renter and other tenures	0.35	0.33	0.35	0.36
Demographics				
Single	0.21	0.23	0.21	0.18
Couple	0.63	0.65	0.62	0.63
Lone Parent	0.07	0.08	0.07	0.03
Other	0.09	0.06	0.10	0.14
Household Size	2.76	2.64	2.71	3.10
KidsPresent	0.37	0.34	0.37	0.44
Age of reference person (years)	47	47	47	46
Region Dummies				
Ontario	0.37	0.37	0.37	0.36
Quebec	0.27	0.26	0.27	0.28
British Columbia	0.13	0.13	0.13	0.12
Atlanti	0.07	0.07	0.07	0.07
Praries	0.16	0.16	0.16	0.17
Northern Territories and Masked Recors	0.0070	0.011	0.00	--
Observations	207,128	92,186	65,385	49,557

Table 2 :Effect of a change in house price on consumption

AUSTRALIA

		House Price Level Proxies						
	Index		**SR .House Value**		**SR .House Wealth**		**Hybrid[3]**	
Specification	**(4)**		**(5)**		**(8)**		**(9)**	
[2003/4]*[% change in house price]								
*Young	-0.80	[0.98]						
*Middle	0.62*	[0.38]						
*Old	0.01	[1.00]						
[2003/4]*[Real house price level]								
*Young			-3.98	[6.00]	-6.00	[7.75]	7.72	[5.45]
*Middle			15.43***	[4.14]	17.25***	[4.62]	35.30***	[3.60]
*Old			7.02	[4.96]	7.43	[5.04]	22.33***	[4.05]
[2003/4]*[Net Non-Housing Wealth]	**(10)**							
*Young	1.39	[5.16]						
*Middle	12.37***	[2.73]						
*Old	**4.53***	**[2.45]**						

CANADA

	Index		**SR .House Value**	
[2000-6]*[% change in house price]				
*Young	0.36***	[0.14]		
*Middle	0.58***	[0.10]		
*Old	0.49***	[0.16]		
[2000-6]*[Real house price level]				
*Young			8.42***	[1.50]
*Middle			19.32***	[1.05]
*Old			15.79***	[1.63]

Notes:1- For Australia house price index variable is from Australian Bureau of Statistics' regional quarterly house price index (HPI). The HPI is published quarterly since and reports house price changes in eight capital cities (Catalogue no 6416.0). For Canada house price index acquired from the Teranet –National Bank of Canada composite price index . 2- *** p<0.01, ** p<0.05, * p<0.1 . 3- This specification uses the self reported net house wealth for the owners and imputed house prices derived from self reported house value. Full results are reported in the Appendix Tables A2-A3-A4

Table 3 :Effect of a change in house price on consumption by homeownership

Specification	AUSTRALIA			CANADA	
	(6)	(7)	(11)	(6)	(7)
[Year>=2000]*[Real house price level]					
*HOME OWNER	12.09***			26.15***	
	[3.09]			[0.94]	
*RENTER	-7.70			-0.08	
	[6.85]			[1.25]	
[Year>=2000]*[Real house price level]*Owner					
*Young		-2.22	-4.64		13.31***
		[7.52]	[11.48]		[1.69]
*Middle		19.50***	21.33***		32.02***
		[4.43]	[5.57]		[1.14]
*Old		8.79*	8.71*		25.80***
		[5.11]	[5.17]		[1.75]
[Year>=2000]*[Real house price level]*Renter					
*Young		-5.79	-5.37		5.70***
		[9.38]	[9.38]		[1.86]
*Middle		-7.73	-7.79		-5.15***
		[11.23]	[11.23]		[1.63]
*Old		-20.65	-20.75		-5.02*
		[20.68]	[20.68]		[2.59]
Homeownership Dummy	82.65***	82.78***	82.60***	76.23***	75.29***
	[5.50]	[5.50]	[5.51]	[2.08]	[2.09]
Mortgage Dummy	-34.29***	-33.95***	-33.84***	-45.58***	-42.95***
	[5.32]	[5.32]	[5.36]	[1.71]	[1.73]
Loan to Value Ratios					
[2003/4]*[LTV ratio 0 to <50%]			-9.03		
			[27.85]		
[2003/4]*[LTV ratio 50 to 80%]			15.98		
			[32.95]		
[2003/4]*[LTV ratio 80% +]			44.48		
			[45.86]		

Notes: 1-Full results are reported in the Appendix Tables A2-A3-A4 . 2- Real house prices are defined from reported house values 3- *** p<0.01, ** p<0.05, * p<0.1

Table 4 : Summary and Interpretation of Results

PANEL A:Summary results for key interaction coefficients based on total consumption expenditure on goods and services

Specifications	Age Groups (2)	Age Group * House Price /Wealth (4), (5) , (8), (9)	Age Group* Tenure Status * House Price /Wealth (3), (6), (7)
Australia			
Individual	Y<0, M>0, 0<0	Y<0, M>0 ***, 0>0	*Owners* : Y<0, M>0 ***, 0>0 , *Renters* : all ≈0
Pairwise	Y≈M≈0	M>O***, M>Y***,Y≈O	*Owners* : M>Y***, M>O**, O>Y***, *Renters:* Y≈ M≈O
Joint Test	≈0	>0***	Owners: >0*** ,Renters: ≈0
Wealth proxies			Owners >Renters***
Canada			
Individual	Y>0***, M>0***, 0>0***	Y>0***, M>0***, 0>0***	*Owners* **:** Y>0***, M>0 ***, 0>0 ***, *Renters* **:** Y>0***, M<0***, 0<0 *
Pairwise	M>O***, M>Y***,Y≈O	M>O***, M>Y***,Y≈O	*Owners* : M>Y***, M>O**, O>Y***, *Renters:* Y>O***, M≈O, Y>M ***
Joint Test	>0***	>0***	Owners: >0*** ,Renters: ≈0
Wealth proxies			Owners >Renters***

PANEL B: Consistency of results with alternative transmission mechanisms

Australia			
Direct wealth effect	?	×	×
Credit constraint effect	✓?	✓?	✓?
Common cause effect	×?	×	×
Canada			
Direct wealth effect	?	×?	×
Credit constraint effect	✓?	✓?	✓?
Common cause effect	×	×	×

Notes: 1-*** p<0.01, ** p<0.05, * p<0.1 .2-. Support is indicated as being provided for the respective transmission mechanisms if all of the following conditions apply. All tests are applied at the 5 per cent level of significance. An × indicates that one or more of the conditions are violated; a ✓ indicates that no conditions are violated; a query is used when the conditions are met but are significant at a 10 per cent rather than 5 per cent level, when perverse results are not significant, or when the specification does not allow for testing of all the conditions identified below. 3- Direct wealth effect: (i) Coefficients on house prices /wealth variables/proxies for owners in all age cohorts are positive and significant.(ii) Coefficients on house prices /wealth variables/proxies for owners have the following pattern: older cohort significantly greater than middle cohort and middle cohort significantly greater than young cohort.(iii) Coefficients onhouse prices / wealth variables/proxies for renters in any age cohort are not significantly different from zero. 4- Credit constraint effect:(i) Coefficients on house prices/wealth variables/proxies for credit constrained cohorts are positive and significant. (ii) Coefficients on house prices/wealth variables/proxies for owners in all age cohorts are non-negative. (iii) Coefficients on house prices/wealth variables/proxies for renters in any age cohort are not significantly different from zero. 5-Common cause effect: (i) Coefficients on house prices/wealth variables/proxies for all households are positive and significant. (ii) Coefficients on wealth variables/proxies for all households (owners or renters) in the young cohort are significantly greater than responses by middle cohort and middle cohort significantly greater than older cohort.(iii) Coefficients on wealth variables/proxies for owners are not significantly different from those by renters.

Figure 1: Real House Price Indices: Australia and Canada
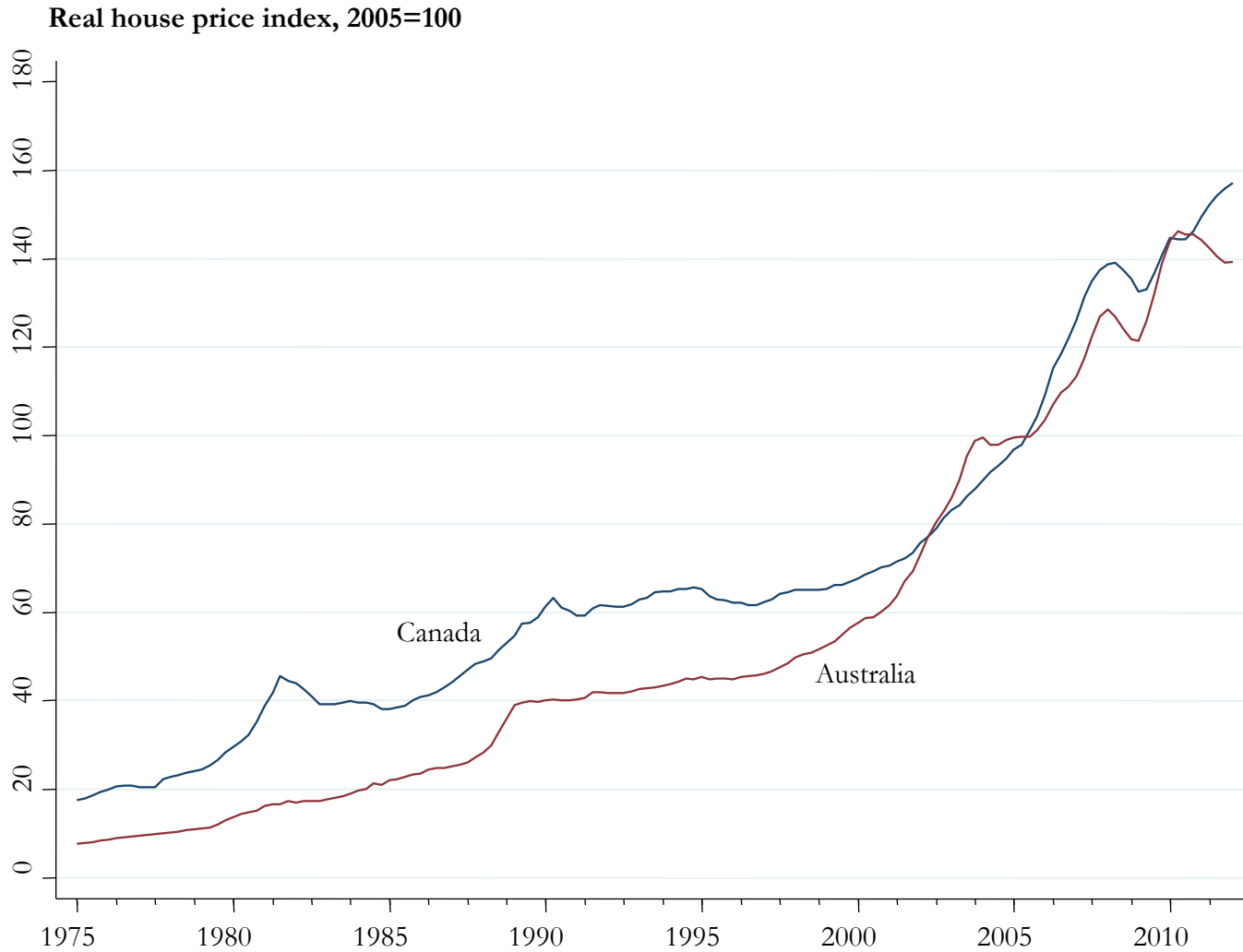
Real house price index, 2005=100

Figure 2: Average per capita weekly expenditure on goods and services excluding housing
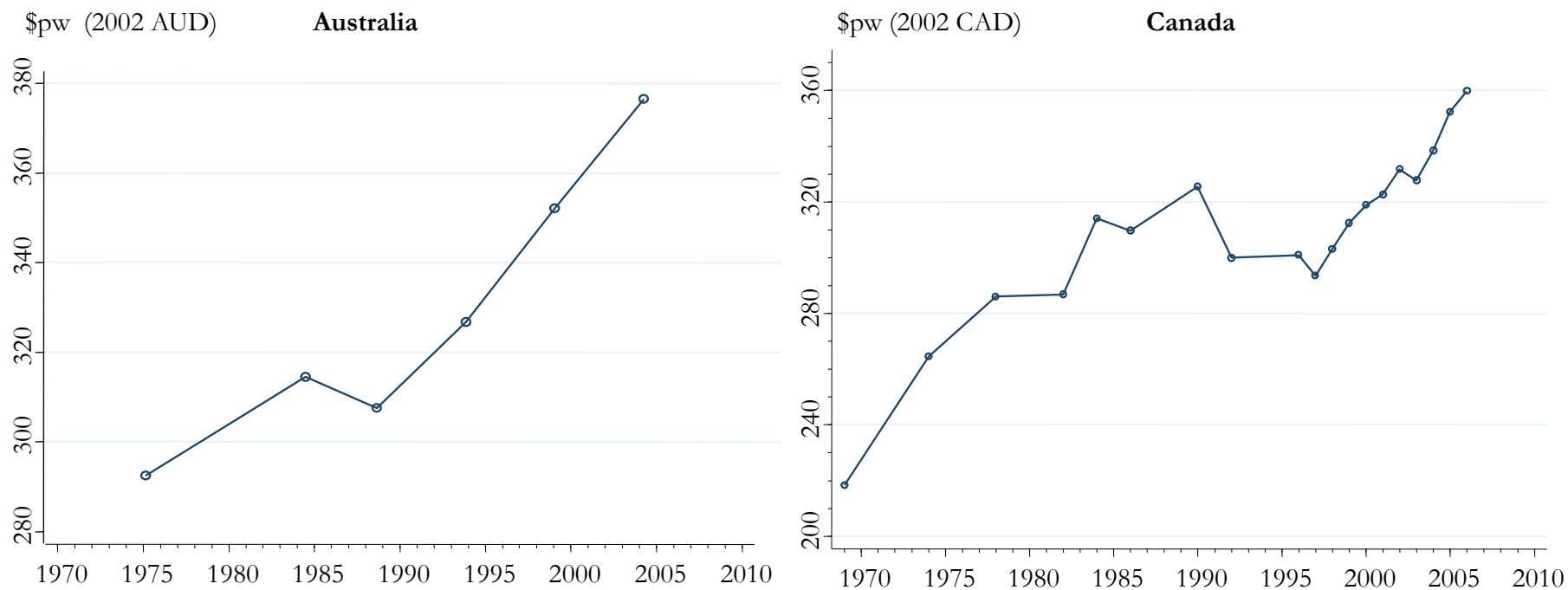
Sources: Authors own calculations from HES (Australia) and from FAMEX and SHS (Canada).

Figure 3: Equivalised expenditure on goods and services (excluding housing) by age and year of survey
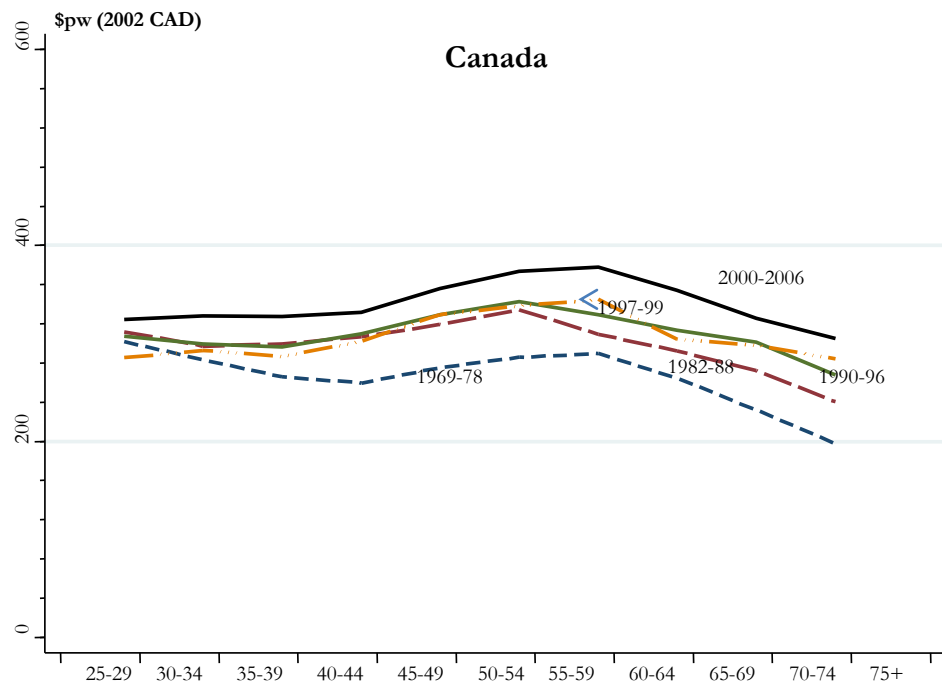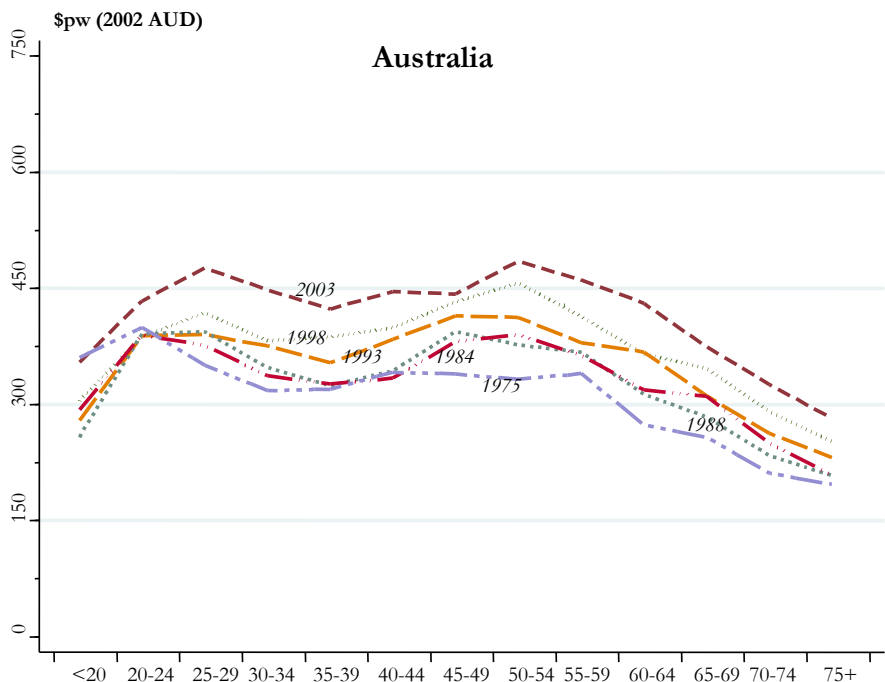
Sources: Authors own calculations from HES (Australia) and from FAMEX and SHS (Canada).

Figure 4: Equivalised expenditure on goods and services (excluding housing) by cohort and age
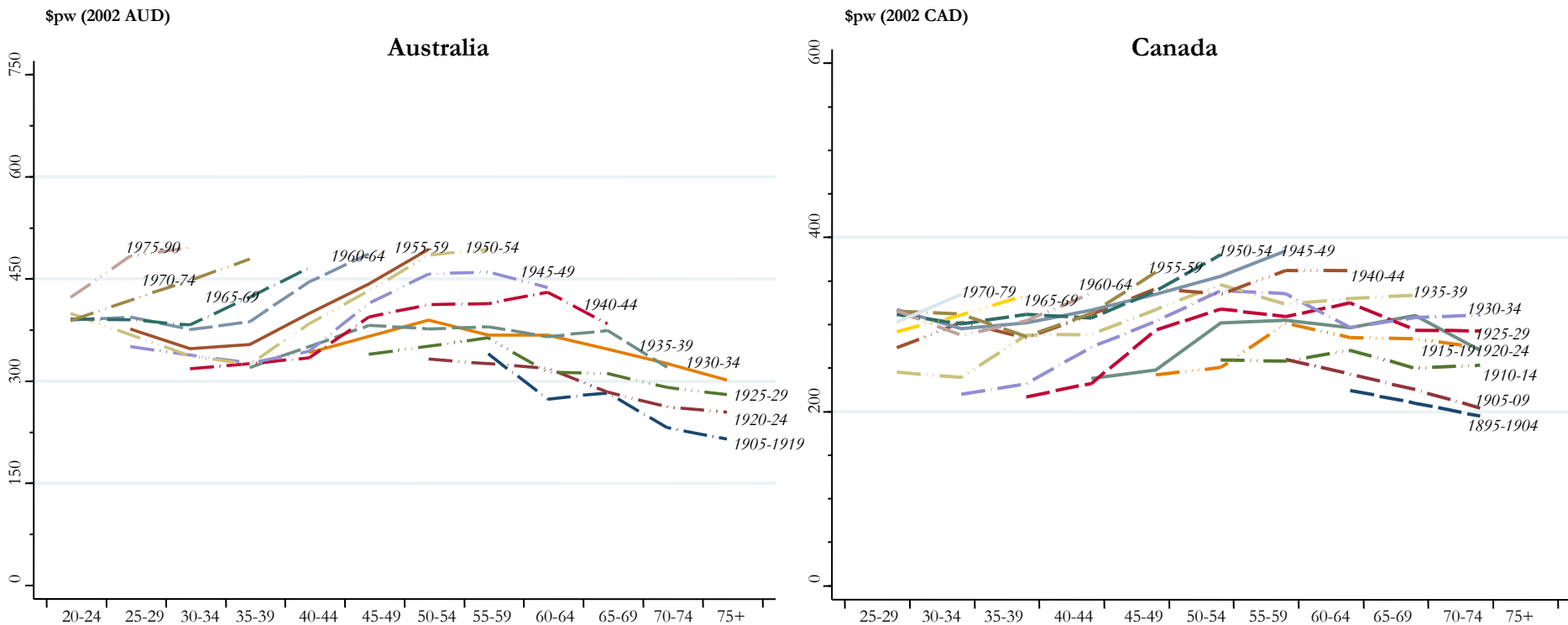
Sources: Authors own calculations from HES (Australia) and from FAMEX and SHS (Canada).

Figure 5: Gap between predicted and actual levels of consumption by age group

(a) Australia

(b) Canada

(c) Australia, by age group

Old (60+)

Mid (40-59)

Young (20-39)

(d) Canada, by age group

Mid (40-59)

Old (60+)

Young (20-39)

Average Consumption Residual
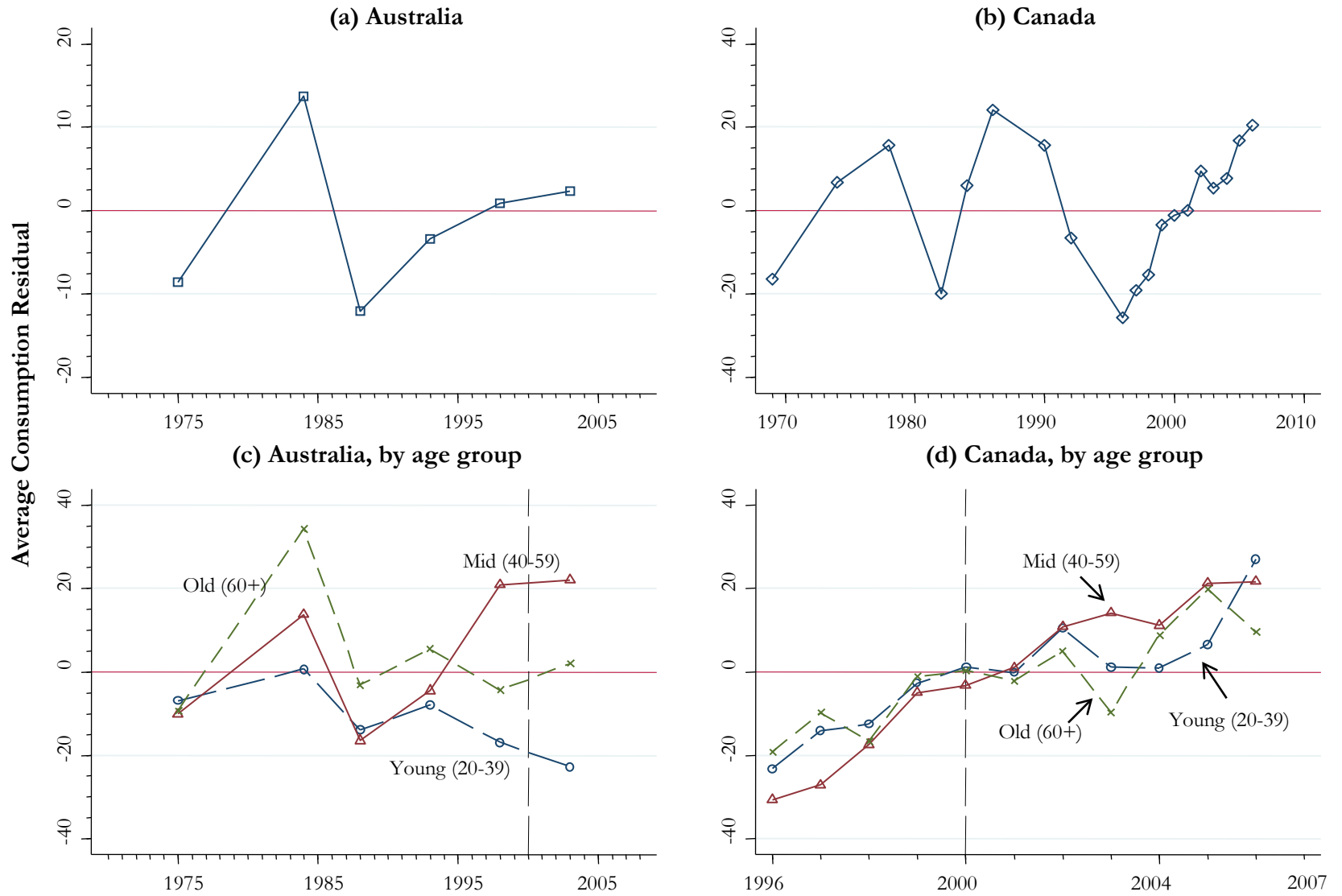
APPENDIX

Appendix Table A 1: Selected empirical results*

		Wealth measure			Country	Period
		Housing	*Financial*	*Total*		
Study	Aggregate time series studies					
Ludvigson and Steindal (1999)	mpc	0.04	0.04	0.05	US	1953-1997
Mehra (2001)	mpc	0.05	0.04-0.06	0.04-.06	US	1959-2000
Davis & Palumbo (2001)	mpc	0.08	0.06	0.04-0.06	US	1960-2000
Bertaut (2002)	mpc	0.05-0.10	0.06		US	1960-2000
Bertaut (2002)	mpc	0.04	0.04		UK	1970-2000
Bertaut (2002)	mpc	0.08-0.09	0.09-0.10		Canada	1976-2000
Bertaut (2002)	mpc	0.05	0.05		Aus	1981-1999
Boone and Girouard (2001)	mpc	0.03-.05	0.04-0.08	0.02-0.04	F, UK, US	1975-2000
Boone and Girouard (2001)	mpc	0.19-0.34	0.10-0.12	0.02-0.06	C, J	1975-2000
Palumbo, Rudd and Whelan (2002)	mpc		0.07-0.08		US	1954-2000
Pichette & Tremblay (2003)	mpc	0.06	0.00		C	1964-2000
Carroll (2003)	mpc	0.09-0.14	0.04-0.07	0.05-0.07	US	1960-2003
Tan and Voss (2003)	mpc	0.00	0.04		Aus	1980-1999
Ramakrishnan (2003)	mpc	0.05			Aus	1981-2002
Belsky and Prakken (2004)	mpc	0.06	0.06	0.06	US	1960-2003
Benjamin, Chinloy and Jud (2004)	mpc	0.08	0.02		US	1952-2001
Catte, Girouard, Price and André (2004)	mpc	0.05-0.08	0.03-0.04		Aus, C, NL, UK, US	~10-40 yrs
Catte, Girouard, Price and André (2004)	mpc	0.01-0.02	0.01-0.02		F, D, I, E	~20 yrs
Carroll, Otsuka and Slacalek (2006)	mpc	0.09	0.04	0.06	US	1960-2004
Tang (2006)	mpc	0.06	0.02		Aus	1988-2003
Kishor (2007)	mpc	0.07	0.03		US	1952-2002
DeVierman and Dunstan (2008)	mpc	0.05-.075	0.14-0.18		NZ	1982-2006
Benjamin and Chinloy (2008)	mpc	0.02	0.04		US	1964-2003
Nieuwerbergh (2008)	mpc	0.09-0.15			US	1952-2008
Davis and Palumbo (2001)	elast	0.36	0.07	0.19-0.34	US	1960-2000
Groenewold (2003)	elast		0.06		US	1947-2002

Table A.1: Selected empirical results (contd).

Study	Aggregate panel studies					
Dvornak & Kohler (2007)	mpc	0.03	0.06-0.09		5 Aus	1986-2001
Labhard, Sterne and Young (2005)	mpc		0.07		11 OECD	1970-2002
Ludwig & Slok (2004)	elast	0.00-0.02	0.01-0.03		16 OECD	1960-1984
Ludwig & Slok (2004)	elast	0.03	0.03		16 OECD	1985-2000
Case, Quigley and Shiller (2005)	elast	0.05-0.09	0.02		51 US	1982-1999
Case, Quigley and Shiller (2005)	elast	0.11-0.17	0.00		14 OECD	1975-1996
	Household cross section studies					
Bover (2005)	mpc	0.02	~0.00	0.02	Spain	2002
Sierminska & Takhtamanova (2007)	elast	0.10-0.13	0.00-0.04		C, F, I	~1999
	Household panel studies					
Dynan and Maki (2001)	mpc		0.05-0.15		US	1993-1999
Maki and Palumbo (2001)	mpc			0.03-0.05	US	1989-1998
Disney, Henley & Jevons (2003)	mpc	0.04-0.08			UK	1991-1999
Guiso, Paiella and Visco (2004)	mpc	0.02	0.02	0.02	Italy	1991-2002
Grant & Pelton (2005)	mpc	0.01	0.01		Italy	1989-2002
Berben et al. (2006)	mpc	0.03		0.01	NL	1993-2005
Juster, Lupton, Smith & Stafford (2006)	mpc	0.03	0.19	0.03	US	1984-1994
Paiella (2007)	mpc	0.02	0.09	0.04	Italy	1991-2002
Cooper (2008)	mpc	0.03			US	1984-2005
Lehnert (2004)	elast	0.04-0.05			US	1968-1993
Attanasio et al. (2008)	elast	0.04-0.21			UK	1978-2002
Bostic, Gabriel & Painter (2006)	elast	0.06	0.02		US	1988-2001
Campbell & Cocco (2007)	elast	1.22			UK	1988-2000

*Results are listed chronologically by type of coefficient estimated. All of the results reported are long run marginal propensities to consume (mpc) or elasticities (elast) and, where a distinction was made, represent responses to permanent increases in wealth. In a number of studies, the analysis was limited to a particular subset of households and in others the focus was on disaggregated results. The most aggregated and, where stated, preferred estimates reported in the paper have been included in this table. A range has been reported when the paper did not indicate a preferred estimate or when only disaggregated results were presented.

Appendix Table A2: Regression Results for Australia -Part1

	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
Constant	-290.85***	[31.88]	-258.02***	[34.12]	-254.70***	[34.52]	-276.86***	[32.84]	-221.33***	[60.05]	-254.76***	[34.06]	-188.24	[60.85]
Cohorts														
<1915	-269.56***	[56.22]	-300.52***	[60.64]	-307.48***	[61.41]	-284.66***	[59.81]	-271.85***	[58.86]	-270.19***	[58.17]	-273.93***	[59.66]
1915-19	-239.46***	[56.46]	-270.57***	[60.88]	-277.54***	[61.63]	-254.64***	[60.04]	-242.27***	[59.09]	-239.98***	[58.38]	-243.65***	[59.89]
1920-24	-215.00***	[56.03]	-246.09***	[60.47]	-253.04***	[61.23]	-230.18***	[59.63]	-218.20***	[58.68]	-217.87***	[57.95]	-221.31***	[59.48]
1925-29	-177.93***	[55.85]	-209.30***	[60.34]	-216.36***	[61.10]	-193.27***	[59.49]	-182.16***	[58.53]	-184.61***	[57.74]	-187.90***	[59.33]
1930-34	-143.81***	[55.79]	-175.34***	[60.30]	-182.43***	[61.06]	-159.25***	[59.45]	-148.78**	[58.48]	-152.01***	[57.66]	-155.18***	[59.28]
1935-39	-141.31**	[55.60]	-172.98***	[60.12]	-179.88***	[60.88]	-156.87***	[59.26]	-147.27**	[58.29]	-149.39***	[57.43]	-152.47***	[59.10]
1940-44	-142.97***	[55.41]	-174.69***	[59.92]	-181.66***	[60.68]	-158.60***	[59.07]	-149.70***	[58.10]	-151.54***	[57.22]	-154.59***	[58.91]
1945-49	-118.83**	[55.19]	-150.87**	[59.64]	-157.90***	[60.42]	-134.77**	[58.81]	-126.92**	[57.84]	-127.38**	[56.96]	-131.34**	[58.65]
1950-54	-102.50*	[55.10]	-134.65**	[59.52]	-141.66**	[60.30]	-118.59**	[58.70]	-111.57*	[57.72]	-112.32**	[56.83]	-116.47**	[58.54]
1955-59	-113.62**	[55.10]	-145.85**	[59.51]	-152.86**	[60.29]	-129.78**	[58.69]	-123.30**	[57.72]	-124.24**	[56.81]	-128.48**	[58.54]
1960-64	-89.79	[54.86]	-121.85**	[59.15]	-128.52**	[59.95]	-105.97*	[58.36]	-100.56*	[57.39]	-100.11*	[56.49]	-104.37*	[58.22]
1965-69	-75.43	[54.78]	-105.14*	[58.57]	-112.48*	[59.45]	-90.42	[57.91]	-84.14	[56.96]	-85.93	[56.32]	-88.03	[57.84]
1970-74	-42.45	[54.93]	-71.2	[58.42]	-78.54	[59.30]	-57.07	[57.83]	-51.53	[56.92]	-49.91	[56.35]	-51.87	[57.77]
1975-79	-19.64	[56.12]	-45.55	[58.88]	-52.39	[59.64]	-32.89	[58.42]	-28.25	[57.66]	-27.84	[57.21]	-29.15	[58.36]
States														
Vic	5.93	[5.00]	5.93	[5.00]	5.76	[5.00]	5.93	[5.00]	6.23	[5.00]	1.69	[5.00]	1.66	[5.00]
QLD	-35.70***	[5.64]	-35.73***	[5.64]	-35.68***	[5.64]	-35.69***	[5.66]	-35.38***	[5.64]	-36.91***	[5.63]	-36.93***	[5.63]
SA	-27.14***	[7.24]	-27.19***	[7.24]	-27.24***	[7.24]	-27.16***	[7.25]	-26.74***	[7.25]	-28.23***	[7.23]	-28.28***	[7.23]
WA	-7.7	[7.04]	-7.75	[7.04]	-7.78	[7.04]	-7.72	[7.04]	-7.38	[7.04]	-8.47	[7.02]	-8.51	[7.02]
TAS	-33.35***	[11.99]	-33.39***	[11.99]	-33.45***	[11.99]	-33.39***	[12.00]	-32.92***	[11.99]	-35.75***	[11.95]	-35.82***	[11.95]
ACT and NT	52.28***	[13.24]	52.24***	[13.24]	52.34***	[13.24]	52.28***	[13.24]	52.81***	[13.24]	58.58***	[13.21]	58.60***	[13.20]
Demographics														
Couple	10.12	[8.20]	10.37	[8.20]	9.96	[8.20]	10.26	[8.20]	10.15	[8.20]	2.37	[8.19]	2.33	[8.19]
Single	4.65	[9.87]	4.7	[9.87]	4.9	[9.87]	4.69	[9.87]	4.65	[9.87]	9.45	[9.85]	9.35	[9.85]
Lone Parents	-27.75**	[12.62]	-27.72**	[12.62]	-27.62**	[12.62]	-27.67**	[12.62]	-27.57**	[12.62]	-20.15	[12.62]	-20.4	[12.62]
Number of Adults	144.64***	[3.57]	144.45***	[3.58]	144.43***	[3.58]	144.56***	[3.58]	144.79***	[3.58]	143.94***	[3.57]	143.82***	[3.57]

Appendix Table A2: Regression Results for Australia -Part1   (Continuing -pg2)

	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
Number of Kids:														
1	61.00***	[6.61]	61.23***	[6.61]	61.26***	[6.61]	61.14***	[6.61]	60.97***	[6.61]	60.40***	[6.60]	60.56***	[6.60]
2	86.40***	[6.48]	86.82***	[6.49]	86.80***	[6.49]	86.65***	[6.49]	86.50***	[6.48]	84.20***	[6.50]	84.59***	[6.50]
more than 3	78.44***	[7.51]	78.84***	[7.52]	78.81***	[7.52]	78.67***	[7.52]	78.28***	[7.52]	78.19***	[7.51]	78.50***	[7.51]
Professional	131.04***	[6.80]	130.99***	[6.80]	130.65***	[6.80]	131.01***	[6.80]	130.89***	[6.80]	124.47***	[6.81]	124.43***	[6.81]
Occupation Other	42.41***	[6.11]	42.33***	[6.11]	42.13***	[6.11]	42.36***	[6.11]	42.27***	[6.11]	37.35***	[6.12]	37.24***	[6.12]
Age	15.29***	[1.15]	15.44***	[1.18]	15.49***	[1.18]	15.32***	[1.17]	15.14***	[1.17]	13.54***	[1.16]	13.49***	[1.17]
Age Square	-0.13***	[0.01]	-0.13***	[0.01]	-0.13***	[0.01]	-0.13***	[0.01]	-0.13***	[0.01]	-0.12***	[0.01]	-0.12***	[0.01]
Household Net Income	0.33***	[0.00]	0.33***	[0.00]	0.33***	[0.00]	0.33***	[0.00]	0.33***	[0.00]	0.32***	[0.00]	0.32***	[0.00]
[2003/4]*Young			-30.56	[20.97]										
[2003/4]*Middle			13.75	[17.39]										
[2003/4]*Old			-0.09	[21.34]										
[2003/4]*Owner														
*Young					-14.41	[26.93]								
*Middle					35.75*	[19.64]								
*Old					21.23	[23.25]								
[2003/4]*Renter														
*Young					-48.05	[30.44]								
*Middle					-77.51**	[36.84]								
*Old					-121.03**	[55.21]								

Appendix Table A2: Regression Results for Australia -Part1   (Continuing -pg3)

	(1)	(2)	(3)	(4)		(5)		(6)		(7)	
[2003/4]*[% change in house price]											
*Young				-0.80	[0.98]						
*Middle				0.62*	[0.38]						
*Old				0.01	[1.00]						
[2003/4]*[Real house price level]											
*Young						-3.98	[6.00]				
*Middle						15.43***	[4.14]				
*Old						7.02	[4.96]				
[2003/4]*[Real house price level]*Owner											
*Young										-2.22	[7.52]
*Middle										19.50***	[4.43]
*Old										8.79*	[5.11]
[2003/4]*[Real house price level]*Renter											
*Young										-5.79	[9.38]
*Middle										-7.73	[11.23]
*Old										-20.65	[20.68]
[2003/4]*[Real house price level]											
*Owner								12.09***	[3.09]		
*Renter								-7.70	[6.85]		
Homeownership Dummy								82.65***	[5.50]	82.78***	[5.50]
Mortgage Dummy								-34.29***	[5.32]	-33.95***	[5.32]
Observations				39,146							
R-squared	0.401	0.402	0.402	0.402		0.402		0.405		0.405	

Appendix Table A3: Regression Results for Australia -Part2

		Proxy for House Prices						
		Net House Wealth		Hybrid		Non-Housing Wealth		LTV	
		(8)		(9)		(10)		(11)	
Constant		-220.59***	[60.02]	-217.22***	[60.30]	-232.39***	[58.55]		
Cohorts									
	<1915	-273.69***	[58.71]	-278.29***	[59.08]	-262.28***	[56.32]	-269.23***	[59.85]
	1915-19	-244.12***	[58.94]	-248.70***	[59.32]	-232.51***	[56.55]	-238.91***	[60.08]
	1920-24	-220.06***	[58.53]	-224.61***	[58.90]	-208.18***	[56.13]	-216.57***	[59.67]
	1925-29	-184.05***	[58.38]	-188.57***	[58.75]	-171.83***	[55.94]	-183.07***	[59.51]
	1930-34	-150.67***	[58.33]	-155.16***	[58.71]	-138.19**	[55.89]	-150.30**	[59.46]
	1935-39	-149.15**	[58.14]	-153.59***	[58.52]	-136.46**	[55.69]	-147.54**	[59.27]
	1940-44	-151.55***	[57.94]	-155.95***	[58.32]	-138.75**	[55.51]	-149.62**	[59.07]
	1945-49	-128.78**	[57.69]	-133.09**	[58.07]	-115.79**	[55.27]	-126.43**	[58.82]
	1950-54	-113.32**	[57.58]	-117.57**	[57.96]	-100.02*	[55.18]	-111.46*	[58.69]
	1955-59	-124.94**	[57.57]	-129.18**	[57.95]	-111.53**	[55.19]	-123.41**	[58.68]
	1960-64	-101.99*	[57.26]	-106.17*	[57.63]	-88.22	[54.94]	-99.24*	[58.34]
	1965-69	-85.69	[56.85]	-89.67	[57.20]	-73.57	[54.83]	-83.35	[57.97]
	1970-74	-53.03	[56.85]	-56.86	[57.18]	-41.19	[54.96]	-47.51	[57.88]
	1975-79	-29.63	[57.63]	-33.08	[57.90]	-18.94	[56.14]	-25.66	[58.43]
States									
	Vic	6.22	[5.00]	6.2	[5.00]	5.93	[5.00]	1.64	[5.00]
	QLD	-35.38***	[5.64]	-35.43***	[5.64]	-35.72***	[5.64]	-36.96***	[5.63]
	SA	-26.74***	[7.25]	-26.78***	[7.25]	-27.08***	[7.24]	-28.29***	[7.23]
	WA	-7.4	[7.04]	-7.44	[7.04]	-7.71	[7.04]	-8.61	[7.02]
	TAS	-32.94***	[11.99]	-32.98***	[11.99]	-33.33***	[11.99]	-35.84***	[11.95]
	ACT and NT	52.80***	[13.24]	52.74***	[13.24]	52.61***	[13.23]	58.51***	[13.21]
Demographics									
	Couple	10.1	[8.20]	10.14	[8.20]	9.92	[8.20]	2.24	[8.19]
	Single	4.65	[9.87]	4.66	[9.87]	4.88	[9.87]	9.34	[9.85]
	Lone Parents	-27.60**	[12.62]	-27.61**	[12.62]	-27.46**	[12.62]	-20.43	[12.62]
	Number of Adults	144.79***	[3.57]	144.76***	[3.57]	145.08***	[3.57]	143.90***	[3.57]

Appendix Table A3: Regression Results for Australia -Part2 (Continuing -pg2)

	Net House Wealth		Hybrid		Non-Housing Wealth		LTV	
	(8)		(9)		(10)		(11)	
Number of Kids:								
1	61.02***	[6.61]	61.05***	[6.61]	61.08***	[6.60]	60.57***	[6.60]
2	86.61***	[6.48]	86.64***	[6.48]	86.67***	[6.48]	84.63***	[6.50]
more than 3	78.35***	[7.51]	78.41***	[7.52]	78.23***	[7.51]	78.49***	[7.51]
Professional	130.93***	[6.80]	130.95***	[6.80]	130.91***	[6.79]	124.47***	[6.81]
Occupation Other	42.29***	[6.11]	42.29***	[6.11]	42.54***	[6.11]	37.27***	[6.12]
Age	15.18***	[1.17]	15.21***	[1.17]	15.11***	[1.15]	13.46***	[1.17]
Age Square	-0.13***	[0.01]	-0.13***	[0.01]	-0.13***	[0.01]	-0.12***	[0.01]
Household Net Income	0.33***	[0.00]	0.33***	[0.00]	0.32***	[0.00]	0.32***	[0.00]
[2003/4]*[House price level]								
*Young	-6	[7.75]	-6.71	[7.05]				
*Middle	17.25***	[4.62]	15.91***	[4.51]				
*Old	7.43	[5.04]	6.86	[5.00]				
[2003/4]*[Non-Housing Wealth]					1.39	[5.16]		
*Young					12.36***	[2.73]		
*Middle					4.53*	[2.46]		
*Old								
[2003/4]*[Real house price level]*Owner							-4.64	[11.48]
*Young							21.33***	[5.57]
*Middle							8.71*	[5.17]
*Old								

Appendix Table A3: Regression Results for Australia -Part2 (Continuing -pg3)

	Net House Wealth	Hybrid	Non-Housing Wealth	LTV	
	(8)	(9)	(10)	(11)	
[2003/4]*[Real house price level]*Renter					
*Young				-5.37	[9.38]
*Middle				-7.79	[11.23]
*Old				-20.75	[20.68]
Homeownership Dummy				82.60***	[5.51]
Mortgage Dummy				-33.84***	[5.36]
Loan to Value Ratios					
[2003/4]*[LTV ratio 0 to <50%]				-9.03	[27.85]
[2003/4]*[LTV ratio 50 to 80%]				15.98	[32.95]
[2003/4]*[LTV ratio 80% +]				44.48	[45.86]
Observations			39,146		
R-squared	0.401	0.401	0.401	0.402	

Appendix Table A4: Regression Results for Canada -Part 1

	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
Constant	-38.48***	[9.59]	-1.51	[10.56]	4.4	[10.55]	-33.31***	[9.86]	-7.05	[10.32]	19.22**	[9.59]	24.67**	[10.32]
Cohorts														
<1915	-139.73***	[8.82]	-96.57***	[9.70]	-102.17***	[9.67]	-133.45***	[8.94]	-98.15***	[9.52]	-81.93***	[9.28]	-83.98***	[9.48]
1915-19	-113.36***	[8.85]	-71.65***	[9.72]	-77.04***	[9.70]	-107.38***	[8.96]	-74.12***	[9.54]	-58.44***	[9.27]	-60.15***	[9.50]
1920-24	-95.53***	[8.11]	-53.03***	[9.06]	-57.69***	[9.04]	-89.37***	[8.23]	-55.32***	[8.85]	-41.34***	[8.58]	-43.04***	[8.83]
1925-29	-83.63***	[7.39]	-42.48***	[8.41]	-46.20***	[8.40]	-77.93***	[7.53]	-45.01***	[8.19]	-32.18***	[7.88]	-33.37***	[8.17]
1930-34	-71.13***	[6.90]	-34.78***	[7.98]	-38.65***	[7.97]	-66.19***	[7.05]	-38.81***	[7.73]	-27.62***	[7.31]	-27.99***	[7.71]
1935-39	-61.48***	[6.50]	-27.48***	[7.71]	-32.92***	[7.70]	-56.98***	[6.68]	-32.42***	[7.42]	-23.49***	[6.89]	-23.62***	[7.41]
1940-44	-51.21***	[6.05]	-21.19***	[7.28]	-28.27***	[7.28]	-47.24***	[6.23]	-26.14***	[6.99]	-18.09***	[6.42]	-18.90***	[6.99]
1945-49	-43.18***	[5.68]	-19.59***	[6.83]	-27.00***	[6.83]	-39.89***	[5.85]	-23.44***	[6.56]	-13.45**	[6.02]	-16.90***	[6.56]
1950-54	-36.73***	[5.36]	-16.47**	[6.55]	-24.61***	[6.56]	-33.95***	[5.55]	-20.54***	[6.27]	-11.75**	[5.67]	-15.35**	[6.27]
1955-59	-30.12***	[5.03]	-14.11**	[6.26]	-21.21***	[6.27]	-28.05***	[5.23]	-18.49***	[5.96]	-9.01*	[5.30]	-12.75**	[5.97]
1960-64	-39.90***	[4.75]	-26.82***	[5.82]	-33.34***	[5.83]	-38.11***	[4.91]	-31.62***	[5.58]	-23.39***	[4.95]	-26.09***	[5.59]
1965-69	-37.24***	[4.51]	-21.77***	[4.81]	-31.25***	[4.85]	-35.26***	[4.54]	-23.76***	[4.73]	-27.74***	[4.64]	-22.10***	[4.78]
1970-74	-26.82***	[4.42]	-17.84***	[4.53]	-24.43***	[4.55]	-25.69***	[4.43]	-19.07***	[4.50]	-22.45***	[4.45]	-18.32***	[4.51]
Region														
Atlantic	-22.70***	[2.54]	-22.65***	[2.53]	-27.36***	[2.52]	-22.80***	[2.54]	-13.89***	[2.58]	-22.00***	[2.57]	-22.12***	[2.56]
Quebec	-27.60***	[1.60]	-27.70***	[1.60]	-26.98***	[1.60]	-29.73***	[1.64]	-21.45***	[1.64]	-17.75***	[1.63]	-17.97***	[1.63]
Praries	13.98***	[1.87]	13.93***	[1.87]	9.94***	[1.86]	13.38***	[1.87]	18.48***	[1.88]	12.32***	[1.87]	12.21***	[1.87]
British Columbia	7.03***	[2.03]	7.09***	[2.03]	6.02***	[2.02]	6.31***	[2.03]	6.04***	[2.03]	5.19**	[2.01]	4.53**	[2.01]
Demographics														
Couple	9.83***	[2.40]	8.65***	[2.40]	0.87	[2.40]	9.68***	[2.40]	8.89***	[2.40]	-2.05	[2.39]	-2.07	[2.39]
Single	-24.92***	[2.83]	-26.58***	[2.83]	-20.65***	[2.82]	-25.15***	[2.83]	-27.44***	[2.83]	-16.08***	[2.82]	-15.95***	[2.82]
Lone Parents	-15.01***	[3.47]	-16.63***	[3.47]	-14.46***	[3.46]	-15.28***	[3.47]	-16.86***	[3.47]	-10.01***	[3.45]	-10.97***	[3.45]
Number of Adults	82.74***	[0.95]	82.51***	[0.95]	82.47***	[0.95]	82.72***	[0.95]	82.09***	[0.95]	82.11***	[0.95]	81.55***	[0.95]
Number of Kids:														
1	32.35***	[2.01]	32.25***	[2.01]	32.73***	[2.01]	32.30***	[2.01]	31.89***	[2.01]	32.27***	[2.00]	32.93***	[2.00]
2	63.47***	[2.08]	63.78***	[2.09]	62.96***	[2.08]	63.50***	[2.08]	63.24***	[2.08]	59.38***	[2.08]	61.04***	[2.08]
more than 3	85.87***	[2.75]	85.59***	[2.76]	85.85***	[2.75]	85.82***	[2.75]	85.13***	[2.75]	83.25***	[2.74]	84.36***	[2.74]

Appendix Table A4: Regression Results for Canada -Part 1 (Continuing -pg2)

	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
Age	7.60***	[0.47]	5.49***	[0.54]	6.27***	[0.53]	7.36***	[0.49]	5.93***	[0.52]	4.93***	[0.48]	4.77***	[0.52]
Age Square	-0.06***	[0.00]	-0.05***	[0.01]	-0.06***	[0.01]	-0.06***	[0.00]	-0.06***	[0.01]	-0.06***	[0.00]	-0.06***	[0.01]
Survey is SHS	-2.54	[2.40]	-11.92***	[2.46]	-11.19***	[2.45]	-4.29*	[2.41]	-10.30***	[2.43]	-9.16***	[2.40]	-9.98***	[2.41]
Household Net Income	0.37***	[0.00]	0.37***	[0.00]	0.36***	[0.00]	0.37***	[0.00]	0.36***	[0.00]	0.35***	[0.00]	0.36***	[0.00]
[2000-06]*Young			21.11***	[3.33]										
[2000-06]*Middle			36.89***	[2.25]										
[2000-06]*Old			24.60***	[3.33]										
[2000-06]*Owner														
*Young					38.77***	[3.60]								
*Middle					67.68***	[2.39]								
*Old					55.25***	[3.55]								
[2000-06]*Renter														
*Young					-5.24	[3.90]								
*Middle					-42.47***	[3.14]								
*Old					-54.02***	[4.86]								
[2000-06]*[% change in house price]														
*Young							0.36***	[0.14]						
*Middle							0.58***	[0.10]						
*Old							0.49***	[0.16]						
[2000-06]*[Real house price level]														
*Young									8.42***	[1.50]				
*Middle									19.32***	[1.05]				
*Old									15.79***	[1.63]				

Continues on the next page

Appendix Table A4: Regression Results for Canada -Part 1 (Continuing -pg3)

	(1)	(2)	(3)	(4)	(5)	(6)		(7)	
[2000-06]*[Real house price level]*Owner									
*Young						13.31***	[1.69]		
*Middle						32.02***	[1.14]		
*Old						25.80***	[1.75]		
[2000-06]*[Real house price level]*Renter									
*Young						5.70***	[1.86]		
*Middle						-5.15***	[1.63]		
*Old						-5.02*	[2.59]		
[2000-06]*[Real house price level]									
*Owner						26.15***	[0.94]		
*Renter						-0.08	[1.25]		
Homeownership Dummy						76.23***	[2.08]	75.29***	[2.09]
Mortgage Dummy						-45.58***	[1.71]	-42.95***	[1.73]
Observations				207,128					
R-squared	0.545	0.546	0.55	0.545	0.546	0.552		0.553	

Appendix Table A5: Regression Results for Canada -Part2

	(2)		(3)		(4)		(5)		(6)		(7)	
Constant	3.71	[10.57]	-7.75	[10.30]	-5.51	[10.33]	0.49	[10.33]	21.44**	[9.60]	9.29	[10.56]
Cohorts												
<1915	-72.74***	[10.15]	-80.59***	[10.14]	-87.16***	[9.71]	-89.84***	[9.70]	-73.72***	[9.42]	-95.85***	[9.68]
1915-19	-48.27***	[10.17]	-55.90***	[10.16]	-62.35***	[9.73]	-66.27***	[9.71]	-50.60***	[9.40]	-71.90***	[9.69]
1920-24	-30.27***	[9.52]	-37.11***	[9.51]	-44.64***	[9.04]	-47.83***	[9.03]	-33.88***	[8.71]	-52.64***	[9.02]
1925-29	-19.43**	[8.92]	-25.30***	[8.91]	-33.76***	[8.41]	-37.33***	[8.40]	-24.18***	[8.03]	-41.20***	[8.39]
1930-34	-13.67	[8.45]	-19.61**	[8.45]	-26.46***	[7.92]	-32.39***	[7.91]	-21.00***	[7.43]	-36.03***	[7.90]
1935-39	-7.06	[8.18]	-14.47*	[8.18]	-19.20**	[7.60]	-26.47***	[7.60]	-17.31**	[7.00]	-31.52***	[7.60]
1940-44	-1.16	[7.77]	-10.05	[7.78]	-11.56	[7.19]	-20.13***	[7.17]	-12.30*	[6.52]	-26.65***	[7.18]
1945-49	-1.8	[7.28]	-11.01	[7.30]	-9.89	[6.74]	-18.23***	[6.73]	-8.14	[6.12]	-25.42***	[6.74]
1950-54	0.26	[7.00]	-9.68	[7.02]	-6.75	[6.44]	-15.84**	[6.43]	-6.82	[5.76]	-23.57***	[6.44]
1955-59	1.05	[6.68]	-7.85	[6.71]	-4.52	[6.12]	-14.61**	[6.11]	-4.81	[5.37]	-21.50***	[6.12]
1960-64	-14.35**	[6.28]	-22.14***	[6.32]	-19.13***	[5.79]	-28.94***	[5.75]	-19.99***	[5.01]	-34.54***	[5.78]
1965-69	-12.13**	[5.03]	-23.03***	[5.10]	-17.90***	[4.87]	-20.62***	[4.83]	-25.04***	[4.68]	-30.14***	[4.89]
1970-74	-11.20**	[4.67]	-19.15***	[4.70]	-14.63***	[4.59]	-16.70***	[4.56]	-20.90***	[4.48]	-23.73***	[4.59]
Region												
Atlantic	-22.66***	[2.53]	-27.37***	[2.52]	-23.69***	[2.53]	-14.42***	[2.58]	-22.43***	[2.57]	-17.18***	[2.57]
Quebec	-27.77***	[1.60]	-27.12***	[1.59]	-30.14***	[1.64]	-21.91***	[1.64]	-18.08***	[1.63]	-21.83***	[1.63]
Praries	13.85***	[1.87]	9.86***	[1.86]	9.10***	[1.89]	18.00***	[1.88]	12.02***	[1.87]	14.69***	[1.88]
British Columbia	7.06***	[2.03]	5.97***	[2.02]	0.75	[2.06]	5.92***	[2.03]	5.22***	[2.01]	4.79**	[2.02]
Demographics												
Couple	8.16***	[2.40]	0.49	[2.40]	8.45***	[2.40]	8.55***	[2.40]	-2.31	[2.39]	1.56	[2.40]
Single	-27.08***	[2.83]	-21.05***	[2.82]	-26.65***	[2.83]	-27.68***	[2.83]	-16.30***	[2.82]	-22.85***	[2.82]
Lone Parents	-16.26***	[3.47]	-14.45***	[3.46]	-15.53***	[3.47]	-16.78***	[3.47]	-9.82***	[3.45]	-15.76***	[3.46]
Number of Adults	82.64***	[0.95]	82.62***	[0.95]	82.74***	[0.95]	82.12***	[0.95]	82.19***	[0.95]	81.90***	[0.95]
Number of Kids:												
1	32.27***	[2.01]	32.75***	[2.01]	32.32***	[2.01]	31.97***	[2.01]	32.19***	[2.00]	32.24***	[2.00]
2	63.51***	[2.09]	62.87***	[2.09]	63.44***	[2.08]	63.33***	[2.08]	59.30***	[2.08]	62.34***	[2.08]
more than 3	85.10***	[2.76]	85.42***	[2.75]	85.13***	[2.75]	85.14***	[2.75]	83.07***	[2.74]	85.08***	[2.74]

Appendix Table A5: Regression Results for Canada -Part2 (Continuing -pg2)

	(2)		(3)		(4)		(5)		(6)		(7)	
Age	4.70***	[0.55]	5.55***	[0.54]	5.50***	[0.52]	5.75***	[0.53]	4.68***	[0.49]	6.53***	[0.52]
Age Square	-0.04***	[0.01]	-0.06***	[0.01]	-0.05***	[0.01]	-0.05***	[0.01]	-0.06***	[0.00]	-0.06***	[0.01]
Survey is SHS	-8.19***	[2.49]	-7.67***	[2.48]	-4.83**	[2.45]	-7.55***	[2.47]	-6.52***	[2.44]	-7.13***	[2.46]
Household Net Income	0.37***	[0.00]	0.36***	[0.00]	0.37***	[0.00]	0.36***	[0.00]	0.35***	[0.00]	0.36***	[0.00]
Homeownership Dummy									76.86***	[2.08]	75.83***	[2.10]
Mortgage Dummy									-45.61***	[1.70]	-42.89	[1.73]

	(2)			(6)	
[2006]*Young	55.05***	[5.54]	2006*Owner	29.42***	[1.43]
[2006]*Middle	53.34***	[3.90]	2006*Renter	5.37***	[1.99]
[2006]*Old	18.82***	[5.92]			
[2005]*Young	37.00***	[5.56]	2005*Owner	28.29***	[1.53]
[2005]*Middle	42.00***	[3.89]	2005*Renter	-0.68	[2.20]
[2005]*Old	39.55***	[6.07]			
[2004]*Young	21.11***	[5.50]	2004*Owner	25.17***	[1.57]
[2004]*Middle	41.37***	[3.95]	2004*Renter	-2.23	[2.24]
[2004]*Old	31.94***	[6.10]			
[2003]*Young	12.76**	[5.53]	2003*Owner	26.78***	[1.69]
[2003]*Middle	47.03***	[3.93]	2003*Renter	-7.78***	[2.36]
[2003]*Old	16.78***	[6.20]			
[2002]*Young	29.85***	[5.51]	2002*Owner	30.20***	[1.95]
[2002]*Middle	42.51***	[3.97]	2002*Renter	4.09	[2.71]
[2002]*Old	33.16***	[6.16]			
[2001]*Young	10.87**	[5.06]	2001*Owner	17.70***	[1.99]
[2001]*Middle	25.63***	[3.86]	2001*Renter	0.61	[2.66]
[2001]*Old	16.63***	[6.22]			
[2000]*Young	15.55***	[4.93]	2000*Owner	15.51***	[2.15]
[2000]*Middle	15.96***	[3.92]	2000*Renter	-1.15	[2.88]
[2000]*Old	11.42*	[6.26]			

Appendix Table A5: Regression Results for Canada -Part2 (Continuing -pg3)

	(4)			(5)		(7)
[2006]*[% change in house price]			**[2006]*[R. house price level]**			
*Young	4.68***	[0.45]	*Young	18.50***	[2.21]	
*Middle	4.16***	[0.34]	*Middle	22.74***	[1.64]	
*Old	1.36**	[0.55]	*Old	10.82***	[2.63]	
[2005]*[% change in house price]			**[2005]*[R. house price level]**			
*Young	3.80***	[0.61]	*Young	13.79***	[2.39]	
*Middle	4.08***	[0.44]	*Middle	17.07***	[1.76]	
*Old	4.06***	[0.70]	*Old	22.26***	[2.89]	
[2004]*[% change in house price]			**[2004]*[R. house price level]**			
*Young	1.56***	[0.54]	*Young	4.78**	[2.42]	
*Middle	3.30***	[0.40]	*Middle	18.41***	[1.82]	
*Old	2.32***	[0.62]	*Old	18.10***	[2.93]	
[2003]*[% change in house price]			**[2003]*[R. house price level]**			
*Young	0.88	[0.55]	*Young	-1.37	[2.60]	
*Middle	3.71***	[0.40]	*Middle	23.67***	[1.94]	
*Old	1.03	[0.63]	*Old	9.65***	[3.19]	
[2002]*[% change in house price]			**[2002]*[R. house price level]**			
*Young	2.88***	[0.64]	*Young	6.76**	[2.95]	
*Middle	4.05***	[0.47]	*Middle	23.84***	[2.26]	
*Old	3.24***	[0.74]	*Old	25.46***	[3.65]	
[2001]*[% change in house price]			**[2001]*[R. house price level]**			
*Young	0.18	[0.14]	*Young	0.99	[2.87]	
*Middle	0.11	[0.11]	*Middle	14.34***	[2.23]	
*Old	0.34**	[0.17]	*Old	9.14**	[3.83]	
[2000]*[% change in house price]			**[2000]*[R. house price level]**			
*Young	2.28**	[1.09]	*Young	4.94	[3.04]	
*Middle	1.52*	[0.88]	*Middle	7.68***	[2.45]	
*Old	1.74	[1.41]	*Old	12.11***	[4.10]	

Appendix Table A5: Regression Results for Canada -Part2 (Continuing -pg4)

	(3)			(7)	
[2006]*Owner			**[2006]*[R. house price level]*Owner**		
*Young	85.40***	[6.76]	*Young	32.67***	[2.81]
*Middle	84.22***	[4.39]	*Middle	36.69***	[1.87]
*Old	48.11***	[6.70]	*Old	24.05***	[2.99]
[2005]*Owner			**[2005]*[R. house price level]*Owner**		
*Young	54.06***	[6.75]	*Young	23.32***	[2.98]
*Middle	76.56***	[4.35]	*Middle	33.44***	[1.98]
*Old	75.16***	[6.80]	*Old	40.12***	[3.25]
[2004]*Owner			**[2004]*[R. house price level]*Owner**		
*Young	33.53***	[6.78]	*Young	11.01***	[3.07]
*Middle	75.14***	[4.41]	*Middle	35.06***	[2.05]
*Old	65.34***	[6.90]	*Old	35.08***	[3.31]
[2003]*Owner			**[2003]*[R. house price level]*Owner**		
*Young	37.56***	[6.76]	*Young	10.91***	[3.25]
*Middle	83.05***	[4.47]	*Middle	43.55***	[2.23]
*Old	47.17***	[6.93]	*Old	25.67***	[3.57]
[2002]*Owner			**[2000]*[R. house price level]*Owner**		
*Young	44.25***	[6.87]	*Young	15.39***	[3.73]
*Middle	71.96***	[4.50]	*Middle	42.89***	[2.59]
*Old	58.42***	[6.92]	*Old	40.87***	[4.10]
[2001]*Owner			**[2000]*[R. house price level]*Owner**		
*Young	14.76**	[6.57]	*Young	3.42	[3.89]
*Middle	51.81***	[4.38]	*Middle	30.28***	[2.57]
*Old	47.91***	[7.10]	*Old	29.28***	[4.41]
[2000]*Owner			**[2000]*[R. house price level]*Owner**		
*Young	30.14***	[6.42]	*Young	15.42***	[4.08]
*Middle	38.81***	[4.49]	*Middle	22.15***	[2.83]
*Old	39.53***	[7.13]	*Old	32.57***	[4.70]

Appendix Table A5: Regression Results for Canada -Part2 (Continuing -pg5)

	(3)			(6)	
[2006]*Renter			**[2006]*[R. house price level]*Owner**		
*Young	10.2	[7.46]	*Young	0.84	[3.01]
*Middle	-26.92***	[6.85]	*Middle	-11.23***	[2.91]
*Old	-50.83***	[10.42]	*Old	-21.45***	[4.73]
[2005]*Renter			**[2005]*[R. house price level]*Owner**		
*Young	8.31	[7.55]	*Young	0.34	[3.34]
*Middle	-53.47***	[6.95]	*Middle	-25.74***	[3.16]
*Old	-56.33***	[11.19]	*Old	-26.70***	[5.43]
[2004]*Renter			**[2004]*[R. house price level]*Owner**		
*Young	-0.1	[7.32]	*Young	-3.77	[3.30]
*Middle	-56.12***	[7.18]	*Middle	-27.62***	[3.36]
*Old	-52.64***	[10.95]	*Old	-27.29***	[5.41]
[2003]*Renter			**[2003]*[R. house price level]*Owner**		
*Young	-25.66***	[7.47]	*Young	-18.60***	[3.61]
*Middle	-41.37***	[6.68]	*Middle	-22.49***	[3.32]
*Old	-68.01***	[11.59]	*Old	-37.38***	[6.15]
[2002]*Renter			**[2000]*[R. house price level]*Owner**		
*Young	6.01	[7.26]	*Young	-5.54	[4.05]
*Middle	-31.27***	[6.85]	*Middle	-20.31***	[3.92]
*Old	-32.27***	[11.30]	*Old	-17.05**	[6.97]
[2001]*Renter			**[2000]*[R. house price level]*Owner**		
*Young	2.49	[6.88]	*Young	-2.25	[3.86]
*Middle	-41.53***	[6.84]	*Middle	-22.93***	[3.94]
*Old	-62.01***	[11.09]	*Old	-40.69***	[6.88]
[2000]*Renter			**[2000]*[R. house price level]*Owner**		
*Young	-4.41	[6.76]	*Young	-6.75	[4.15]
*Middle	-39.17***	[6.83]	*Middle	-25.39***	[4.31]
*Old	-60.81***	[11.27]	*Old	-40.23***	[7.43]
Observations			207,128		
R-squared	0.546	0.546	0.546	0.551	0.552	0.554