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THE STOCK MARKET, HOUSING AND CONSUMER SPENDING: DIRECT WEALTH EFFECTS, COMMON CAUSALITY AND BORROWING CONSTRAINTS. A SURVEY OF THE EVIDENCE

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Abstract

This paper examines the literature on the relationship between stock and house prices and consumer spending. Three main hypotheses have been proposed to explain this relationship. First, a rise in asset prices may increase desired consumption via a direct wealth effect. Second, asset prices and consumption may co-vary due to the influence of common factors. Third, house price growth may facilitate higher consumption as it relaxes borrowing constraints by increasing the value of the collateral available to homeowners. A survey of the literature reveals a strong relationship between asset prices and consumer spending. The time-series approach allows to distinguish between short-run and long-run links between consumption, income and wealth. It allows to identify which variables adjust to restore the long run equilibrium in case of a shock, and to determine the time taken by the adjustment process. The microeconomic evidence allows us to improve our understanding of the nature of the link between these variables and to distinguish among the alternative hypotheses proposed to explain this relationship.

JEL classification: E2, G1.

Keywords: stock market wealth, housing, consumption, direct wealth effects, common causality and borrowing constraints.

Contents

1. Introduction[1]

The second half of the 1990s recorded a dramatic increase in stock values. In the US, the annual return to equity rose from an average 5.9 percent in the first half of the 1990s to an astonishing 26.3 percent average annual return from 1996 to 1999. Over the same period the aggregate saving rate dropped from 4 to 2 percent in the US. Similar evidence has been recorded in many other industrialized countries. In the Euro area, the aggregate saving rate fell from 17 to 14 percent (OECD, 2004). This has led to renewed policy and scientific interest in the effects of household wealth upon consumer spending. To the extent that the inflation of stock prices increased spending pressures, there were good reasons to fear that constant or declining share prices may depress consumption and exacerbate a slowdown in the economy.

The stock market decline of the late 1990s however did not depress expenditure as expected. The leading explanation for the limited impact of falling stock prices on aggregate demand is that of an offsetting real estate wealth effect (Benjamin et al., 2004). In fact, the decline occurred at a time of sharply rising housing prices: during 2000-2001, house prices grew by over 8 percent a year in the US[2] and similar rates have been recorded in the UK and Euro area. In many countries the cycles of house price and consumption growth have been closely synchronized. Catte et al. (2004) find that, on average for OECD countries, the correlation between house prices and consumption growth has been 0.6 over the past 30 years.

An alternative explanation relies on the observation that a small fraction of the variation in household wealth is related to changes in spending. The empirical evidence for most countries suggests that household consumption is correlated with wealth and does respond to changes in permanent changes in wealth. However, the vast majority of the fluctuations in asset values are attributable to transitory innovations that display no association with consumer spending (see Lettau and Ludvigson, 2003).

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As to the nature of the correlation between asset prices and consumption, it is tempting to attribute it to a direct wealth effect: increasing asset prices increase household wealth, which in turn increases consumption. There are however several reasons not to make this attribution without further analysis, as there are alternative explanations for the correlation between asset prices and consumer spending.

One such explanation is that they are driven by a common macroeconomic factor. For example, asset prices may respond to future income prospects to which current consumption also responds, provided that households are not borrowing constrained. Alternatively, financial market liberalization may drive up asset prices and stimulate consumption by relaxing borrowing constraints, as suggested by Muellbauer and Murphy (1990). As to house prices, King (1990) and Pagano (1990) argued that an upward revision of expected future incomes may simultaneously increase the demand for housing services – which in turn rises house prices, given that housing is in relative fixed supply – and consumption.

Another hypothesis is that house prices may affect consumption by relaxing (or tightening) borrowing constraints. Housing is an asset that can be used as collateral in a loan. For borrowing constrained homeowners, an increase in house prices relaxes credit constraints and may lead to an increase in spending because it allows homeowners to borrow more and to smooth consumption over the life-cycle. A related issue is that changes in asset prices may affect households' desire for other forms of precautionary savings, too. When the price of an asset rises, the stock of savings held in that form increases, and households may choose to reduce the stock of other assets and increase consumption.

Distinguishing among these alternative explanations for the asset price-consumption correlation is crucial for several reasons, beyond the basic goal of better understanding household behavior. First of all, if wealth is not causal to consumption, a decline in asset prices would be interpreted as a symptom of a future slowdown in consumer spending, rather than a cause. Further, the implications of a sharp correction in asset prices might differ depending on whether a price change causes revisions in the expectations of future economic conditions. Finally, if the wealth effects on consumer spending are mainly direct, and there is

[2] The source for the US is the Office of Federal Housing Enterprise Oversight (historical data available at: http://www.ofheo.gov/house/)

a causal channel, the heterogeneity of household portfolios necessarily implies considerable heterogeneity in the response of household consumption to asset prices.

This paper reviews the evidence on these issues. It updates the work of Poterba (2000) by reviewing the most recent studies on wealth effects. These studies are explicitly set out to improve our understanding of the links between asset prices and consumer spending and go beyond the quantification of the wealth effects, which was the focus of most 1990s studies. Furthermore, it extends Poterba (2000), which concentrates primarily on stock market wealth effects, by examining the impact of house price changes on consumer spending. The effects of housing wealth on consumption have received considerable attention only recently, when house prices started climbing in the late 1990s and early 2000s. The debate has then intensified as the housing market exhibited signs of cooling down towards the mid of this decade. Finally, the paper compares the evidence available across countries and discusses the extent to which institutional differences are behind the heterogeneity in the response of household consumption to asset prices.

The rest of the paper is organized as follows. Section 2 briefly reviews the life-cycle model for consumption, which provides a rigorous theoretical framework to appraise the relevance of wealth effects. Section 3 examines the econometrics of wealth effects: section 3.1 focuses on the approaches that rely on aggregate data; section 3.2 considers those that employ household level data. Section 4 summarizes and discusses the empirical evidence on the links between wealth and consumption based on macro data; section 5 reviwes the micro-data-based evidence. Section 6 consludes.

2. Conceptual framework: the life-cycle model for consumption

The basic ideas and key theoretical links between wealth and consumption can be described using the life-cycle model of household spending behavior, developed by Ando and Modigliani (1960, 1963). According to the life-cycle model, households accumulate and deplete their wealth to keep their consumption roughly steady. In the absence of unpredictable changes in wealth, the model predicts that wealth could vary even substantially over the household lifetime, but their consumption will remain relatively stable. However, if households experience an unexpected change in their wealth, they will revise their consumption plan. Thus, the model suggests that predictable changes in asset prices should

not lead to changes in planned consumption, while unexpected changes should generate a response.

Economists have extended the basic model to obtain a more realistic description of the process by which households make their consumption-saving decisions. In particular, they have allowed for the possibility that households are unable to borrow as much as they would like against higher future incomes. They also have allowed for the possibility that households may want to keep some assets as a precaution against unpredictable, future, adverse events or to bequeath to younger generations. These extensions do not change the basic predictions of the model: as long as households can borrow against anticipated future increases in income or wealth, they will try to keep their consumption constant. Nevertheless, they help to explain some deviations from its basic predictions. They allow for the possibility that consumption responds to predictable changes in income or wealth or that it responds slowly to permanent changes. They also suggest that household spending may be related to all those variables that help to predict future changes in income or wealth.

Economists have started from the basic predictions of the life-cycle theory to build empirical models and quantify the relationship between consumption and wealth. These models have been used to estimate the consumption response to changes in wealth. The theory in its simplest form predicts that the marginal propensity to consume (*mpc*) out of all wealth, whatever its form, should be the same small number. In practice though, if assets are not fungible and households develop "mental accounts" that dictate that certain assets are more appropriate to use for current expenditure and others for long-term saving, or if they view the accumulation of some kinds of wealth as an end in itself or rather bequeath their wealth in a specific form for tax or other reasons, the extent and nature of wealth effects may turn out to be asset-type specific.

Two types of approaches have been used for the empirical appraisal of wealth effects: one relies on aggregate data; the other is based on household level data. In the next section, we will review the econometrics of these approaches. Then, we will turn to the empirical evidence.

3. The econometrics of wealth effects

3.1 Time Series Econometrics of Wealth Effects[3]

Most recent macroeconomic studies of wealth effects use a logarithmic[4] approximation to the aggregate consumption function that can be derived solely from the intertemporal budget constraint which takes the form of:

(1)[5] $c_t = a_0 + a_1 y_t^d + a_2 w_t + u_t$,

where c_t is log per-capita planned expenditure; y_t^d is log per-capita disposable income; w_t denotes log per-capita wealth; and, u_t is the error term capturing the effects of unexpected shocks to consumption.

Equation (1) is a description of the long-run relationship between consumption, income and wealth. The coefficients a_1 and a_2 give the effect on consumption of permanent changes, i.e. changes that are sustainable in the long run, in wealth and income, and have the size of an elasticity. The implied level responses, i.e. the marginal propensities to consume, can be backed out using recent values of the consumption-income and consumption-wealth ratios.[6]

Deviations from this long-run relationship are possible in the short run. To address the issues of short-run dynamics, of which variables adjust to restore the long-run equilibrium, and of the time taken by the adjustment process, researchers typically estimate a vector error-correction model of the consumption-income-wealth relationship, such as:

(2) $\Delta x_t = b_0 + b_1 u_{t-1} + B(L)\Delta x_{t-1} + v_t$.

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[3] See Davis and Palumbo (2001) and Lettau et al. (2001) for a thorough review of the statistical approach typically employed by macroeconomists to investigate the empirical link between aggregate data on household consumption, income and wealth.

[4] Aggregate time-series data on consumption, income and wealth appear to be closer to linear in logs than liner in levels.

[5] Since Campbell (1987), it has been clear that equation (1) can be derived solely from the intertemporal budget constraint, with no need of assumptions concerning preferences and the stochastic processes generating the variables. This makes it less vulnerable to the Lucas critique, which has by large undermined the popularity of the models based on aggregate consumption functions in the 1980s. In fact, a solved-out relationship between consumption, income and wealth would require a stable data-generating process for expectations.

[6] In the data, consumption, income and wealth exhibit very strong upward trends over time. However, if the variables are *co-integrated*, the error of (1) is stationary and ordinary least square estimates are super-consistent and, therefore robust to the presence of regressor endogeneity.

Δx_t is the vector of log differences (Δc_t Δy_t^d Δw_t); $b_0 \equiv (b_{0c}\ b_{0y}\ b_{0w})$ and $b_1 \equiv (b_{1c}\ b_{1y}\ b_{1w})$ are 3x1 vectors of coefficients; $B(L)$ is a finite-order distributed-lag operator; and u_{t-1} denotes last period's equilibrium error, corresponding to the difference between actual and planned consumption, and is based on (1). b_1 is the vector of adjustment coefficients and tells us which variables contribute to restore the long-run equilibrium, when a deviation occurs.[7] A negative statistically significant b_{1c} would imply that current period consumption moves to correct an *error* from last period. However, it is also possible that, when consumption deviates from its usual ratio with income and wealth, it is wealth, or labor income, and not necessarily consumer spending, that adjusts until the equilibrium relationship is restored.

It is worth stressing that the presence of a wealth effect on consumption is not inextricably linked to error-correction behavior in consumption. The latter phenomenon tells us about the time needed for consumption to adjust to permanent changes in wealth, but nothing about the magnitude of the wealth effect. A statistically significant long-run wealth effect and no error-correction in consumption would imply that spending adjusts to permanent changes in wealth within the period.

In practice, many time-series studies of wealth effects do not estimate the full vector error-correction model in (2), and focus instead on a single equation error-correction for consumption. Furthermore, in many instances, they augment the single equation regression for consumption growth, adding conditioning variables to the set of explanatory variables that are part of the error-correction representation.

The single equation approach yields consistent estimates of the adjustment parameter[8] and allows to appraise the short-run dynamics of consumption and to verify to what extent consumption adjusts to restore the long-run equilibrium in case of an equilibrium distorting shock. However, unless consumption does all the adjusting ($b_{1c} \neq 0$) and income and wealth none of it ($b_{1y} = 0$, $b_{1w} = 0$), in order to infer the speed of the adjustment in consumer spending subsequent to a shock, it is necessary to take into account the adjustments of all the variables in the system. System estimation is therefore needed.

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[7] The Granger Representation Theorem states that, if a vector x_t is co-integrated, at least one of the adjustment parameters b_{1c} b_{1y} b_{1w} is statistically significant in the error-correction representation.

[8] The parameters of the vector error-correction model can be estimated consistently by ordinary least squares estimation of (2) equation by equation (Engle and Granger, 1987, and Stock, 1987).

As to the addition of conditioning variables to the right-hand side of the error-correction equation for consumption, the equation for consumption growth becomes:

$$(3)\quad \Delta c_t = \tilde{b}_{0c} + \tilde{b}_{1c} u_{t-1} + \tilde{B}(L)\Delta x_{t-1} + C(L) z_t + v_t ,$$

where z_t denotes a set of other predetermined variables that economists have found to influence the short-run dynamics of consumption. They generally include real interest rates, unemployment rates, measures of consumer sentiment, and so on. These variables are typically motivated by the extensions to the simple life-cycle model that have been mentioned earlier. More importantly, in finite samples, efficiency gains can be obtained by including additional variables if they are important short-run determinants of consumption growth. However, if the additional explanatory variables are not weakly exogenous, the adjustment parameter b_{1c} cannot be recovered from the estimation of a single equation specification such as (3) (Engle et al., 1983).[9] A solution would be using a two-step procedure. In the first step, each element of z_t should be regressed on the right-hand-side variables in (2). In the second step, the estimation of (3) would be carried out after replacing z_t with the estimated residual from first-step estimation. The efficiency gains would be preserved and the estimation would allow to uncover the adjustment parameter of interest.

The single-equation macro-econometric approach has recently been extended to panel data covering a set of countries, by applying the method for co-integrated panels of Pesaran et al. (1999) to the analysis of the relationship between consumption, income and wealth. This estimator pools the long-run relationship of individual countries while short-run responses are flexible and unrestricted across countries. The hypothesis of equal long-run coefficients across countries can be tested. If it is rejected by the data, pooling, and therefore imposing homogeneity, can still be desirable when samples are small if one is interested in average effects. In fact, the averages of unrestricted individual group coefficients are sensitive to outliers in small samples. Pooling reduces such bias and the estimated coefficient can be interpreted as the weighted averages of individual group estimators where the weights are determined by the inverses of their variance-covariance matrixes.

[9] The intuition behind this result is that b_{1c} captures the co-variation between this period consumption growth and last period co-integrating error. In estimating the adjustment parameter, one does not want to remove the variation in the co-integrating error that is correlated with z_t. In fact, if u_{t-1} and z_t are correlated, the estimate of the coefficient of u_{t-1} will tell us how consumption adjusts to a disequilibrium that is not associated

The estimation of the long-run statistical relationship between consumption, income and wealth requires long time-series of data.[10] This partly explains the sensitivity of a given long-run model's coefficients to the sample period chosen for the estimation and the disparity of the estimates of wealth effects in the literature.[11] Further, since long-time series of data, especially for wealth, are not available for many countries, most estimates of the strength of the wealth effects refer to the United States. A number of different approaches have been used to generate estimates of consumption responses to changes in wealth for other industrialized countries. These approaches include calibration estimates based on the existing evidence for the United States and estimates using asset prices as a proxy for wealth.

3.2 Micro-Econometric Analysis of Wealth Effects

The time-series approach to wealth effects allows to distinguish between short-run and long-run relationship between consumption, income and wealth. It allows to identify which variables adjust to restore the long run equilibrium in case of a shock, and to determine the time taken by the adjustment process. However, they do not allow to identify the nature of the relationship between consumption and wealth and to distinguish between the alternative hypotheses – of direct causality, of common factors or of impact through borrowing constraints. Individual level data enable us to examine the effects of prices on individual household's consumption, helping to unpick these theories which are observationally equivalent in aggregate data, but have different implications for the behavior of different types of households. Furthermore, reliance on aggregate data to detect an effect of asset price changes on consumption fails to assess heterogeneous responses by different groups of households to the same price movement and may lead to the wrong conclusion that consumption does not, or weakly, respond to capital gains. In particular, if aggregate

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to a variation in z_t, but nothing about the adjustment to a disequilibrium associated to a variation in z_t.

[10] Long time series are needed for consistency of the estimator due to the properties of co-integration.

[11] Yet, as Poterba (2000) points out, there may be reasons why the marginal propensity to consume out of wealth may vary over time. For example, the marginal propensity to consume out of equity may have fallen over time due to the growing importance of equity investments that are held in retirement accounts. Thaler (1990) argues that households develop "mental accounts" that make them more likely to consume assets that are held in a certain form. Then, they may be more inclined to consume out of directly held assets rather than retirement accounts since the latter are often thought of as long-term assets. The relative importance of these "accounts" may vary. Further, institutional changes, such as changes in the costs of leaving a bequest or financial market liberalization, may have modified the relative cost of consuming out of specific types of wealth.

consumption were found not to respond to asset price changes, it would not be possible to say whether this is due to consumers not changing their spending when faced with changes in the value of their assets or it is due to heterogeneous responses that cancel out in the aggregate.

Like the time-series studies, most microeconomic studies of wealth effects focus on the equilibrium behavior of consumers and use cross-sectional data to estimate a relationship between consumption, income and wealth such as the following:

$$(4) \quad \frac{C_{h,t}}{Y_{h,t}} = d_0\left(z_{h,t}\right) + d_1\left(z_{h,t}\right)\frac{W_{h,t}}{Y_{h,t}} + \varepsilon_{h,t}\,.$$

$C_{h,t}$ is household's consumption, $Y_{h,t}$ is its non-asset income, which proxies for human wealth and $W_{h,t}$ is its non-human wealth. Equation (4) is an approximation to the consumption function that is consistent with the life-cycle model, where rational, utility maximizing agents optimally allocate their resources over their entire life. The functions $d_0(z_{h,t})$ and $d_1(z_{h,t})$ denote the marginal propensity to consume out of income and wealth, respectively. They depend on the age composition of the household, on changes in household needs and in discount factors and so on. $\varepsilon_{h,t}$ is a residual term. Equation (4) should be interpreted as an approximation to a consumption function because in the standard life-cycle model a closed-form solution for consumption can be obtained only under very strong and unattractive assumptions (such as a quadratic utility). The residual captures both innovations to permanent income and transitory shocks to current income.

Since, within this framework, identification is based on cross-sectional variation in levels, the estimation of equations such as (4) yields information only about the long-run marginal propensity to consume and has no implications for whether a direct effect occurs in the short run. Furthermore, unobservable variables such as differences in risk aversion or discount factors might vary systematically across the wealth distribution and contaminate estimation of the true relationship between consumption and wealth. To control for this unobserved heterogeneity, a set of controls is generally added to the right-hand side of equation (4).

The lack of reliable information on household wealth has been such that, to investigate the nature of the wealth effects on consumption, asset price variables[12] have been used on the right-hand side of the baseline model in (4), in place of wealth, and the model has been estimated dividing the sample between young and old households, stockholders and non-stockholders, and homeowners and renters. The coefficients on asset prices cannot be interpreted as the causal effects of prices on consumption. Instead, the basic idea is to compare the coefficients across groups. If wealth has a *direct effect* on consumer spending and asset price changes imply a change in wealth, price movements should be most relevant for asset holders. Furthermore, under this channel, an increase in house prices can be expected to depress renters' spending if they are saving to buy a house, or even if rents simply move in line with house prices. If present, this effect on renters' spending will weaken the effect of capital gains on aggregate expenditure caused by any positive effect on homeowners' consumption. On the other hand, asset price changes could be capturing *innovations to productivity and income growth*. Under this explanation, younger households can be expected to benefit the most, as a permanent revision to all expected future earnings would be more significant as they have longer remaining working lives. Hence, their consumption can be expected to grow more than that of older households. Finally, under the *collateral channel*, a rise in house prices would increase the value of the equity available to homeowners and may encourage them to borrow more, in the form of mortgage equity withdrawal, enabling them to finance higher consumption. This effect can be expected to be stronger among younger homeowners, who are more likely to be credit constrained and among those homeowners who live in areas with higher price inflation. The effect could be negative for renters for whom credit availability is reduced.

An alternative strategy that has been used in the literature to investigate wealth effects is regressing consumption on the change in the value of asset holdings. However, households that decide to increase their consumption may sell part of their wealth and a simplistic regression would find a spurious correlation between consumption and wealth changes.

[12] While price series and wealth series are highly correlated (see for example Lettau and Ludvigson, 2004), there is some "uncertainty" when mapping the growth rates of price indexes to the growth rates of (unobserved) individual household wealth. This is bound to introduce measurement error in the analysis, leading to attenuation bias in the estimated effect on consumption. The effect can be expected to be particularly severe for stock prices and stock market wealth, because there is evidence that household portfolios are very

Therefore, the computation of the *passive component* of the wealth change, i.e. the capital gain, is called for. Including the capital gain, as opposed to the asset price change, allows to interpret the coefficient in terms of marginal propensity to consume, rather than simple correlation.

Other methodologies have also been used to investigate the wealth effects on consumption using micro data, such as reduced-form regressions for consumption growth (Parker, 1999), tests of the consumption-capital asset pricing model (Paiella, 2004, and many others), studies of responses to qualitative questions about the wealth effects on spending (Starr-McCluer, 1998), tests based on the correlation between the share of aggregate expenditure devoted to luxury goods and asset prices (Poterba and Samwick, 1995) and studies of the effects of winning a lottery on consumer spending (Imbens et al, 1999).

4. Wealth effects in time series data

Most estimates of how wealth affects consumer spending are based on aggregate time series data and, until very recently, most studies have focused on the implications for consumption of the stock market or of total wealth. The effect of house prices on consumption has been largely considered an incidental issue. As mentioned earlier, most studies focus on the United States where throughout the 1990s the changes in the price of a constant quality home have mimicked closely the changes of consumer prices.[13] Furthermore, US households hold large amounts of their wealth in stocks and gains and losses in the stock market are extremely important in explaining the movements in aggregate wealth (see Ludvigson and Steindel, 1999, for a chart).

Most empirical research on the link between wealth and consumption has found evidence of a positive and significant long-run relationship between the two variables. Among recent macroeconomic studies on the US are Ludvigson and Steindel (1999), Mehra (2001), Davis and Palumbo (2001) and Lettau and Ludvigson (2004). All of these studies find that a dollar increase in aggregate wealth leads to an increase in aggregate consumption of 3 to 5 cents, a point estimate that is consistent with the early academic work of Modigliani (1971). The

heterogeneous and far from fully diversified.

[13] This has not always been the case. In fact, in the 1970s and 1980s much of the wealth fluctuations were the result of changing house prices.

magnitude of these estimates is not trivial quantitatively and may explain why it is commonly presumed that sharp swings in asset values will generate changes in consumer spending.

As mentioned earlier, these estimates describe the trend relationship between consumption and wealth. They are not informative about the nature of the short-run deviations from the trend relationship or about the impact of temporary fluctuations in the growth rate of wealth on future consumption growth. From the estimation of a vector error-correction model for consumption, income and wealth, Ludvigson and Steindel (1999) and Lettau and Ludvigson (2001 and 2004) find that, subsequent to an equilibrium distorting shock, it is wealth, and not consumption or income, that adjusts to restore the long-run equilibrium. [14] In other words, it is wealth growth that exhibits error-correction behavior.

It is worth repeating that there is no logical inconsistency between the presence of a wealth effect that will influence consumption in the long run on the one hand and the absence of error-correction behavior in consumption on the other. The absence of error-correction behavior in consumption does not imply that wealth has no impact on consumption; rather, that spending adjusts *contemporaneously* to *permanent* movements in wealth and income.

An implication of the lack of error-correction behavior in consumption is that conventional estimates of the marginal propensity to consume out of wealth may greatly overstate the response of consumption to a change in wealth. In fact, the estimates of the wealth effect mentioned above are based on parameters of the shared trend in consumption, income and wealth. Thus, they are informative only about the correlation between consumption and permanent changes in wealth. If most changes in wealth are not trend movements, but are transitory movements and are unrelated to consumption, as Lettau and

[14] The fact that wealth participates in the error correction implies predictability of wealth and consequently of stock returns. This is in line with a large and growing body of empirical research in the field of asset pricing that suggests that asset returns are forecastable and that the error correction in wealth reflects this forecastability (Lettau and Ludvigson, 2001). Predictability in the stock market is not necessarily inconsistent with market efficiency and it is not necessarily the case that the average investor can make money from such predictability (see Campbell et al., 1997, chapter 7).

Ludvigson (2004) find, such estimates will exaggerate the true correlation between consumption and wealth. [15]

Fernandez-Corugedo et al. (2003) report similar results for the UK, where, like in the US, directly and indirectly held equity accounts for a large share of household aggregate wealth. Their estimate of the long-run marginal propensity to consume out of total wealth is 0.05. In the dynamics of the system they find that adjustments take place in wealth and not through consumption, nor through income. Further, almost all of the variation in the consumption and income processes appears to be related to permanent shocks. Instead, a substantial part of the fluctuations in non-human wealth is transitory and decoupled from permanent consumption. Tan and Voss (2003) and Fisher and Voss (2004) find qualitatively similar evidence for Australia.

To the best of my knowledge, to date, there has not been any comparable evidence for economies in continental Europe, except for Germany. Using a new data set of German household wealth, Hamburg et al. (2005) estimate that a one euro permanent increase in wealth leads to a 4 – 5 cents increase in spending. They also find that consumption does not exhibit error correction behavior. Yet, in stark contrast with what Lettau and Ludvigson report for the US, they find that, subsequent to an equilibrium distorting shock, it is income, and not wealth, that adjusts to restore the long-run equilibrium. Income is also the only variable for which transitory shocks play some role. In comparison to evidence for the US, the transitory component in asset wealth appears to be rather small.

There are several reasons why the transitory component in wealth is small and much smaller than in the US. First of all, Germany's financial system is often characterized as bank-dominated, while in Anglo-Saxon countries capital markets play a much bigger role for firm's financing decisions. As a result, the German market for both equity and corporate bonds are relatively small and the weight of these two asset types in German household

[15] Lettau and Ludvigson (2004) find that the vast majority of the variability in consumption is driven by permanent shocks. Instead, transitory shocks dominate changes in wealth and the transitory (albeit persistent) variation is driven primarily by the volatility of equity prices. Furthermore, the permanent component of consumption is virtually uncorrelated with the transitory component. Hence, the variation in stock prices does not appear to significantly affect consumption. These findings imply that the vast majority of variability in consumption, driven by permanent shocks, is dissociated with the vast majority of variability in wealth, driven by transitory shocks. This does not mean that wealth has no effect on consumption, but rather that only

portfolios is limited. Hence, stock price fluctuations hardly affect household wealth. Furthermore, the prices of residential real estate, which accounts for a relatively larger share of household wealth, have remained relatively flat over the sample period considered (1980-2003). It thus appears that income is the driving force behind deviations of consumption, asset wealth and income from their common trends.

Hamburg et al. (2005)'s results, besides being of interest in their own right, provide important differential evidence with respect to those studies that have concentrated on the Anglo-Saxon economies. Germany's financial system is representative of the continental European type of financial systems where private stock ownership is much less widespread than in the Anglo Saxon countries and households generally hold large shares of their wealth in the form of relatively illiquid assets, such as housing. The evidence that they present suggests that these differences find their reflection in a very different transmission mechanism between financial markets and the real economy and in particular in a very different role of asset price fluctuations for consumption.

In a recent paper, Ludwig and Sløk (2004) investigate the implications of the structure of the financial system for the transmission of changes in asset prices to consumption using a panel of OECD countries. They distinguish between countries with bank-based financial systems (Finland, France, Germany, Italy, Japan, Norway and Spain) and with market-based systems (Australia, Canada, Ireland, the Netherlands, Sweden, the United Kingdom and the United States). Although their point estimates are somewhat sensitive to the specification, they find that the responsiveness of consumption to changes in stock prices is higher for the latter group of countries, as expected.

Ludwig and Sløk also recover individual countries' marginal propensities to consume out of stock market wealth by multiplying the elasticity of consumption to stock prices, which is estimated pooling country data according to the structure of the financial system, by the consumption-to-equity ratios of individual countries, as measured by their stock market

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permanent changes in wealth are related to consumer spending.

capitalization ratios. Despite different elasticities, the marginal propensity to consume out of stock market wealth is around 0.02 in both bank-based and market-based economies. [16]

Another multi-country study is Bertaut (2002) who runs individual country ECM (single equation) regressions. Her marginal propensity to consume out of financial wealth estimates exhibit a large variation and vary from 10 cents per dollar for Canada and Japan, to 6 cents per dollar for the US, to 2.7 cents per euro for France. There appears to be large cross-country dispersion also in the marginal propensity estimates of Labhard et al. (2005), which are obtained from structural VARs on individual country data. Structural VARs have the advantage of explicitly allowing for feedback effects from consumption to wealth, something that the single-equation studies of Ludwig and Sløk and of Bertaut cannot address. Their estimates of the marginal propensities to consume out of total wealth range between 1 and 5 percent for most euro-area countries. The corresponding values for the US and Canada fall in the lower and end of this range, respectively. However, when focusing on equity wealth, the mpc_s for the US and Canada are much higher than the mpc_s of most European countries.

There is little theoretical rational for the wide cross-country dispersion of the mpc_s estimates that these multi-country studies report. The extent of the cross-country differences appears to be especially large when compared with those of calibrated models, such as the IMF's MULTIMOD. In calibrated models, the mpc_s out of wealth are based on deep parameters such as the intertemporal elasticity of substitution in consumption, the real interest rate, the probability of death and taxation. Hence, these mpc_s provide a theory-consistent guide to reasonable values that one might expect for the marginal propensities to consume. Overall, these mpc_s tend to be similar across countries, because most deep parameters determining the mpc_s are the same across countries. They range between 5 and 8 percent. The highest values are for Canada and the US; the values for the euro area are somewhat lower.

[16] Ludwig and Sløk (2004) is subject to a number of limitations. First of all, they use asset price indexes as proxy variables for wealth. While price indexes and wealth series are highly correlated, there is some uncertainty in mapping the growth rates of price indexes to the growth rate of (unobservable) wealth. This additional uncertainty should be accounted for when computing standard errors. Second, the sample split is ad hoc and an endogenous grouping of countries according to more explicit measures for the financial system would certainly be warranted. Finally, they estimate an ECM using a single equation approach, which does not allow for definite judgment regarding the adjustment mechanism, which they find to be mainly linked to consumption.

Labhard et al. argue that the cross-country differences in empirical estimates most likely reflect differences in the measurement of wealth across countries and a failure to account for differences in the nature of the shocks to consumption and wealth. They verify this hypothesis using Pesaran et al (1999) panel technique, which allows to handle both long-run homogeneity and short-run heterogeneity of the parameters of interest. Furthermore, they use a ratio specification (as opposed to a specification in logs), which does not require the use of individual countries' volatile wealth-to-consumption ratios to back out the mpc_s from an estimate of the elasticity. Using a sample of eleven OECD countries, they find that the hypothesis of common long-run *mpc* cannot be rejected and obtain a plausible estimate of the marginal propensity to consume out of financial wealth of 6 percent, which is broadly consistent with estimates used in a wide range of policy models. The short-run adjustment coefficients, which are allowed to vary across countries, exhibit substantial heterogeneity. However, appraising the extent of the across-country differences in the speed of adjustment is problematic because of the use of a single-equation framework.

Table 1 summarizes the evidence reported in the papers cited in this section.

4.1 Housing Wealth

As mentioned, the evidence of a housing wealth effect on consumption based on time series data is scarce. Further, the literature differs in its views as to the relative role of housing effects across countries and over time and the results are often inconclusive. The main cause seems to be data deficiencies which undermine the effort to detect any such effect. Theoretical reasons may also explain why aggregate data may be unsuitable to explore housing wealth effects on consumption.

Among the studies that have found a role for housing wealth are Case et al. (2005), Bertaut (2002), Dvornak and Kohler (2003) and Ludwig and Sløk (2004). Case et al. (2005) find a statistically significant and rather large effect of housing wealth upon consumption. The estimate of the elasticity of consumption to housing wealth varies from 0.11 to 0.17, when a panel of 14 developed countries is used, and from 0.05 to 0.09, when a panel of US

states is used. [17] Altissimo et al. (2005) back out individual countries' marginal propensities to consume out of housing wealth by multiplying Case et al.'s estimated elasticities by individual countries' consumption-to-housing ratios. The *mpc* out of housing wealth varies from 7.5 to 9.5 cents per euro for Germany, from 5 to 7 for France and Italy and is around 4 cents per dollar for the United States. Bertaut (2002) finds a positive significant housing wealth effect for the US and for the UK, but not for Canada. For the US, the elasticity is 0.14, which implies an *mpc* of 9.7 cents per dollar; for the UK, the elasticity is 0.09 and the *mpc* is 4.2 pence per pound. For these countries, Bertaut's estimates of consumption responses are similar for both financial and non-financial wealth. Dvornak and Kohler (2003) find that housing significantly affects also Australian household consumption and the effect is similar to that of the stock market. Some evidence of significant housing wealth effects is provided also by Ludwig and Sløk (2004), who use housing market price indices.

In the case of housing, and in contrast to financial wealth, there are reasons why there might be systematic differences across countries in the response of consumption to price shocks. To the extent that housing price shocks affect consumption in the *short run* through their impact on mortgage equity withdrawal, one may expect the effect to be larger where households are more severely credit constrained and where re-mortgaging and housing turnover are easier and cheaper (see Aoki et al., 2002, for a simulation for the UK).

However, in the long run it is less clear that changes in aggregate house prices should lead to changes in aggregate consumption. Houses are different from other assets for two reasons. First, people generally live in their house and value directly the services provided by their home. So, the benefit of an increase in house prices is immediately offset by an increase in the opportunity cost of housing. Second, houses are little traded internationally. As a consequence, homeowners in aggregate cannot sell their home and realize the capital gains. In aggregate, the gains of the sellers will be offset by the losses of the first-time buyers. Thus, there is no traditional *direct* wealth effect on consumption from housing. On the other hand, a positive shock to permanent income would be expected to boost consumption of both

[17] The estimated elasticities of consumption to housing wealth are significantly larger than the estimated elasticities to stock market wealth, which are often negligible. The fact that Case et al. (2005) define their variables in per-capita terms might explain why equity is not significant. In fact, although the stock market plays an important role in explaining the variation of aggregate wealth, it is unlikely to affect the behavior of

housing and non-housing good, but if the house prices are more flexible than the prices of other goods, house prices would seem to Granger-cause consumption. Hence, overall aggregate data may be unsuitable to appraise the relevance of the effect that changes in housing wealth may have on consumer spending.

5. Household-level evidence of wealth effects

The microeconomic literature of wealth effects is relatively recent and is intended to shed light on the household behavior underlying the relationship between wealth and consumption. As explained earlier, individual level data allow to distinguish the relative roles of the alternative hypotheses explaining the aggregate relationship. Nevertheless, the evidence on the household-level underpinnings of wealth effects is still limited, which partly reflects the lack of good data to explore the question. The ideal data set should provide a comprehensive measure of household consumption, which is necessary to determine the quantitative importance of wealth effects, and detailed data on household balance sheets, at frequent intervals and over a sufficiently long period of time to allow to explore a rich set of asset price movements.

Among the recent papers estimating the marginal propensity to consume out of wealth using micro data is Parker (1999) who uses the US Panel Study of Income Dynamics (PSID) and the Consumer Expenditure Survey (CEX). He finds a positive and significant relationship between consumption and wealth. His *mpc* estimate is approximately 8 percent, which is a much higher value than most aggregate studies suggest, although it seems to be lower among households with higher net worth. Since identification is based on cross-sectional variation in levels, Parker's findings yield information only about the long run and have no implications for whether a direct wealth effect occurs in the short run. Furthermore, unobservable variables such as differences in risk aversion or discount rates might vary systematically across the wealth distribution and contaminate the *mpc* estimate.

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the average consumer.

To overcome the problem of cross-sectional identification, Dynan and Maki (2001) use the CEX[18] and exploit its (short) panel dimension. Their results imply that the aggregate relationship between consumption and stock market wealth is consistent with a *direct* view of the wealth effects, in which changes in aggregate consumption stem from changes in the consumption of households that own stocks. They also rule out any important indirect wealth effect, because the consumption growth of households with no equity has little correlation with movement in stock prices. Dynan and Maki's estimates of the marginal propensity to consume out of stock market wealth range between 5 and 15 percent. The high values are most likely due to the fact that their sample (like Parker's) excludes high income households. Indeed, analytic results by Carroll and Kimball (1996) and numeric simulations by Zeldes (1989) show that the consumption function is concave. Thus, the marginal propensity to consume out of wealth is lower for households with more resources. Empirical support for such concavity is found by Parker (1999) and also by Dynan, Skinner and Zeldes (2004).

Also Maki and Palumbo (2001) provide strong evidence supporting the hypothesis of a direct wealth effect on US household consumption during the 1990s. Using the US Survey of Consumer Finances (SCF)[19] they find that those households whose portfolio was boosted the most by the exceptional stock market performance are the same households whose savings fell the most in the second half of the 1990s. Households with limited amounts of equity, who experienced relatively modest capital gains, continued to save at the same rate. In addition, the authors present new estimates of the marginal propensity to consume out of wealth which lie between 3 and 5 cents-to-the-dollar, a range that is well aligned with typical estimates from time-series econometrics. Finally, they show that the size of the wealth effect experienced by the households in the uppermost quintile of the income distribution is large enough to explain essentially all the decline in the aggregate saving rate observed in the 1990s.

[18] In the CEX, the information on household asset and liabilities is scarce and noisy. Dynan and Maki (2001) overcome this shortcoming of the data set by imputing equity wealth exploiting portfolio information from the Flow of Funds accounts and a stock price index to compute the *passive* component of changes in equity wealth. Generally speaking, a simplistic regression of changes in consumption on changes in the value of wealth would find a spurious negative correlation between the two variables because households that decide to increase consumption may liquidate part of their wealth to do so.

Paiella (2007) provides comparable evidence for Italy. Using the Bank of Italy Surveys of Household Income and Wealth (SHIW), she finds that in the 1990s in Italy wealth effects were smaller than in the US. This is partly due to Italian households' smaller holdings of stocks and financial wealth in general, despite similar mpc_s. More importantly, she finds that wealth effects in Italy are unlikely to be direct. In fact, although aggregate saving rates fell, those of stockholders, who enjoyed most capital gains, held basically unchanged. Italian stockholders, in contrast with the American wealthiest, instead of cashing in their capital gains, have continued to save a lot and have invested heavily in stocks. These findings seem to suggest that stockholders are influenced by a positive feedback effect, through which higher recent returns encourage higher investment.[20]

5.1 House Price Effects

The recent house price increases have renewed the interest for the effect that changes in the value of housing wealth may have on household expenditure. The interest for housing wealth effects is also due to the fact that real estate and housing investment is widespread and for many households it is the most important component of their wealth. In fact, aside from the US, where over half of the population invests in stocks, in most countries equities are held by a small fraction of wealthier households (Guiso et al., 2001). It is therefore tempting to attribute the observed correlation between the cycles of house prices and consumption growth to a direct price effect. However, the real effect of an increase in the price of housing is not clear. An increase in the value of the housing stock increases also the value of housing services and therefore has a negative effect on all households with a positive demand for such services. Reliance on micro data to detect a direct effect of house prices on consumption allows to assess heterogeneous responses by different groups of households to the same asset price movement. It also allows to single out the nature of the

[19] Maki and Palumbo (2001) construct a new data set combining information about household balance sheets from the triennial Survey of Consumer Finance with quarterly data on aggregate balance sheets and saving flows published in the Flow of Funds accounts.

[20] Choi et al. (2004) find evidence of a similar effect using administrative records on over 40,000 401(k) accounts. Contrary to theory, they estimate a negative marginal propensity to consume out of idiosyncratic 401(k) capital gain shocks and conclude that 401(k) participants increase behaviors that have been associated with high rewards in the past.

effect and to distinguish among the alternative hypotheses of direct wealth and collateral effects and common causality.[21]

The literature that uses microdata to study housing is small. Much of this literature asks how housing affects savings and asset allocation (e.g. Flavin and Yamashita, 2002, Cocco, 2005, and Yao and Zhang, 2005). One of the first papers explicitly examining the relationship between consumption and house prices is Attanasio and Weber (1994). These authors investigate whether the financial liberalization in the 1980s was responsible for the UK house price and expenditure booms. More specifically, they assessed the common causality hypothesis against the possibility that the consumption growth reflect a direct wealth effect caused by higher real estate prices and concluded in favor of the productivity explanation.

Attanasio et al. (2005) update and extend Attanasio and Weber (1994) and confirm the main findings supporting the common causality hypothesis.[22] These results contrast sharply those of Campbell and Cocco (2007) who also look at the UK and argue that there is a significant wealth effect from house prices to consumption, operating partly through an easing of borrowing constraints. Although both papers use cohort analysis and the same dataset, there are two significant practical differences in the metholdologies: first, Campbell and Cocco's sample period starts in 1988, whereas Attanasio et al.'s starts in 1978; second, Campbell and Cocco rely on a reduced-form regression for analyzing cohorts' consumption growth, while Attanasio et al. use a permanent income hypothesis. There are also significant

[21] Focusing on real estate has also an additional advantage over the studies of capital gains on equity. Most surveys on household portfolios only report whether households own stocks and what is their overall amount, but they do not usually provide detailed information on the types of stocks held. Therefore, in order to compute capital gains one has to assume that each household holds the market portfolio and to use stock market indexes to compute price changes in individual portfolios. This is bound to introduce measurement error as, on the contrary, stockholders generally invest in a small number of stocks. As a consequence, capital gains computed at the household level may not be a good proxy for actual capital gains, leading to attenuation bias in the estimated effect on consumption. These problems are generally not shared by data on housing prices, which tend to be available with some geographical breakdown, allowing to match house prices with the household-specific real estate and to compute capital gains and losses at the household level.

[22] Attanasio et al. (2005) find that the relationship between house prices and consumption is stronger for younger than older households. Under the wealth and collateral hypotheses, an increase in the price of a homeowner's house increases the value of her wealth/collateral and reduces the expected net future wealth of non-owners (who are more likley to be the young), as rents are likley to increase. In contrast, under the common causality hypothesis, we expect a co-movement between house prices and expenditure for both owners and renters. This explanation is associated with a permanent upward revision to all expected future earning, which would benefit the most younger housheolds whose remaining working lives are longer.

differences between the estimates. Campbell and Cocco argue that a 1 percent increase in house prices leads to a 1.2 percent increase in consumption, with an even higher elasticity for older homeowners. Attanasio et al.'s consumption response estimate is much smaller, between 0.21 and 0.04 percent depending on the age group, which is closer to the 0.15 percent relationship found in aggregate data. Of course, it is likley that the wealth and collateral channel are important for different households at different points in time.

Another paper focusing on the UK is Disney et al. (2003) who provide estimates of household marginal propensity to consume out of housing wealth ranging between 0.09 and 0.14. An additional interesting finding of this paper is that consumption responses may be asymmetric: consumption impacts of house prices appear to be stronger when house prices are rising and the effect is largest for households with zero or negative home equity.[23]

The micro evidence on the link between house prices and expenditure in the US is limited and most empirical works, such as Skinner (1989, 1996) and Engelhardt (1996) suggest at best a weak relationship between house price changes and nonhousing consumption. Juster et al. (2006) estimate a zero effect for a sample of PSID households over the period 1984-1994. Another recent work by Bostic et al. (2005) based on matched household-level data from the US SCF and the CEX estimates a home value elasticity of about 6 percent which translates into an *mpc* out of capital gains of around 0.02. Morris (2007) ascribes these papers' findings of no significant effects to the restriction of constant (across households) coefficient on capital gains. In her work she allows responses to housing gains to vary by age and finds an *mpc* out of capital gains of -0.15 for the young, between 0.01 and 0.05 for the middle-aged and of 0.13 for the over fifty.

Finally, Paiella (2007) and Guiso et al. (2006) find that housing market effects on consumption are small also in Italy, smaller than financial market effects. However, when distinguishing between homeowners and renters, Guiso et al. finds that responses differ: while homeowners increase consumption with a marginal propensity to consume out of real value changes in housing wealth that is close to 0.035, renters appear to reduce it,

[23] An explanation of this result is that negative home equità induces precautionary savings so that house price inflation that lifts households out of negative equity induces a disproportionally large consumption response.

counteracting the effect on aggregate consumption, even if their response cannot be estimated with statistical precision.

6. Conclusions

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Tables

Table 1

Estimates of MPCs and elasticities based on aggregate data

	FR	GE	IT	UK	US	CA	AU	JAP
Lettau and Ludvigson (2004)								
mpc (total wealth)	-	-	-	-	0.046	-	-	-
elasticity (total wealth)	-	-	-	-	0.30	-	-	-
Ludwig and Sløk (2006)								
mpc (equity)	0.014	0.019	-	0.013	0.018	0.023	0.023	-
elasticity (equity)	0.03	0.03	0.03	0.08	0.08	0.08	0.08	0.03
Fernandez-Corugedo et al. (2003)								
mpc (total wealth)	-	-	-	0.050	-	-	-	-
elasticity (total wealth)	-	-	-	0.25	-	-	-	-
Tan and Voss (2003)								
mpc (total wealth)	-	-	-	-	-	-	0.040	-
elasticity (total wealth)	-	-	-	-	-	-	-	-
Hamburg et al.(2005)								
mpc (total wealth)	-	0.045	-	-	-	-	-	-
elasticity (total wealth)	-	0.31	-	-	-	-	-	-
Bertaut (2002)								
mpc (total wealth)	-	-	-	0.043	0.054	0.083	0.049	-
elasticity (total wealth)	-	-	-	0.20	0.29	0.41	0.22	-
mpc (financial wealth)	0.027	-	-	0.042	0.059	0.097	-	0.106
elasticity (financial wealth)	0.10	-	-	0.09	0.23	0.34	-	0.29
mpc (equity)	-	-	-	-	0.062	0.087	-	-
elasticity (equity)	-	-	-	-	0.10	0.14	-	-

Table 2

Estimates of MPCs and elasticities based on micro data

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