

Wealth Effects on Consumption in Austria

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Between the start of the financial crisis in the third quarter of 2007 and the third quarter of 2008, Austrian household sector losses arising from investment in tradable securities amounted to approximately EUR 24 billion. This study uses micro and macro data to examine the possible consequences of this loss of wealth on the consumption behavior of households. Micro data for Austria indicate that owing to unequal distribution, it is primarily the wealthier households that have been directly affected by the crisis. However, all households may be impacted by the consequences of the financial crisis via confidence effects, irrespective of whether they hold securities or not. Estimates based on macro data show that the marginal propensity to consume out of wealth of Austrian households is 0.05 and thus within the international average. Results of Oesterreichische Nationalbank (OeNB) simulations using a macroeconomic model indicate that a decrease in wealth has a relatively minor effect on private consumption and economic growth in Austria. Moreover, this effect only occurs with a substantial lag. Due to the historic singularity of the current financial crisis, however, above all the indirect confidence effects could be more intense than estimated.

JEL classification: E21, E44, D14, D10, D31

Keywords: wealth effects, financial wealth, marginal propensity to consume out of wealth, saving behavior, financial crisis

1 Introduction

Changes in asset prices can affect the real economy via two main channels. First, via investment decisions made by companies² and second, via consumption decisions made by households. The study at hand is primarily concerned with the latter channel.

The extensive literature on the transmission of asset price changes to private consumption is based on empirical observations of a positive correlation between these two variables. However, assessments of the causal relationship between consumption growth and changes in wealth diverge substantially. Some argue that equity prices are a leading indicator of future economic performance and that households do not change their consumption behavior because asset prices have changed – after all, even households with no assets would adjust their consumption behavior as their expectations of the

future change (Poterba and Samwick, 1995). This effect thus represents an indirect phenomenon – the confidence channel. Others interpret asset price changes to be a direct cause of the positive correlation between consumption and wealth (direct wealth channel). According to economic theory, households will generally expand consumption spending when their wealth increases unexpectedly and permanently. Only under extreme assumptions, such as a bequest of the entire gain in wealth, would consumption remain unchanged. For all intents and purposes, it is thereby of no consequence whether the wealth effect works directly through a shift in budget constraints (direct wealth effect) or through a change in collateral in the case of credit-financed consumption (liquidity channel or balance sheet channel). Neatly separating indirect wealth effects (including the confidence channel) from direct wealth effects re-

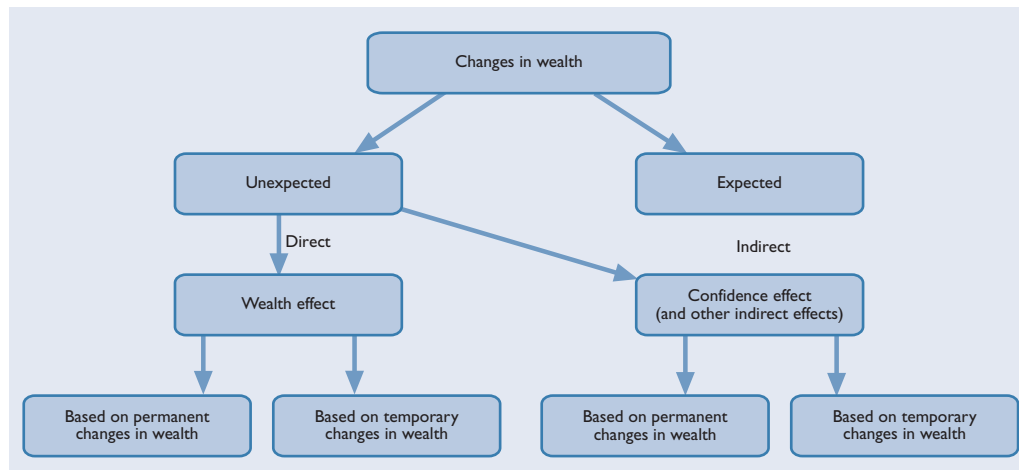
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² The transmission channels through which companies are affected by asset prices include Tobin's Q , the balance sheet and credit channels, and the indirect confidence effect. Empirically, those channels are however very hard to distinguish.

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Chart 1

Wealth Effect Channels



Source: OeNB.

quires empirical studies based on micro data. For instance, Dynan and Maki (2001) found significant direct wealth effects but only weak empirical evidence for the existence of indirect wealth effects. Chart 1 illustrates the wealth effect channels for responding to asset price changes discussed here. In addition to differentiating between direct and indirect wealth effects, it is also of significance whether the asset price changes are permanent or temporary or are perceived as being permanent or temporary.³

The intensity of the direct wealth effect depends on a number of factors, including the liquidity of the assets in question. Liquid assets, in the case of which price changes may be readily realized by households, generally lead to more intense, direct reactions in private consumption. By contrast, changes in wealth that cannot be realized that readily – such as changes in the capital invested in pension funds – lead to slower and less intense reactions in private consumption. Moreover, con-

sumers keep “mental accounts” (Thaler, 1990). Rather than treating all assets equally, consumers tend to hold some instruments for long-term provision (life insurance, pension products). Holdings of such instruments are linked to a lower propensity to consume, while other instruments having a shorter time horizon are linked to a higher propensity to consume. In addition, changes in wealth that appear, or are known, to be uncertain or temporary lead to weaker consumption reactions (Lettau and Ludvigson, 2004). Finally, wealth distribution plays an important role as well. On the assumption of a concave utility function, wealthier households have a lower marginal propensity to consume (Caroll and Kimball, 1996). If wealth is distributed unequally, the aggregate wealth effect is lower.

The theoretical basis of the relevant studies is usually what is known as *wealth accumulation identity* and the *life cycle model* (Modigliani and Brumberg, 1954) or the *permanent income hypothesis*

³ The simulations described in section 4 are based on the assumption of a permanent change in asset prices and do not allow for a differentiation between indirect and direct effects.

(Friedman, 1957). The theory implies that *anticipated* changes in income or wealth have no effect whatsoever on consumption. An analysis of the wealth effect becomes relevant as soon as *unforeseen* changes in wealth occur, which is usually the case in two areas of the household portfolio:⁴ First of all with respect to real estate wealth when property values change unexpectedly, and second with respect to portfolio investments made by households, which can likewise be affected by unforeseen price fluctuations.⁵

Against this backdrop, this article will attempt to examine the wealth effect on private consumption in Austria on the basis of relevant micro and macro data. In so doing, recent developments on the financial markets will be given particular consideration. Section 2 offers an overview of the relevant literature. Section 3 quantifies the losses arising from investments in tradable securities since the start of the current financial crisis. Section 4 outlines the wealth structure of households as evident from available micro data, which provides an indication of the effect changes in wealth may have on individuals. In this respect our analysis focuses on the extent and distribution of Austrian households' real estate and securities holdings. Given that micro panel data are not available for sufficiently long periods for Austria, we use macro data to estimate the wealth effect on Austria (section 5). Finally, in section 6 we summarize our results and draw conclusions.

2 Overview of the Literature

Empirical analyses of the wealth effect focus on the question of whether – and if so, to what extent – changes in wealth affect consumption behavior. The purpose of these analyses is typically to estimate the marginal propensity to consume out of wealth. This figure reflects the cent amount by which households increase or decrease consumption spending when an unexpected increase or decrease in wealth of 1 euro occurs.

Methodically, two approaches (with somewhat different objectives) are possible to estimate the wealth effect, namely a framework based on *macro data* or a framework based on *micro data*. The advantage of macro data lies in the long time series available for many countries. However, macro data do not allow any conclusions to be drawn regarding individual wealth effects. Individual wealth effects depend on age, income, net worth, and other demographic features. Separating wealth effects from confidence effects requires the use of the corresponding micro panel data sets, which contain both wealth and consumption variables.

Numerous empirical studies have attempted to estimate the marginal propensity to consume out of wealth using macro data. As early as the 1970s, Modigliani (1971) calculated a figure of 0.05 for the U.S.A., meaning that for each increase in wealth of 1 euro, consumption increases by 5 cent per year. A number of follow-up studies, however, suggested that the results were highly sensitive to the wealth variables selected, the time periods studied, and the countries (regions) studied. An

⁴ In the event of extreme inflation, additional effects could of course occur in other areas that are normally foreseeable, such as bank deposits.

⁵ An additional third area consists of unforeseen debt-related changes, such as sharp interest rate changes for variable interest loans or sharp securities price changes affecting loans with repayment vehicles (above all savings plans involving mutual fund shares).

overview article by Poterba (2000) cites estimates for the U.S.A. indicating that an increase in equity wealth of 1 euro causes consumption to increase by 3 to 4.2 cent, whereas an equal increase in real estate wealth leads to a consumption increase of 6.1 to 7.5 cent. Ludvigson and Steindel (1999) emphasized the fact that the marginal propensity to consume can vary greatly over time. For the U.S.A., for instance, they calculated a marginal propensity to consume of 0.021 for the period from 1986 to 1997, which is only approximately half of the average for the period from 1953 to 1997 (0.04). Ludwig and Slok (2002) found significant differences between countries with bank-based and countries with market-based financial systems. The long-term marginal propensity to consume out of equity wealth was much higher for market-based economies (0.043) than for bank-based economies (0.026). A comprehensive overview article from the ESCB (2004) found the marginal propensity to consume out of wealth to lie within a range of 0.015 and 0.07 across Europe, with the majority of studies determining higher values for the U.S.A. and the U.K. than for continental Europe. One panel estimate for European countries, however, estimated a marginal propensity to consume of 0.068, which is certainly comparable with the available estimates for the United States. Moreover, the ESCB study found evidence, albeit weak, suggesting that the real estate wealth effect is somewhat stronger than the equity wealth effect in European countries. Catte et al. (2004) confirmed these findings for the OECD countries.

The literature based on micro data is less extensive given that panel data are available only for a few countries. For the U.S.A. a direct wealth effect on consumption has been estimated in

a few studies, the most relevant being Skinner (1989) and Parker (1999). Skinner concentrated primarily on real estate wealth effects, while Parker covered a broader wealth spectrum. Both studies found significant – if only minor – wealth effects on consumption. Parker, for instance, estimated a marginal propensity to consume out of wealth of 0.04. By contrast, Dynan and Maki (2001) focused on the effect of changes in equity wealth on consumption. They estimated a marginal propensity to consume out of equity wealth of 0.05 to 0.15. A more current study involving U.S. data was conducted by Juster et al. (2006) and estimated a marginal propensity to consume out of equity wealth of 0.17 over five years, a figure that is considerably higher than that for real estate or other assets. Bover (2005) estimated the wealth effect using micro data from the Spanish *Survey of Household Finances* (EFF). This study differs from others in that it reflects the different wealth distribution across different regions. The findings indicate significant effects of real estate wealth with a marginal propensity to consume of 0.015, but no significant effects of financial wealth. Similar findings were supplied by a more recent study by Grant and Peltonen (2008), which showed relatively strong significant effects of real estate wealth (0.05 to 0.08) and weaker effects of equity wealth (0.005) based on Italian micro data from the *Survey of Italian Household Income and Wealth* (SHIW). Paiella (2007), likewise using SHIW data, found similarly high marginal values for the propensity to consume out of financial wealth in Italy as in the U.S.A. (0.09), although the impact on the overall economy is considerably lower due to the lower levels of financial wealth. For net worth, the estimator is 0.04.

3 Household Wealth Losses Triggered by the Financial Crisis in the Period from Q3 2007 to Q3 2008

Since the onset of the financial crisis in the third quarter of 2007 and up to the third quarter of 2008, household sector losses arising from investment in tradable securities amounted to approximately EUR 24 billion. This corresponds to approximately 14% of disposable household income, or 5% of total gross financial wealth (based on the figure for the second quarter of 2007). The loss amounts to approximately 20% of the household sector's securities portfolio and is thus by all means considerable, even though securities amount only to some 30% of the financial assets of the household sector, compared with more than 50% held in cash and deposits.

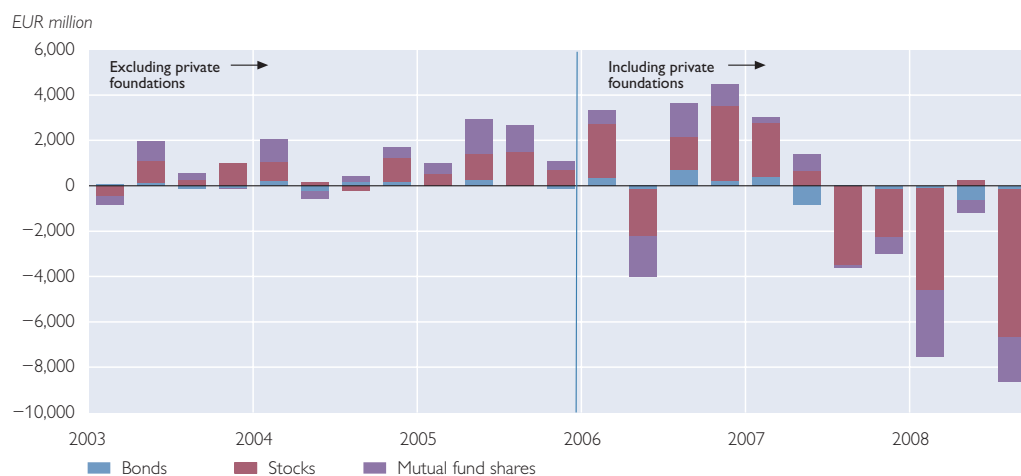
The aggregate data on the household sector, however, contain not only the securities holdings of households

per se but also those of self-employed persons, private nonprofit institutions and – from 2006 onward – private foundations. The share attributable to private foundations in particular cannot be disregarded. From the third quarter of 2007 to the third quarter of 2008, private foundations registered valuation losses of EUR 7 billion. However, this is hardly likely to affect the consumption spending of households. Households and self-employed persons (sector 14) are left with valuation losses of approximately EUR 17 billion.⁶ The simulations described in section 5 are based on this figure.

It should furthermore be taken into consideration that statistics on securities do not separately identify pension funds and life insurance for households and self-employed persons. Some of these instruments also include equity investments, with the volume of losses attributable to households and self-employed persons arising from unit-

Chart 2

Price and Exchange Rate Effects on Household Sector Assets



Source: OeNB.

⁶ For a detailed portrayal of the data on income from financial assets and the special problems with regard to the underlying data, see Waschiczek (2009).

linked life insurance contracts⁷ being estimated at approximately EUR 1.5 billion (since the third quarter of 2007). Households have also suffered losses arising from defined contribution pension funds, with EUR 300 million these losses being attributed to reductions of current payments and EUR 600 million to losses in benefit entitlements, whereby the extent to which these are permanent losses or are perceived as such is debatable.

4 Structure of Household Wealth

Only with the help of micro data is it possible to determine which households hold which assets and in what quantities. This information is essential for an informed assessment of wealth effects, since the marginal propensity to consume can be assumed to differ for different wealth or income classes, and since other socioeconomic characteristics may also play a role. Moreover, the marginal propensity to consume is different for different types of wealth, as

confirmed by both macro and micro studies. With regard to real estate wealth, thus far no micro data set exists for Austria that can be mined for structural analyses,⁸ but rough estimates based on international micro data from the Luxembourg Wealth Study (LWS) suffice to fill the void. For the purpose of analyzing security holdings, primarily stocks and mutual fund shares, we use data from a financial survey conducted by the OeNB in 2004.

4.1 Real Estate Wealth

According to Statistics Austria, the home ownership rate in Austria is approximately 57% (with respect to principle residences) and has fluctuated only slightly in recent years. In the rest of Europe, the home ownership rate ranges from approximately 40% in Germany to nearly 90% in Spain. Any real estate wealth – usually residential property – owned by a household normally accounts for the bulk of that household's total wealth. In aggregate terms,

Table 1

Luxembourg Wealth Study Micro Data

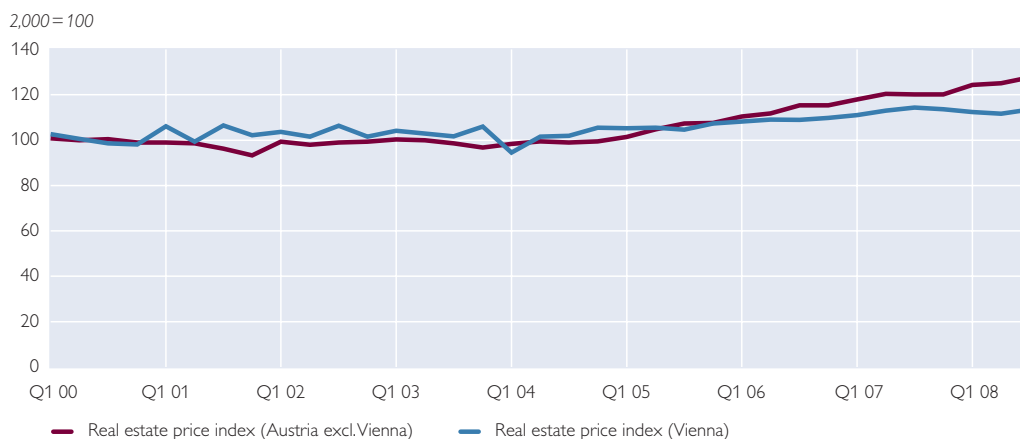
Source	Wealth variable			
	Nonfinancial assets ¹	Financial assets	Total	
	%			
Canada	SFS 1999	78	22	100
Cyprus	SCF 2002	84	16	100
Finland	HWS 1998	84	16	100
Germany	SOEP 2002	87	13	100
Italy	SHIW 2002	85	15	100
Sweden	HINK 2002	72	28	100
United Kingdom	BHPS 2000	85	15	100
U.S.A.	PSID 2001	67	33	100
U.S.A.	SCF 2001	62	38	100

Source: Luxembourg Wealth Study (LWS), Sierminska et al. (2006, table 5).

¹ In the LWS, the nonfinancial assets comprise: Principal residence, investment real estate, business equity, vehicles, durables and collectibles, as well as other nonfinancial assets. However, the majority of nonfinancial assets are made up of real estate assets.

⁷ Approximately 21% of life insurance policies are (partially) unit-linked.

⁸ The initial results of the OeNB's Household Survey on Housing Wealth are expected to be published in the spring of 2009.

Austrian Real Estate Price Indices Q1 00 to Q3 08

Source: OeNB, Austria Immobilienbörse, Vienna University of Technology, Institute for Urban and Regional Research.

the real estate wealth of households is, in most countries, also significantly greater than financial wealth, which can lead to substantial aggregate effects, even if the marginal propensity to consume out of real estate wealth is lower than the marginal propensity to consume out of financial wealth (table 1).⁹

The financial crisis has thus far not resulted in any notable revaluation of real estate assets in Austria. This is due to the fact that in contrast with the U.S.A, Ireland or Spain, real estate prices have performed unremarkably (chart 3).¹⁰ At present, therefore, only the wealth effect of the financial crisis on securities is relevant. We have addressed this issue in the following.

4.2 Securities Wealth

The current crisis is leading to strong valuation effects in the capital mar-

kets and thus to major changes in the securities wealth component. Securities wealth, particularly assets invested in stocks and mutual fund shares, can as a rule be regarded as being highly liquid, which would imply a stronger wealth effect. However, the exposure of Austrian investors to the capital markets and the determinants of such exposure would tend to favor a weaker effect. The distribution of wealth is highly unequal in general, and the marginal propensity to consume decreases along with decreasing income or wealth. When measuring the impact of crisis on households it is important to distinguish between the decision to participate in the capital market in the first place and the decision of how much to invest in capital market instruments.¹¹

⁹ Micro data generally underestimate aggregate financial wealth (Sierminska et al., 2006).

¹⁰ The impact foreign currency-denominated bullet loans with repayment vehicles taken out to purchase real estate may have on households' financial wealth cannot yet be estimated. These loans make up approximately 20% of all household sector debt. Since the majority of these foreign currency loans will not fall due prior to 2018, no notable effect on the real estate market is expected in the short term. In the medium term, the continued performance of the securities markets will be crucial. Yet the affected households may change their consumption and saving behavior even in the short term, as they will need to compensate any losses in the value of repayment vehicles by increasing future savings.

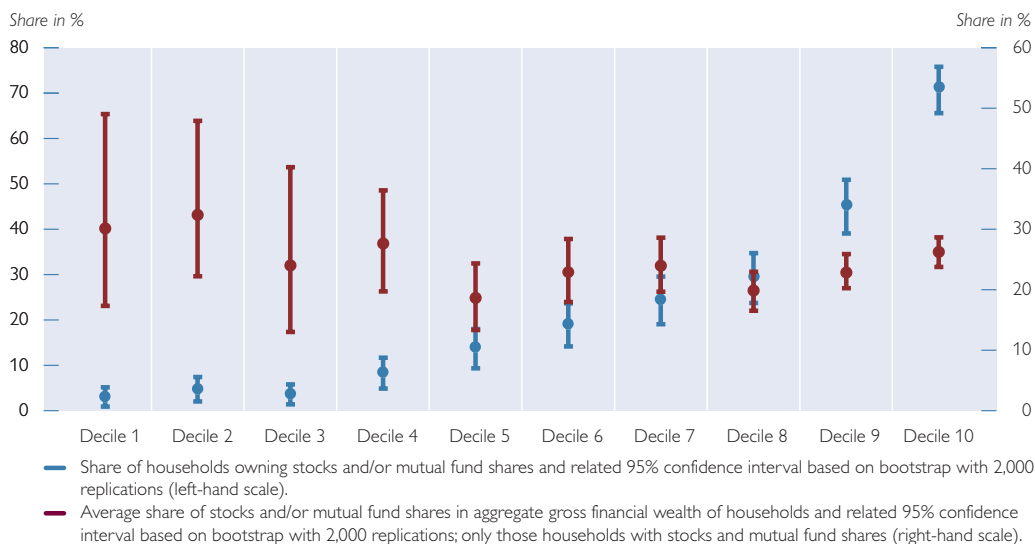
¹¹ See Fessler and Schürz (2008) for details on securities holdings in Austria.

Charts 4 and 5 depict the capital market participation rates and the share of wealth held in capital market instruments as a percentage of total gross financial wealth¹² (based on the OeNB's 2004 financial wealth survey). The rate of participation with respect to stocks and/or mutual fund shares increases sharply over the financial wealth decile and over the income classes. The overall participation rate is approximately 22% (weighted). Although participation rates show significant variations over the financial wealth deciles and income classes for the most part, no significant differences were determined with respect to the share of financial wealth held in these investments. The average share of assets invested in such

instruments is approximately 23% (weighted). The sharp increase in capital market participation is reflected in the narrowing confidence intervals¹³ for the share of assets of wealthy or high-income households held in stocks and/or mutual fund shares. This also means that the wealthier population strata have a higher exposure to securities price fluctuations due to their higher participation levels and larger securities portfolios. Thus it is the wealthier or higher-income households that tend to be especially affected by valuation losses on the capital markets, yet these households are at the same time less likely to have liquidity problems forcing them to realize these losses. In Austria, both the capital

Chart 4

Stock and/or Mutual Fund Share Holdings by Gross Financial Wealth Decile



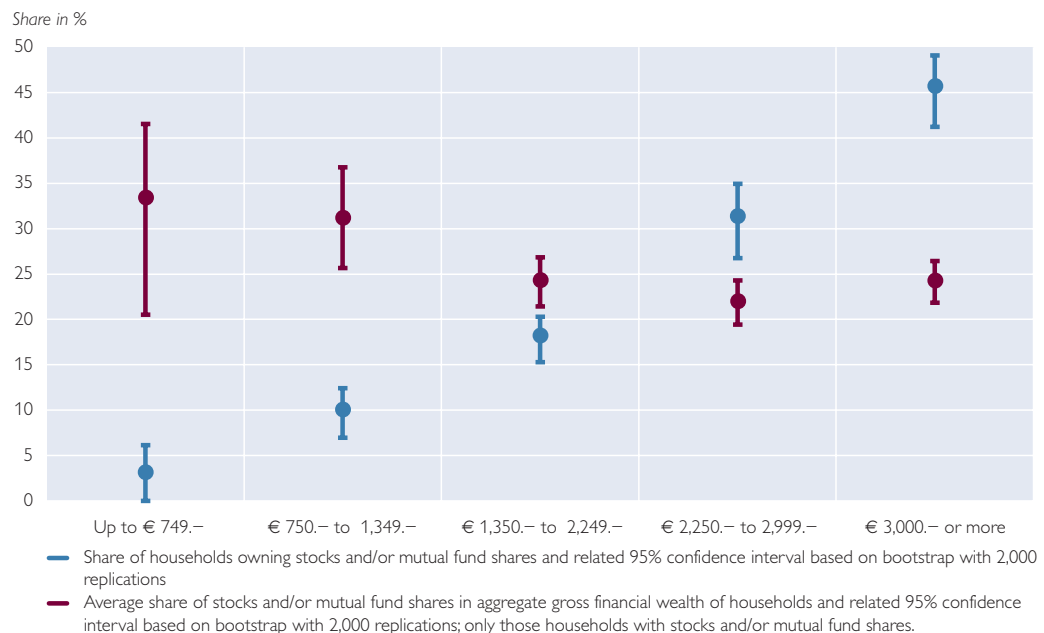
Source: OeNB financial wealth survey of 2004.

¹² Gross financial wealth is defined as the sum of bank account holdings, savings deposits (including savings plans with building and loan associations), the value of bonds, stocks, mutual fund shares, holdings in enterprises, and aggregate premium payments for life insurance.

¹³ The corresponding values – generated with the help of a bootstrap (2,000 replications) – are approximately 24% each. The bootstrap method (bias corrected) was used for charts 4 and 5 because when methods based on the assumption of the normal distribution are used to estimate very small shares this may result in confidence intervals, which contain partly negative values.

Chart 5

Stock and/or Mutual Fund Share Holdings by Net Household Income



Source: OeNB financial wealth survey of 2004.

market participation rate and the share of total assets held in capital market instruments are relatively low on an international comparison. This structure is not likely to have changed substantially since the survey was conducted in 2004.

The available international data indicate that the positive correlation between the rate of capital market participation and total asset holdings is an international phenomenon that is valid at different points in time¹⁴ (table 2).

Table 2

Stock and/or Mutual Fund Share Holdings by Gross Financial Assets

	Quartile 1	Quartile 2	Quartile 3	Quartile 4	Top 5%	Total share
	%					
U.S.A.	4.4	38.3	66.0	86.7	93.7	48.9
United Kingdom	4.9	11.9	37.8	71.1	83.9	31.5
Netherlands	4.4	16.9	36.8	75.9	92.3	33.5
Germany	6.6	17.6	22.1	29.3	41.6	18.9
Italy	3.4	10.8	19.6	38.9	54.6	18.9
Austria	3.9	9.7	20.7	52.3	74.0	21.7

Source: U.S.A., United Kingdom, Netherlands, Germany, Italy: Guiso et al. (2002, table 1.5); Austria: OeNB financial wealth survey of 2004.

¹⁴ The data originated in the 1990s: U.S.A.: 1998; United Kingdom: 1997 and 1998; Netherlands: 1997; Germany: 1993; Italy: 1998. The Luxembourg Wealth Study (LWS), in which Austria also participated, supplied more current comparable data, at least for the U.S.A. and Italy. According to LWS data, the U.S.A. had a capital market participation rate of 30% in 2001 (following the burst of the dot-com bubble), and Italy reached a rate of approximately 18% in 2002.

5 Estimate of the Wealth Effect for Austria

The theoretical foundation of the wealth channel is deeply rooted and is based on the concept that private consumption can be depicted as a function of income and wealth. This functional correlation can be derived from the permanent income hypothesis of Friedman (1957) and Muth (1960), the life cycle theory of Modigliani (Modigliani and Brumberg, 1954), and from Ando and Modigliani (1963). The saving and consumption behavior of households is thereby derived from intertemporal utility maximization.

Assuming that the subjective discount rate corresponds with the interest rate, the fundamental concept can be derived from a simple intertemporal budget constraint as described in standard textbooks (Romer, 1996):

$$\sum_{t=0}^T \frac{1}{(1+r)^t} C_t = W_0 \quad (4.1)$$

with C_t referring to consumption, W_0 to total household wealth, and r to the interest rate. Household wealth is composed of A_0 , the actual assets (financial and real estate assets), and H_0 , human capital. For the latter variable, the literature typically assumes a cointegration relationship with labor income (Y_t).

$$W_0 = A_0 + H_0 = A_0 + \sum_{t=0}^T \frac{1}{(1+r)^t} Y_t \quad (4.2)$$

The link between changes in wealth and changes in consumption can be derived from equations 4.1 and 4.2:

$$\Delta C_t = \left(\sum_{t=0}^T \frac{1}{(1+r)^t} \right)^{-1} \Delta A_0 \quad (4.3)$$

The expression on the right side of the equation represents the marginal propensity to consume out of wealth. Equation 4.3 exemplifies two important determinants of the marginal pro-

pensity to consume: First of all, the duration of planning horizon T and second, the interest rate level r . In accordance with the findings of Poterba (2000), it is possible to determine theoretical values for the marginal propensity to consume out of wealth for various combinations of these factors, which can provide a rough theoretical framework for empirical studies. The findings presented in table 3 illustrate the fact that the marginal propensity to consume decreases as the planning horizon lengthens, and increases as the interest rate rises. The longer the planning horizon, the closer the marginal propensity to consume comes to the real interest rate.

The duration of the planning horizon is closely linked to life expectancy. Accordingly, retirees are expected to have a higher marginal propensity to consume out of wealth than persons who are at the start of their working lives. When bequest motives play an important role, however, the marginal propensity to consume is low. As portrayed in table 3, households experiencing an unexpected and permanent rise in wealth of 1 euro increase their consumption by between 1 cent (indefinite planning horizon and real interest rate of 1%) and 13 cent (10-year planning horizon and real interest rate of 7%).

Table 3

Theoretical Marginal Propensity to Consume

Interest rate	Planning horizon			
	10	20	40	∞
0.01	0.105	0.055	0.030	0.010
0.03	0.114	0.065	0.042	0.029
0.05	0.123	0.076	0.056	0.048
0.07	0.133	0.088	0.070	0.065

Source: Authors' calculations in accordance with Poterba (2000).

Empirical studies that work with macro data over time typically assume a common trend between consumption, wealth, and income. Gali (1990) offers a theoretical foundation for a cointegration relationship between these three variables. Following this approach, we first tested whether such a common trend between consumption, wealth, and income exists for Austrian data. The second step consisted of entering the long-run relationship thus calculated into a dynamic consumption function. As part of the OeNB's macroeconomic model (AQM, Austrian Quarterly Model), this error correction model of private consumption can be used to determine short-term and long-term wealth effects.¹⁵ The estimation is based on the two-step procedure developed by Engle and Granger (1987).

Data on real private consumption are derived from current national accounts, and data on real disposable household income are derived from sector accounts. As there are no time series based on direct surveys that reflect the wealth of Austrian households, we use a simplifying assumption that first, allows us to construct the relevant wealth time series indirectly and second, corresponds to the AQM model logic. Assuming that households ultimately hold all of the wealth of an economy, an approximation of such wealth can be computed from the sum of the Austrian economy's total capital stock, the general government consolidated debt, and Austria's net interna-

tional investment position. Statistics Austria prepares a time series for capital stock, and data on general government consolidated debt and the net international investment position originate from Eurostat and the OeNB, respectively. This wealth assumption also corresponds to the structure of the AQM model and facilitates model closure, thus ensuring the stability of long-run simulations (Fenz and Spitzer, 2005).

Two points are worth mentioning when comparing the time series of Austrian household wealth thus computed with the data from other countries. First of all, the magnitude of the aggregate household wealth corresponds with that of comparable countries. During the observation period from Q1 1988 to Q2 2008, average wealth in Austria amounted to approximately 410% of GDP or 680% of disposable household income. Similar magnitudes were calculated for other countries (ESCB, 2004; Deutsche Bundesbank, 2007).¹⁶ Second, on an international comparison the wealth variable for Austria is far less volatile than that of other countries. Short-term fluctuations on the equity markets play a minor role only, primarily due to the fact that data on wealth are collected indirectly via the capital stock. For this reason, fluctuations reflect permanent changes in wealth to a greater extent than is the case for comparable international studies. All variables are real indicators and adjusted for seasonal effects.

¹⁵ *The AQM model strategy follows the "neoclassical synthesis," a combination of short-term Keynesian and long-term neoclassical behavior. While the short-term model dynamics are determined empirically, the long-term dynamics follow from a neoclassical optimization framework. The process of adjusting to the theoretical equilibrium is slow. Imperfections in labor markets and goods markets prevent the economy from reverting immediately to its long-term equilibrium (see Fenz and Spitzer, 2005, for a more detailed explanation).*

¹⁶ *The total assets held by households in Austria can be calculated using data from Synthesis Forschung on real estate assets and financial accounts data on financial wealth for the years from 1997 to 2002. Total assets amounted to approximately 400% of GDP in 1997 and 380% of GDP in 2002, which is very close to the average value for the asset time series computed by us.*

Unit root tests¹⁷ show that all three variables (consumption, wealth, and income) are stationary in first differences and that a cointegration relationship exists between them. When determining the functional form of the long-run relationship we follow the idea put forth by Muellbauer and Lattimore (1999). (Log) real consumer spending (lnc_t) is explained by a constant, the (log) real disposable household income (lny_t), and the ratio of real wealth (a_t) to real disposable household income. The time trend ($trend961$) depicts the rise in the saving rate since the second half of the 1990s, which cannot be explained by means of traditional consumption models. ecm_t denotes the residuals that are consequently included as an error correction term in the dynamic equation for private consumption. Pursuant to the unit root tests, the error correction term is stationary in level, confirming our assumption of a cointegration relationship between consumption, income, and wealth. Equation 4.4 illustrates the estimated results for the long-run consumption equation:

$$lnc_t = \underset{(-6.6)}{-0.431} + lny_t + \underset{(5.4)}{0.054} \cdot \frac{a_t}{y_t} - \underset{(-17.4)}{0.001} \cdot trend961 + ecm_t \quad (4.4)$$

The values for the t-statistics are specified in parentheses under the variables. To the extent that changes in wealth are of a permanent nature, the effects thereof on private consumption can be calculated with the help of the above long-run equation. Accordingly, the long-term marginal propensity to consume out of wealth equals 0.05. This means that an increase in wealth of

1 euro will lead to a rise in private consumer spending of approximately 5 cent per year over the long term.¹⁸ The results are quite sensitive to the estimation-period selected, fluctuating within a range of 3 to 8 cent. They are still statistically highly significant, however. Comparison with international analyses (section 1) shows that the results for Austria fall within the spectrum of the estimated results for other countries, though they are somewhat above the average for the continental European countries.

Over the short term, deviations from the long-run relationship estimated in equation 4.4 can occur. In the literature, adjustment costs, habit persistence, and liquidity constraints are among the primary reasons given for these deviations (Ludwig and Slok, 2002). These dynamic effects are excluded by definition from the static analysis of the wealth effect in the long-run consumption equation. The AQM model can be used first, to estimate these dynamic effects and second, to account for feedback between the variables of the consumption equation and other model variables. The residuals of the long-run relationship are included in the following short-run consumption equation:

$$d(lnc_t) = \underset{-3.4}{-0.11} \cdot ecm_{t-1} + \underset{(13)}{+0.76} \cdot d(lnc_{t-1}) + \underset{(4.4)}{+0.19} \cdot d(lny_{t-1}) - \underset{(-1.8)}{0.29} d(lti_t) + \varepsilon_t \quad (4.5)$$

with d symbolizing first differences, lti_t the long-term interest rate as indicated by 10-year government bonds and ε_t the

¹⁷ Augmented Dickey-Fuller and Phillips-Perron tests, 5% significance level.

¹⁸ This figure is calculated by multiplying the coefficient for the ratio of wealth to income (0.054) by the ratio of consumption to income (0.926, which equals the long-term average over the observation period from Q1 1988 to Q2 2008).

residuals. $d(\ln c_t)$ refers to changes in private consumption, which are explained by ecm_t (the error correction term), $d(\ln c_{t-1})$ (an autoregressive term), $d(\ln y_{t-1})$ (changes in disposable household income), and $d(\ln i_t)$ (changes in the long-term interest rate). Equations 4.4 and 4.5 form the consumption block of the AQM model for the following simulation.

The decrease in wealth of EUR 17 billion corresponds to approximately 1.7% of the aggregate wealth of households. While this is a substantial amount, AQM simulation results suggest only minor effects on economic growth and private consumption. After five years, the private consumption level is 0.3% below the baseline solution (table 4). The decline in real GDP of 0.1% is considerably less than the share of private consumption in total economic output would be, since a portion of the reduced consumer spending is compensated by lower imports and improved – albeit only slightly – price competitiveness.

Furthermore, these slight wealth effects only occur with a substantial lag. In the first year of the simulation (i.e. after the first four of a total of five quarters evidencing decreases in wealth), the negative effect on GDP and private consumption was still negligible.

The simulation is based on some critical assumptions, which are briefly

discussed in the following. First, it was assumed that the changes in wealth were permanent. However, whether and if so, to what extent, the current changes in wealth are of a permanent nature or are assessed as permanent by consumers is very questionable. The extreme volatility of the stock markets would imply that consumers regarded neither the sharp increase in equities prices between 2003 and mid-2007 nor the following crash as being permanent. The ATX, for example, was still at the same level as at the beginning of 2004 at the time of writing. In such circumstances, any model estimate must be interpreted as representing the upper limit of the possible effects of changes in wealth on private consumption. In a survey covering the U.S.A., Lettau and Ludvigson (2004) found that 88% of all variance in net household wealth is attributable to transitory shocks. These fluctuations have an only very minor influence on the consumption behavior of households. Conventional estimates of the wealth effect are therefore in danger of overestimating this influence. However, since the wealth variable used for Austria is, by design, characterized more strongly by permanent wealth fluctuations, this does not play a great role in our estimate. The lower variance in wealth variables can also explain the somewhat stronger wealth effect in Austria compared to other countries.

Table 4

Effect on Austrian Consumption and GDP of EUR 17 billion Wealth Loss Accumulated from Q3 07 to Q3 08

	Year 1	Year 2	Year 5
<i>Deviation from base solution in %</i>			
Private consumption	-0.03	-0.18	-0.30
GDP	-0.02	-0.06	-0.10

Source: Authors' calculations.

Second, we do not differentiate between real estate and financial wealth. The majority of international macro studies find a higher marginal propensity to consume out of real estate wealth than out of financial wealth. There are no data-based estimates on this for Austria. Accordingly, the wealth effect arising from stock price setbacks calculated by us would represent the upper limit. At the same time, the low depth of the real estate market, the low home ownership rate, and the high significance of bequest motives point toward a low marginal propensity to consume out of real estate wealth in Austria.

Third, the securities statistics upon which the computed decrease in equity wealth of EUR 17 million are based contain only highly liquid assets, whose price fluctuations are, in addition, very transparent for the holders. Both of these facts speak in favor of a relatively high marginal propensity to consume (Poterba, 2000, and section 1). At the same time it matters that some of the household sector's assets that are tied up in life insurance and pension funds have been invested in the stock market and are not included in the wealth statistics used in this study (section 3). Both insurance and pension fund assets, however, have long time horizons and are strongly characterized by precautionary saving motives. The propensity to consume should thus be accordingly low.

Fourth, in our linear model consumers react equally strongly to growth in wealth as to decreases in wealth. Zandi (1999) questions this symmetry assumption and emphasizes the possibility that consumers react more sensitively to decreases in prices than to price gains.

Finally, estimates of the wealth effect, such as that on Austria, do not dif-

ferentiate between reasons for changes in wealth. Rather, the assumption of a constant marginal propensity to consume implicitly presumes that all changes in wealth have the same cause or that different causes trigger equally strong effects. However, it can be surmised that – for example – changes in wealth resulting from stock market bubbles trigger significantly different consumer reactions than productivity-driven changes in wealth.

6 Summary and Conclusions

Changes in asset prices, i.e. changes in real estate prices and in financial asset prices, can influence household consumption. On the whole, aggregate real estate wealth is considerably greater than financial wealth; financial wealth is usually more liquid, though. While real estate prices in Austria have hardly changed since the onset of the current financial crisis, tradable securities have experienced significant devaluation. Households and the self-employed (sector 14) lost approximately EUR 17 billion since the crisis began in the third quarter of 2007 until the third quarter of 2008. However, given that securities holdings are concentrated among the wealthier households as evidenced by micro data, potential wealth effects on consumption should be limited. Estimates based on macro data show that the marginal propensity to consume out of wealth of Austrian households is 0.05 and thus within the international average. Simulation results using a macroeconomic model indicate that the decrease in wealth of EUR 17 billion will have a relatively minor effect on private consumption and economic growth in Austria. Over a five year period, the effect is -0.3% and -0.1% , respectively. Moreover, the effect occurs only with a substantial lag.

Marked changes in wealth also present challenges for economic policy. First of all, wealth-based taxes are an important source of government revenue in many countries. In light of the positive correlation between economic activity and changes in wealth, tax revenues from capital (gains) taxes, inheritance taxes, and other wealth-based taxes are procyclical. While revenue from wealth-based taxes as a percentage of GDP has risen over the past 20 years in the U.S.A. (2006: 3.1% of GDP), in the EU-15 (2006: 2.2% of GDP), and in the OECD (2006: 2% of GDP), in Austria this figure has fallen significantly (2006: 0.6% of GDP). This means that in Austria, any changes in wealth would only have a slight fiscal impact given that revenues from wealth-based taxes are at a historical low anyway as well as being very low on an international comparison.

Second, it is important to analyze the wealth effect from a distributional policy perspective. Both national and international micro data indicate that it is the wealthier households that are most affected by the changes in prices and asset values on the capital markets due to their more frequent and greater market involvement. Accordingly, wealthier households are most likely to experience a direct wealth effect. Therefore, the direct wealth effect poses less of a challenge for economic policy since wealthier households are better able to absorb fluctuations in wealth. However, the number of households in Austria affected by fluctuations in securities prices is likely to have increased in recent years as a result of rising participation in the stock market, foreign currency bullet loans with repayment vehicles, pension funds, and private retirement plans (such as the

“prämiengeförderte Zukunftsvorsorge” state-supported pension plans).

Households with no securities holdings may also be indirectly affected by changes in wealth via confidence effects. With our estimates, we were unable to distinguish between the direct wealth effect and indirect confidence effects. Empirical evidence for other countries suggests that the direct wealth effect tends to dominate indirect confidence effects. However, confidence effects could be of greater significance in the current financial crisis. Moreover, the data on which the estimates of wealth effects are based only extend back to 1988. Overall, the current unique situation can only be inadequately captured by estimate models. With respect to the direct wealth effect, this should not present a substantial problem. The lack of sufficient data could, however, lead to a considerable underestimation of indirect confidence effects. This is of significance from a distributional policy perspective, since it is precisely the less affluent households which are affected by little else than the confidence effect. Given the limited exposure of these households to the capital markets, they are hardly affected by direct valuation losses. However, they could feel any indirect effects on the real economy more than the wealthier households.

Finally, the question arises of how to react to changes in asset prices from the perspective of monetary policy.¹⁹ Cecchetti et al. (2002) are in favor of an active monetary policy in the event of capital market aberrations. However, in practice it is difficult to say when a trend can be referred to as an aberration. Bernanke and Gertler (2001) make the case that central banks have no comparative advantage in recogniz-

¹⁹ For a comprehensive discussion see Crespo Cuaresma and Gnan (2006).

ing aberrations and advocate ignoring fluctuations in stock prices as long as aggregate demand or inflation is not affected. However, even if one accepts the ideas of Bernanke and Gertler and additionally assumes a low marginal propensity to consume out of wealth,

in view of the sheer magnitude of the recent stock market collapses in combination with the sharp increases experienced in the preceding years, it must be assumed that these developments are of the greatest relevance in terms of monetary policy.

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