mea – Mannheimer Forschungsinstitut Ökonomie und Demographischer Wandel
Gebäude L 13, 17_D-68131 Mannheim_Sekretariat +49 621 181-2773/1862_Telefax +49 621 181-1863_www.mea.uni-mannheim.de

Saving Viewed from a Cross-National Perspective

Axel Börsch-Supan and Annamaria Lusardi

24-2002

June 2002

[FINAL DRAFT 24 June 2002]

Life-Cycle Savings and Public Policy: A Cross-National Study in Six Countries

edited by Axel Börsch-Supan

Saving Viewed from a Cross-National Perspective[1]

***by Axel Börsch-Supan*[2] *and Annamaria Lusardi*[3]**

Introduction

Household saving is still little understood, and even the basic facts – for instance: How does saving change over the life cycle? Does saving turn negative in old age? – are controversial. Understanding saving behavior is not only an important question of economic theory because the division of income in consumption and saving concerns one of the most fundamental household decisions, but it is also of utmost policy relevance. One reason is that private household saving as a private insurance interacts with social policy as public insurance. Population ageing and its threat to the sustainability of the public insurance systems have put the spotlight back on own saving as a device for old-age provision. Solving the pension crises therefore requires understanding saving. Another reason is growth: capital accumulation through saving increases economic growth directly, and indirectly through changes in labor productivity.

The topic of household savings is by no means uncharted territory. Recent comprehensive surveys of the work on saving include Deaton (1992), Browning and Lusardi (1996), and Attanasio (1999). These surveys illustrate the many challenges the theory faces in matching the empirical facts about saving as well as the need to use micro data to understand saving behavior.

---

[1] The authors would like to thank Al Gustman, Stefan Hoderlein, Anette Reil-Held, Jon Skinner, and Joachim Winter for suggestions and comments. Mathias Sommer provided very able research assistance. We received financial support from the Deutsche Forschungsgemeinschaft (Sonderforschungsbereich 505) and the European Commission (TMR contract no. ERBFMRXCT960016). The first author very much enjoyed the hospitality of Dartmouth College when writing this article.

[2] Mannheim Research Institute for the Economics of Aging (MEA), University of Mannheim, Germany, and National Bureau of Economic Research (NBER), Cambridge, Mass., USA.

This volume adds a distinctive international dimension to these studies of saving. It presents the results of the "International Savings Comparison Project" – a project performed under the auspices of a European Union sponsored network of researchers.[4] The main focus of this project is the interaction of household saving with public policy, notably the generosity of public pension systems. In this sense, our work is very much in the tradition of Feldstein's (1974) seminal study. However, we transpose the inference from time series data to a set of international panel data drawn from six country studies. These studies analyze household saving in four European countries – Germany, Italy, the Netherlands and the United Kingdom – and in Japan and the United States.

The value of cross-national comparisons

The cross-national aspect of this volume is important. The synthesis of the six country studies – this is the conviction underlying this book – is far more than the sum of the parts. The reason for this conviction is the insight that we can learn a lot from observing and exploiting differences. Hence, understanding saving behavior requires differences in the determinants of saving. These determinants include household size and composition, age, life-time income, and many other variables at the household level -- plus the influence of public policy, such as the structure of the pension system and the general social safety net, plus capital market features. While we generally observe a lot of variation in household level variables, studies within a single country often lack the necessary variation in public policies and institutional background.[5] This is most germane for cross sectional data from a single country, which often fail to have any policy variation. Hence, little can be learned about the impact of public policy on savings because the counterfactual is missing.

Traditional studies of household saving, such as Feldstein (1974) for the US and Kim (1992) for Germany, have therefore exploited the time series variation in aggregate data. Such studies, however, cannot really account for changes in the composition of a heterogeneous population. One obvious solution is to use panel data, which combine the cross-sectional variation within a country with the time-series variation of that country. Unfortunately, however,

---

[3] Department of Economics, Dartmouth College, Hanover, NH, USA.
[4] The TMR (Training and Mobility of Researchers') network on "Structural Analysis of Household Savings and Wealth Positions over the Life Cycle".

national panel data sets that contain saving data are usually short and therefore rarely include sufficient policy changes and "historical experiments." This particularly applies to one potentially very important determinant of saving, namely public pension policy. For good reasons, pension systems are not changed frequently, and short national panel data will not identify the impact of public pensions on saving with sufficient precision. The main idea behind the International Savings Comparison Project is to exploit cross-national differences that provide an additional source of variation in policy variables because countries have substantially different social policies, capital taxation regimes, etc.[6]

While the benefits of comparative international research for policy-making become increasingly clear, the conduct of such research poses a number of challenges. The basic challenges for cross-national research are the development of research questions and designs that can be readily adapted to different social and cultural settings, and the harmonization of concepts and measures that provide a reasonably acceptable level of cross-national comparability. Up to now, there is little coordination of data collection and analysis across countries. While recent decades have seen heightened sensitivity to, and substantial technical advances in, the validation of measures in different cultural settings, many problems remain, and we have encounter many such challenges in this project. Data on the same variable or process may differ in myriad small ways. The analysis of data without shared protocols can easily lead to misleading conclusions. This project therefore spends considerable effort in harmonizing the measurement and analysis of household saving. Indeed, we believe that one of the valuable outcomes of this project is the provision of statistics and data that can be compared across countries and that can be used by other researchers.[7]

This volume is in the tradition of earlier cross-national studies, and we are happy that we can leverage earlier work to new connections and insights. A particularly noteworthy foundation are the age-saving profiles for the G-7 countries (except France) that have been presented in the volume edited by Poterba (1994), which analyses savings data from the mid-1970s through the mid-1980s. Almost in parallel to this cross-national study of household savings, a cross-national study of household portfolio choice and stock holdings has been completed (see Guiso, Haliassos

---

[5] As notable exceptions, see Attanasio and Rohwedder (2001) and the references therein.
[6] The various aspects of the power of cross-national comparisons are discussed in National Research Council (2001).

and Jappelli (2001). The analyses in these two volumes nicely complement our studies of household savings, and we draw some of the institutional descriptions from their work, in particular descriptions of capital taxation and saving subsidies. Kapteyn and Panis (2002), very much in parallel to this project, compare Italy, the Netherlands and the United States in terms of household saving.

We have also been inspired by the cross-national analysis of pension policies in the volume edited by Gruber and Wise (1999). Their analyses are a particularly good example of the power of cross-national comparisons, relating labor force participation of older persons to the incentives in the pension systems to retire early. In addition to the general philosophy, our volume also draws from the institutional descriptions of the pension systems contained in Gruber and Wise (1999).

Several other international comparisons help us to augment such institutional background data. There are several studies on the sources of retirement income, which provide summary data on the generosity of public pension systems, the relative size of pay-as-you-go and funded pillars, and similar system parameters. Most notable is the OECD-commissioned study edited by Disney et al. (1998) and the follow-up study by Disney and Johnson (2001). Health insurance coverage, the second major piece of the savings-related safety net, is documented in the OECD Health Data (2001), and we use a host of other data compiled by the OECD for background information on social expenditures and capital market features.

The importance of panel data

The research pursued in this volume departs from previous projects in several ways. For example, not only do we try to get data on wealth and saving which is comparable across countries, but we also use different measures of saving and devote much attention to the methodological issues involved in studying saving.[8] Most importantly, we purge the age-wealth and age-saving profiles from cohort effects exploiting the longitudinal dimension of our data sets. This cohort correction is extremely important because apparent life-cycle effects in cross sectional data are severely confounded by changes from cohort to cohort. Researchers looking at

---

[7] The data is available in tabular form by age category at www.mea.uni-mannheim.de/iscp.
[8] See, in particular, the first chapter of the book by Brugiavini and Weber.
[9] See, in particular, the first chapter of the book by Brugiavini and Weber.

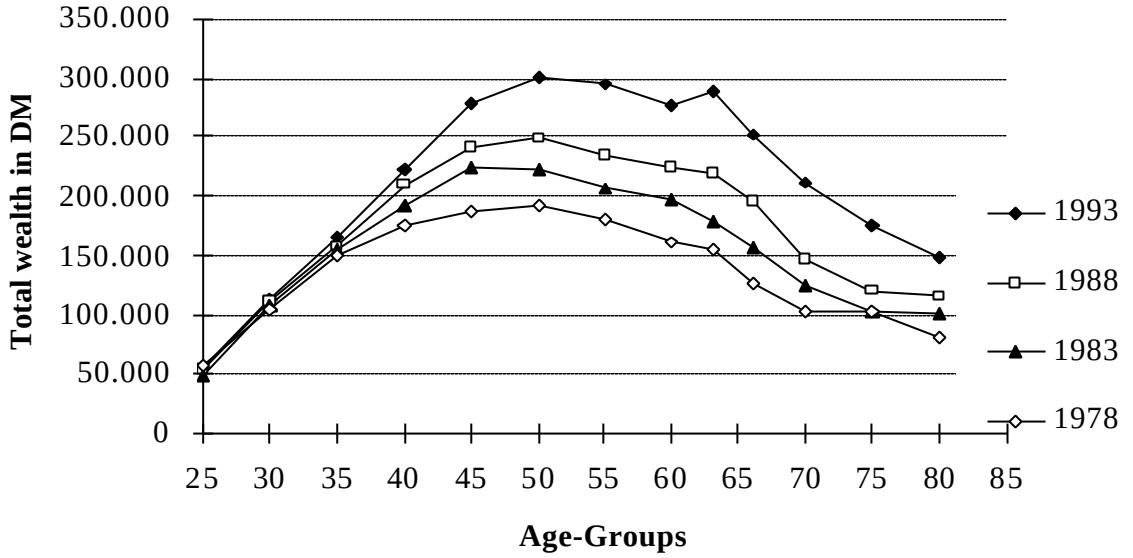
cross-sectional data may only learn very little about the behavior of saving over the life cycle.

This point is quite vividly shown by the sequence of Figures 1 through 3, taken from an earlier version of the German country study. Figure 1 begins with a set of conventional cross-sectional age-wealth profiles. Each of the four cross-sections appear to depict a hump shape, quickly increasing between age 25 and 50, reaching a peak around age 50, and then slowly declining.

Saving behavior, however, does not only change by age, but also from cohort to cohort. Younger cohorts have experienced peace and stability, while the cohorts that are now in retirement have lived through one or even two World Wars and the Great Depression. In addition, cohorts have been exposed to different changes in the pension system and some of them lived in a period without any social security (see Alessie, Kapteyn and Lusardi, 1998). Cohorts have also been exposed to different rates of productivity growth and to different conditions in the real estate market or the stock market.

Household saving, moreover, reacts to the business cycle and similar factors at any given point in time. Thus, in addition to age and cohort effects, there are also time effects to be taken into account. One of the great challenges of saving research is to distinguish these effects.

Figure 1: Wealth by Cross Section

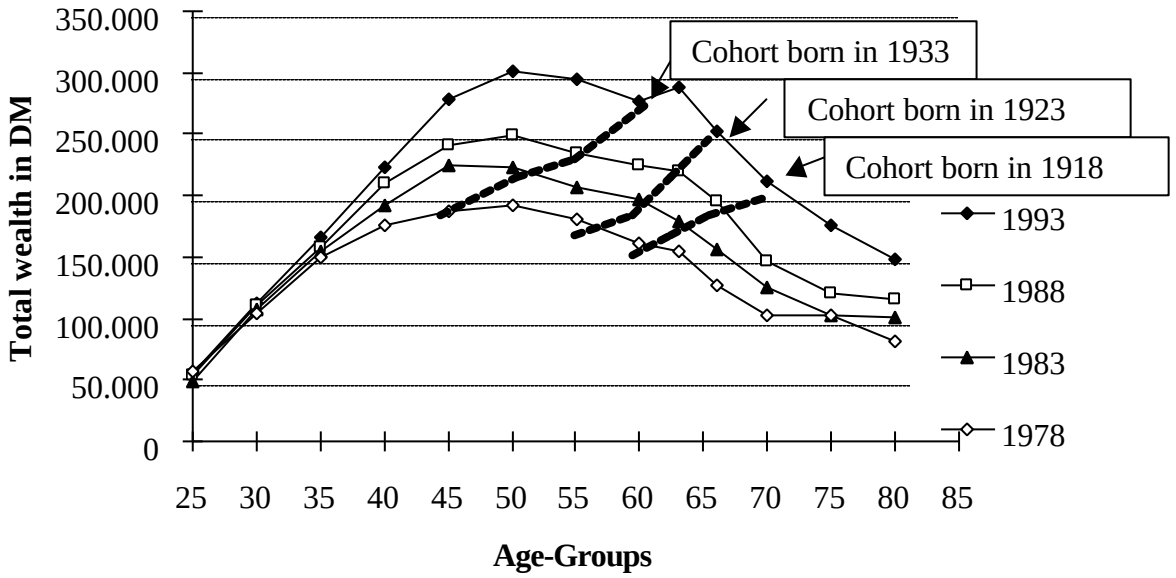


Notes and Source: See chapter on Germany in this volume. All amounts in 1993 DM. 1 DM in 1993 corresponds to a purchasing power of 0,57 Euro in 2001.

In Figure 1, each age category also represents a cohort. Comparing points on one of the cross sectional lines drawn in Figure 1 does not depict life-cycle changes since one compares households that are simultaneously in different age categories and cohorts. Hence, the apparent hump shape of wealth in Figure 1 is a combination of age, time, and cohort effects, not the life-cycle change created by age. A better approximation of life-cycle effects is to compare the 45-49 year old persons in 1978 with the 50-54 year old persons in 1983 (i.e., follow individuals of similar age over time), the 55-59 year old persons in 1988, and the 60-64 year old persons in 1993, and so forth. This procedure amounts to reconnecting the points of Figure 1 in a different fashion (see Figure 2) and identifies changes over time of a given cohort with life-cycle changes. Technically speaking, this procedure assumes the time effects away, and therefore this identification assumption ignores that not all changes over time for a given cohort are life-cycle changes – some may be changes in the economic and social environment that affect all ages and all cohorts at the same calendar time. There are several more sophisticated methods to separate age, cohort, and calendar-time specific effects (some of them discussed in the methodology chapter by Brugiavini and Weber in this volume), but Figure 2 suffices to make a crucial point:

cross-sectional data may be grossly misleading in the analysis of life-cycle savings behavior.[10] Rather than being hump-shaped, wealth steadily increases with age even after retirement which is, on average, just before age 60 in Germany.

Figure 2: Age and Cohort-Time Effects in Wealth

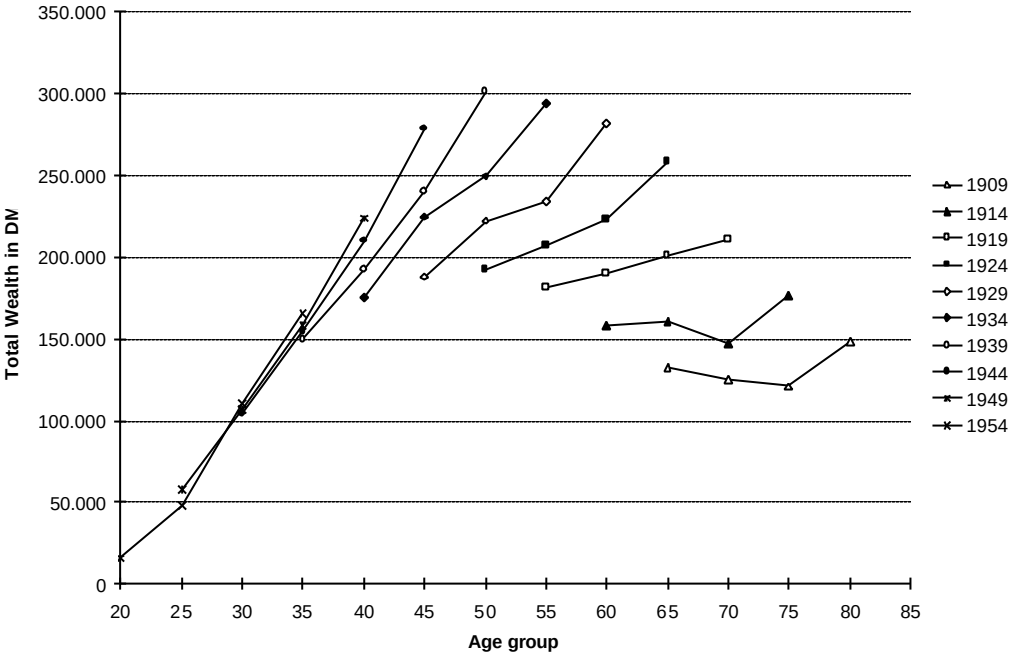


Notes and Sources: See Figure 1.

This finding comes out even more clearly in Figure 3 which simplifies Figure 2 by extracting only the dotted lines. Based on the assumption of no time effects, it depicts the life-cycle profiles of wealth by cohorts, starting at the left side with the youngest cohort in our data, born between 1954 and 1958, and proceeding to the oldest cohort, born between 1909 and 1913.

[10] See also the approaches by Deaton (1985), Attanasio (1994), Deaton and Paxson (1994), and Alessie, Kapteyn and Lusardi (1998).

Figure 3: Wealth by Cohorts



Notes and Sources: See Figure 1.

The lesson of this exercise is that there are strong differences between the shape of the life-cycle savings profile drawn from cross-sectional and panel data. The cohort-corrected profiles in Figure 3 leave nothing of the apparent hump shape that was suggested by the cross sectional data in Figure 1. All age profiles monotonically increase with age, except a little blip among the very old. In addition, we see that each consecutive cohort has accumulated slightly higher wealth levels. It is therefore crucial to analyze saving behavior using panel data. Some of the countries in this study provide genuine panel data of household saving; for other countries, we have to resort to Deaton's (1985) methodology and create synthetic panel data from repeated cross sections.

A typical pitfall in the analysis of cross-national saving behavior

The fact that life-cycle saving patterns are the primary object of analysis in this book also points to a challenge for this cross-national analysis of saving. The already mentioned cross-national analysis of pension policies by Gruber and Wise (1999) produced a truly amazing outcome, namely a very tight correlation between an aggregated measure of old-age labor force

participation and a summary measure of early retirement incentives. In that study, it was relatively easy to identify the reasons for the differences in retirement age across countries.

Saving, however, appears to be a much more complex subject than labor force participation. One of the reasons is that there are many motives for saving. Thus, the decision to save depends on a large set of determinants, all of which can vary across countries. Saving for retirement is certainly an important motive, but it is not the only one, and we should not expect a simple alignment of national saving rates with the generosity of national public pension systems, as a naïve and quick interpretation of Feldstein's substitution hypothesis would predict. Among the motives to save that have been suggested by many researchers are the precautionary and the bequest motive. Most importantly, these and other motives to save interact and are affected by the degrees of imperfections in the financial and insurance markets and by public policies.

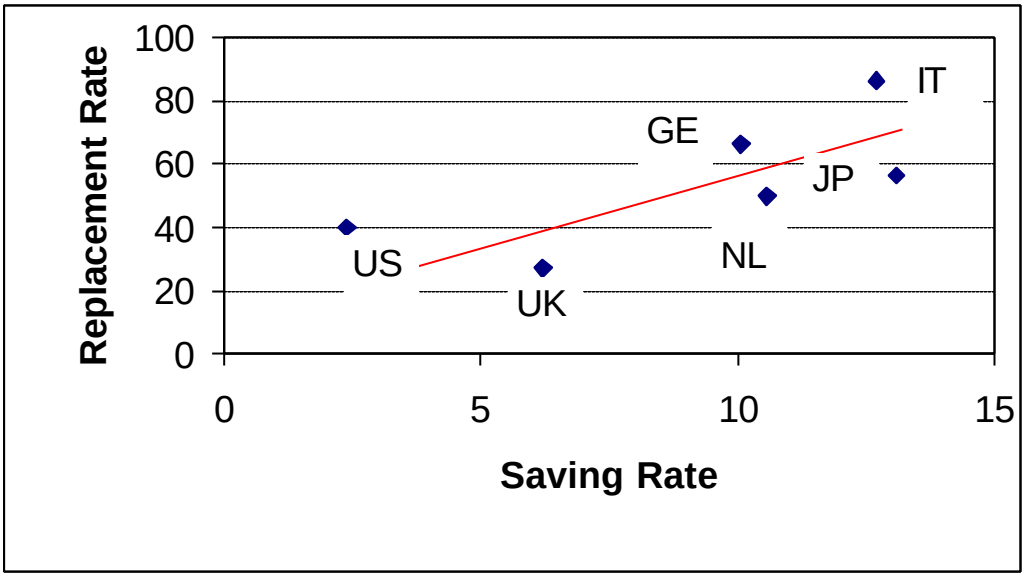
We will discuss this multitude of motives and determinants in more detail further below when we review what an extended model of life-cycle saving can teach us. Let us consider just one of these other determinants, namely the degree of imperfections in financial markets in order to demonstrate that, without properly accounting for other saving determinants, one can easily jump to wrong conclusions. Table 1 shows aggregate household saving rates in our six countries together with two other aggregate statistics, namely the replacement rates of these countries' public pension systems at their average retirement ages and the average down-payment required to buy a house in the time period under consideration – a rough measure of financial market imperfections.

Table 1: Saving rates, replacement rates, and down-payment ratios

	Germany	**Italy**	**Japan**	**Nether-lands**	**United Kingdom**	**United States**
Saving rate	10.1	12.7	13.1	10.6	6.2	2.4
Replacement rate	66.8	86.3	56.8	50.2	27.2	39.6
Down-payment ratio	35	50	35	25	19	20

Sources: Household saving rates: OECD Economic Outlook (2001). Replacement rates of public pension at average retirement age: OECD Ageing and Income (2001; Table A10, p.172). Down-payment ratios for owner-occupied housing: Chiuri and Jappelli (2000).

Figure 4: Saving rates and replacement rates

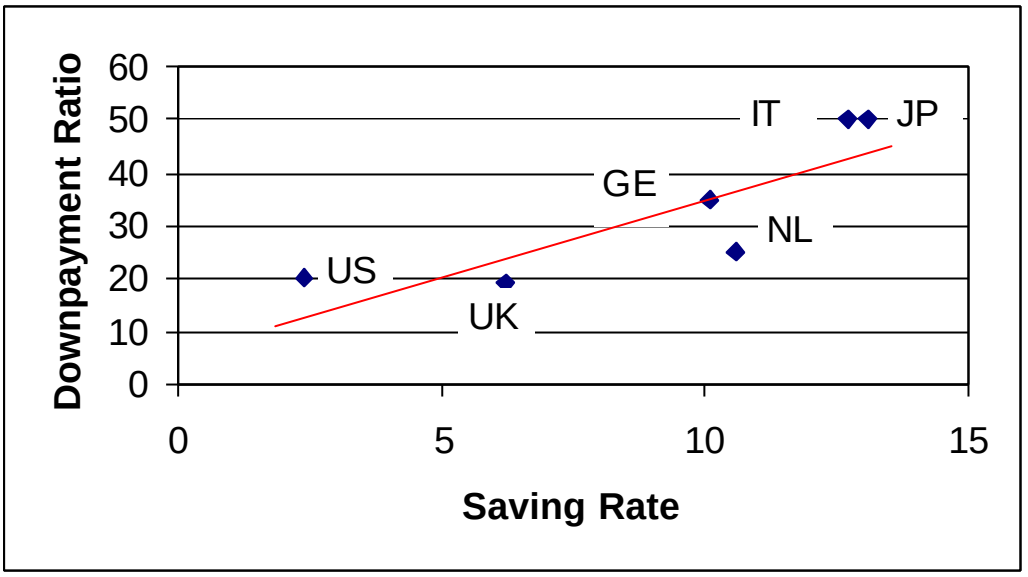


Sources: See Table 1.

Figure 4 shows that the simple correlation between saving and the replacement rate of pension is positive, not negative as predicted by Feldstein's (1974) substitution hypothesis. This simple *positive* correlation is often used as an argument against funded pension systems.[11] Saving, however, is not only influenced by the tightness of the social safety net, represented here by the replacement rate of the public pension system, but also by the degree of imperfections in financial markets, represented in Figure 5 by the down-payment ratio.

[11] Examples are statements found regularly in European newspapers such as "funded pensions depress rather than encourage saving as the comparison of saving rates between continental European and Anglo-Saxon countries shows".

Figure 5: Saving rates and down-payment ratios



Sources: See Table 1.

Figure 5 shows two important facts. First, down-payment requirements are correlated with saving. Countries which have less developed financial markets also display higher saving rates, a finding documented in several other studies on saving.[12] Moreover, down-payment ratios and replacement rates show a very similar pattern across countries, so much so that Figures 4 and 5 are almost identical. Hence, both bivariate correlations are deceiving due to missing variable bias.

Unfortunately, we have only six countries in our study, too few for a proper multidimensional analysis. Accounting for the down-payment requirement in a trivariate regression that has both the replacement rate and the down-payment ratio as explanatory variables provides a hint of how treacherous the bivariate correlation in Figure 4 is: it turns the sign of the relation between the saving rate and the generosity of the public pension system from a positive into a negative one, now conforming to Feldstein's crowding-out hypothesis.

[12] See Jappelli and Pagano (1989, 1994).

Table 2: Regression of saving rate on replacement rate and down payment ratio

	Coefficient	Standard Error	t-Statistic
Replacement rate	-.148	.265	0.56
Down payment ratio	5.18	4.68	1.11
Constant	10.3	40.1	0.26

Note: This regression has only 4 degrees of freedom. The R-squared is 0.63, and the adjusted R-squared is 0.38.

Quite clearly, with only six countries in our sample, we have too few degrees of freedom in this regression to obtain significance. Thus, this exercise is simply a suggestive one. The challenge of this book is to go deeper and to study life-cycle saving patterns rather than cross-sectional snapshots. In addition, we aim to account for the many determinants of saving by using micro data rather than aggregate statistics.

Goals of this book

While the main goals of this book are to collect and to analyze data on saving across countries, our work is guided by the theoretical work on saving originating in Modigliani and Brumberg (1954) and Friedman (1957) and some of its extensions which incorporate other motives to save and make the standard textbook life-cycle model more realistic, see Browning and Lusardi (1996) for a review.

It is important to incorporate uncertainty in income and in other aspects of life, notably in health and, even more fundamental, in the length of life. It is also important to recognize that insurance markets are imperfect and that constraints abound in financial markets. Thus, the possibilities of shifting resources over time is often rather limited. What we particularly would like to take into account is the fact that countries have long recognized the importance of saving for retirement and institutionalized it by devising social security and pension systems designed to provide income support after retirement. In addition, many countries have adopted policies that aim to encourage saving, for example via tax incentives or education policies.

Ideally, we would estimate a structural model of such an extended life-cycle model of saving as a function of pension policies, taxes rules, and all the other many determinants of saving at the household level. While estimating such a dynamic life-cycle optimization model on

cross-national data is not a realistic goal for this International Saving Comparisons Project, our work has been guided by such a frame of thinking.

More modestly, this volume fulfils two tasks. The first is descriptive: the country chapters collect the main saving measures by age and cohort, subject to a common treatment of time effects and a common definition of the various saving components. This provides very valuable data, which we make available to other researchers and/or policy-makers. The second task is interpretation: We will try to link saving patterns to country-specific policies, such as pension policies, other parts of the social safety net, financial market features, and capital taxation.

Measuring life-cycle saving

The first task of measuring saving in each stage of the life cycle is based on the definitions and procedures described in the methodology chapter by Brugiavini and Weber, which follows this introduction. Each country team collected data on saving and related measures according to a tightly specified "template". While these accounting definitions may appear tedious, they are a crucial necessity for a meaningful cross-national comparison.

In principle, there are three different ways of measuring saving:

? by comparing asset holdings at the beginning and at the end of a period;

? by adding inflows and outflows of wealth accounts during one period;

? by taking the difference between income and consumption expenditures in a period.

There are several measurement issues to deal with when examining saving; for example, should wealth and income incorporate unrealized capital gains? Which measure is more appropriate to use depends ultimately on the research question under consideration, but also data availability. Given that our focus is to study life-cycle saving, all resources that can be used to support households over the life cycle are relevant for our analysis. We will therefore work with the most comprehensive measure of saving which differs from aggregate statistics from the national income and product accounts that exclude many components of saving, most notably, unrealized capital gains on assets.

To measure and study saving behavior, when possible, we distinguish between active and passive saving. *Passive saving* are capital gains that are automatically reinvested – the most

salient example is the increase in assets value due to stock market appreciation. *Active saving* is everything else. Of particular importance for our analysis of household saving behavior is another distinction: discretionary versus mandatory saving. *Discretionary saving* is completely under the control of the households. Households choose its value as well as its portfolio composition, given their budget constraints and applicable incentives, such as tax relief and mandatory contributions to funded and unfunded pension schemes. In turn, *mandatory saving* is beyond the control of the household. The most important example is mandatory contributions to funded occupational pension plans. Here, the volume is prescribed (e.g., a fixed absolute sum or a fixed percentage of gross income) and frequently even the portfolio composition is outside the control of the household (e.g., the employer provides workers with a single pension plan). Where possible, we also distinguish between *financial* and *real saving*.

A broader definition of saving also includes the addition of claims on unfunded pension benefits (Jappelli and Modigliani, 1998). Under such a broad view, contributions to pay-as-you-go financed pension schemes are considered as saving. We will use the term *"notional saving"* for these contributions although we are aware that the term "saving" may be confusing since these contributions do not contribute to the physical capital stock. Consequently, receiving pension benefits is *"notional dissaving"*, and the current present value of pension benefit claims is dubbed "*notional wealth"*, "*unfunded pension wealth"*, or "*social security wealth."*

In practice, not only definitional but also measurement issues are extremely difficult, in particular when considering micro data. It is well known that wealth, consumption, and income data are severely affected by measurement error and taking first differences (as when using wealth) makes the measurement error problem even more dramatic. Econometric techniques have to be chosen wisely when examining saving data, even though data limitation is often a major constraint. While we would like to report all three measures of saving in order to learn how reliable our measurements are, the data sources available to the six country studies do not allow this. In many countries, only two measures can be computed, in some countries only one. Frequently, capital gains are not measured or have to be imputed using data on rates of return that is likely to produce additional measurement error.

As an illustration of the serious problems we face when calculating saving data, Table 3 reports the saving rate in the United States calculated from three different data sets: the Consumer

Expenditure Survey (CEX), the Panel Study of Income Dynamics (PSID), and the Survey of Consumer Finances (SCF). While saving is calculated subtracting consumption from income when using CEX data, saving is calculated by first differencing wealth when using PSID and SCF data.

Table 3: Household Saving Rates in the US

		CEX	SCF	PSID	PSID
		1982-89	1983-89	1984-89	1984-89
		Y-C	? Wealth	? Wealth	Active
Age 30-39	Median	0.27	0.05	0.04	0.04
	Mean	0.30	0.03	0.17	0.15
Age 40-49	Median	0.26	0.08	0.03	0.04
	Mean	0.30	0.29	0.33	0.15
Age 50-59	Median	0.26	0.05	0.07	0.04
	Mean	0.30	0.24	0.32	0.11
All Ages	Mean	0.25	0.18	0.17	0.08
National income and product accounts for corresponding period		*0.09*	*0.09*	*0.08*	*0.08*

Source: Dynan, Skinner, and Zeldes (2002).

Differences among data sets are startling. First, saving rates are much higher when using the CEX than the other two data sets. This has to do with a plurality of reasons: measures of income and consumption considered in the calculation, the severity of measurement error in particular in the income data in the CEX, differences in survey design and selectivity of the chosen samples. Second, active saving is a large proportion of total saving among the young, but at older ages, when it is more likely that household portfolios include stocks and housing, passive saving becomes also important. This highlights the importance of unrealised capital gains in deriving saving. Third, as already mentioned before, saving measures calculated from micro data do not match well with aggregate statistics. For the US, saving from the national income and product accounts (NIPA) is much lower than reported in the CEX, PSID, and SCF. Again, this has much to do with the fact that NIPA saving does not include unrealised capital gains on

existing assets.[13]

The various saving measures and their components are displayed in graphical form in the country chapters. In addition, the data is available on our internet site.[14] This internet site represents a machine-readable appendix to this volume that enables readers to generate alternative specifications of saving aggregates and to apply alternative assumptions for the separation of age, cohort, and time effects in saving behavior. The saving data is augmented by summary data on pension systems and other national policies.

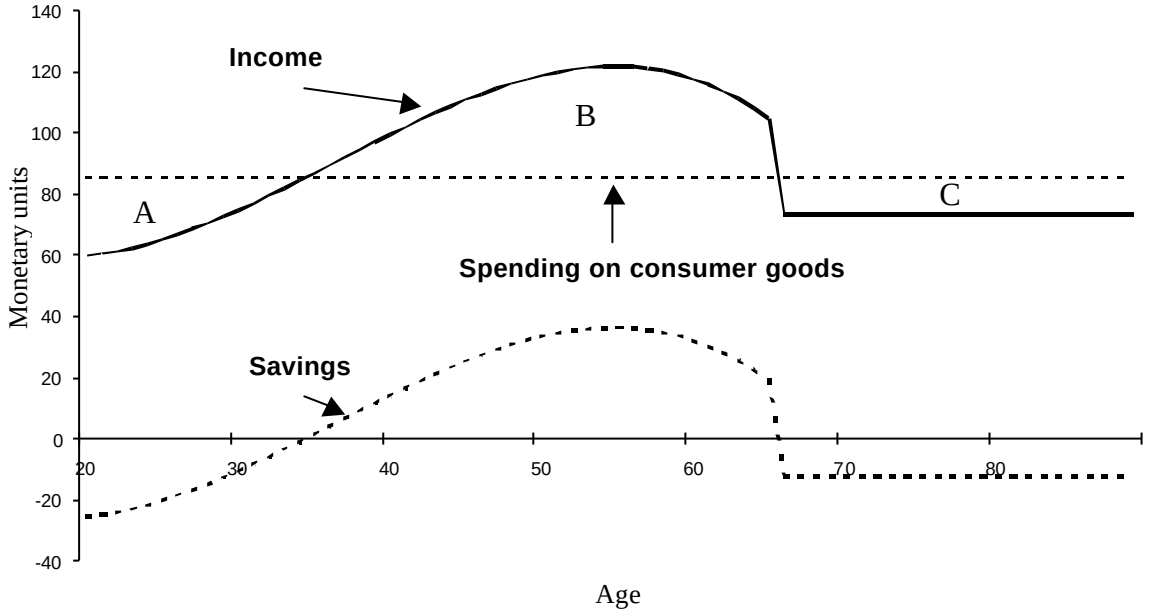
The data was collected to analyze our main working hypothesis, namely that a major part of the differences in the age-saving patterns observed across European countries, Japan and the U.S. is generated by differences in national policies. The main results are summarized in the sequel of this introduction. We begin by collecting the main results from economic theory, and then structure the sequel by three questions: What are the main institutional differences across the six countries in our study and what do they imply in light of the extended life-cycle theory of saving? What do we observe empirically? Are these observations consistent with the predictions of extended life-cycle models of saving?

What does an extended life-cycle model of saving predict?

As mentioned before, our point of departure is the traditional life-cycle model by Modigliani and Brumberg (1954) and Friedman (1957). The main saving motive in this model is consumption smoothing due to a declining marginal utility of consumption, and the fact that income after retirement is generally lower than before. The resulting textbook life-cycle profile of saving is well-known and illustrated for convenience in Figure 6. With relatively low earnings at the beginning of the career, consumption is smoothened by borrowing (via financial markets or a loan from the family) (area A). Increasing earnings makes saving possible (area B), which is then decumulated after retirement (area C).

[13] See also the discussion of saving measures in the US in Lusardi, Skinner and Venti (2001).
[14] The URL of this site is www.mea.uni-mannheim.de/iscp.

Figure 6: Income, consumption and life-cycle saving



This profile, however, rests on a large number of simplifying assumptions that do not fit many of the institutional peculiarities present in the countries we consider in this volume. For example, the introduction of uncertainty and market imperfections changes the simple predictions of the simple life-cycle model in a substantial way. Much can be gained by considering more realistic features of the economy, and in particular by capturing features that vary across countries.

As a first example, mentioned before, we note that borrowing constraints are likely to prevent young households from smoothing consumption before the symbolic age of 35 in Figure 6 (see Jappelli and Pagano, 1989, 1994; Alessie, Devereux and Weber, 1997). Thus, one needs to model more complex budget constraints than the simple intertemporal one that is underlying Figure 6. We also would expect higher saving rates (especially at younger ages) in countries with more stringent borrowing constraints.

Figure 6 assumes that the time of death is known for the life-cycle computation. In fact, there is uncertainty about the time of death (see Davies, 1981, and Rodepeter and Winter, 1998). In addition, there is a great deal of income uncertainty over the life course. Thus, saving not only

serves to offset the decline of income after retirement, but also to shield households against shocks to income (see Deaton, 1992, chapter 6; Caballero, 1990; Carroll, 1994, 1997; Zeldes, 1989). Uncertainty becomes particularly relevant when households face borrowing constraints (see Deaton, 1991), so there is often an interaction between uncertainty and imperfections in financial markets. Individuals face uncertainty not only in income and in the length of life, but also in all kinds of future economic circumstances, for example in the size of health costs they may face, in particular in old age (see Palumbo, 1999; Hubbard, Skinner and Zeldes, 1995; Kennickell and Lusardi, 2001). Thus, there exists a precautionary motive to save and not just a retirement motive. Countries with a higher degree of uncertainty in income and other future economic circumstances will feature higher saving rates in the presence of a precautionary saving motive.

Probably because of the pervasiveness of uncertainty and imperfections in the insurance and financial markets, there exist public and social safety nets. These safety nets may in turn replace the need for savings, for example by reducing the gap between earned and actual income that needs to be filled in Figure 6 and by insuring against shocks. Countries with a high replacement of earnings by pension annuities are therefore likely to feature lower wealth at retirement, and less decumulation of wealth after retirement. Similarly, the increased annuitization of wealth because of the growing importance of social security and pensions during the last two to three generations is likely to have reduced the amount of precautionary savings, see Browning and Lusardi (1996) and the references therein.

The same logic holds for unemployment benefits (see Engen and Gruber, 2001, and Lusardi, 1998) and other welfare policies (see Hubbard, Skinner and Zeldes, 1995, and Gruber and Yelowitz, 1999), which aim to reduce changes and shocks to life-time income. In addition to public safety nets, individuals may also rely on the network of relatives and friends to offset shocks (see Lusardi, 2000). Such informal borrowing opportunities may replace formal capital market interactions and reduce further the need to save.

There are more cross-national differences than those cast into institutions. Anybody working with micro data recognizes the extent of heterogeneity in household behavior and the importance of modeling differences in individual preferences. Some of the preference parameters, such as the degree of risk aversion and the willingness to substitute consumption over time, play

a pivotal role in affecting saving decisions. It is certainly restrictive to assume that these preferences do not change across individuals and across countries.

Individuals may, for instance, differ in the extent they care about their children and, more generally, for future generations and thus in the strength if their bequest motive. We expect countries with a more pronounced bequest motive to accumulate higher wealth at retirement than countries with a less pronounced bequest motive. It has been hard, however, to assess empirically the strength of this motive, as the fact that wealth is left over at the end of life and the existence of transfers per se does not necessarily mean that one generation cares for the next. Bequest can be accidental (Davies, 1981; Abel, 1985), strategic (Bernheim, Schleifer, and Summers, 1985) or the result of decreased consumption due to an unexpected deterioration of health (Börsch-Supan and Stahl, 1991b). The existence and strength of a bequest motive is, in turn, critically important to evaluate the effects of public policies on saving. For example, the increased annuitization of wealth through social security is likely to reduce accidental bequests.

Furthermore, households may be more short-sighted than modeled by traditional models of saving, and this tendency may vary across countries. For example, households may display varying rates of impatience (see Lawrence, 1991, and Carroll, 1992). They may also have preferences that are inconsistent over time because they lack self-control, and therefore procrastinate saving (see Thaler and Shefrin, 1981; Laibson, 1997; O'Donoghue and Rabin, 1994a, 1994b). In addition, households may simply lack financial literacy and information on the many variables that are needed to make saving plans for the future and face high planning costs and/or limited opportunities to overcome these costs (see Bernheim, 1995, 1998, and Lusardi, 2001). Such planning restrictions have become particularly apparent in countries like the US, where there has been much discussion about privatizing social security and where firms have increasingly shifted from defined benefits to defined contribution pension plans. We have little data on informational differences across countries. In recent years, particular in the UK and the US, firms have become concerned about the amount of information, literacy, and planning skills of workers. Many firms, in particular large ones, have started offering retirement seminars to their workers and there is some evidence that this type of financial education has an impact on saving (see Bernheim and Garrett, 1999).

The lack of data that permit researchers to compare preferences across countries forces us

to leave those differences in the residuals. Nevertheless, since many of the deviations from Modigliani-Friedman's idealized world are observable and do vary across countries, cross-national comparisons help us to identify their impact on saving behavior. We now review these major observable differences among the countries considered in this volume and then examine how these differences affect saving behavior.

Some institutional differences across countries and what they mean for saving

We begin with the institutional environment since this is our main interest, and then add general statistics on income and demographics. Table 4 shows that among the six countries under consideration, Italy has the most generous social security system, which is essentially pay-as-you-go. It has both a very early retirement age and a rather high replacement rate. Pay-as-you-go systems also dominate retirement income in Germany and Japan. Social security benefits in the United States are less generous than in the preceding three countries, but all four countries have earnings-related benefits. This is different in the UK and in the Netherlands, where the basic pension is flat. In the Netherlands, all earnings-related retirement income comes as private sector savings, mostly as occupational pensions. In the UK, the situation is complicated since the long string of pension reforms has generated large differences across cohorts. The older cohorts have earnings-related public pensions on top of their basic state pension, resembling the US Social Security system, while the younger cohorts have occupational pensions, resembling the Dutch pension system.

The need to fill income gaps after retirement with private savings is much larger in the US and the UK than in Italy and Germany since the former have much higher public pension replacement rates than the latter. This is the core of Feldstein's (1974) argument. All other things equal, we would therefore expect the US and UK to have a more pronounced hump-shaped life-cycle saving profile than Italy or Germany.

As shown in Table 4, pension fund assets – savings in the economic sense – are much higher in the Netherlands, the UK and the US than in Germany, Italy and Japan, where most retirement income is pay-as-you-go.

Table 4: Pension systems

	Germany	Italy	Japan	Netherlands	UK	USA
Public pension spending as percentage of GDP (1999)	11.8	14.2	7.9	5.2	4.3	4.4
Replacement rate of public pension at average retirement age (1998)	66.8	86.3	56.8	50.2	27.2	39.6
Average retirement age (1998)	60.3	58.8	68.5	60.4	62.6	64.6
Percent of workers covered by occupational pensions (mostly 1998)	46	5	50	91	46	45
Financial assets of pension funds as percentage of GDP (1998)	3.3	3.2	18.9	106.1	83.7	86.4
Average public pension income as percent of total pension income (1998)	94.5	94.7	96.3	48.9	42.6	58.8

Sources: OECD Ageing and Income (2001)

In turn, the possibility to retire at very early retirement ages that the public pension systems in countries such as Italy provide and even encourage (Gruber and Wise, 1999) is likely to increase savings before and wealth at retirement age.

Countries also differ in their exposure to risk, for example unemployment risk and more generally income risk, as well as longevity and health risk, just to mention some of the important sources. More income uncertainty increases savings in the early and medium age ranges, and increases dissaving at old age, holding all other determinants constant (see, among others, Rodepeter and Winter, 1998).

Some of the largest uncertainties in life concern health shocks. Some countries, such as the US, do not have a national health system and a considerable share of their population does not have public health insurance coverage (see Table 5). The average size of out-of-pocket health costs is quite different among the six countries and again the US display a high average cost for medical expenses that individuals have to pay. Measured relative to GDP, Americans have to pay

more than 7 percent of GDP as private health expenditures, while the figure is about 1 percent in the UK. Given this coverage, we would expect that US households save more for health reasons than households in the other countries, notably in the UK. Interestingly, health risks as measured by "potential years of life lost" (i.e., the number of life years lost due to death before age 70 among male residents in each country) are substantially higher in the US and Germany than in the other countries, supposedly reducing life-time resources and amplifying the need for precautionary saving for surviving spouses and other family members, all other things equal.

Table 5: Health care systems

	Germany	**Italy**	**Japan**	**Netherlands**	**UK**	**USA**
Health care spending as percentage of GDP (1998)	10.3	8.2	7.4	8.7	6.8	12.9
Public health care spending as percent of total health care spending (1998)	75.8	67.3	78.5	68.6	83.3	44.8
Percent of households covered by public health insurance (1997)	92.2	100	100	74.6	100	45.0
Private health care spending as percentage of GDP (1998)	2.5	2.7	1.6	2.7	1.1	7.1
Male potential years of life lost per 100.000 males and females (1997)	5500	4860	4000	4300	4900	6850

Sources: OECD Health Data (2001).

Other important risks are unemployment and, more generally, poverty. While the US, the UK and Italy offer a relatively low replacement rate for unemployment benefits, countries such as the Netherlands and Germany offer a rather generous unemployment insurance scheme (see Table 6). Replacement rates are only one part of the story. In addition, the probability of entering unemployment is rather different across countries. Thus, while the US has the lowest unemployment rate, it has nevertheless the highest percentage of population below the poverty

line.

Table 6: Other social safety nets

	Germany	Italy	Japan	Netherlands	UK	USA
Unemployment compensation spending as percentage of GDP (1998)	1.32	0.71	0.50	2.60	0.32	0.25
Unemployment rate (1999)	8.6	11.3	4.7	3.3	6.1	4.2
Replacement rate of unemployment insurance (single person / married couple, two children)	60 / 73	36 / 54	63 / 59	75 / 85	50 / 64	60 / 61
Maximum duration of unemployment compensation (1998)	32 months*	6 months	n.a.	5 years	1 year	26 weeks
Percent of households below OECD poverty line (1993)**	9.7	18.4	n.a.	11.2	9.1	22.1

Sources: OECD Economic Outlook (various issues), OECD Employment Outlook (various issues), OECD Benefit Systems and Work Incentives (1997), OECD Social Expenditures (various issues)
Notes: *after 7 years of work experience **earning less than 2/3 of median earnings.

It is difficult to measure the overall income risk, not to mention comparing it across countries. Several innovations, however, have been made in the data available in some of the countries under consideration. For example, Italy, the Netherlands, and the US all have surveys that report subjective expectations of future changes in income from which it is also possible to derive a subjective measure of the variation in income. Das and Donkers (1999) have compared these subjective measures across these three countries and found that the perceived variation in income is higher in the US than in Italy and the Netherlands. Thus, precautionary motives for saving caused by income risks should be higher in the US than in the two European countries.

Table 7: Income, income distribution and income uncertainty

	Germany	Italy	Japan	Netherlands	UK	USA
GDP per capita worker in US-$ at PPP (2000)	24,900	24,500	25,600	27,500	23,900	30,600
Earnings of average production worker in US-$ at PPP (1998)	29,600	24,000	25,800	27,800	26,600	29,100
Income distribution (Gini coeff. For disp. Income)	28.2	34.5	26,0	25.5	32.4	34.4
Income uncertainty	Low	low	n.a.	low	n.a.	high

Source: Own Calculations based on OECD Economic Outlook (2001). Income distribution: OECD Economic Outlook (1997) and Förster, M. (2000). Income risk: Das and Donkers (1999)

Compared to Germany and Italy, the Netherlands the US and Japan are wealthier in terms of per capita GDP, while the UK has the loweest GDP per capita (Table 7). While wealthier individuals tend to have a higher saving rate than poorer ones, this does not necessarily translate to the aggregate. An offsetting effect, for instance, comes through the income distribution, which is more unequal in the US than in countries such as the Netherlands (Table 7). Hence, one may expect most saving in the US to come from relatively few households, and indeed, this is the finding in most micro data analyses (Avery and Kennickell,1991, Carroll 2000 Dynan, Skinner and Zeldes 2002).

Cross-country capital market differences are also likely to shape differences in saving patterns. We have already pointed out the large differences in borrowing constraints, repeated in Table 8 below. Borrowing constraints are particularly large in Italy with its traditionally very high down-payment requirements. We expect that these constraints increase saving in younger ages, particularly during the time span in which households have to save for their own home. In turn, the ease at which money can be borrowed in the US should reduce the US saving rate accordingly.

Some countries, such as the US, but also Germany and Japan, have pursued policies to encourage saving. The US, for example, offers several tax incentives (IRAs, 401(k)s) to promote saving. Japan, after the second World War, launched a major educational campaign to promote saving (Bernheim, 1991). Germany has traditionally subsidized saving for a down payment in

building societies (Börsch-Supan and Stahl, 1991a) as well as saving through whole life insurance (Walliser and Winter, 1998). Countries also differ in their capital taxation, in particular the taxation of interest income and wealth, which include inheritance taxes, see Table 8. Countries with low rates of capital taxation, such as Germany, supposedly save more than countries with high capital taxation, such as Japan -- and again we need to stress: all other things being equal.

Table 8: Capital market features

	Germany	**Italy**	**Japan**	**Netherlands**	**UK**	**US**
Down-payment ratio (1970-79)	35	50	35	25	19	20
Stock market capitalization (in % of GDP; 1998)	51	49	66	158	175	163
Corporate income tax (* = double taxation)	1.4	4.0	4.7 DT	4.1 DT	3.8	2.7 DT
Capital gains tax	Exempt	12.5	26	n.a.	INC	20
Taxation of interest income	31.5 WC	27 WF	20 WF	n.a.	20 WC	INC

Sources: Down-payment ratios for owner-occupied housing: Chiuri and Jappelli (2000). Stock Market Capitalization: WDI 2000. All else: OECD Economic Surveys – Poland (2000). Notes: DT=double taxation of dividend income; INC=taxes as ordinary income; WF=withholding tax payable in full; WC= withholding tax with a tax credit.

Another source of cross-national differences in saving rates are demographic differences, although the direction of causality is difficult to determine (see Cigno and Rosati 1996). Some of the core differences are collected in Table 9.

Table 9: Demographic features

	Germany	Italy	Japan	Netherlands	UK	USA
Life expectancy at birth (male/female; 1998)	74.5/80.5	75.3/81.6	77.2/84.0	75.2/80.7	74.8/79.7	73.9/79.4
Life expectancy at 65 (male/female; 1998)	15.3/19.0	15.8/20.2	17.1/22.0	14.7/18.8	15.0/18.5	16.0/19.1
Share of population aged 65 and over (1998)	16.4	18.2	17.1	13.8	16.0	12.5

Sources: OECD Health Data (2001).

In a deterministic world, a longer life span for given retirement age increases saving before retirement, provided that the replacement rate of retirement income is less than unity. Uncertainty about the length of life increases this effect (see Davies 1981). While Japanese persons have considerable longer life expectancies than Dutch or British people, the differences are probably too small to make a discernible difference. Moreover, it is the difference in actual duration of retirement, which should matter according to economic theory. This is the longest in Germany and Italy, which therefore are expected -- all other things being equal -- to have higher wealth at retirement, in particular compared to the US (see Gruber and Wise, 1999).

Reviewing Tables 4 through 9 delivers a rather complicated and multi-dimensional picture of cross-national differences. Table 10 makes an attempt to summarize and to conclude what economic theory predicts about saving behavior in our six countries:

Table 10: Expected effects on savings behavior

Cause	Germany	Italy	Japan	Netherlands	UK	US
Wealth at retirement						
Public pension replacement rate	Low	Low	Low	High	High	High
Retirement age	Inter-mediate	High	Low	Inter-mediate	Inter-mediate	Low
Income risk		Low		Low		High
Longevity and health risk	Low	Low	Low	Low	Low	High
Saving at younger ages						
Public pension replacement rate	Low	Low	Low	High	High	High
Retirement age	Inter-mediate	High	Low	Inter-mediate	Inter-mediate	Low
Income risk		Low		Low		High
Down-payment ratio	Inter-mediate	High	Inter-mediate	Low	Low	Low
Dissaving at older ages						
Public pension replacement rate	Low	Low	Low	High	High	High
Longevity risk	High	High	High	High	High	Low
Health risk	High	High	High	High	High	Low

As we see from Table 10, there are many opposing effects. In Italy, for instance, we would expect lower saving due to its generous public pension replacement level, but higher saving because of the early retirement age and, particular at younger ages, the strict down-payment requirements. The Netherlands have lower income uncertainty than the US but their public health care system coverage is more l generous. The US has many reasons to save much, in particular precautionary motives -- but the US also has a capital market that makes borrowing much easier and a relatively short duration of retirement since people retire much later than in most European countries. In addition, it is hard to predict an overall effect as we do not have

good and comparable data across countries for preferences. For example, we do not have a good idea which country has the strongest bequest motive.

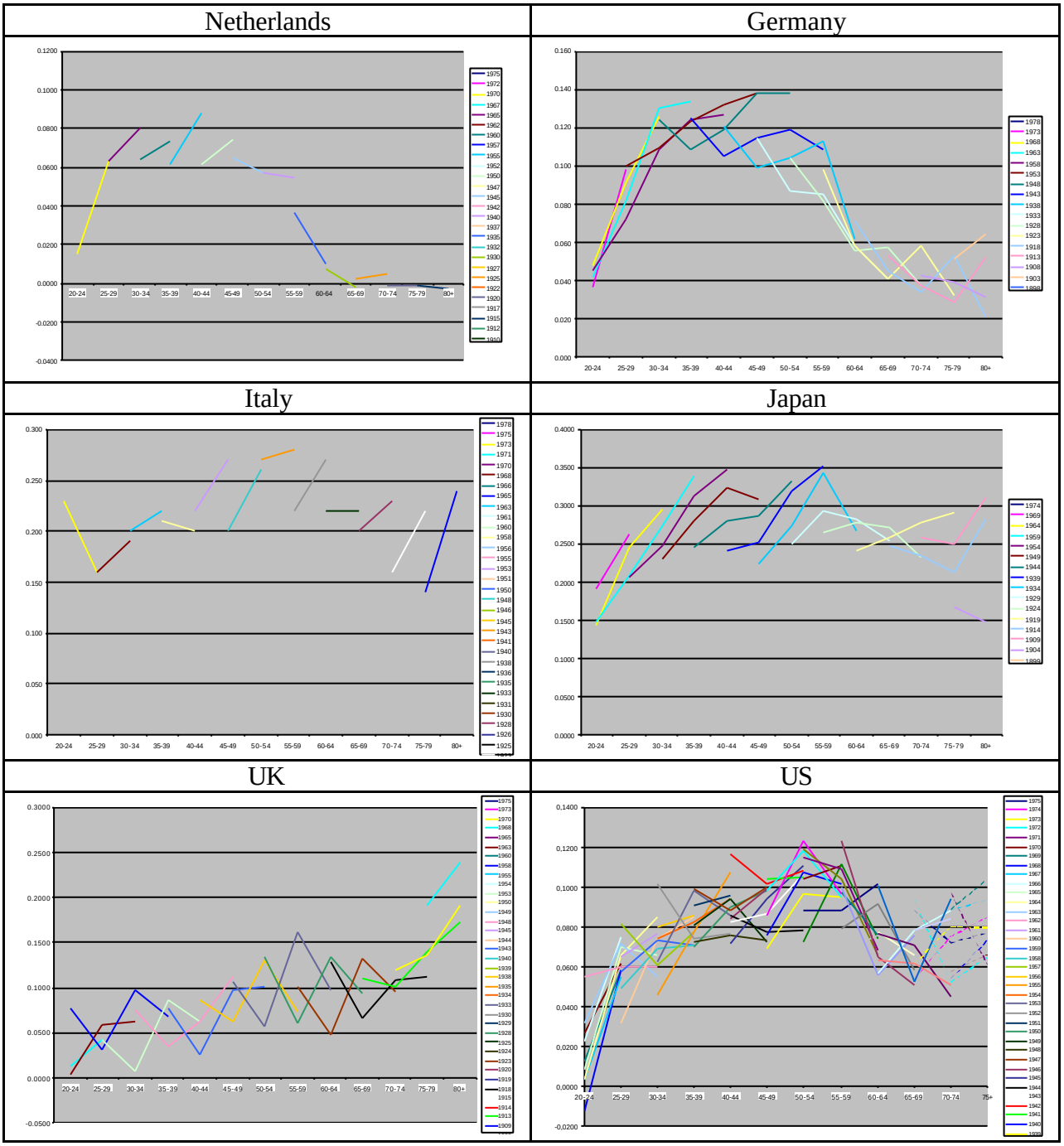
There are, however, some relatively clear patterns. A good case in point concerns the neighbors Germany and the Netherlands. The Netherlands with its small pay-as-you-go system, but otherwise relatively similar background, should feature higher wealth at retirement and more dissaving after retirement than Germany. Another example of a relatively clear case concerns the strict borrowing constraints in Italy which should increase saving in young ages, while the generous pension replacement rate should lower wealth at retirement, thereby flattening out the life-cycle profile compared to, for instance, the Netherlands and the US.

What do we observe empirically?

Figures 7 and 8 present the median saving rates in the six countries described in this volume. Figure 7 plots the raw data by cohort and age, subsuming all time effects into age and cohort effects. This is the simple methodology shown earlier in Figures 1 through 3. Figure 8 uses a more sophisticated methodology developed by Deaton and Paxson (1994), regressing median saving rates on age, cohort and time dummies restricted by the identifying assumption that time effects sum up to zero and are uncorrelated with any linear trends in the data. Neither of the two identifying assumptions is uncontroversial, and both are certainly restrictive. It is possible to think of cases where time effects do not follow the pattern we assume in the data. For instance, it is possible that there is an interaction between time and cohort effects or time and age effects. The model with uncertainty would predict such interaction.

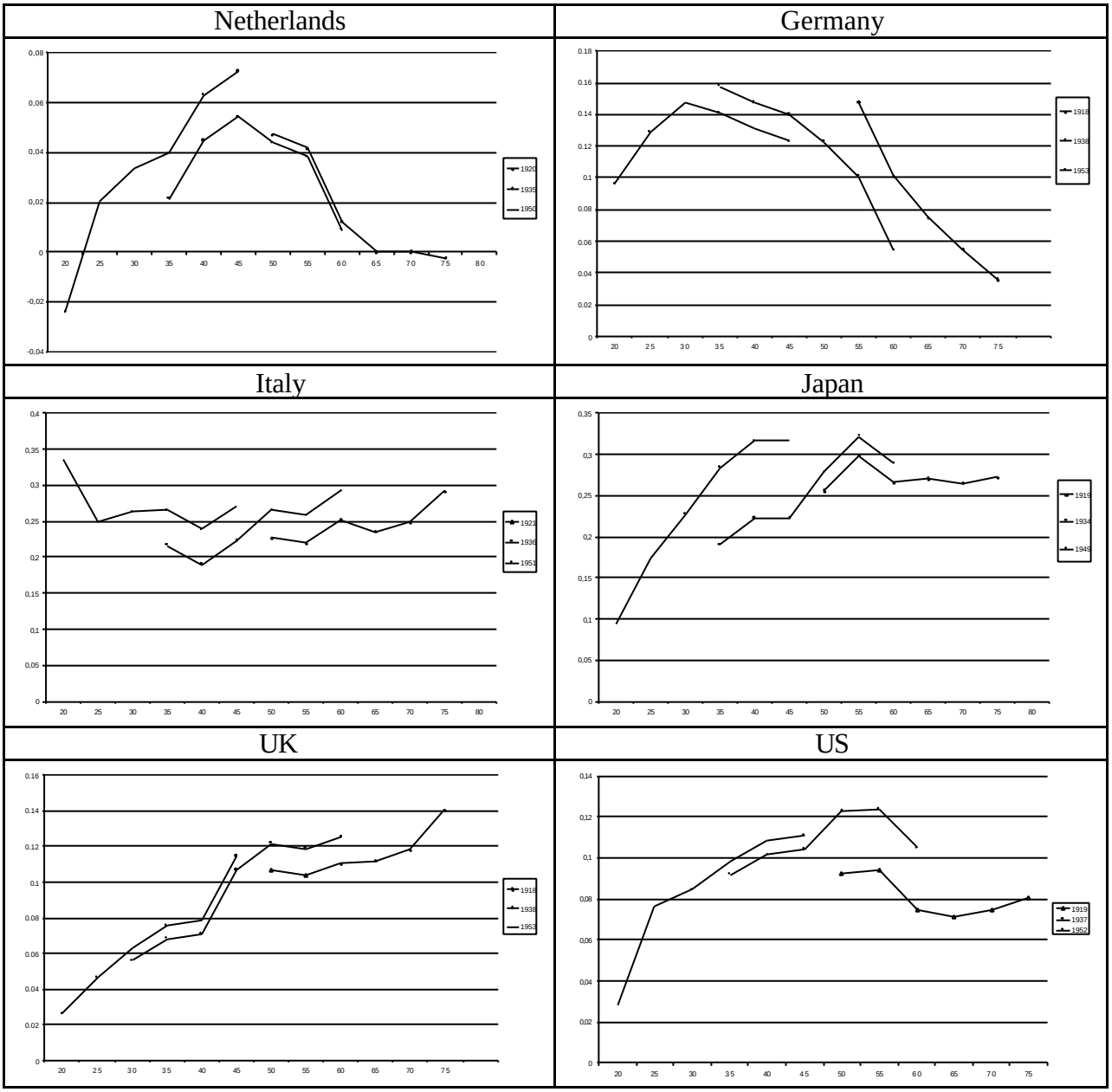
Unfortunately, the separation of age, cohort and time effects cannot be data driven since any two of these effects determine the linear part of the third. Hence, it is not possible to separately identify age, time, and cohort effects without imposing some a priori assumptions. Only higher order effects can be separated by the data (Fitzenberger et al., 1998), but not the basic linear trends. Assuming that time effects sum to zero and are orthogonal to a linear time trend essentially reduces time effects to cyclical variation, which we regard as the most meaningful and most useful a priori assumption. Figures 7 and 8 must be interpreted taking these a priori restrictions into account.

Figure 7: Cohort-corrected saving rates by age (medians, raw data)



Source: Derived from country chapters. Average saving rates have been roughly adjusted to match aggregate household saving rates at corresponding year, see OECD Economic Outlook (various issues).

Figure 8: Saving rates by age (medians, Deaton-Paxson decomposition)



Note: Age profiles for three representative cohorts, born around 1920, 1935 and 1950.
Source: Derived from country chapters. Average saving rates have been roughly adjusted to match aggregate household saving rates at corresponding year, see OECD Economic Outlook (various issues).

Since Figure 8 is regression based, it is smoother than the raw data depicted in Figure 7. Figure 8, on which we focus our analysis, shows the age profiles for three representative cohorts, born around 1920, 1935 and 1950.

Differences in the saving profile across countries are striking. While we observe a pronounced hump-shaped profile in the Netherlands, and a bit in Germany and the US, saving increases with age almost throughout the entire life course in Japan and the UK. Moreover, Italy has essentially a flat saving profile (Figure 8).

The most striking communality in Figures 7 and 8 is that (maybe except for the Netherlands) we do not observe dissaving in old age[15]. While we may face the problem of differential mortality in old age (poorer individuals tend to die younger, see Hurd, 1990) and therefore figures for very old ages have to be interpreted with caution, it is hard to reject a pattern of substantial positive saving between retirement and age 70).

Are these observations consistent with our expectations?

What explains these startling differences? Do they match our theoretical predictions ? The honest answer is that the pattern is much too complicated in order to tell a simple story.However, one important part of the explanation seems to be the pension system. Let us focus on the three continental European countries. Germany and Italy have pay-as-you-go financed public pensions with very high replacement rates. They generate net retirement incomes that are almost 70% of pre-retirement net earnings in Germany and almost 90% in Italy. In addition, the public pension systems in Germany and Italy provide generous survivor benefits that constitute a substantial proportion of total unfunded pension wealth, and disability benefits at similar and often even higher replacement levels than old-age pensions. Pensions are important not only for providing support at retirement, but also for providing insurance against the risks of disability and survivorship. As a result, public pensions are by far the largest pillar of retirement income in these countries and constitute more than 80% of the income of households headed by persons aged 65 and older, while funded retirement income, such as asset income from private saving or

[15] Findings for the Netherlands in Figure 8 are consistent with the empirical estimates of Alessie, Lusardi and Kapteyn (1995).

firm pensions in which the employer saves on behalf of the worker, plays a much smaller role. This is quite different from the Netherlands, which only provides a flat base pension on a pay-as-you-go basis with a replacement rate that is very low for households above median income. All other retirement income is withdrawals from mandatory occupational and individual pension accounts. Hence, a crucial difference between the three countries is that saving for old age is unlikely to be the main savings motive in Germany and Italy, while it is necessary for Dutch households. The famous hump shape of savings predicted by the life-cycle hypothesis – negative, positive, and negative again, see Figure 6 – therefore applies to Dutch households much more than to the other two continental European countries. This finding is broadly confirmed in Figures 7 and 8.

If this explanation of the observed cross-national saving differences were correct, it would have important implications for the future. If indeed most of the saving patterns currently observed in Germany and Italy were caused by generous retirement benefits from their pay-as-you-go pension systems, we should expect distinct changes in saving patterns when the pension reforms in these countries will be put in place. The introduction of multi-pillar systems with a substantial portion of funded retirement income will revive the retirement and precautionary motive for saving. In fact, these reformed systems will look very similar to the current Dutch system. Hence, it is likely that saving rates among the young Germans and Italians will increase (to accumulate retirement savings), and saving rates among the elderly will decline sharply (because they will decumulate their retirement savings).

Another one-dimensional element of explanation is the stringency of borrowing constraints. Germany, Italy and Japan feature much more restrictive down payment requirements for housing – the single-largest budget item for almost all households – than the Anglo-Saxon countries and the Netherlands. This appears to drive up savings in young age, as can be seen in Figure 8, and also increases aggregate saving in general, see Table 1. Again, the ongoing changes in the financial markets, particularly in Italy, are likely to change this pattern and have the potential to make Italy, Germany and Japan look more like the Netherlands, the UK and the US.

Pension replacement rates and down-payment ratios are just two determinants. The experience of the six countries we have considered is rather complex and requires the consideration of many variables. As we have demonstrated, many other factors, from uncertainty

through preferences – what econometricians call "unobserved heterogeneity" – confound simple comparisons.

This International Savings Comparisons Project, therefore, ends on the note that we need to go one step further than comparing savings data on the aggregate level, even if derived from carefully compiled micro data. One of the lessons of this project is that research on saving behavior is still severely hampered by the lack of suitable data. Most of the age-saving profiles in Figures 7 and 8 were based on synthetic panels constructed from cross-sectional micro data. To purge unobserved heterogeneity, however, a genuine panel of individual households is required, with sufficient length to capture individual specific effects. Without proper longitudinal data on savings and wealth, it appears impossible to establish causal linkages, and we will keep making pension, tax and other public policy decisions without understanding the most basic behavioral effects of such policies.

References:

Abel, A. (1985). Precautionary saving and accidental bequests, *American Economic Review* 75, 777-791.

Alessie, R., A. Lusardi and A. Kapteyn (1995). Saving and wealth holdings of the elderly. *Ricerche Economiche* 49 293-315.

Alessie, R., A. Kapteyn, and A. Lusardi (1998). Explaining the wealth holdings of different cohorts: Productivity growth and Social Security. CentER Discussion Paper, Tilburg University.

Alessie, R., M. Devereux and G. Weber (1997). Intertemporal consumption, durables and liquidity constraints: A cohort analysis. *European Economic Review* 41, 37-59.

Attanasio, O. (1994). Personal Saving in the United States, in: J. Poterba (ed.), *International Comparisons of Household Savings*, Chicago, London: University of Chicago Press, 57-124.

Attanasio, O. (1999): Consumption, in J. Taylor and M. Woodford (eds.), *Handbook of Macroeconomics*, Amsterdam: Elsevier Science B.V..

Attanasio, O., and S. Rohwedder (2001): The impact of pension reform on household saving behaviour. Working Paper 01/21, Institute for Fiscal Studies, London.

Avery, R., and A. Kennickell (1991). Household saving in the US. *Review of Income and Wealth* 37, 409-432.

Bernheim, D. (1991). *The vanishing nest egg: Reflections on saving in America*. New York: Priority Press.

Bernheim, D. (1995). Do households appreciate their financial vulnerability? An analysis of actions, perceptions and public policy. *Tax policy and economic growth.* Washington, D.C.: American Council for Capital Formation, 1-30.

Bernheim, D. (1998). Financial illiteracy, education and retirement saving, in O. Mitchell S. Schieber (eds), *Living with defined contributions pensions*. Philadelphia: Pension Research Council: 38-68.

Bernheim, D., A. Schleifer and L. Summers (1985). The strategic bequest motive. *Journal of Political Economy* 93, 1045-1075.

Bernheim, D., and D. Garrett (1999). The effects of financial education in the workplace: Evidence from a survey of households. Mimeo, Stanford University.

Börsch-Supan, A. (1992). Saving and consumption patterns of the elderly: The German case. *Journal of Population Economics*, 5, 289-303.

Börsch-Supan, A. (1994a). Savings in Germany - Part I: Incentives. In: Poterba, J. M. (ed.), *Public Policies and Household Saving*. Chicago: University of Chicago Press, 81-104.

Börsch-Supan, A. (1994b). Savings in Germany - Part II: Behavior. In: Poterba, J. M. (ed.), *International Comparisons of Household Saving*. Chicago: University of Chicago Press, 207-236.

Börsch-Supan, A., und A. Brugiavini (2001): Savings: The Policy Debate in Europe, *Oxford Review of Economic Policy*, 17(1), 116-143.

Börsch-Supan, A., and L. Essig (2002). Stockholding in Germany, in: L. Guiso, M. Haliassos and T. Jappelli (eds.), *Household Stockholding*, manuscript in preparation.

Börsch-Supan, A., A. Reil-Held and R. Schnabel (1999): Pension provision in Germany, in: P. Johnson (Hg.): *Pensioners' Income: International Comparisons*. Cambridge, MA and London: MIT-Press. Im Erscheinen.

Börsch-Supan, A., A. Reil-Held, R. Rodepeter, R. Schnabel, and J. Winter (2001). The German savings puzzle. *Research in Economics*, 55(1),15 –38.

Börsch-Supan, A., and A. Reil-Held (1998). Retirement income: level, risk, and substitution among income components. *OECD Ageing Working Paper AWP 3.7*. Paris.

Börsch-Supan, A., and K. Stahl (1991a). Life-cycle savings and consumption constraints. *Journal of Population Economics*, 4, 233-255.

Börsch-Supan, A. and K. Stahl, (1991b). Do dedicated savings increase personal savings and housing consumption? An analysis of the German bausparkassen system. *Journal of Public Economics 44*, 265-297.

Börsch-Supan, A., and R. Schnabel (1999). Social Security and retirement in Germany, in: Gruber, J., and D. Wise, *International comparison of Social Security systems.* Chicago: The University of Chicago Press.

Börsch-Supan, A., R. Rodepeter and J. Winter (1999). The empirical identification of life-cycle savings patterns. Mimeo, Universität Mannheim.

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

Brugiavini, A., and G. Weber (2001). Household savings: Concepts and measurement, in Börsch-Supan, A. (ed.), *International Comparisons of Household Saving*, New York: Academic Press.

Caballero, R (1990). Consumption puzzles and precautionary savings. *Journal of Monetary Economics* 25, 113-136.

Carroll, C. (1992).The buffer-stock theory of saving: Some macroeconomic evidence. *Brookings Papers on Economic Activity*, 2, 61-156.

Carroll, C. (1994). How does future income affect consumption? *Quarterly Journal of Economics*, 59, 111-148.

Carroll, C. (1997): Buffer-stock saving and the life-cycle/permanent income hypothesis. *Quarterly Journal of Economics* 62, 1-56.

Carroll, C. (2000). Why do the rich save so much, in J. Slemrod (ed.), *Does Atlas Shrug? The Economic Consequences of Taxing the Rich.* Cambridge, MA: Harvard University Press.

Chiuri, M. C., and T. Jappelli (2000). Financial market imperfections and home ownership: A comparative study. CSEF Working Paper n. 44, University of Salerno, Italy.

Cigno, A., and F.C. Rosati (1996). Jointly determined saving and fertility behaviour: Theory, and estimates for Germany, Italy, UK, and USA, *European Economic Review* 40, 1561-89.

Das, M., and B. Donkers (1999). How certain are Dutch households about future income? An empirical analysis. *Review of Income and Wealth* 45325 –338

Davies, J. (1981). Uncertain lifetimes, consumption and dissaving in retirement. *Journal of Political Economy* 89, 561-578.

Deaton, A. (1985). Panel data from time-series of cross-sections. *Journal of Econometrics*, 30, 109-124.

Deaton, A. (1991). Saving and liquidity constraints. *Econometrica* 59, 1221-1248

Deaton, A. (1992). *Understanding consumption*, Oxford: Oxford University Press.

Deaton, A., and C. Paxson (1994). Saving, aging and growth in Taiwan, in: D. Wise (ed), *Studies in the economics of aging*, Chicago: The University of Chicago Press.

Deutsches Institut für Altersvorsorge (DIA, 1999a): *Die Deutschen und Ihr Geld*. Köln: Deutsches Institut für Altersvorsorge.

Deutsches Institut für Altersvorsorge (DIA, 1999b). *Reformerfahrungen im Ausland: Ein systematischer Vergleich von sechs Ländern.* Köln: DIA.

Disney, R., and P. Johnson (eds, 2001). *Pension systems and retirement incomes across OECD countries.* Edward Elgar, Cheltenham.

Disney, R., M. Mira d'Ercole and P. Scherer (1998): Resources during retirement. OECD Ageing Working Paper AWP 4.3. Paris.

Dynan, K. J. Skinner and S. Zeldes (2002), Do the rich save more? Mimeo, Dartmouth College.

Engen, E., and J. Gruber (2001). Unemployment insurance and precautionary saving. *Journal of Monetary Economics* 47, 545-579.

Eymann, A., and A. Börsch-Supan (2001). Household Portfolios in Germany, in L. Guiso, M. Haliassos and T. Jappelli (eds.), *Household Portfolios*, Cambridge, Mass.: MIT-Press.

Feldstein, M. (1974). Social Security, induced retirement and aggregate capital accumulation, *Journal of Political Economy*, 82,5, 905-926.

Fitzenberger, B., R. Hujer, T.E. MaCurdy and R. Schnabel (2001). Testing for uniform wage trends in West Germany: A cohort analysis using quantile regression for censored data, *Empirical Economics*, 26(1), 41 –86.

Friedman, M. (1957), *A theory of the consumption function*. Princeton: Princeton University Press.

Gruber, J., and D. Wise, eds. (1999). *Social Security and Retirement Around the World.* Chicago: The University of Chicago Press.

Guiso, L., M. Haliassos, and T. Jappelli (2001), *Household Portfolios*, Cambridge, MA: MIT Press.

Hubbard, G., J. Skinner, and S. Zeldes (1985). Precautionary saving and social insurance. *Journal of Political Economy* 103, 360-399.

Hurd, M (1990). Research on the elderly: Economic status, retirement, and consumption and saving. *Journal of Economic Literature* 28, 565-637

Jappelli, T., and M. Pagano (1989). Consumption and capital market imperfections: An international comparison, *American Economic Review* 79, 1088-1105.

Jappelli, T., and M. Pagano (1994). Saving, growth and liquidity constraints, *Quarterly Journal of Economics* 109, 83-109.

Jappelli, T., and F. Modigliani (1998). The age-saving profile and the life-cycle hypothesis, CSEF Working Paper No. 4, University of Salerno.

Kapteyn, A., and C. Panis (2002): The Size and Composition of Wealth Holdings in the United States, Italy, and the Netherlands. Mimeo, The RAND Corporation.

Kennickell, A. and A. Lusardi (2001).Wealth accumulation and the importance of precautionary saving. Mimeo, Dartmouth College.

Kim, S., (1992). Gesetzliche Rentenversicherung und Ersparnisbildung der privaten Haushalte in der Bundesrepublik Deutschland von 1962 bis 1988, *Zeitschrift für die gesamte Versicherungswirtschaft 81*, 555-.

Laibson, D. (1997). Golden eggs and hyperbolic discounting. *Quarterly Journal of Econo*mics 112, 443-478.

Lusardi, A. (1997).Precautionary saving and subjective earnings variance. *Economics Letters* 57, 319-326.

Lusardi, A. (1998). On the importance of the precautionary saving motive. *American Economic Review Papers and Proceeding* 88, 449-453.

Lusardi, A. (2000). Precautionary saving and the accumulation of wealth. Working Paper. Dartmouth College.

Lusardi, A. (2001). Explaining why so many households do not save. Working Paper, Dartmouth College.

Lusardi, A., J. Skinner and S. Venti (2001). Saving puzzles and saving policies in the United States. *Oxford Review of Economic Policy* 17, 95-115.

Lawrence, E. (1991). Poverty and the rate of time preference: Evidence from panel data. *Journal of Political Economy 9*9, 54-77.

Modigliani, F. and R. Brumberg (1954). Utility analysis and the consumption function: an interpretation of cross-section data. In: J.H. Flavell and L. Ross (Hg.): *Social Cognitive Development Frontiers and Possible Futures*. Cambridge, NY: University Press.

National Research Council (2001). *Preparing for an aging world: the case for cross-national research,* The National Research Council, Washington, D.C.

O'Donoghue, T., and M. Rabin (1999a). Doing it now or later. *American Economic Review* 89, 103-124.

O'Donoghue, T., and M. Rabin (1999b). Procrastination in preparing for retirement, in H. Aaron (ed.), *Behavioral dimensions of retirement economics*. Washington D.C.: Brookings Institution and Russell Sage Foundation, 125-156.

Organization of Economic Cooperation and Development (OECD, 2001). *Health Data.* Paris: OECD.

Organization of Economic Cooperation and Development (OECD, 1998-2001). *Social Expenditure.* Paris: OECD

Organization of Economic Cooperation and Development (OECD, 2001). *Ageing and Income.* Paris: OECD

Organization of Economic Cooperation and Development (OECD, 1998-2001). *Economic Outlook*: Paris: OECD

Organization of Economic Cooperation and Development (OECD, 1998-2001). *Employment Outlook*: Paris: OECD

Organization of Economic Cooperation and Development (OECD, 1998-2001). *Benefits Systems and Work Incentives*: Paris: OECD

Palumbo, M. (1999). Uncertain medical expenses and precautionary saving near the end of the life-cycle. *Review of Economic Studies* 66, 395-421.

Poterba, J. (ed.) (1994). *International Comparisons of Household Savings,* Chicago, London: University of Chicago Press.

Reil-Held, A. (1999). Bequests and aggregate wealth accumulation in Germany. *The Geneva Papers on Risk and Insurance*, 24, 50-63.

Rodepeter, R. and J. Winter (1998): Savings decisions under life-time and earnings uncertainty: Evidence from West German household data. Discussion Paper Nr. 98-58, Sonderforschungsbereich 504, Universität Mannheim.

Thaler, R., and H. Shefrin (1981). An economic theory of self-control. *Journal of Political Economy* 89, 392-406.

Venti, S., and D. Wise (1990). But they don't want to reduce housing equity, in D. Wise (ed.) *Issues in the economics of aging*. Chicago: University of Chicago Press, 13-29.

Venti, S., and D. Wise (1998), The cause of wealth dispersion at retirement: Choice or chance? *American Economic Review Papers and Proceedings* 88, 185-191.

Walliser, J., and J. K. Winter (1999): Tax incentives, bequest motives and the demand for life insurance: Evidence from Germany. Discussion Paper No. 99-28, Sonderforschungs-bereich 504, University of Mannheim.

Zeldes, S. (1989), Optimal consumption with stochastic income: Deviations from certainty equivalence. *Quartertly Journal of Economics* 104, 275-298.