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Household Wealth
What We Ccan Learn From Micro Data Registers

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Household wealth

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Contents

1. Background and purpose

Calculation of the households' net wealth

This paper presents the results from a project in Statistics Denmark (DST) regarding the calculation of household wealth – the so-called "Household wealth project". The valuation is based on registers specified on individual level with the market value of real estate and cars as well as financial assets and liabilities. The individual-based registers cover the entire population of Denmark. The calculation of the market value of real estate and cars is based on actual sales on the market. Sector delimitation and concepts of value are defined in the European system of National Accounts (ESA95).

The market value of real estate and cars

The household wealth project has established registers with information about the households' assets in real estate on individual level for the years 2004-2011. The market value of the households' cars is also calculated on individual level, but only for the years 2006 and 2008. The value of real estate and cars roughly makes up the value of the total real assets of the household sector, which means that combined with individual information about financial assets and liabilities, the net wealth of the households can be calculated on individual level. There are no micro data concerning pension schemes, so it is necessary to exclude pension schemes from net wealth in this analysis. The results and method of the calculation of real assets and net wealth on individual level are described in this paper.

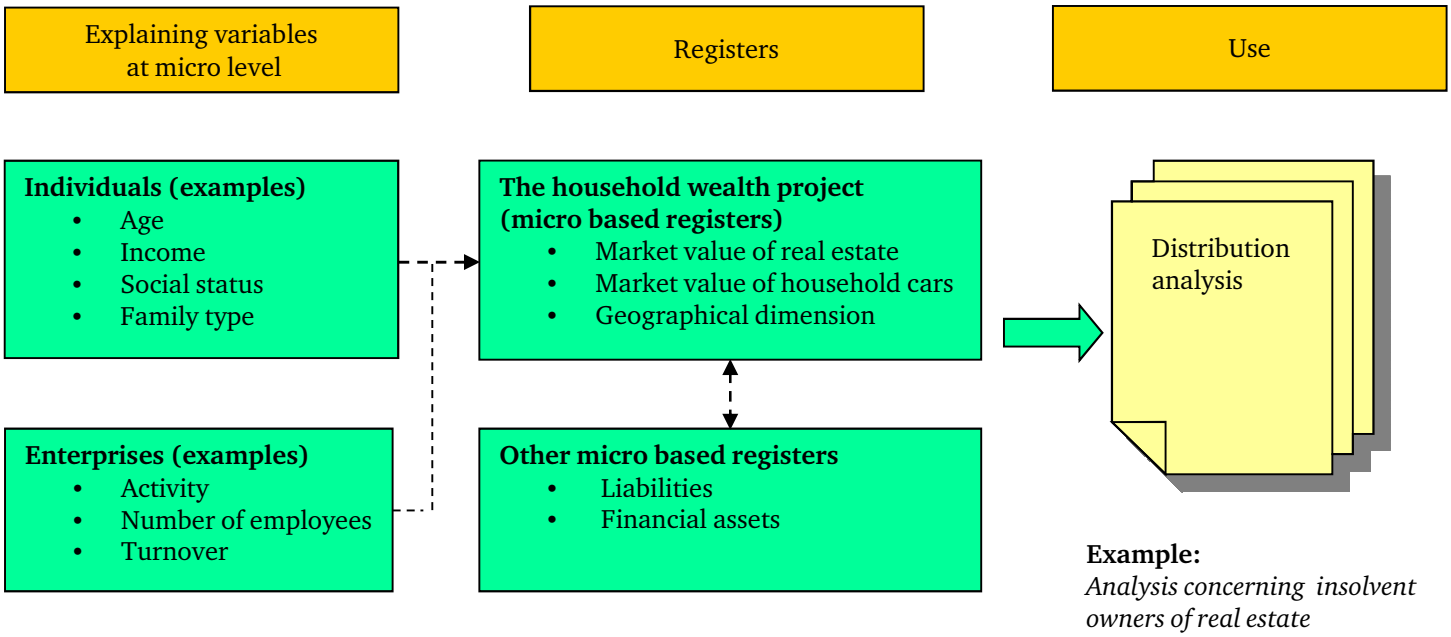
The market value of yachts and private planes

The market value of the household's yachts and private planes has been calculated on macro level. The results are showed in the paper.

Distribution analysis

Registers on individual level can be used for distribution analyses, e.g. in relation to age, income, family type or socioeconomic status. The paper presents an example of an individual-based distribution analysis, in which the register with the net wealth on individual level is used for an analysis concerning insolvent owners of real estate. See figure 1.

Figure 1: The use of micro based registers



Content of the paper

The paper contains the following:

1. Presentation of the main results from the calculation of households' real assets and net wealth. Including examples of micro based results from distribution analyses.

2. Assets and liabilities in the national accounts, which can be calculated from aggregated micro data.

3. Distribution analysis of insolvent owners of real estate in Denmark.

4. Comparison of two methods used for the valuation of the households' owner-occupied dwellings:
   - Calculation of the market value based on actual selling prices
   - Calculation of the value of the buildings based on calculations of the reconstruction costs.

5. Review of the methods for establishing individual-based registers with the market value of the households' real estate and cars.

2. Summary of results

Households' real estate on individual level

The main result of the project regarding household wealth is the establishment of an individual-based register with the market value of the households' real estate[1]. The register includes information about the market value on both property level and individual level, as the market value of each individual's part of a property has been calculated. An individual in the register is a person or a sole proprietorship, which is registered with a personal ID number or a business register number. This means that households in the project are defined as the household sector in the national accounts.

Financial assets and liabilities on individual level

The individual-based register with the market value of the households' real estate is used in an analysis of insolvency in the period 2004-2010. The information about financial assets and liabilities on individual level comes from the banks and credit institutions' reports to the tax authorities.

The market value of cars on individual level

The individual-based car register in DST is enriched with the price and value data from the Danish Motorcar Society (DAF), which has delivered actual selling prices for most types of cars on such a detailed level that a solid valuation of households' cars on individual level can be done.

Yachts and planes are calculated on macro level

The market value of yachts and private planes has been calculated on macro level by use of information from the statistics on foreign trade and industry in DST, as well as external sources like The Danish Sea Sport Association, The Danish Union of Yacht Clubs, The Danish Maritime Authority and The Civil Aviation Administration.

[1] The household's real estate consisting of owner occupied dwellings and co-operative dwellings. Owner-occupied dwellings make up about 95 per cent of the households' real estate value in Denmark.

2.1 Households' real assets

Aggregated micro data

The aggregated individual-based result for households' real estate and cars are indicated in table 1. The valuation on macro level for yachts and private planes are also indicated in the table.

Table 1: Households' real assets (aggregate micro data) 2004-2011

Billion DKK (current prices)	2004	2005	2006	2007	2008	2009	2010
Owner occupied dwellings	2.446	2.837	3.107	3.913	4.005	3.534	3.476
Co-operative dwellings	134	152	253	228	244	228	228[1]
Real estate, total	**2.580**	**2.989**	**3.361**	**4.141**	**4.249**	**3.762**	**3.704**
GDP	1.466	1.545	1.632	1.695	1.753	1.668	1.755
Real estate, % of GDP	176	193	206	244	242	226	211
Household cars			132		188		
Yachts					10		
Aircrafts owned by households					1		
Real assets, total					**4.448**		

[1] Note: There are not yet calculated market values of co-operative dwellings in 2010. Use the result for 2009 in 2010.

Co-operative dwellings make up 6 per cent of the households' real estate

The household wealth project has calculated the households' real estate as 3,704 billion DKK in 2010, of which 6 per cent of the value is co-operative dwellings. The value of the households' real estate is twice as large as the GDP in 2010. The market value of the households' real estate is largest in 2007 and 2008, where the financial expansion had the maximum effect on the real estate market. The method for calculating the households' real estate on micro level is described in section 4 (owner occupied dwellings) and section 5 (co-operative dwellings).

The market value of household cars and yachts

2008 is the only year where there is a complete calculation of the households' real assets. Household cars, yachts and aircrafts owned by households only make up 4 per cent of the households' real assets. The method for calculating the market value of households' cars is described in section 6.

Examples of micro based results (real estate)

Owner occupied dwellings

Value: The average one-family house in the Copenhagen area has a market value 84 per cent above the average for the rest of the country.

Social status: Pensioners own 16 per cent of the market value.

Sector of employment: 55 per cent of the market value is owned by persons who work in the private sector.

Co-operative dwellings

Value: The average value in the Copenhagen area is 14 per cent higher than in the rest of the country.

Type of family: 50 per cent of co-operative owners are single.

Geography: 70 per cent of co-operative dwellings are located in the Copenhagen area.

2.2 Households' net wealth

Comparisons between macro data and aggregated micro data

In table 2 it is illustrated how many items in the national accounts which can be calculated from aggregated micro data. The column "National Accounts S.14" contains published National Accounts data from Statistics Denmark, which are calculated on macro level. The column "Aggregate micro data" contain data from the project concerning household wealth along with data from individual based registers with financial assets and liabilities.

Definition of net wealth

This definition is used in the calculation of the households' net wealth:

Net wealth = Financial assets – liabilities + real assets

Table 2: Household wealth in National Accounts and aggregate micro data 2010

Billion DKK			Household sector 2010	
			National Accounts S.14	Aggregate micro data
Financial assets	Currency	AF.21	36	
	Deposits	AF.22+29	840	551
	Securities other than shares	AF.3	168	197
	Quoted shares	AF.511	201	218
	Unquoted shares	AF.512	457	
	Other equity	AF.513	238	253[1]
	Mutual funds shares	AF.52	309	
	Insurance - technical reserves	AF.6	2.128	
	Other accounts receivable	AF.7	66	
Liabilities	Securities other than shares	AF.3	17	15
	Loans	AF.4	2.478	2.388
	Other accounts payable	AF.7	157	
	Net financial wealth		**1.791**	**-1.183**
Real assets	Dwellings and other real estate		1.505[2]	3.476
	Motor vehicles[3]		240	188[4]
	Yachts and aircrafts owned by households			11[4]
	Real assets, total		**1.745**	**3.675**
Net wealth	**Net financial wealth + real assets**		**3.536**	**2.492**

[1] inclusive co-operative dwellings
[2] Exclusive land
[3] Only cars
[4] Data from 2008

Assumptions

There are some challenges and assumptions associated with the definition and calculations.

Challenges

- No micro data concerning unquoted shares and pension schemes.
- Micro data for real assets concerns only real estate and cars.
- Micro data for cars are only available in 2006 and 2008.

Assumptions for the calculation of net wealth

- Real estate and cars are the major parts of household's real assets.
- It is necessary to exclude unquoted shares and pension schemes from net wealth because individual based data are not available.

Conclusion

- The analysis of insolvency includes only the aggregate micro data regarding owners of real estate. The analysis could be extended to cover the whole household sector, which includes the tenants.

2.3 Insolvent owners of real estate

Trends in the net wealth

The households' net wealth has generally improved since the 1980s. This is primarily because the financial net wealth has been strengthened through the spread of individual pension schemes. In the same period tax reforms have been implemented that make it attractive to save. The households' savings in real estate have not the same rising trend, and the real estate worth (real estate wealth minus mortgage) has not grown to the same degree. The real estate net wealth increased until 2008 during the financial expansion but the wealth loss from real estate was significant in the period that followed.

Some owners of real estate are vulnerable

Despite the recession from 2008 the households as one still has significant net wealth both as equity, savings, and retirement funds. But the general picture covers a spread where some owners of real estate are vulnerable.

Covering of the analysis

This analysis covers the period 2004-2010 and includes all owners of real estate in Denmark.

2.3.1 Compiling individual net wealth

The individual owner's private economy

To analyse the differences in the net wealth of the owners of real estate, it is necessary to start with the individual owner's private economy. The private economy of the owners of real estate has been calculated based on detailed individual information about real estate wealth, financial assets and liabilities and characteristics specific to the person (e.g. age). The value of cars, yachts and aircrafts owned by households is not included in this analysis of insolvent owners of real estate.

Definition of net wealth

Calculation of net wealth concerning real estate owners:

Net wealth = Financial assets – liabilities + real assets,

Real assets = Market value of owner occupied dwellings and co-operatives dwellings.

Data missing In 2010

There is not yet data available for 2010 regarding co-operative dwellings. In the calculation of net wealth in 2010, 2009 data is used for real estate concerning co-operative dwellings.

Liquid net wealth

The analysis only includes owners of real estate, and sole proprietorships are not included – this means that sole proprietorships are not part of the calculation. No information about pension schemes is available, so the net wealth of the owners of real estate is therefore underestimated. The pension funds make up a significant part of the households' wealth in Denmark. The pension funds cannot, however, be released before the age of retirement without large losses, so the net wealth in this analysis is relatively liquid.

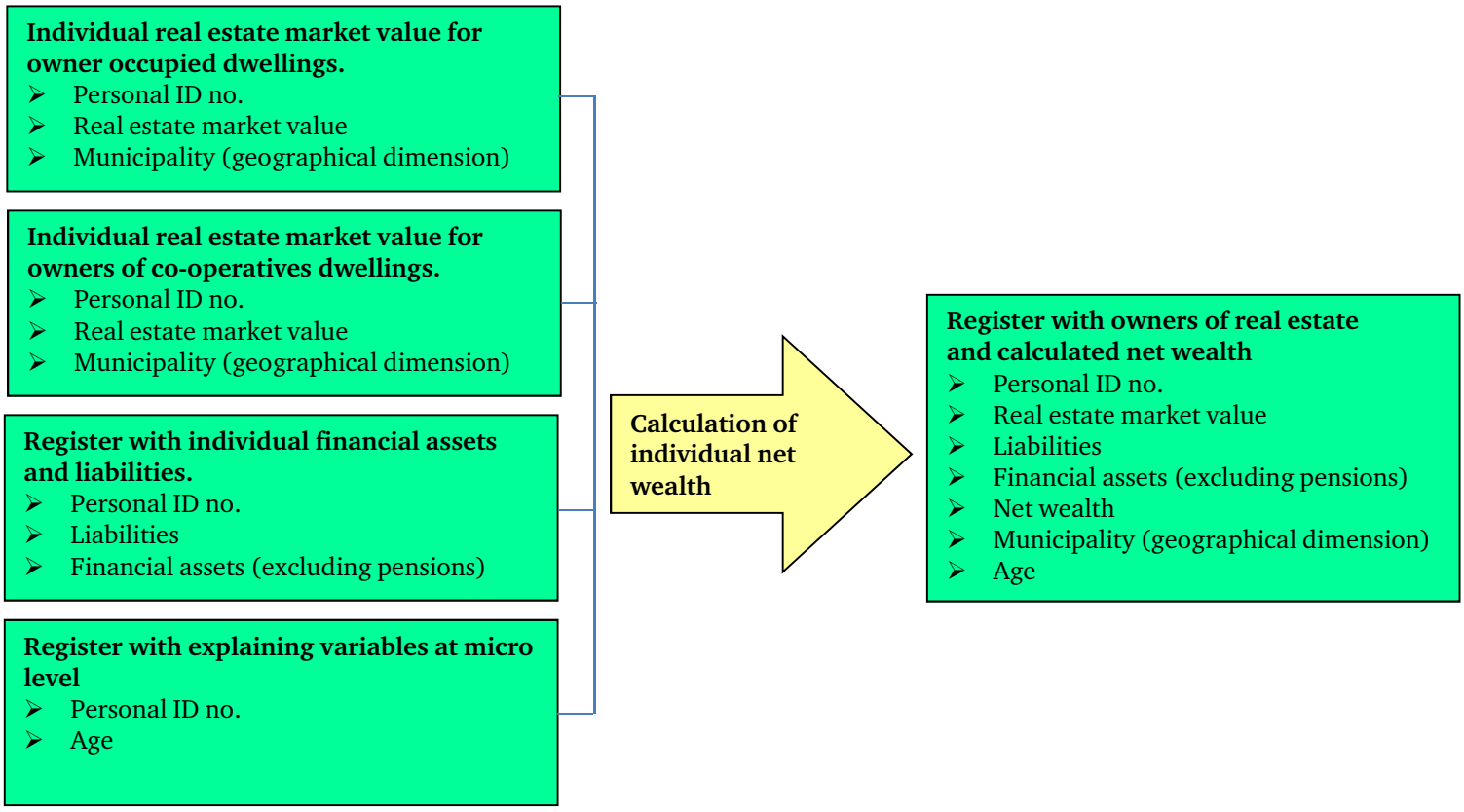
Distribution of assets and liabilities

In 2010 the owners of real estate had in total a net wealth (excluding pension funds) of 2,240 billion DKK. The assets alone make up 4,696 billion DKK and the distribution is 84 per cent for the market value of the real estate, 9 per cent for savings in banks, and the market value of financial assets made up 7 per cent. The liabilities make up 2,403 billion DKK and here the distribution is 75 per cent for mortgages (credit secured on real property), 24 per cent for debt in banks, and other debt of 1 per cent

Data basis

The data basis for the calculation of the number of insolvent owners of real estate is a linking of the registers with the individual real estate market value for owner occupied dwellings and co-operatives dwellings and two other registers. The register with individual financial assets and liabilities has the information from bank and credit institutions, which report data to the tax authorities. For use in the analysis, information about age and geographical dimension has been added. See figure 2.

Figure 2: Data basis for calculation of real estate and net wealth at micro level



The location of the dwelling influences insolvency

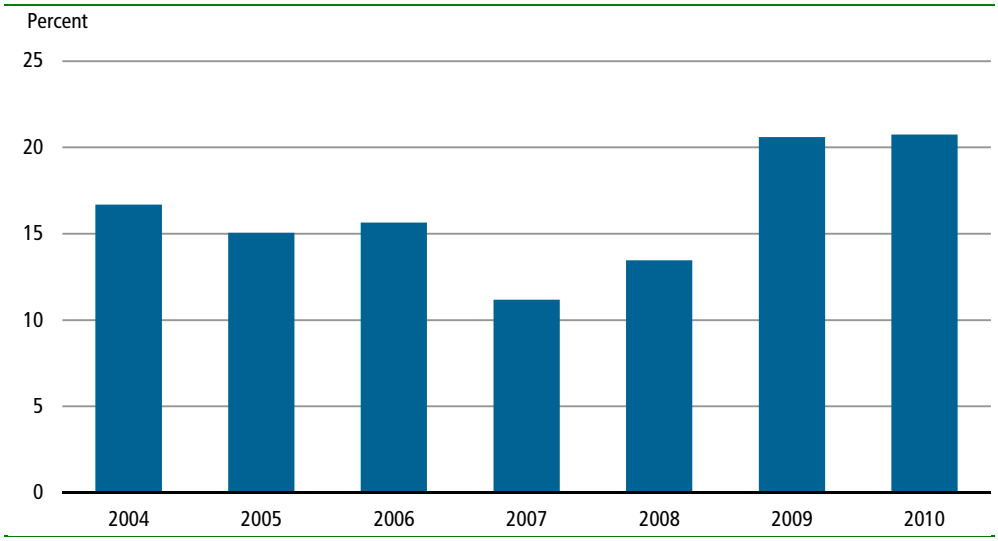
Location is crucial to the market price of the individual dwelling, so the analysis includes a variable for the geographical dimension. The analysis in relation to the geographical dimension illustrates the effects of the recession on the net wealth of owners of real estate in relation to the location of the dwelling.

2.3.2 Negative net wealth

Insolvency

The owners of real estate are insolvent if their net wealth is negative. The majority of the owners of real estate have a positive net wealth in 2010, but 21 per cent have a debt that is larger than the value of their financial assets and real estate combined. See figure 3.

Figure 3: Insolvent owners of real estate, 2004-2010.



In 2010 the share of insolvent owners is 21 per cent

The recession is felt from 2007 to 2010, where the share of insolvent owners of real estate increases from 11 per cent to 21 per cent The figure also shows that owners of real estate generally are worse off after a financial expansion with strong price increases on real estate.

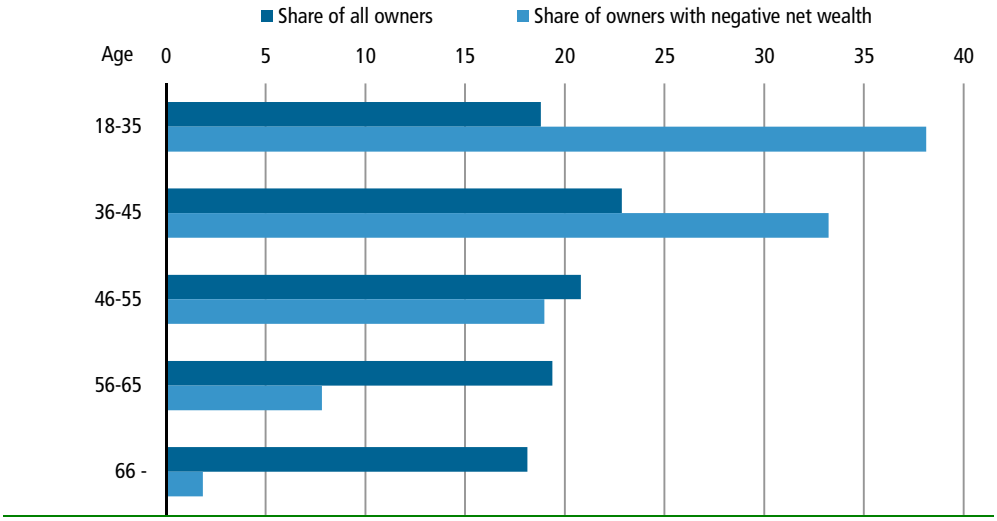
Negative net wealth not always a problem

A negative net wealth is not necessarily a problem for the individual owner, as long as the regular costs associated with the dwelling can be paid. These costs are independent of the market value of the dwelling. A negative net wealth only causes financial losses if the owners are forced to sell their dwellings.

Young owners are overrepresented in the group of insolvent owners

Owners of real estate who are below 45 years of age are overrepresented in the group with a negative net wealth, as 72 per cent of the owners of real estate in this group have a negative net wealth in 2010 while the group only makes up 41 per cent of the owners of real estate. Younger people are relatively new on the real estate market and most will only have paid off a limited amount of the mortgage that the first property purchase is associated with. In time the majority of the owners of real estate will reduce their debt and in the long-term the dwelling will increase in value. Thus people above the age of 46 are underrepresented among owners of real estate with a negative net wealth. Particularly people above the age of 66 are strongly underrepresented, as only 2 per cent of the owners of real estate in this group have a negative net wealth while the group makes up 18 per cent of the owners. See figure 4.

Figure 4: Insolvent owners of real estate by age, 2010



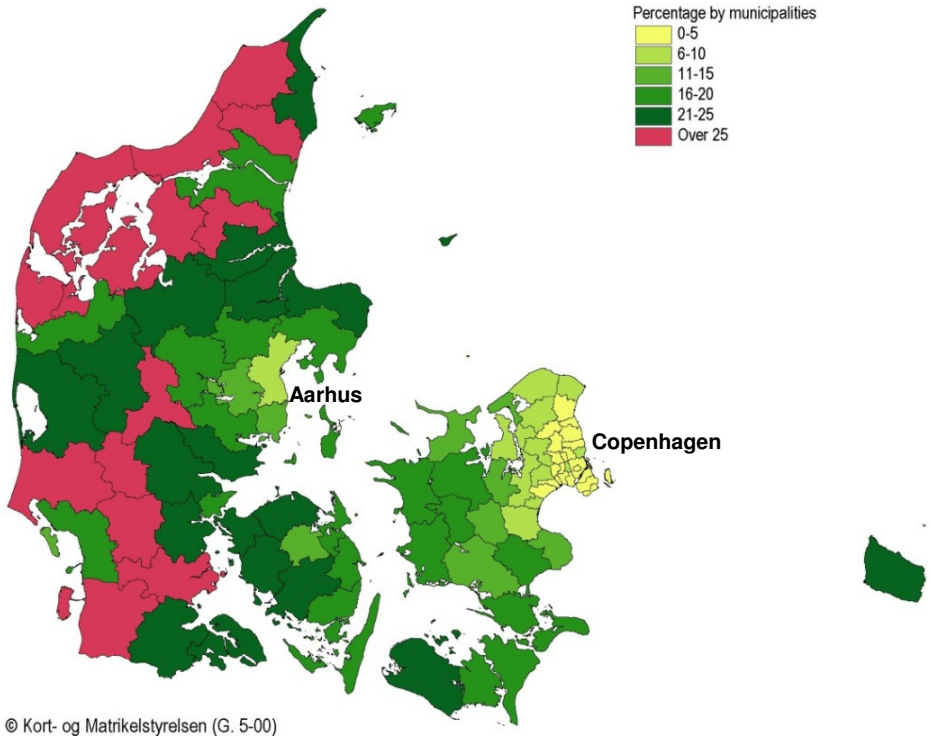
Buying real estate is common in all age groups

As seen in figure 4, the share of owners of real estate in the different age groups is around 20 per cent for all age groups. This means that buying your own dwelling is common for people in all age groups. However, the share of owners of co-operatives dwellings is overrepresented in the age groups 18-35 and 66+ as these dwellings are usually small and focused around the larger cities.

More insolvency in the peripheral areas

The number of insolvent owners of real estate also varies depending on the geographical location of the dwelling. In the peripheral areas of Jutland more than 25 per cent of the owners of real estate are insolvent in 2006. This is due to the fact that the price increases on real estate during the financial expansion were delayed in influencing the peripheral areas of the country. See figure 5.

Figure 5: Insolvent owners of real estate by geography, 2006.



Financial expansion in all areas in 2007

The large price increases on real estate in the peripheral areas showed up in 2007. It is also clearly visible that the municipalities near the larger cities (Copenhagen and Aarhus) have significantly fewer insolvent owners than elsewhere in Denmark.

Figure 6: Insolvent owners of real estate, 2007

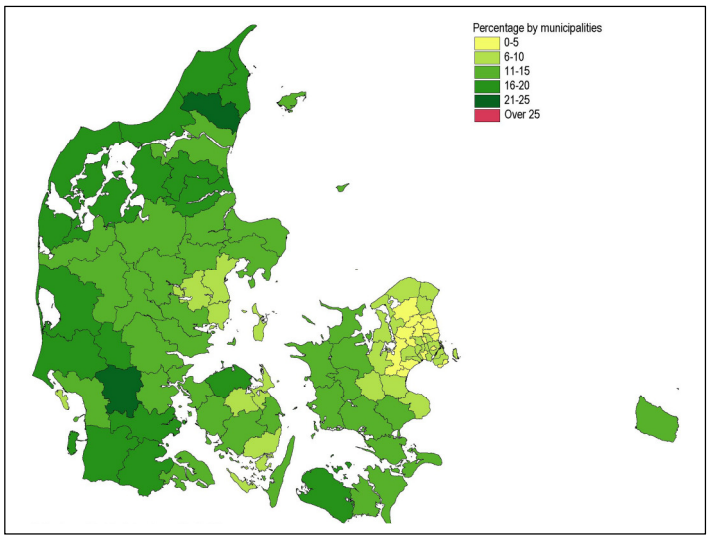
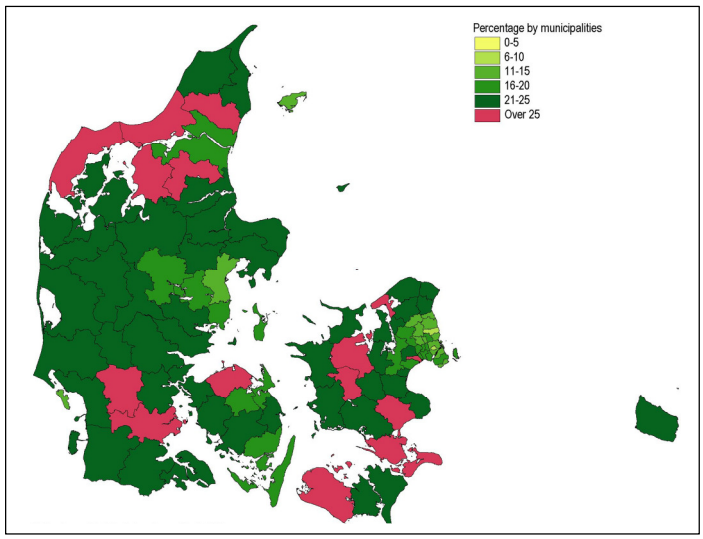


Figure 7: Insolvent owners of real estate, 2010



The peripheral areas are vulnerable to fluctuations

In 2007 the financial expansion reaches the peripheral areas and no municipalities in the country have more than 20 per cent insolvent owners of real estate. But in 2010 the number of insolvent owners has increased again and this is caused in part by the lower real estate prices and in part by increased debt. The recession also reaches the larger cities where the number of insolvent owners' increases from 2007 to 2010, but the drop in real estate prices is not as severe as in the peripheral areas. The share of the insolvent owners is still less in the larger cities than in the peripheral areas after the recession (see figure 6 and 7).

The effect of the recession depend on the location

A main result of the analysis is that owners of real estate are generally worse off after a financial expansion with large price increases in real estate. But the location of the dwelling has a large influence on the effect of the recession on the net wealth of the individual owner.

3. Aggregated micro data concerning real estate

Individuals in the register

Sector delimitation of units in the sector of households is defined in ESA 95. From this it appears that sole proprietorships are a part of the households' sector.

Co-operative dwellings are a part of real estate

The households' real estate assets consists mainly of owner occupied dwellings and co-operative dwellings. Co-operative dwellings are a hybrid between owner occupied dwellings and rental property. A shareholder is a co-owner of the wealth of the housing co-operative and has the right to use a dwelling in the co-operative's buildings.

Linkage of variables from four registers in DST

The registers with the market values of owner-occupied dwellings and co-operative dwellings on individual level is the result of a linkage of variables from four registers in DST with information about owners, parts of

ownership, types of property, official real estate valuations, real estate sales and the geographic dimensions. The geographical dimension is the real estate's location in relation to postal code, municipality and region. In addition to this, calculated variables have been added, e.g. the market value. The project has emphasised the quality-control of data during the linkage of information from the four registers and the development of a model that calculates the market value as detailed as possible in relation to the location of the real estate.

One-family homes are most expensive in the Capital Region

The location is the key to the market price for the individual dwelling. The average market price for owner-occupied dwellings is significantly higher in the Capital Region of Denmark than in the rest of the country. In 2007 the average market price of a one-family home in the Capital Region is 120 per cent higher than the average price in the rest of the country. In 2010 the average price of a one-family home in the Capital Region has dropped so that the price level is 84 per cent higher than the average price in the rest of the country (see figure 8).

Figure 8: Market value for owner occupied dwellings

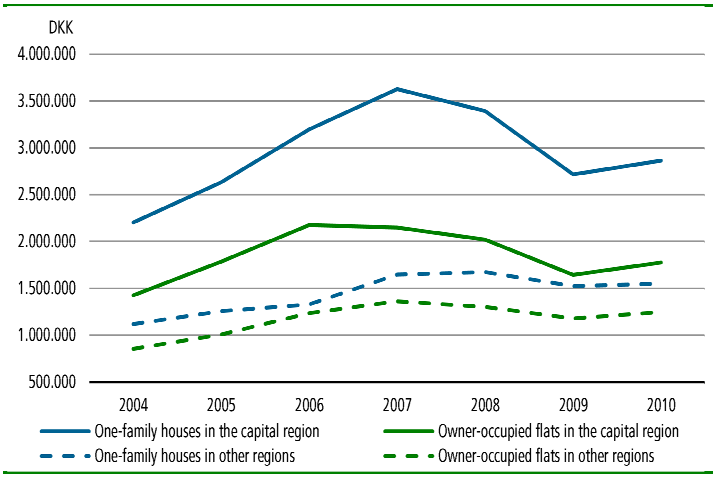
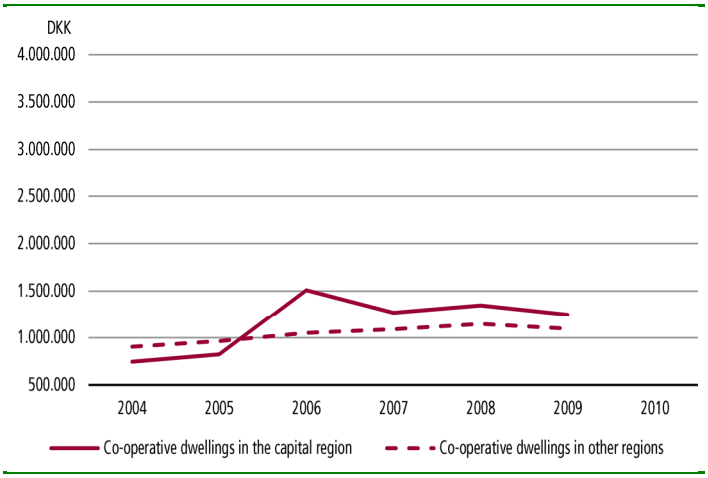


Figure 9: Market value for co-operatives dwellings



The price difference between co-operative dwellings and owner-occupied dwellings

70 per cent of the country's co-operative dwellings can be found in the Capital Region, and by far the majority of the co-operative dwellings in that area are flats[2]. The co-operative dwellings in the Capital Region are still cheaper than owner-occupied flats, but the difference is evened out somewhat in the years 2007-2009. In 2007 the owner-occupied flats are 75 per cent more expensive than the co-operative dwellings, and in 2009 the price difference has dropped to 55 per cent (See figure 8 and 9).

Improved possibilities of loans for co-operative dwellings

In 2005 the law about co-operative dwellings was changed so that the possibilities of loans were improved. The improved possibilities of loans and the financial expansion have caused large increases in the prices of co-operative dwellings in the Capital Region from 2005 to 2006, which the market has adjusted downwards when demand dropped in 2007.

[2] Owner-occupied dwellings are specified in real estate types, e.g. one-family homes, apartments, and holiday cottages. The same is not the case with co-operative dwellings.

Methods for establishing individual-based registers

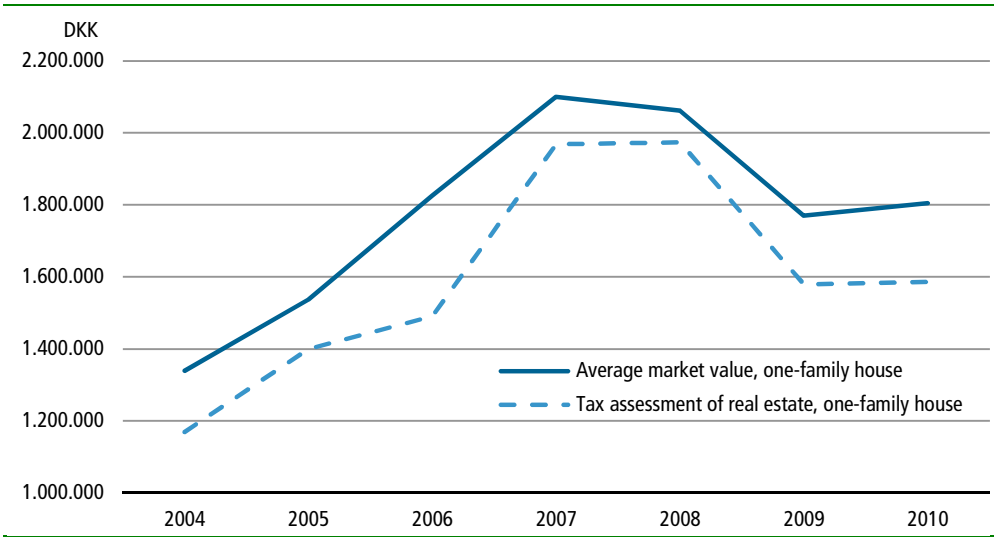
In chapter 4 the method for establishing an individual-based register with the market values of owner occupied dwellings is described. In chapter 5 the method for creating an individual-based register with the market values of co-operative dwellings is described. In the end of these chapters the challenges and assumptions in the methods are discussed.

4. Market value of owner occupied dwellings

Official real estate valuations differs from market price

The official real estate valuations from the Danish tax authorities (SKAT) do not reflect the market prices. The difference between the official real estate valuations and the market price depends on the market conditions, which are not described to a sufficient degree in SKATs' official real estate valuations. See the difference between the market value and the official real estate valuation for a one-family house in figure 10.

Figure 10: Average market value and tax assessment of one family house.



The adjustment factor converts the official real estate valuation to the market value

By linking the actual real estate sales with the official real estate valuations, it is possible to calculate the average relationship between the actual price and the real estate valuation for the sold dwellings. This relationship is called the "Adjustment factor". In the model it is assumed that the adjustment factor between the actual purchase price (the market value) and the official real estate valuation is the same for individual types of real estate[3] (e.g. one-family houses) within the same geographical area (e.g. a postal code). The market values of the dwellings that have not been sold are calculated by multiplying the adjustment factor with the official real estate valuation.

Solid adjustment factor if there are a lot of sales in a geographical area

The adjustment factor is calculated on postal code level, if there are enough sales within the individual postal codes to give a reliable factor for grossing up. If there are not enough sales, the geographical area is raised a level and the adjustment factor is calculated on the municipality level. The last geographical levels are the regions and the entire country. Denmark can geographically be split into about 1,100 postal codes, 98 municipalities or 5 regions.

[3] 41 types of real estate are defined in the model, the most important being one-family houses, flats, holiday cottages, built-up/developed farms, business real estate and building sites.

Statistics on property level

On property level the market value can be calculated for various real estate types for the years 2004-2010. See table 3.

Table 3: Market value by category of property 2004-2011

Billion DKK (current prices)	2004	2005	2006	2007	2008	2009	2010
One-family houses	1.412	1.632	1.960	2.273	2.252	1.945	1.989
Dwelling houses with 2-8 flats	114	133	128	191	199	172	171
Dwelling houses with 9 plus flats	17	16	20	29	27	28	29
Flats (in a block of flats)	198	249	310	333	324	275	293
Holiday cottages	173	215	235	288	288	252	256
Residential- and business property	122	134	137	172	165	154	144
Farms	351	391	255	528	633	598	490
Sites	13	13	19	24	24	20	21
Areas of nature	23	29	23	46	64	64	59
Other	22	25	21	29	30	27	25
Total	**2.446**	**2.837**	**3.107**	**3.913**	**4.005**	**3.534**	**3.476**

Statistics on individual level

When the register is individual-based, various background variables can be connected to the individual person, so that the households' real estate assets in owner-occupied dwellings can be calculated based on different criteria for the population, e.g. age and social groups.

Market value distributed on generations

The owners' share of the total real estate value at market prices increases with age. This is not a surprising, as people build up their assets in their real estate throughout their life. The share of the market value owned by the 60+ year olds is consistently around 30 per cent from 2004-2010. The other age groups' share of the total market value is also roughly constant, so the price development of the real estate market has not changed the distribution of the real estate value between the generations.

Market value distributed on social groups

The share of the market value of owner-occupied dwellings owned by the self-employed decreased during the period 2004-2010, while the employees' part increased. It is the inexpensive loan opportunities that are introduced on the market which gives more employees the opportunity of buying their own dwelling.

More opportunities for analyses e.g. location

The market values distributed on real estate type, age and social groups are examples of areas for analysis where the register with the calculated market values for the households' owner-occupied dwellings can be used. One can also include the geographical differences which is a part of the register information about by location in accordance to postal district, municipality, and region.

Producing an individual-based register

In section 4.1 and 4.2 it is shown how the individual-based register with the market values of the households' owner-occupied dwellings is produced.

A unique real estate no is the key of merging

Section 4.1 illustrates a linking of individual-based registers with official real estate valuations, actual real estate sales and geographical dimensions. Information about a unique real estate number is the key to merge the official real estate valuation to the register with sales. The register is delimited to include information about the real estate owned by private people and sole proprietorships. Section 4.2 shows the method for calculating the market value of real estate that has not been sold.

4.1 Register with official real estate valuations

Official real estate valuation, sale and geographical dimension

The register with the official real estate valuations is merged with information about the location of the property in relation to postal code, municipality and regions. Then information from a third register with actual selling prices is added. The key to merging is a real estate number which is unique to every property in Denmark.

1. Geography dimension

Official real estate valuations register
- Real estate no.
- Official real estate valuation (tax value)

Merging
Key: Real estate no.

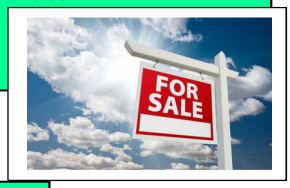
Building and real estate register
- Real estate no.
- Postal code
- Municipal code
- Region

2. Real estate sales

Official valuation and geographical dimension
- Real estate no.
- Official real estate valuation
- Postal code, municipality, region

Merging (Register 1)
Key: Real estate no.

Real estate sales register
- Real estate no.
- Actual sale values



Register 1: Official real estate valuations, geographical dimension and sales
- Real estate no.
- Official real estate valuations
- Postal code, municipality, region
- Actual sale values

Register with the owners from the household sector

The register should only contain information about property owned by private individuals and sole proprietorships, which makes up the household sector according to ESA95. The register for owners of real estate is delimited to contain private people and sole proprietorships through information from the Business register. Then the register of owners belonging to the household sector is linked with the official real estate valuations for owner occupied dwellings. The result is a combined individual-based register with official real estate valuations for owner occupied dwellings in the household sector.

3. Sector delimitation: Household sector

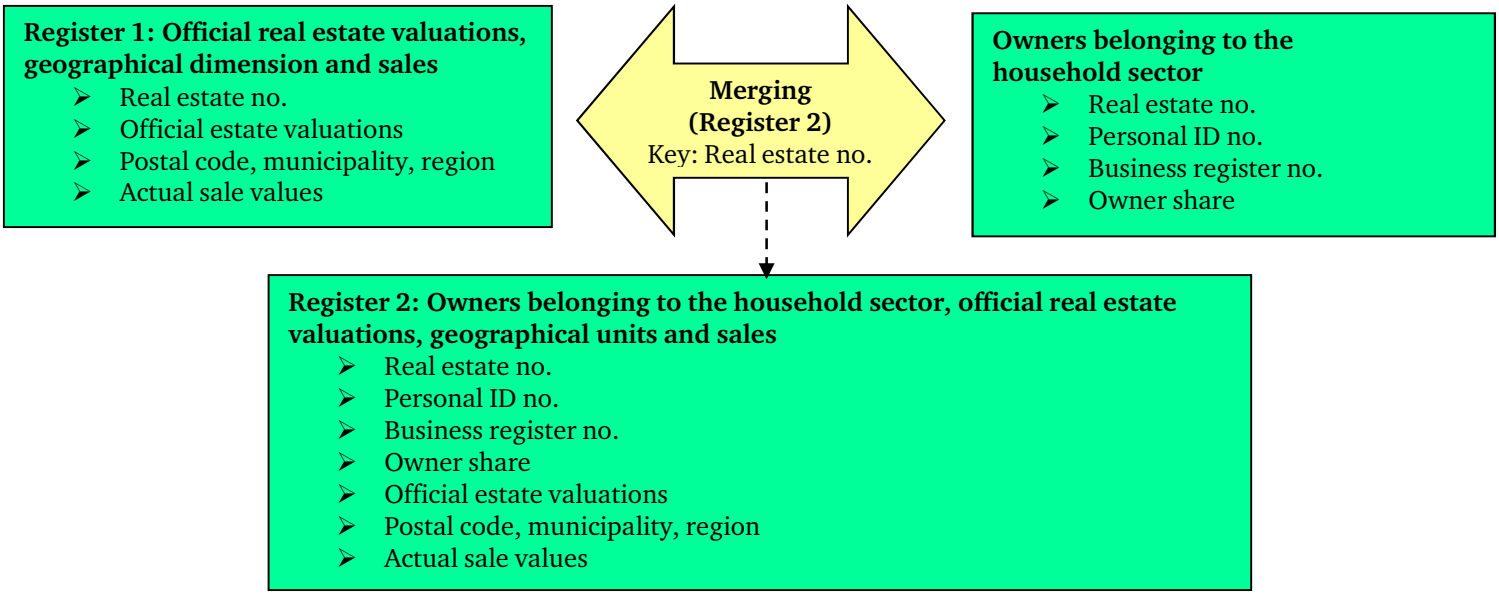
Business register
- Business register no.
- Type of ownership

Owners of real estate
- Real estate no.
- Personal ID no.
- Business register no.
- Owner share

Filter:
Persons and sole proprietorships

Owners belonging to the household sector
- Real estate no.
- Personal ID no.
- Business register no.
- Owner share

4. Official estate valuations broken down by individuals and geographical units.



4.2 Register with actual market values

Calculating an average adjustment factor

Information about the official real estate valuations and the actual selling prices for the sold property makes it possible to calculate an average adjustment factor within a geographical area. The market value of the property that has not been sold is calculated by multiplying the adjustment factor with the official real estate valuations. In the model the adjustment factor is assumed to be identical for properties of the same type that are located within the same geographic area. The smallest geographic area in the model is the postal code. The adjustment factor is called the "Market value coefficient" in the model.

5. Estimation of market value coefficient.

Relating actual sale values to official real estate valuations:

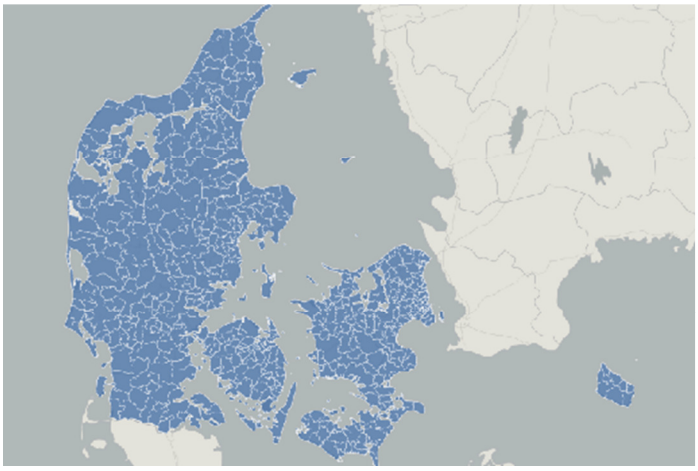
$$\text{Market value coefficient}_k = \frac{\sum_{J=1}^{J} (\text{sale values})_{j,k}}{\sum_{J=1}^{J} (\text{Official real estate valuation})_{j,k}}$$

k is a geographical area, e.g. a postal code, a municipality or a region
j is an owner occupied dwelling (type j), traded in the geographical area k

The geographical area of the adjustment factor

The number of sales of the specific type of owner occupied dwellings determines which geographical level the adjustment factor can be calculated for. If there are not enough sales to calculate a reliable adjustment factor for e.g. a postal code, it will be attempted for the next geographical level (municipality) instead.

Denmark divided by postal code



Denmark divided by municipalities and regions

Geographical areas	There are about 1.100 postal districts in Denmark. Denmark is also divided in 98 municipalities and 5 regions.
One family houses	The adjustment factors for one-family houses, flats, holiday cottages, and building sites are calculated on postal code level.
Farms	Privately owned farms use adjustment factors calculated on municipality level.
Business, natural areas	Business properties, natural areas, and undeveloped farmland use adjustment factors calculated on municipality or region level.

6. Estimation of market value at micro level

Market value = Official estate value * market value coefficient

Register 2: Owners belonging to the household sector, official real estate valuations, geographical units and sales

- Real estate no.
- Personal ID no.
- Business register no.
- Owner share
- Official estate valuations
- Postal code, municipality, region
- Actual sale values

Calculation of market value using market value coefficient

Final register: Owners belonging to the household sector and the individual real estate market value

- Real estate no.
- Personal ID no.
- Business register no.
- Owner share
- Postal code, municipality, region
- Market value

4.3 Assumptions in the compilation of individual market value

Challenges

Value of land and buildings

The real estate in the household wealth project is valuated with a total market value of buildings and land. In the national accounts the market value should be split into the value of the buildings and the value of the land.

Adjustment factor for a geographical area

The adjustment factor is the same within a postal code, even though the actual sales value can vary a lot due to e.g. differences in the location of the owner-occupied dwellings (amenity), which are not reflected completely in the official real estate valuations.

Assumptions for estimation of market values at micro level

In praxis the land value is a percentage of the market value

In the comparison with the national accounts in section 4.4, the land value is calculated as an average percentage of the total market value in the household wealth project. When the land value is calculated as a percentage of the total market value, it is implicitly assumed that the land value and the value of buildings are affected equally by price changes. This is different from the theoretical perspective that all price differences between geographical areas are picked up by the land value.

Adjustment factor is calculated from sold properties

The market value coefficient reflects the difference between the real estate valuations and the market price for the sold properties within a geographical area.

Conclusion

Differences in the market value is picked up by the land value

For the national accounts a method must be developed to split up the market value concerning land and buildings. From a theoretical perspective, the entire difference in the location value for e.g. one-family houses between the most and least expensive geographical areas should be caught by the land value. From this perspective, the real estate value of uniform houses should be the same in different parts of the country, except for any possible differences in the cost of development between these areas.

The adjustment factor is an average

The register of sales of owner-occupied dwellings represents a broad section of owner-occupied dwellings within a geographical area. The adjustment factor is an expression of the average difference between the official real estate valuation and the price on the market in the geographical area.

4.4 Valuation of owner-occupied dwellings in the national accounts

National Accounts use the reconstruction price of buildings

The national accounts estimate the value of buildings at reconstruction prices. The calculation is based on macro data, and the value of land is not estimated. National Accounts have two concepts for real estate, which are “Gross stock” and “Net stock”. Gross stock is the value of buildings at the reconstruction price, which leave out life span and wear in the calculation. The calculation of the net stock adjusts for all depreciations and therefore the net stock is an estimate of the market price. The households’ owner-occupied dwellings in the household wealth project are valuated with a total market price of buildings and land, and therefore the statistics are not directly comparable.

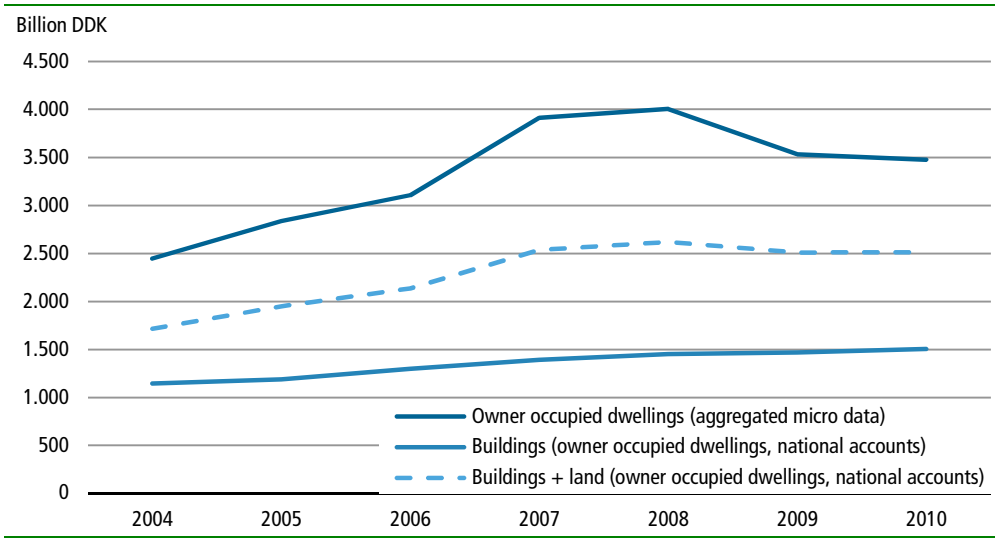
The national accounts' method

The gross and net stock of buildings in the national accounts is calculated for several types of buildings, e.g. dwellings. The gross stock for dwellings is determined by information about the number of square metres and a calculated price per square metre for the reconstruction of dwellings. The market price is calculated by withdrawing the consumption of fixed capital from the gross stock[4].

Comparison of valuation in the national accounts and the wealth project

In figure 11, the dotted line illustrates the national accounts' level of the valuation of building and land, if the value of land is taken from the household wealth project.

Figure 11: Market value by national accounts and aggregated micro data



Development of the real estate value

The market prices calculated on basis of the actual real estate sales in the period (the household wealth project) gives an image of the price bubble that was present in the real estate market.

The national accounts' calculation does not reflect the economic trends

The national accounts' calculation of the value of buildings is based on the reconstruction cost index (depreciated) and will as such not reflect the economic trends in the economy to the same degree. When a calculated land value from the household wealth project is added, the large price increases will implicitly be part of the land value. The figure also shows that the level of the national accounts' calculation is significantly below the calculation from the household wealth project.

5. Market values of co-operative dwellings

Definition of a co-operative dwelling

Housing co-operative is a legal entity - usually a cooperation - that owns real estate, consisting of one or more residential buildings. The co-operative is membership based, with membership granted by way of a share purchase in the co-operative. Each shareholder in the legal entity is granted the right to occupy one housing unit (co-operatives dwellings).

[4] The square metre price is regulated every year with the construction cost index. A depreciation period of 75 years for houses is used.

The value of the co-operative dwelling

The model calculates the price represented by the individual co-operative dwelling, if the entire building was sold on market terms. This is often a higher price than the price of the individual co-operative dwelling can be sold for. This is because the model does not take into account any debt the housing co-operatives may have. Furthermore not all housing co-operatives set the price as the maximum permitted according to legislation, in part because it can be difficult to sell the co-operative dwellings if the price is too high, and also to avoid large fluctuations in the price from year to year.

In agreement with the national accounts

The calculation of the market value of the co-operative dwelling is in agreement with the definitions in the national accounts. Any debts in the cooperation will be a part of the financial accounts.

Distribution of the market value on e.g. gender, age, and social group

The register with the value of the co-operative dwellings is individual based, so that different explaining variables can be connected to the individual shareholder. The market value of the co-operative dwellings can be calculated based on different criteria of the population, e.g. gender, age, family type, education, and socioeconomic status.

Results on real estate level

The main results are presented on property level in table 4.

Table 4: Market value and number of co-operative dwelling

Billion DKK (current prices)	2004	2005	2006	2007	2008	2009
Market value						
Region Nordjylland	3,5	4,4	8,7	11,8	11,0	10,9
Region Midtjylland	9,5	10,7	14,6	15,2	16,1	20,8
Region Syddanmark	16,6	16,7	16,9	17,0	19,7	15,5
Capital region (Hovedstaden)	94,8	106,0	198,5	167,2	177,6	163,2
Region Sjælland	10,1	14,0	14,6	16,7	20,0	17,6
Total	***134,5***	***151,8***	***253,3***	***227,9***	***244,3***	***228,0***
Number of co-operative dwellings	***170.982***	***176.429***	***183.740***	***187.511***	***190.033***	***190.012***

The total market value decreased from 2006 to 2007.

The number of co-operative dwellings increased with 11 per cent in the period 2004-2009. The total market value has increased sharply from 2005 to 2006, after which it decreased in 2007 with 10 per cent compared to the 2006-level. Increase in the market value from 2004-2009 makes up to 70 per cent in current prices.

New loan opportunities cause increase in the market value

From February 1st 2005, the legislation regarding co-operative dwellings was changed so that the shareholders can now take out a mortgage in their share of private housing co-operatives. The improved loan opportunities and the financial expansion have caused large price increases in 2005 and 2006, which the market has adjusted downwards when demand decreased again in 2007. The overall trend reflects the market in the Capital Region of Denmark, as 70 per cent of the co-operative dwellings are located there. But there are large regional differences in the price development.

Results on individual level

At individual level the shareholders can be distributed on e.g. family type and age. Based on the distribution on family type it can be concluded that in 2009 half the shareholders are single and 31 per cent are married couples.

Shareholders distributed on age

A third of the shareholders are above the age of 60. A little more than half of the shareholders are either above the age of 60 or younger than 29, so a relatively large number of elderly and young people are shareholders. See table 5.

Table 5: Number of co-operative owners by age

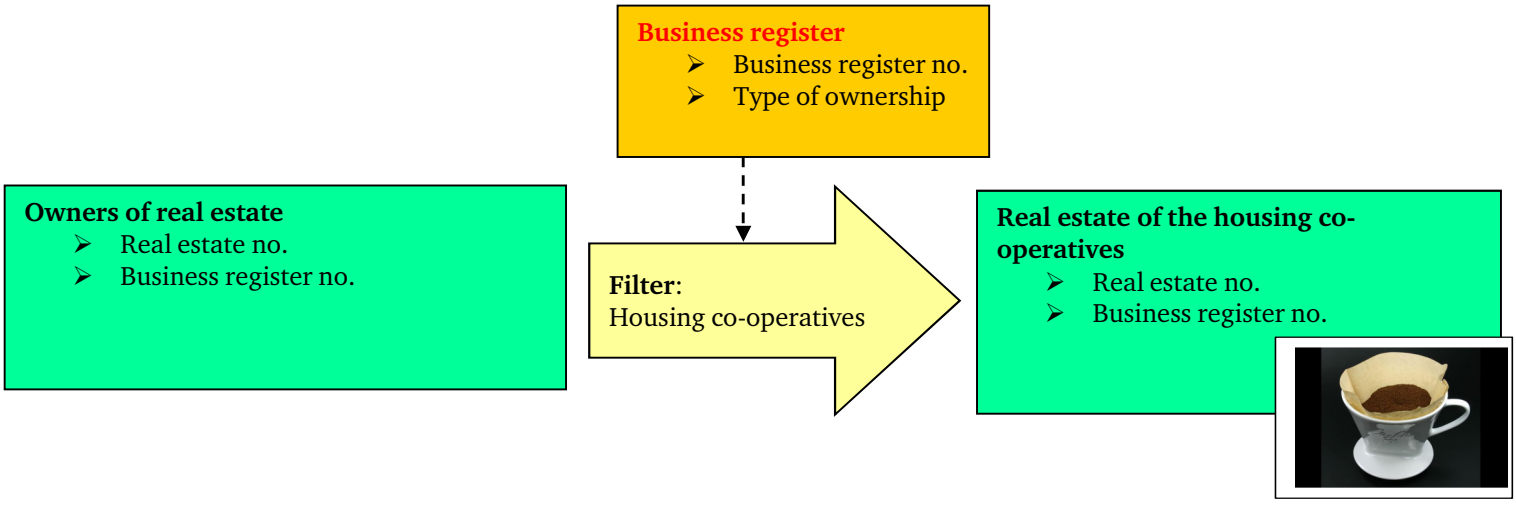
Age groups	2004	2005	2006	2007	2008	2009
0-29	59.215	58.191	58.424	57.013	58.626	58.885
30-39	56.113	57.251	58.731	58.017	58.083	59.451
40-49	30.062	31.905	34.427	36.161	37.423	38.596
50-59	30.772	31.504	32.196	32.151	32.196	32.138
60+	72.229	76.340	81.248	85.554	88.364	86.208
Number of co-operative owners	***248.391***	***255.191***	***265.026***	***268.896***	***274.692***	***275.278***

5.1 Register with official estate valuations

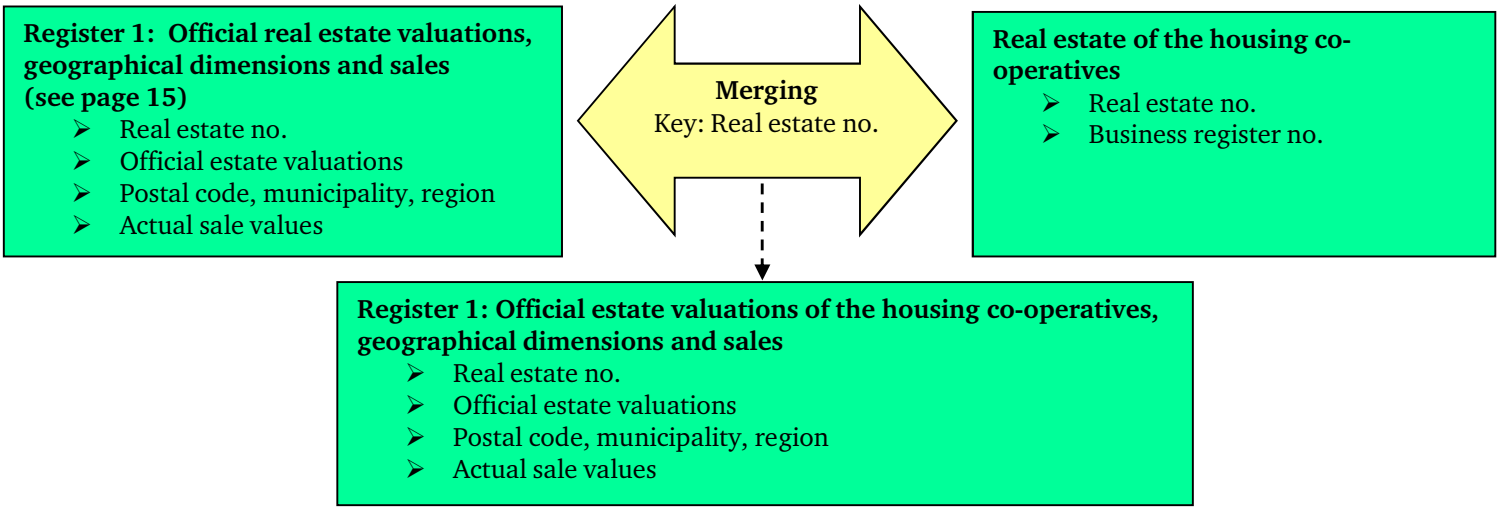
Valuation is based on an adjustment factor by region

The individual based register of the market value of the co-operative dwellings is produced by linking a number of variables from five different registers. First the register is delimited to only contain buildings owned by housing co-operatives. Then information about the official real estate valuations is added. The key to the linking is a real estate no. which is unique for every property in Denmark.

1. Identification of housing co-operatives



2. Official estate valuations of the real estate of the housing co-operatives broken down by geographical units.



The shareholders are not registered in a central register

The shareholders are not registered in any central register, so the individual based statistics is based on those residents who are located in the buildings owned by the housing co-operatives. Some co-operative dwellings are subleased, so that the shareholder themselves do not live there. It is assumed that the people who sublease co-operative dwellings are similar to the people who are shareholders. This means that the subleased apartments do not have a big effect on the information in the finished individual based register – from a statistical point of view.

All adults are assumed to be equal owners

Beyond the tenants, there are also other residents in the co-operative dwellings that are not shareholders, e.g. children. In the model it is assumed that all adults – who are not children living at home – are equal shareholders in relation to the residence they live in. Thus they share the part of the total value of the housing co-operative that their residence represents.

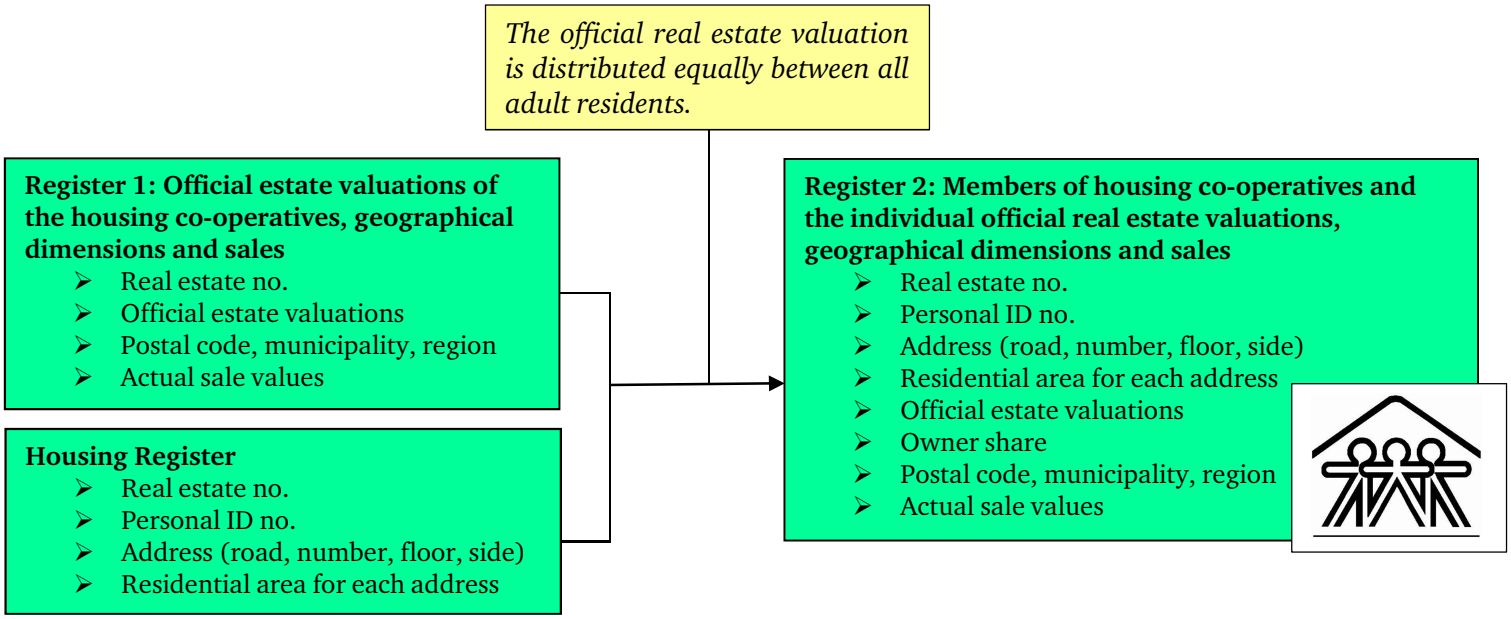
Robust assumption about equal shareholders for 80 per cent of the residents

Approximately 50 per cent of the residents in the co-operative dwellings are single and roughly 30 per cent are married. There are therefore 80 per cent of the residents in the buildings owned by the housing co-operatives about which the assumption of equal shareholders in relation to the individual residence is not a major problem. The remaining 20 per cent of the residents are cohabiting couples, where there is a greater uncertainty about the equal share of the value of the real estate. But overall it is estimated that the assumption about equal shareholders is reasonably sounds in regards to reality.

Distribution of the official real estate valuation on shareholders

The relation between the square meters of the individual residence and the total square meters of the building are the key in distributing the official real estate valuations on the individual residences. The number of residents at each address can be determined from the address information. The residence's share of the official real estate valuation is divided equally between residents that are not children living at home.

3. Official estate valuations of the co-operatives dwellings by the members of the housing co-operatives



The market value of co-operate dwellings

The market value of co-operative dwellings is not necessarily the same as the official real estate valuation from SKAT. Actual real estate sales are used to correct the official real estate valuations so that the market value can be estimated.

5.2 Register with actual market values

Calculation of the adjustment factor

By linking real estate sales and the official real estate valuations, it is possible to calculate the relationship between the actual selling price and the real estate valuation of the sold dwellings. This relationship is called the "Adjustment factor" or the market value coefficient.

Adjustment factor at regional level

Real estate sales and the official real estate valuations of the buildings owned by the housing co-operatives are linked in a separate register for the calculation of the average adjustment factors on the geographical level for regions.

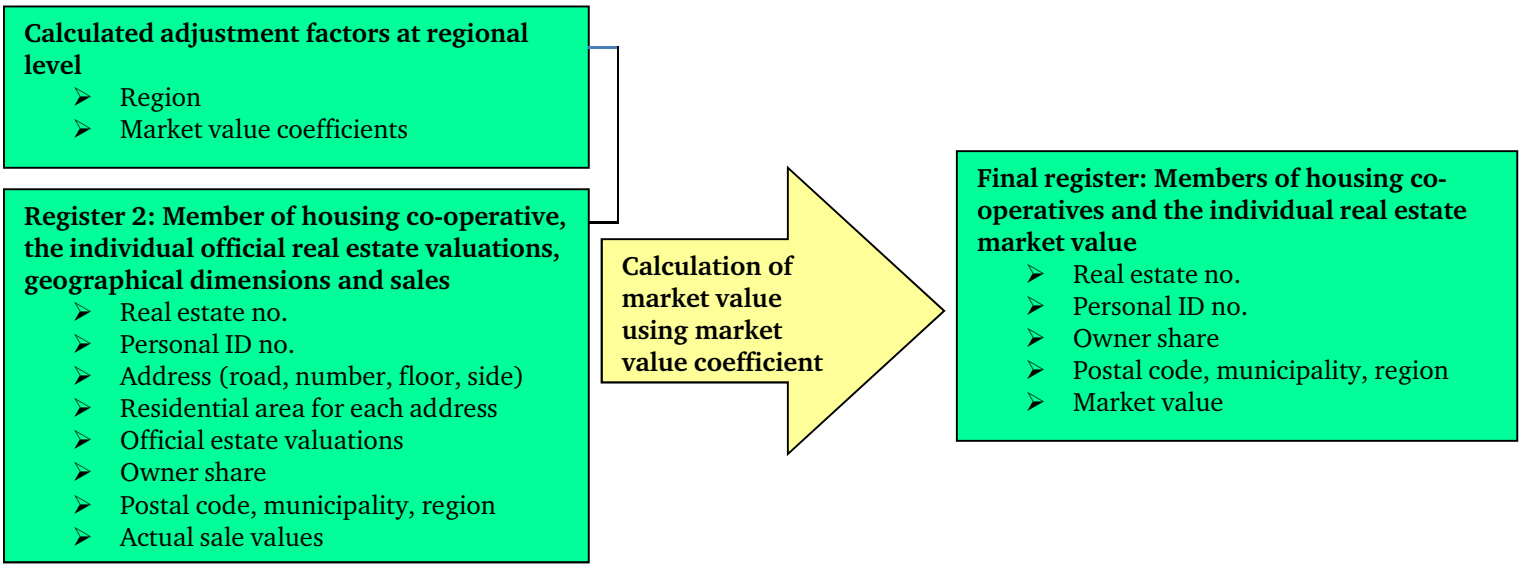
The market value distributed on the individual shareholder

The calculated adjustment factors are incorporated in the register with the official real estate valuations distributed by the members of the housing co-operative. Afterwards the individual shareholder's share of the market value is calculated by multiplying the adjustment factor with the individual share of the real estate valuation.

Estimation of market value at micro level:

Market value = Official estate value * market value coefficient

4. Estimation of market value of the co-operatives dwellings at micro level



Comparison with the register for owner-occupied dwellings

In the calculation of the market value of shareholders there are two assumptions that cause an uncertainty on individual level:

- All residents (excluding children living at home) are shareholders
- Sole proprietorships as shareholders are not part of the register

These uncertainties are not present in the individual based calculation of the market value of owner-occupied dwellings, as all owners of owner-occupied dwellings are registered with a personal ID number or a business register number.

5.3 Assumptions in the compilation of individual market value

Challenges

- No central registration of owners
- No official real estate valuation of co-operative dwellings

Assumptions for estimation of market values at micro level

- All adults at the same address own equal shares of the co-operative dwelling
- The total real estate value owned by the co-operative is distributed proportionally among dwellings according to square meters
- Coefficients between actual sales values and official estate value are estimated at regional level only

Conclusion

Estimates suffer from incomplete information for ownership and actual sales values unlike register information on owner occupied dwellings.

6. Market value of cars

An individual based register with household's cars

The market value of cars generally plays a smaller role in the net wealth of the owners of real assets. In this section a method for calculating the market value of households' cars in Denmark is described. An individual based register with the market value of the cars is established.

Actual price data is delivered by the Danish Motorcar Society

The car register in Denmark Statistic (DST) is enriched with the price and value data from the Danish Motorcar Society (DAF). They have delivered actual selling prices of most types of new and used cars on such a detailed level that a solid valuation of all cars on individual level has been possible. Price data from the years 2006 and 2008 has been delivered.

Imputation program for the missing observations

The price data from the Danish Motorcar Society covers 90 per cent of all passenger cars from the years 1990-2008. DST has used an imputation program which can eliminate the problems with the missing observations in the price data.

Only calculation for the passenger cars

The model only estimates the market value for passenger cars – this means that the households' vans, motorcycles, caravans, and other vehicles are not included in the calculation.

Uses the definitions from the national accounts

The model uses the definitions from the national accounts in the valuation of the market value of the cars. The sector delimitation of the households also follows the definitions in the national accounts, i.e. all car owners with a personal ID number and all sole proprietorships with a business register number are included in the register.

Distribution analysis

The market value of the household cars can be determined based on different criteria for the population, e.g. family types, education, housing conditions, income, employment, and industry for the sole proprietorships.

6.1 Method

Delimitation of the household sector

DST's car register contains information about vehicles and the owners of these. From information about the owners' personal ID number or business register number the register can be delimited to include owners in the household sector – i.e. private people and sole proprietorships.

The value of cars older than 1990 is zero

DAF has delivered estimated prices on the same detailed level as the categorisation in the car register in DST. The price data from DAF contains prices for cars registered in 1990 and later. Ca. 6 per cent of the households' cars are older and in the model the market value is set at zero.

Valuation of cars

The majority of the households' cars are priced directly from DAF's price data. Some cars cannot be priced based on DAF's price data and those have been given market value through use of an imputation program, which has estimated prices based on the principles of the 'nearest neighbour' in relation to type, fuel, age, weight, km/l, engine size, and motor power.

94 per cent of the cars are valuated by DAF's price data

In 2008, 94 per cent. of household cars are valuated based on DAF's price data – either directly or through use of the imputation program. The remaining household cars are too old to be included in the price data.

Table 6 shows how the valuation has been done for passenger cars owned by households or sole proprietorships.

Table 6: Sources of valuation of household cars in the car register

(Number)	2006	2008
Households	***1,889,213***	***1,958,981***
Price data from DAF	1,516,281	1,653,017
Imputed prices	176,712	175,809
Older than 1990 (no price data)	196,189	129,979
Remaining	31	176
Companies	***130,418***	***141,023***
Price data from DAF	112,011	120,001
Imputed prices	14,666	18,307
Older than 1990 (no price data)	3,734	2,681
Remaining	7	34
Number of passenger cars	**2,019,631**	**2,100,004**

Two valuation concepts

DAF's calculation model delivers two prices for used cars:

- Gross value: Recommended selling price at a dealer of a car ready for sale, with normal equipment, normal mileage, and in normal condition in relation to its age.
- Net value: The price a private owner receives by selling the car to a professional dealer.

The gross value equals the selling price

The gross value equals the dealer's selling prices and the net value is calculated as the differens between gross value and the gross profit. The gross profit must cover the dealer's costs and profit.

Connection between the concepts

The gross value of a used car is based on the most recent price for a new car and a depreciation profile that is specific for each car model. The cross profit is a sum of the calculated average profit, share of fixed costs, and the cost of preparing the car.

All costs must be included

In the national account all costs in relation to a change in ownership must be included in the valuation, i.e. also the dealer's gross profit. But there is also a good amount of private sales on the used car market, where the price is lower than a sale from a dealer.

The gross value is most accurate estimate according to ESA95.

The net value is close to the price from a private sale, as the private owner often includes a profit in the prices, but doesn't have to take into account other costs in relation to the sale. The gross value thus represents a maximum and the net value a minimum of the market value of the car. The actual market value is somewhere in between the gross value and the net value, but it is assumed that the gross value gives the most accurate estimate according to ESA95.

6.2 Results

Main results

In this section the main results from the valuation of the households' cars are presented. In table 7 the numbers of households' cars are specified by

subsectors. In 2008, the private households owned 93 per cent of the passenger cars.

Table 7: Number of cars by subsector

(Number)	2006	2008
Private households	1,889,213	1,958,981
Sole proprietorships	130,418	141,023
Total	**2,019,631**	**2,100,004**

Almost all household cars are valuated

In table 8 the aggregated market value of the cars is specified. Just about all households' cars are valuated in the model, or estimated at zero because they are more than 20 years old.

The households' total market value in 2008 is calculated at 188 billion DKK.

Table 8: Gross value (estimated market value) of the households' cars

	Year		
	1902-1989	1990-2008	Total
Value of household cars (billion DKK)			
2007	0	131.8	131.8
2009	0	188.0	188.0
Average price (DKK)			
2007	0	77,823	-
2009	0	102,777	-

Depreciation profiles have influence on the result

The assumptions about depreciation profiles in the model have a large influence on the result, as a large share of the cars in the household sector is relatively old. In table 9 the households' cars are distributed on years. In 2008, about half of the households' cars are older than the year 2000.

Table 9: Number of cars by year

	Year					
(Number)	1902-1989	1990-1994	1995-1999	2000-2004	2005-2008	Total
2006	199,924	351,409	666,956	508,740	292,602	2,019,631
2008	132,660	270,471	610,110	505,286	581,477	2,100,004

6.3 Assumptions in the compilation of individual market value

Challenges

- The price data from Danish Motorcar Society contains only households' passenger cars. Other vehicles are not included.
- No prices for cars older than 20 years

Assumptions for estimation of market values at micro level

- No market value for household vans, motor cycles, mobile homes etc.
- All cars older than 20 years have a market value equal to zero.
- Imputed market values for 10 per cent of the household cars

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