Danmarks Nationalbank

Monetary Review 2nd Quarter Part 2

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The small picture on the front cover shows the "Banker's" clock, which was designed by Arne Jacobsen for the Danmarks Nationalbank building.

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The Wealth and Debt of Danish Families

By Asger Lau Andersen, Anders Møller Christensen and Nick Fabrin Nielsen, Economics, Sigrid Alexandra Koob and Martin Oksbjerg, Statistics, and Ri Kaarup, Financial Markets

1. INTRODUCTION AND SUMMARY

Compared with other countries, Danish households have a very high debt-to-income ratio. This has attracted considerable attention from the International Monetary Fund, IMF, and the credit rating agencies, among others. The European Commission (2012) recently pointed out the households' high gross debt as a danger signal, while also aknowledging that it partly reflects very substantial pension savings and an extensive social safety net.

At the aggregate level, these issues have recently been discussed in the Monetary Review by Isaksen et al. (2011) and Kramp et al. (2012). Overall, the high gross debt is offset by large assets, e.g. via the widespread use of labour-market pensions, but whether this also holds true at the level of the individual family cannot be determined using aggregate data for the whole economy. If this is the case, the development is less of a concern than if debt and assets are held by different persons.

In this article, we look into – at family level – the composition of gross debt for families in different income and age groups and the degree to which the debt is offset by various types of assets. Relative to other studies, e.g. Danish Economic Councils (2008) and the Ministry of Economic and Business Affairs (2010), we focus more on the distribution of the debt.

The high gross debt of Danish families, viewed in an international perspective, is concentrated in the families with the highest incomes. In 2010, the 20 per cent of the families with the highest incomes after tax thus accounted for 53 per cent of total family gross debt. The half with the lowest incomes accounted for 14 per cent in total of the gross debt.

Among the families with the highest incomes, the ratio of gross debt to income after tax, i.e. the gross debt ratio, is highest for families whose oldest member is in his or her thirties, and the gross debt ratio generally decreases as the age increases.

Within the various age groups, the gross debt ratio is generally higher for high-income families than for families with lower incomes. This indi-

cates that the debt is often raised in order to finance purchases of luxury goods, including a larger home.

The overall impression is that families with debt also have the income required to service the debt.

The percentage change in gross debt from 2002 to 2010 is most pronounced for the oldest age groups in the study. The families in the lowest income groups have also shown relatively high percentage increases. Measured in kroner, however, high-income families and families in the middle of the age distribution interval have clearly accounted for the strongest growth.

At end-2010, the assets of the families in this analysis totalled almost kr. 3,400 billion, excluding pension wealth. This value is around twice the value of the gross debt, and real property in Denmark worth around kr. 2,600 billion is the dominant asset type. Besides pension wealth, this analysis also excludes a number of other assets due to insufficient data. Such assets are, *inter alia*, cash holdings and the value of the family's durable consumer goods, e.g. cars, boats, household effects, etc. The value of private cooperative housing is also excluded.

Like the distribution of gross debt, the distribution of assets is very uneven. Large assets are predominantly held by families with substantial gross debt. However, the group of families with no gross debt at all also includes a number of families with considerable assets.

Although the value of the assets is almost twice as high as the gross debt, more than one out of three families still had net debt in 2010.

Net debt is not prevalent in the oldest age groups. But more than half of the families in the 25-34 age group have net debt, irrespective of the size of their income, which should be attributed to education-related debt, among other factors.

Most families with current or previous affiliation with the labour market will have assets in the form of pension savings. The savings-based pension system is still under expansion, entailing considerably stronger growth in pension wealth than in incomes over the last decades.

A family's pension wealth is generally less liquid than its other assets, but knowledge of active pension saving should be expected to be incorporated in the family's other decisions. Families of retirement age will thus increasingly be able to service their debt without compromising on lifestyle. Consequently, for persons reaching retirement age gross debt of a certain size will be less of a problem than previously.

As opposed to most other assets, pension wealth is taxed when released. After estimated taxation, families' pension wealth, excluding the value of public service pensions, amounted to approximately kr. 1,500

billion at end-2010. For one third of the families, pension wealth after tax exceeded kr. 1 million.

Taking pension wealth into account, less than one out of four families has net debt. Net wealth increases strongly with age. Half of the families in the 60-64 age group have net wealth of more than five times their annual income after tax, and for one out of four of the families in this age group net wealth is more than eight times the family's annual income.

The large gross debt of Danish families indicates that they are frequent users of the financial system, for many reasons, since gross debt is generally offset by even more substantial assets. The balance between gross debt and assets can be explained especially in terms of family income, age, house prices and the structure of the pension system.

The families predominantly use the financial system, they do not abuse it. However, some families are so heavily indebted that they are assessed to find it difficult to manage their debt using their own income. The debt problems of families with net debt have grown in the period under review, but the drop in the general level of interest rates and the increased use of adjustable-rate loans have reduced the interest burden. Given the current economic outlook, the extent of the indebted families cannot, however, be assumed to pose a threat to the household sector or the financial sector.

As regards the soundness of the financial sector, the results support the conclusion that the most pronounced threats to financial stability do not come from families' debt-to-income ratios. So far, the financial sector's losses on household exposures have been modest despite rising gross debt and a number of years of rising unemployment. But, as expected, it is also clear that families who experience prolonged periods of unemployment are more vulnerable than other families. Should unemployment become more widespread than the current level, losses on private customers should therefore be expected to increase.

Finally, it should be pointed out that we are far from having performed all possible analyses of these register data. Thus, we have not performed econometric analyses following the individual families over time. Further analyses will no doubt provide new knowledge, including modification of some conclusions and strengthening of others.

2. DATA

The analyses are primarily based on anonymised register data from Statistics Denmark for the years 2002-10, although not all registers are updated to end-2010. The information on families' pension wealth is

DEFINITION OF A FAMILY Box 1

The analysis unit used in this article is the *family*. The decomposition of the population into families is made on the basis of Statistics Denmark's definition of "E-families". According to this definition, a family consists of one or two adults and any children living at home. Two adults are counted as members of the same family if they live together and meet at least one of the criteria below:

- They are spouses or registered partners
- They have at least one joint child registered in the Civil Register (CPR)
- They are of opposite sex with an age difference of less than 15 years, are not close relatives and live in a household with no other adults.

Adults living at the same address who do not meet at least one of the above criteria are counted as members of different families.

Children living at home are counted as members of their parents' family if they are under the age of 25, live at the same address as at least one of the parents, have never been married or in registered partnership and have no children registered in CPR.

Given these criteria, a family may consist of two generations only. If more than two generations are living at the same address, the family consists of the two youngest generations together.

based on results from work performed for the Welfare Commission relating to 2003. The data is formed with the family as the economic unit. Box 1 contains a statistical definition of a family.

A review of the data revealed that quite a few families had zero or negative income after tax. Since the ratio of debt to income after tax is used in several of the analyses below, only families whose annual income after tax exceeds kr. 25,000 are included. The families thus excluded are dominated by the very young. Families with self-employed persons are also excluded, and all adults in the family must be fully liable to income tax in Denmark in order for the family to be included in the analysis. The significance of these exclusions appears from Table 1.

The analysis for 2010 thus concerns 91 per cent of the families accounting for 89 per cent of total income after tax, 74 per cent of gross debt and 77 per cent of registered assets.

All income data and most wealth data are based on the annual tax reports for the individual family members. This excludes unregistered incomes, private debts, cash holdings, the value of the family's durable consumer goods (such as cars, boats, household effects and art) and the value of private cooperative housing, whereas any debt raised in order to acquire these assets is included.

Real property in Denmark (excluding cooperative housing) is included in wealth at approximated market prices. For each county/region, the relationship between cash sales prices for properties sold in the market

AGGREGATED DATA FOR SELECTED GROUPS OF FAMILIES, 2010 Table 1

	Number of families	Income after tax, kr. billion	Liabilities, kr. billion	Share of liabilities for all families, per cent	Assets, kr. billion	Share of assets for all families, per cent
All families	2,836,759	882.4	2,371.2	100.0	4,387.9	100.0
Families with self-employed	166,713	88.0	582.1	24.6	974.2	22.2
Families without full tax liability	54,288	6.3	10.5	0.4	16.5	0.4
Families with income after tax of less than kr. 25,000	74,225	-2.9	56.5	2.4	74.6	1.7
Families with income after tax of exactly zero	36,152	0.0	1.3	0.1	0.4	0.0
Families with negative income after tax	8,900	-3.2	49.3	2.1	65.4	1.5
Families without self-employed, with full tax liability and income after tax of at least kr. 25,000	2,570,518	789.2	1,762.5	74.3	3,371.6	76.8

Note: Families with self-employed are defined as families in which at least one of the adult members can be classified as self-employed or assisting spouse. The classification is based on information on the person's most important source of income. Families without full tax liability are defined as families in which at least one of the adult members has less than full tax liability in Denmark. Pension wealth is not included.
Source: Own calculations on the basis of register data from Statistics Denmark.

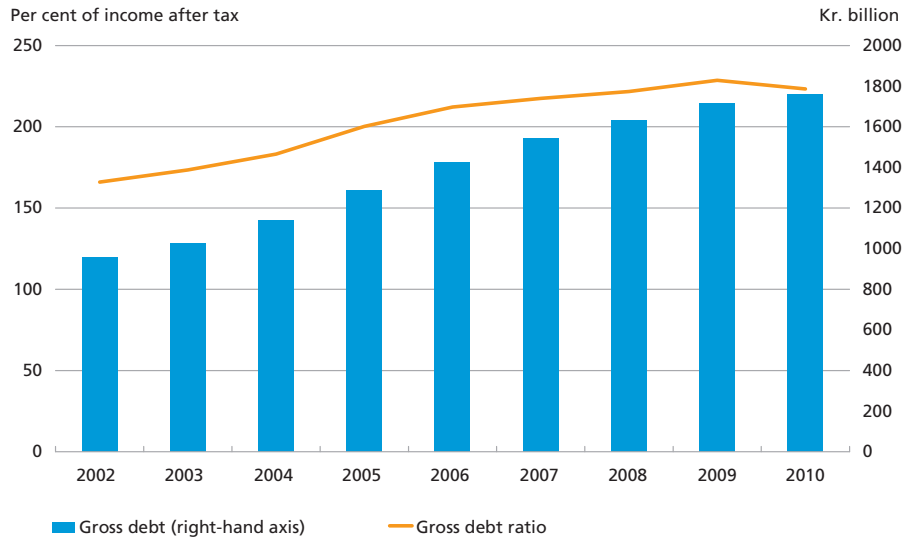
and the property valuation is used for adjustment of the property valuation from the annual tax report.

Compared with the Danish data for household income and debt analysed in Isaksen et al. in the Monetary Review, 4th Quarter 2011, there are some differences, particularly reflecting different data sources. Isaksen et al. use national accounts data including income, assets and debt for non-profit organisations serving households. Naturally, these organisations are not considered in this study, which is structured around the family. Another important difference is that debt in the form of arrears to the public sector is included in the financial accounts of the national accounts, but not in the family data set. Moreover, the income concepts applied differ slightly. In this analysis, family income after tax has been calculated excluding rental value and contributions to pension schemes administered by employers. Interest expenditure is not deducted from family income.

3. FAMILY GROSS DEBT

Aggregating the gross debts of the more than 2.5 million families included in the analysis shows the well-known picture of strongly rising gross debt in the years 2002-10, cf. Chart 1. Furthermore, since gross debt has shown much stronger growth than annual income after tax, the relationship between the two, i.e. the gross debt ratio, has increased from 1.7 to 2.2. In 2010, however, the rate of growth in income after tax

AGGREGATE GROSS DEBT AND AGGREGATE GROSS DEBT RATIO — Chart 1

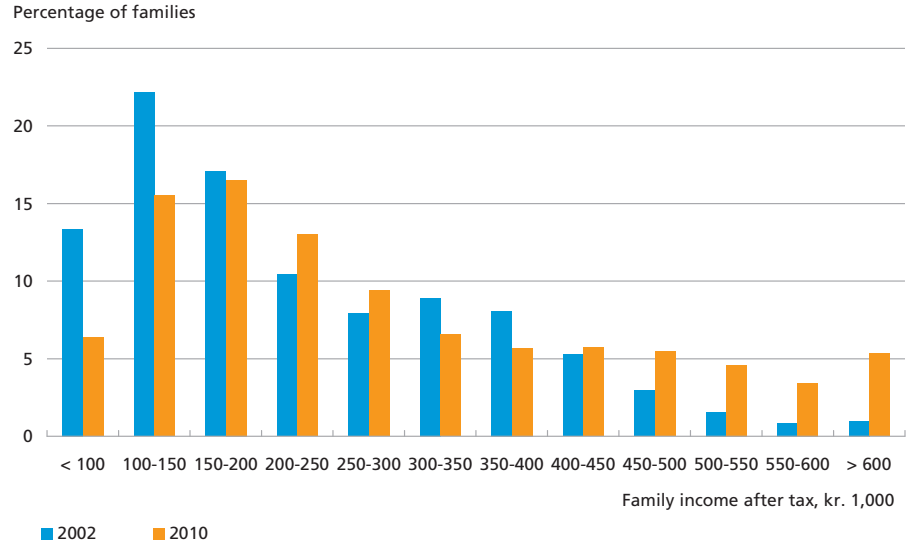


Note: The aggregate gross debt ratio is calculated as aggregate gross debt divided by aggregate income after tax for all families in the population.
Source: Own calculations on the basis of register data from Statistics Denmark.

was slightly higher than that of gross debt, resulting in a slight decrease in the aggregate gross debt ratio relative to 2009.

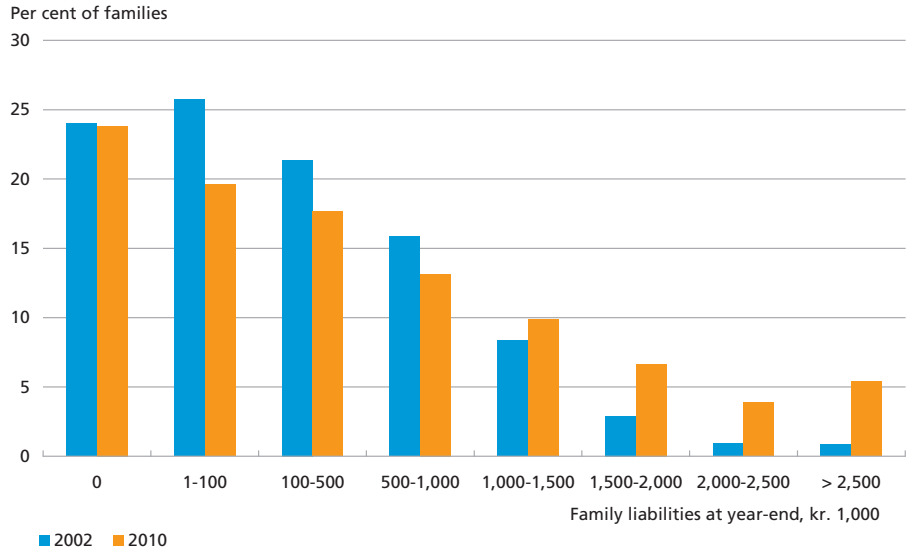
Chart 2 shows the distribution of family income after tax in 2010. The well-known phenomenon that the income distribution is skewed to the

DISTRIBUTION OF FAMILY INCOME AFTER TAX — Chart 2



Source: Own calculations on the basis of register data from Statistics Denmark.

DISTRIBUTION OF FAMILY LIABILITIES Chart 3



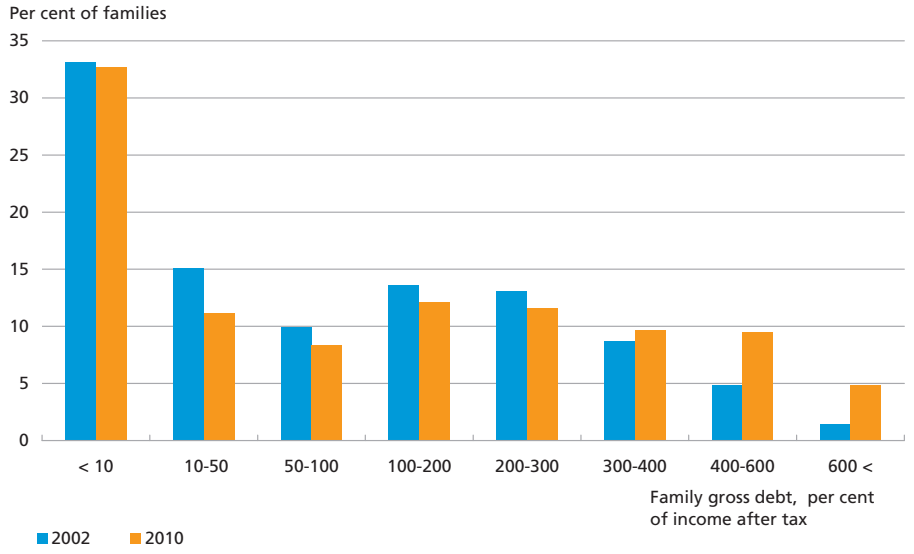
Source: Own calculations on the basis of register data from Statistics Denmark.

right clearly appears from the Chart. This reflects partly income differences at individual level, partly variations in family size. Moreover, the Chart also reflects the generally higher nominal incomes in 2010 compared with 2002.

Chart 3 shows the distribution of family gross debt. Almost one fourth of all the families did not have any debt at all in 2010, half of the families had debt of less than kr. 1 million, while the last fourth had gross debt exceeding kr. 1 million. Slightly more than 5 per cent of the families had gross debt exceeding kr. 2.5 million. The share of families with high debt has risen strongly relative to 2002.

Chart 4 shows the ratio of gross debt to income after tax, i.e. the gross debt ratio. As a result, data for 2002 and 2010 become immediately comparable in view of the automatic adjustment for general income growth in the period. For half of the families, their gross debt in 2010 was smaller than their income after tax. At the opposite end of the scale, nearly 15 per cent of the families had gross debt of at least four times their income after tax. The debt-to-income ratio gives an indication of the debt burden on the individual family. However, it is not possible to state exact thresholds for when debt should be considered to be problematically large. This would depend on the income and income prospects. It would also depend on the capacity of the family's finances to sustain a general increase in interest rates in the future, on the family's lifestyle, the extent of its marketable assets and its possibilities of re-

DISTRIBUTION OF FAMILY GROSS DEBT RATIO Chart 4



Note: The gross debt ratio is calculated as the gross debt at year-end as a percentage of total family income after tax.
Source: Own calculations on the basis of register data from Statistics Denmark.

ceiving financial support from e.g. a broader group of relatives. It has not been possible to break down the gross debt at family level by loan type and interest-rate exposure, but such a breakdown is envisaged in a future analysis.

From 2002 to 2010 the share of families with gross debt of more than four times the size of their income after tax doubled, while the share with gross debt below the annual income fell considerably.

Gross debt ratio, income and age

A high gross debt ratio will reflect either a high gross debt in absolute terms or modest income, or possibly both. Theoretically, there is good reason to expect a positive link between income and gross debt. Families who have experienced income growth and expect income growth in the future will be inclined to raise debt in order to acquire a good home, a good means of transport and otherwise support private consumption in line with the new, expected higher income. Financial institutions also have an interest in extending such loans, in so far as they can obtain a sufficient degree of certainty that the loan will be repaid, often via the borrower's pledging of real property or durable consumer goods as collateral. In this situation, the resultant gross debt will contribute to increasing the welfare of the families involved. Naturally, the flip side of the coin is that if the future income expectations are not fulfilled, the

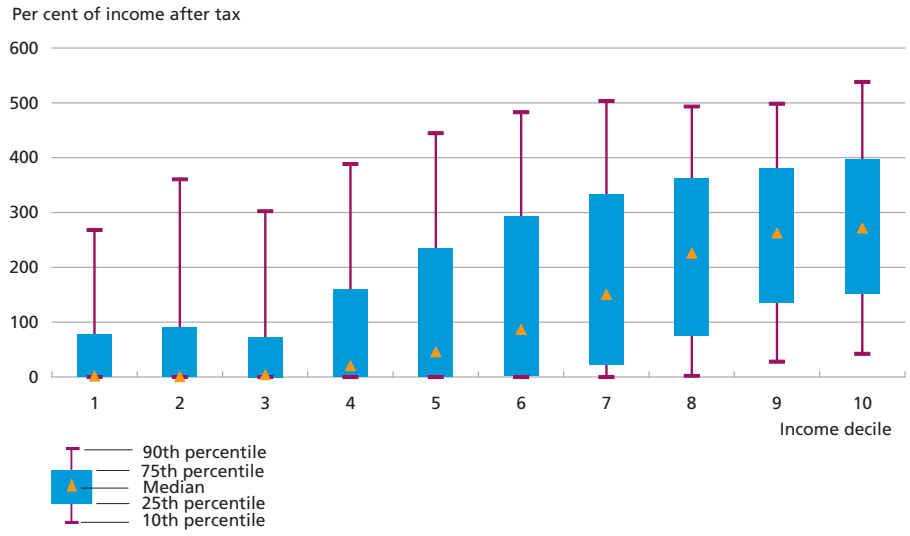
family will find it difficult to service the loan as agreed, and it will experience reduced welfare as a result of large and unmanageable debt. At the same time, the lender runs a risk of loss.

It is hardly possible to calculate theoretically well-founded values of the optimum ratio of gross debt to current income. For young families with expected permanent income growth of a certain size, raising considerable debt would be a rational thing to do if they can manage the risks associated with unfulfilled expectations – including the consequences of social events such as unemployment and divorce – and the possible dependence on future developments in interest rates unless they opt for a fixed-interest loan. For families closer to retirement age, income growth will often be of a more temporary nature, entailing less capacity to sustain indebtedness. The age of the family should therefore be expected to have considerable influence on the size of the gross debt.

Chart 5 shows the distribution of family gross debt ratios in various income groups in 2010. Families are divided into 10 groups, or deciles, according to income after tax. For each of the 10 groups of equal size the Chart shows the distribution of the gross debt ratio. The median shows the gross debt ratio for the middle family in each income decile after ranking the families according to gross debt ratio. Similarly, the

DISTRIBUTION OF FAMILY GROSS DEBT RATIO ACROSS INCOME DECILES, 2010

Chart 5



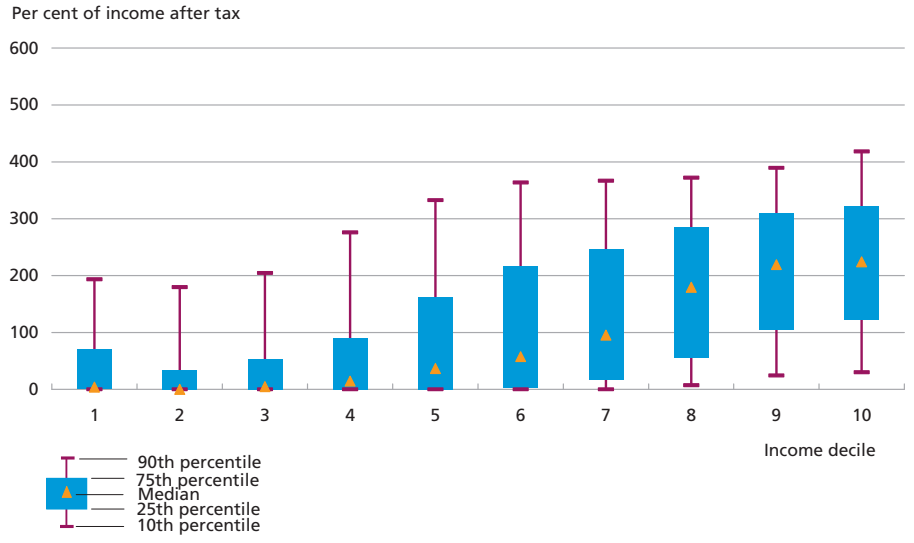
Note: The grouping of families into income deciles is based on income after tax.
Source: Own calculations on the basis of register data from Statistics Denmark.

10th percentile indicates that 10 per cent of the families have a gross debt ratio below the marking. The 90th percentile indicates that 10 per cent of the families have a gross debt ratio exceeding the marking.

The pattern is very clear: the ratio of gross debt to income after tax increases strongly with income size. In each of the three lowest income deciles, the median family has no gross debt at all. In this decile, the family income after tax is up to kr. 173,000. In the next income deciles, the median for the gross debt-to-income ratio rises from decile to decile, whereby the median family in the top income decile has gross debt of just over 2½ times their annual income after tax. In 2010, the top income decile comprised families with income after tax exceeding kr. 565,000. The pattern of the median is generally reflected in the other percentiles. As from the fourth income decile, the 75th percentile rises as income increases. Thus, 25 per cent of the families in the highest income group have gross debt of more than four times the size of their annual income after tax. Among the families in the lowest income decile, the 10 per cent with the highest debt had gross debt of at least 2.8 times the size of their income after tax in 2010. The corresponding figure in the five highest income deciles was around five.

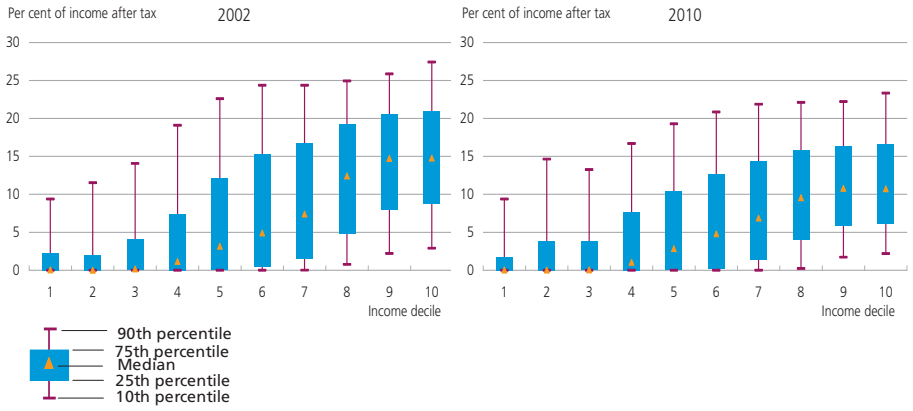
The same pattern is reflected in 2002, but with lower gross debt ratios, cf. Chart 6. This applies across the distribution.

DISTRIBUTION OF FAMILY GROSS DEBT RATIO ACROSS INCOME DECILES, 2002 — Chart 6



Note: The grouping of families into income deciles is based on income after tax.
Source: Own calculations on the basis of register data from Statistics Denmark.

DISTRIBUTION OF FAMILY INTEREST BURDEN ACROSS INCOME DECILES Chart 7



Note: The interest burden is calculated as the family's interest expenses as a percentage of income after tax.
Source: Own calculations on the basis of register data from Statistics Denmark.

Despite the increase in gross debt ratios in practically all income deciles from 2002 to 2010, most families have seen a diminishing interest burden, defined as the family's interest expenses relative to income after tax, cf. Chart 7. In the highest income decile, the interest expenses for the median family in 2010 accounted for approximately 10 per cent of income after tax, against approximately 15 per cent in 2002.

This can be attributed to the generally falling interest rates and the increasing popularity of adjustable-rate loans during the period.

The overall picture from Charts 5 and 6 is that the gross debt ratio is high primarily for high-income families. However, the link between income and gross debt ratio is complicated by both quantities being systematically related to the ages of the family members. As mentioned previously, younger families tend to have a higher gross debt ratio than older families, while income is expected to rise with age up to a certain point, after which it declines. In order to obtain a clearer picture of the link between gross debt ratio and income, we have therefore examined their covariation within given age groups. The positive link between gross debt ratio and income after tax is observed within all age groups, cf. Table 2.

In consumption theory, goods for which consumption rises more than proportionally as income increases are called luxury goods. The behaviour of gross debt is similar, which is a sign that debt is often incurred in order to finance purchases of luxury goods or for investment purposes, including buying a home.

Above we examined the covariation between gross debt ratio and income after tax, given the age of the oldest family member. Similarly, we

MEDIAN GROSS DEBT RATIOS BY AGE AND INCOME, 2010 Table 2

Gross debt ratio, median, per cent	Income decile									
	1	2	3	4	5	6	7	8	9	10
Oldest family member										
15-24 years	0.0	3.8	9.8	16.8	22.2	28.4	44.9	146.0	187.2	61.5
25-29 years	45.8	33.1	31.9	39.6	53.2	67.1	101.2	262.6	315.7	274.7
30-34 years	65.6	46.1	40.0	46.8	65.7	97.2	157.2	293.2	340.4	355.5
35-39 years	59.5	43.2	32.8	41.5	60.4	89.7	171.2	286.4	324.0	344.8
40-44 years	50.1	39.3	29.3	35.0	56.7	80.1	150.2	256.1	287.3	305.0
45-49 years	50.5	39.3	27.4	34.9	56.8	79.6	142.7	227.8	253.1	265.0
50-54 years	41.8	36.1	25.0	33.3	59.1	96.7	164.9	209.2	229.3	242.8
55-59 years	26.3	31.8	19.4	28.6	58.4	105.3	168.8	189.2	206.7	230.3
60-64 years	17.8	16.1	12.1	19.2	51.4	126.7	165.1	178.8	190.1	214.0
65-69 years	0.5	5.9	3.4	20.5	99.8	154.4	174.6	183.6	189.3	187.5
70+ years	0.0	0.0	0.0	0.0	0.8	33.9	100.8	104.3	98.1	74.6

Note: The Table shows the median of the gross debt ratio for the group of families in the relevant cell. The families have been grouped into income deciles before the grouping into age groups. This means that the figures are comparable both horizontally and vertically, but the figures in certain cells are based on a limited number of families. For example, in 2010 the top income decile included only 61 families whose oldest member was 15-24 years old.

Source: Own calculations on the basis of register data from Statistics Denmark.

can examine the link between gross debt ratio and age, given the family's income level. Below we will thus examine the covariation of the relationship between gross debt and income in 2010 and the age of the oldest family member for various income groups. It should be noted that the number of families varies in the different age groups in these income quartiles, as Table 3 clearly shows.

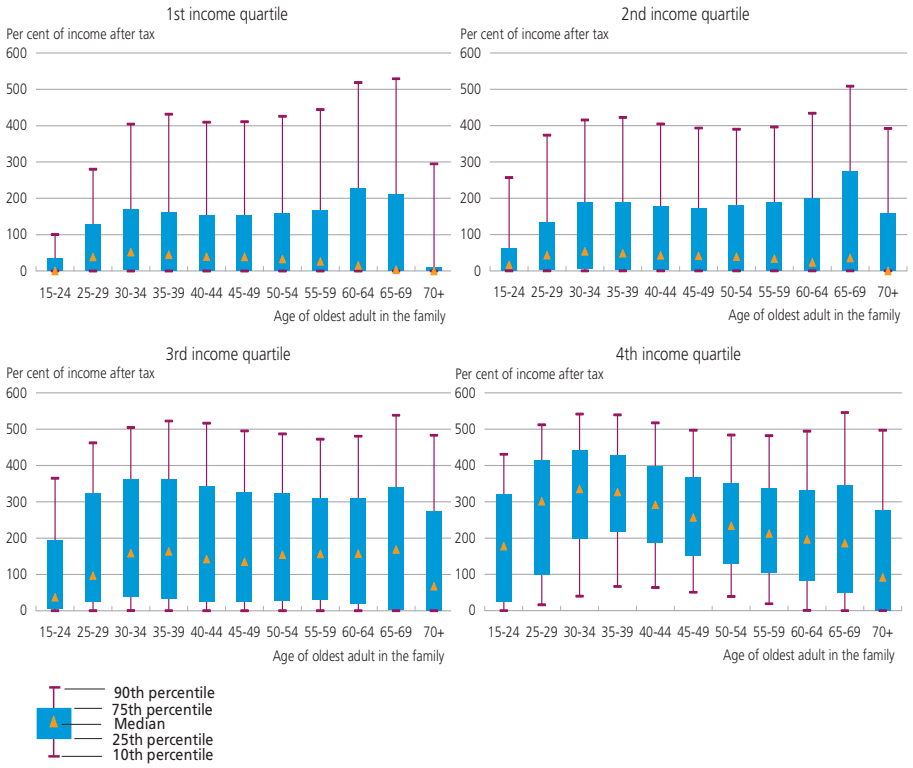
The lowest income quartile has a relatively high number of families from the youngest and oldest age groups. In contrast, the top income quartile is dominated by families whose oldest member is 35-54 years old.

NUMBER OF FAMILIES BY AGE AND INCOME QUARTILE Table 3

Number of families	Income quartile			
	1	2	3	4
Oldest family member 15-24 years	150,475	33,537	14,609	812
25-29 years	65,846	57,879	48,343	14,698
30-34 years	26,973	46,562	59,070	54,690
35-39 years	20,380	43,905	61,152	89,424
40-44 years	19,590	42,387	63,818	100,581
45-49 years	20,947	44,426	63,676	107,791
50-54 years	20,635	42,484	55,691	93,167
55-59 years	20,412	43,673	57,078	80,491
60-64 years	32,397	44,640	75,209	60,357
65-69 years	50,068	61,096	68,781	25,271
70+ years	214,911	182,036	75,203	15,347
Total	642,634	642,625	642,630	642,629

Source: Own calculations on the basis of register data from Statistics Denmark.

GROSS DEBT RATIO BY AGE AND INCOME QUARTILE, 2010 Chart 8

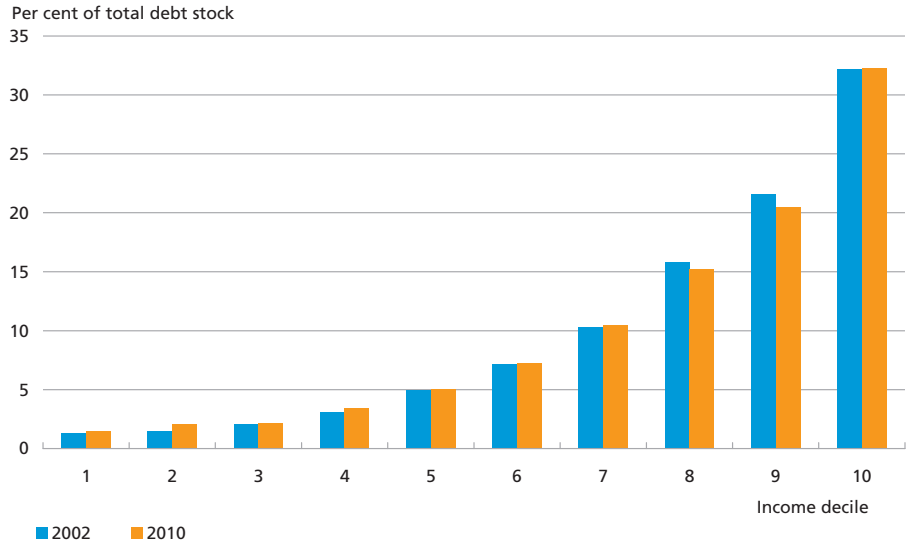


Source: Own calculations on the basis of register data from Statistics Denmark.

In the lowest income intervals, i.e. the 1st and 2nd income quartiles, there is no clear link between gross debt ratio and age, which is hardly surprising given the very low level of debt for the median families. Measured by the median, families in the age groups between 25 and 44 years have slightly higher debt than the very young and the older families. The relationship outlined above clearly appears in the highest income quartile, i.e. with family income after tax exceeding kr. 417,000 in 2010. In this group gross debt is high particularly for families whose oldest member is 30-39 years, after which gross debt gradually declines with age. However, in almost all income and age groups, around 10 per cent of the families, i.e. the 90th percentile, have gross debt of at least 4-5 times the size of income after tax. The gross debt ratios are particularly high for the 10 per cent of the families with the highest debt in the 65-69 age group. Presumably, this reflects lower income in connection with retirement.

A consequence of the gross debt-to-income ratio rising with income is that the highest income groups account for the largest share of the

GROSS DEBT STOCK BY INCOME DECILE Chart 9



Source: Own calculations on the basis of register data from Statistics Denmark.

families' total gross debt, cf. Chart 9. Thus, the 30 per cent of the families with the highest incomes accounted for almost 70 per cent of total gross debt in 2010. Among these families, relatively few are immediately facing retirement and consequently a decrease in income in the near future. The half of the families with the lowest incomes together accounted for 14 per cent of total gross debt.

Development in gross debt since 2002

Table 4 throws light on the development in average gross debt since 2002 for various subgroups of the population. It appears that gross debt has increased for all income groups, all age groups, and for homeowners as well as tenants. The percentage increase since 2002 has been most pronounced for low-income families and especially for older families. Measured in kroner, high-income families and families in the middle of the age distribution interval have clearly accounted for the strongest increases.

The considerable increases in family gross debt have resulted in markedly stronger growth in aggregate gross debt relative to total family income after tax. Thus, the aggregate gross debt ratio rose from 166 per cent of income after tax in 2002 to 223 per cent in 2010, cf. also Chart 1, corresponding to an increase by 57 percentage points over the entire period.

The detailed data behind this article can be used to analyse how the development in the ratio of gross debt to income after tax in different

AVERAGE GROSS DEBT FOR VARIOUS POPULATION GROUPS Table 4

Kr. 1,000	2002	2010	Change 2002-10	Relative change, per cent
Income deciles				
1st income decile	51.1	100.9	49.8	97.5
2nd income decile	56.4	142.0	85.6	151.7
3rd income decile	78.5	150.1	71.5	91.1
4th income decile	120.7	237.1	116.5	96.5
5th income decile	190.8	346.3	155.5	81.5
6th income decile	277.9	497.5	219.6	79.0
7th income decile	400.1	717.1	317.0	79.2
8th income decile	613.8	1042.6	428.8	69.9
9th income decile	836.8	1406.8	570.0	68.1
10th income decile	1251.0	2216.3	965.3	77.2
Age groups				
15-24 years	79.7	82.3	2.7	3.4
25-29 years	279.7	379.9	100.3	35.9
30-34 years	510.5	831.0	320.5	62.8
35-39 years	621.3	1079.1	457.8	73.7
40-44 years	638.6	1098.9	460.3	72.1
45-49 years	609.5	1058.2	448.7	73.6
50-54 years	573.7	988.9	415.2	72.4
55-59 years	498.2	879.1	380.9	76.5
60-64 years	360.5	746.8	386.3	107.2
65-69 years	226.6	589.1	362.5	160.0
70+ years	86.0	249.6	163.7	190.4
Type of housing				
Families in owner-occupied housing	717.0	1268.3	551.3	76.9
Families in rental housing	120.4	187.2	66.8	55.5

Note: All averages are calculated for families belonging to the relevant population group in the year in question. For example, the average gross debt in 2002 for families in the 30-34 age group has been calculated for families whose oldest member was 30-34 years old in 2002. The corresponding figure for 2010 has been calculated for families whose oldest member was 30-34 years in 2010. The grouping into income deciles is based on family income after tax.

Source: Own calculations on the basis of register data from Statistics Denmark.

population subgroups has contributed to the overall pattern. This can be done specifically by decomposing the change in the aggregate gross debt ratio into contributions from changes in the corresponding ratios for each subgroup, cf. Box 2.

A breakdown of families by income after tax shows that the families at the high end of the income scale have contributed most to the rise in the aggregate gross debt ratio, cf. Chart 10. Out of the total increase of 57 percentage points, just over 30 percentage points can thus be attributed to the higher gross debt ratio for the group of families in the three top income deciles in 2010 compared with 2002. As mentioned, the families in the lowest income deciles have seen the strongest relative increases in gross debt. Nevertheless, the rise in these families' gross debt ratio had only a modest effect on the aggregate gross debt ratio.

DECOMPOSITION OF CHANGE IN THE AGGREGATE GROSS DEBT RATIO Box 2

The aggregate gross debt ratio is defined as the sum of family gross debt divided by the sum of family income after tax. The change in the aggregate ratio can be decomposed into contributions from changes in the corresponding gross debt ratios for various subgroups of families and contributions from changes in the income distribution between these subgroups.

The relationship between the aggregate gross debt ratios in year *t*, BGK_t, and the gross debt ratios in each subgroup of families can be expressed as follows:

$$BGK_t = \frac{BG_t}{DI_t} = \frac{\sum_j BG_t^j}{\sum_j DI_t^j} = \sum_j s_t^j BGK_t^j \ ,$$

where BG_t^j and DI_t^j are total gross debt and total income after tax, respectively, for the families in subgroup *j* in year *t*, while BG_t and DI_t are the corresponding aggregates. $s_t^j \equiv DI_t^j / DI_t$ denotes subgroup *j*'s share of aggregate income after tax in year *t*, while $BGK_t^j \equiv BG_t^j / DI_t^j$ is the total gross debt ratio for subgroup *j* in year *t*. The aggregate gross debt ratio can then be written as the weighted sum of gross debt ratios in the individual subgroups where each subgroup is weighted by its share of total income after tax.

The change in the aggregate gross debt ratio from year *t-h* to year *t* can thus be decomposed as:

$$\begin{aligned} \Delta BGK_{t-h,t} &= \sum_j s_t^j \cdot BGK_t^j - \sum_j s_{t-h}^j \cdot BGK_{t-h}^j \\ &= \sum_j s_{t-h}^j \cdot \Delta BGK_{t-h,t}^j + \sum_j \Delta s_{t-h,t}^j \cdot BGK_t^j \end{aligned}$$

The expression on the right-hand side of the above equation consists of two sums, each of which can be given an economic interpretation. The first sum denotes the contribution from changes in the gross debt ratios within each subgroup, given the income distribution between the groups. This expresses how large the change in the aggregate gross debt ratio would have been, given an unchanged income distribution between the subgroups relative to year *t-h*. The total effect of this is calculated as the sum of contributions from the individual subgroups. The contribution from each subgroup is calculated as the change in the subgroup's gross debt ratio weighted by its income share in the starting year.

The other sum on the equation's right-hand side captures the effect of changes in the income distribution between the subgroups, given their gross debt ratios. The size of the sum can be seen as a counterfactual expression of how much the aggregate gross debt ratio would have changed if the gross debt ratios of the individual subgroups had been the same in year *t-h* as they are today. This contribution becomes positive if it is generally the case that the income shares for subgroups with large gross debt ratios have increased, while they have diminished for subgroups with small gross debt ratios.

CONTINUED Box 2

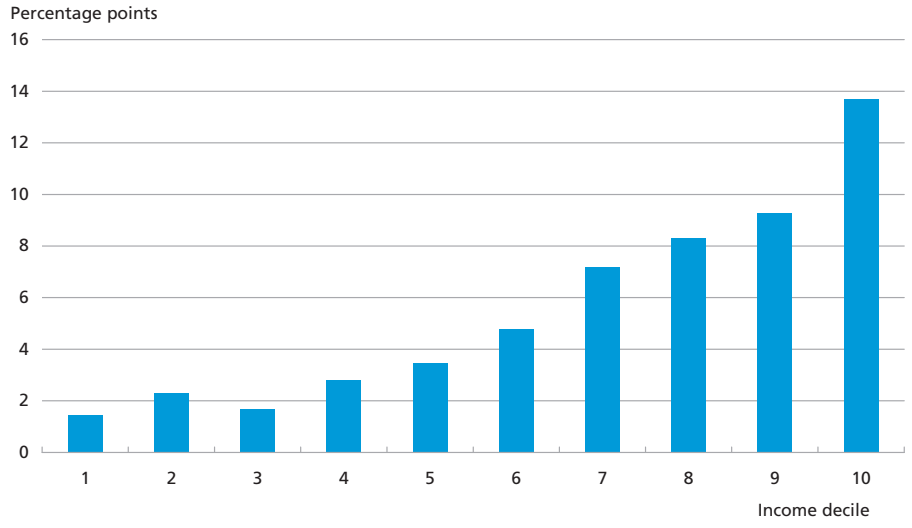
The decomposition can be made for any division into subgroups. For example, the families may be grouped by income or age. For all the groupings we have made, the groups' shares of total income after tax are almost unchanged over the period under review. The contribution from changes in the income distribution between the groups is thus negligible relative to the contribution from changes in the subgroups' gross debt ratios.

The reason is that both income and gross debt are lower in absolute terms for this group of families than for families in higher income deciles. Their overall economic impact is therefore limited.

The previously mentioned modest drop in the gross debt ratio from 2009 to 2010 is primarily attributable to families in the top income decile reducing their gross debt ratio.

In Chart 11, families are instead distributed by age. The picture from this breakdown is less clear than that emerging from a breakdown by income. The Chart shows that the largest contribution to the increase in the aggregate gross debt ratio is the result of families in the 35-39 age group having larger gross debt relative to income in 2010 than in 2002.

CONTRIBUTIONS TO CHANGE IN AGGREGATE GROSS DEBT RATIO, 2002-10, BY INCOME DECILE Chart 10

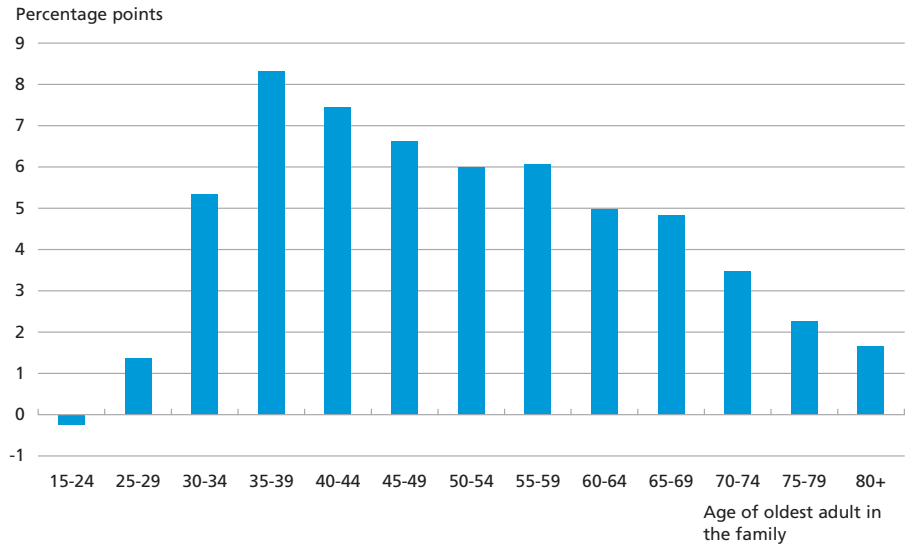


Note: The contribution from each income decile has been calculated as the change in the gross debt ratio since 2002, weighted by the share of total income after tax in 2002, cf. Box 2. The grouping of families into income deciles has been made for each year. This results in dynamic grouping, i.e. the same family does not necessarily appear in the same decile in different years.

Source: Own calculations on the basis of register data from Statistics Denmark.

CONTRIBUTIONS TO CHANGE IN AGGREGATE GROSS DEBT RATIO, 2002-10, BY AGE GROUP

Chart 11



Note: The contribution from each age group has been calculated as the change in the gross debt ratio since 2002, weighted by the group's share of total income after tax in 2002, cf. Box 2. The grouping of families into age groups has been made for each year. Consequently, a family will move upwards through the age groups as its members age.

Source: Own calculations on the basis of register data from Statistics Denmark.

From here, the size of the contributions diminishes with age. It is notable, however, that even the highest age groups have accounted for contributions of non-negligible size. Out of the total increase by 57 percentage points in the aggregate gross debt ratio, 12.5 percentage points can thus be attributed to an increase in the ratio of gross debt to income after tax for families with members over 64 years.

4. FAMILY ASSETS

When assessing family finances, it is not enough only to look at income and gross debt. As a result of the tax system, the costs of simultaneously holding debt and assets may be modest. As regards pension savings and owner-occupied housing, the tax system is designed with certain incentives to acquire such assets for borrowed funds. This means that most families have both gross debt and assets, some of which are easy to realise. However, in this study it is only possible to include owner-occupied housing in Denmark, real property abroad, financial assets and pension wealth. Cash and durable consumer goods such as cars, boats, household effects and art are not included in the registers used.

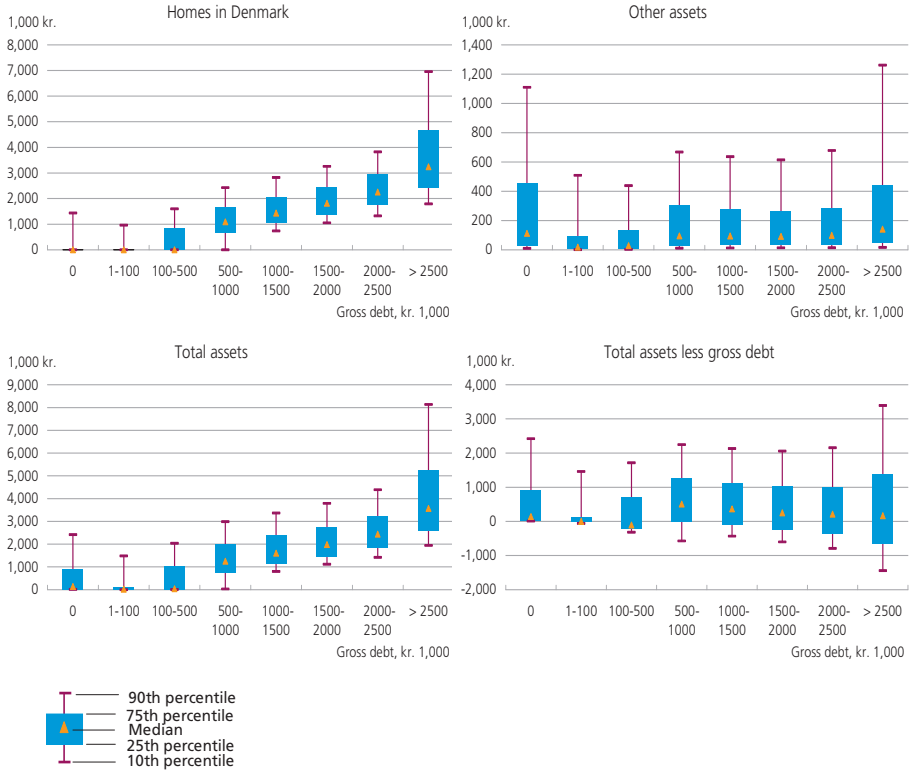
The value of the excluded assets is not inconsiderable. According to the national accounts, the value of consumer vehicles at end-2010 was approximately kr. 280 billion. Whereas the value of these vehicles is not included on the assets side, debt incurred in connection with the purchase of the vehicles is included in families' gross debt.

The calculation of the value of families' real property in Denmark, excluding the value of private cooperative housing, is described in Box 3. 204,000 families live in private cooperative housing.

Chart 12 shows the value of some of the most important assets, but not pension wealth, in various gross debt intervals. It is not surprising that the approximated market price for family housing in Denmark is higher, the larger the gross debt, cf. the top left-hand part of the Chart. This can be seen as a counterpart of the fact that the predominant part of the families' gross debt is debt to mortgage banks.

As regards other assets, i.e. financial assets and real property abroad, the correlation between assets and gross debt is U-shaped, cf. the top

DISTRIBUTION OF FAMILY ASSETS, EXCLUDING PENSION WEALTH, ACROSS GROSS DEBT INTERVALS, 2010 Chart 12



Source: Own calculations on the basis of register data from Statistics Denmark.

CALCULATION OF APPROXIMATED MARKET VALUES OF FAMILY HOUSING WEALTH (EXCLUDING PRIVATE COOPERATIVE HOUSING) Box 3

In register data from Statistics Denmark, each family's housing wealth is calculated on the basis of the official property valuation made by SKAT (Danish tax authority). But the official property valuation does not always show a true picture of the market value of a home. An approximated market value needs to be calculated in order to get a more accurate measure.

Statistics Denmark publishes quarterly statistics for average cash prices for sold properties relative to the average official property valuation. These statistics are compiled on the basis of property sales statistics from SKAT and are broken down by geography and property category. This relationship between sales prices and appurtenant property valuations can be used for calculation of an approximated market value using the following formula:

$$\tilde{M}_t^{ij} = EV_t^{ij} \cdot \left(\frac{\overline{KS}_t^j}{\overline{EV}_t^j} \right) \quad (1)$$

Here $\tilde{M}_t^{ij}$ denotes the approximated market value and EV_t^{ij} the official property valuation of property i, subgroup j, year t. $\overline{KS}_t^j$ denotes the average sales price and $\overline{EV}_t^j$ the average property valuation, both for subgroup j year t. Each subgroup represents a certain combination of geography and property category. So the approximated market value is calculated by adjusting the official valuation of the individual property by a common factor for the subgroup to which the property belongs. This factor is published by Statistics Denmark.

An assumption in the above formula is that the factor published by Statistics Denmark reflects the ratio between average sales prices and average valuations in the same year. That is not always the case, however. For example, Statistics Denmark calculates the average sales price from property transactions in 2005 relative to the average official property valuation from 2004. In the years when the purchase price is compared to the property valuation in the previous year, it is exploited that the market value in year t can be written as:

$$M_t^{ij} = EV_t^{ij} \cdot \frac{M_t^{ij}}{EV_t^{ij}} = EV_t^{ij} \cdot \frac{M_t^{ij}}{EV_{t-1}^{ij}} \cdot \left(\frac{EV_t^{ij}}{EV_{t-1}^{ij}} \right)^{-1}$$

In such years, the approximated market value is thus calculated as:

$$\tilde{M}_t^{ij} = EV_t^{ij} \cdot \left(\frac{\overline{KS}_t^j}{\overline{EV}_{t-1}^j} \right) \cdot \left(\frac{\overline{EV}_t^j}{EV_{t-1}^j} \right)^{-1} \quad (2)$$

In contrast to formula (1), in formula (2) we adjust for the average increase in property valuations in each subgroup relative to the previous year.

right-hand part of the Chart. As mentioned previously, almost 25 per cent of the families have no debt at all. These families are distributed as a very large group that does not have substantial financial assets either,

cf. that the median value is around kr. 112,000, and another group with actual wealth, since 10 per cent of the debt-free families have financial assets of kr. 1.1 million or more. It should be emphasised that pension wealth is not included in these figures. In all gross debt groups, the median family has relatively modest financial assets, etc. This probably reflects that, for most families, having both gross debt and financial assets over a relatively limited size involves costs.

All in all, the relationship between gross debt and the assets under review is dominated by the value of real property in Denmark, cf. the left-hand part of Chart 12.

The bottom right-hand part of Chart 12 shows the size of assets, excluding pension savings, less gross debt. The median value of this net wealth peaks for gross debt of between kr. 500,000 and kr. 1 million. The dispersion of net wealth is strongest for families whose gross debt exceeded kr. 2.5 million. This is illustrated by both the 75th and the 90th percentiles being higher in this group than in the other groups, while both the 10th and the 25th percentiles are lower than in the other groups. This indicates that both the most affluent families and the families with the highest gross debt are to be found in the group of families with gross debt exceeding kr. 2.5 million. In 2010, around 5 per cent of the families had gross debt exceeding kr. 2.5 million, cf. Chart 3, so the 10th and 90th percentiles in this group will delimit approximately 0.5 per cent of the families. This corresponds to around 12,500 families having net wealth of at least kr. 3.4 million despite gross debt in excess of kr. 2.5 million. A corresponding number of families with such gross debt have so few assets that their net debt exceeds kr. 1.4 million.

Pension savings

Most Danish families have assets in the form of pension savings. In most cases, pension wealth is illiquid in the sense that there may be legislative barriers or large costs associated with realising it before retirement age, and pension savings are not normally included as assets in the case of bankruptcy or enforced sale.

If the purpose of the analysis is to examine how family finances influence financial stability, these factors seem to support that pension wealth should not be included on the families' assets side. On the other hand, it is clear that pension wealth, by its sheer size, plays a key role in many families' financial decisions. It is therefore highly relevant to include pension wealth as an asset for the family when analysing these decisions.

The calculation of the value of family pension wealth is described in Box 4. The value of civil servants' public service pensions is not included

CALCULATION OF FAMILY PENSION WEALTH, 2003-10 Box 4

In this article family pension wealth is the result of own calculations, because Danes' pension wealth is not compiled in existing registers. Pension wealth excluding civil servants' public service pensions is calculated on the basis of extraordinary reported data on Danes' pension wealth and register-based data on contributions to and disbursements from pension schemes. We have endeavoured to calculate our statistics in the same way as in previous analyses (including Jørgensen (2007), Welfare Commission (2006) and Danish Economic Councils (2008)).

The method for calculation of Danes' pension wealth in company pension schemes and individual personal schemes is based on a data set with pension wealth at individual level in 2003 collected in connection with the Welfare Commission's work (Welfare Commission, 2006). We have thus been given access to individual data for wealth in safe custody at end-2003 in a number of life insurance companies, pension funds and banks.[1] Together with Statistics Denmark's register data for contributions and disbursements, Danes' individual pension wealth in company pension schemes and individual personal schemes has been projected each year from 2003 up to and including 2010.

An individual's pension wealth in a pension company in year *t* equals the sum of the pension wealth in the previous year *t-1*, net contributions to the company in year *t* adjusted for estimated operating costs and return and capital gains on the individual's pension custody account in year *t*. This corresponds to the following identity for individual *i* in year *t*:

$$wealth_{i,t} = wealth_{i,t-1} + net\ contributions_{i,t} + return_{i,t}$$

Starting in 2004, individual pension wealth in the preceding year is known from the Welfare Commission's 2003 data and net contributions are known from Statistics Denmark's register data. On the other hand, return and capital gains on individual pension wealth are unknown. Instead, the return and capital gains are calculated residually at company level as the difference between total provisions in a given company and the sum of individuals' wealth excluding return and capital gains in the same company:

$$return_{s,t} = wealth_{s,t} - \left(\sum_{i=1}^{N_S} wealth_{i,t-1} + \sum_{i=1}^{N_S} net\ contributions_{i,t} \right)$$

where $wealth_{s,t}$ denotes the total pension provisions of company S, and N_S indicates the number of persons in the company. Total pension provisions in year *t* have been found on the basis of the company's financial statements. Thus, the weighted average rate of return has been calculated for each company, and this rate is applied to all persons with wealth in safe custody in a given company. Hence, the projection does not take into account that different schemes in the same company may have different rates of return – e.g. guaranteed interest rates and unit link schemes. Moreover, in the projection, the companies' unallocated reserves are distributed proportionally on all persons independently of age.

CONTINUED Box 4

The amounts allocated to pensioners with life annuities are thus too small if the reserves have contributed especially to ensuring guaranteed benefits in a period of steady longevity increases. In addition, we use data on Danes' pension rights at ATP in the years 2003-10 in the form of data on annual disbursements to which an ATP pension right holder would be entitled at the age of 65, given that no further contributions are made to the scheme. These entitlements are converted to corresponding wealth at the age of 65 as follows:

$$wealth_{i,t}^{65} = \sum_{t=1}^{T_i-65} \frac{entitlement_i}{(1+r)^t}$$

where $T_i - 65$ is the remaining life expectancy after age 65, $rettighed_i$ is the person's annual pension right, and r is the annual return, which is assumed to be 6 per cent. For persons under 65 the wealth at age 65 is discounted to their current age.

Finally, we also use information on individuals' wealth in safe custody at the Employees' Capital Pension Fund, the Special Pension Savings Scheme (SP) and the supplementary labour-market pension scheme for the years 2003-10. Projected pension wealth in company pension schemes and individual personal schemes is added to the wealth in custody under these schemes, and finally a macro revaluation is made for total pension wealth excluding public service pensions, where the sum of individuals' wealth is compared with macro figures for household pension wealth excluding public service pensions each year in the period according to the quarterly national accounts for Denmark. The difference between the macro figure and the summed wealth in safe custody is distributed proportionally on all persons in the population.

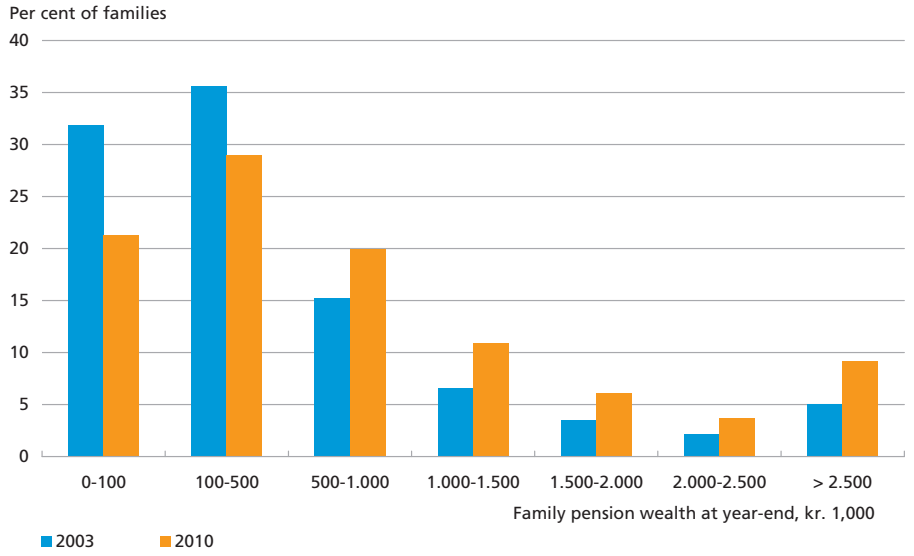
[1] The data set from the Welfare Commission is not exhaustive, so it has been necessary to make certain imputations, which generally follow the description in Jørgensen (2007). The imputations concern disability pensioners and disbursement of unallocated reserves. In addition, we have sought to impute reporting gaps by means of contribution and disbursement flows to company pension schemes and individual personal schemes. In this connection, the authors would like to thank Michael Andersen (DREAM) and Frederik Hansen (Ministry of Economic Affairs and the Interior).

in the calculation. According to the calculations of the Agency for the Modernisation of Public Administration, the value of civil servants' public service pensions totalled approximately kr. 430 billion at end-2009.

The current expansion of labour-market pensions has led to a substantial shift towards rising pension wealth, cf. Chart 13. In 2003, around one out of three families had pension wealth exceeding kr. 500,000. In 2010, this figure had increased to around one out of two, and 30 per cent of the families had pension wealth exceeding kr. 1 million, of which almost 10 per cent had more than kr. 2.5 million. However, the development from 2003 to 2010 also reflects that the general price level was approximately 15 per cent higher at end-2010 than at end-2003.

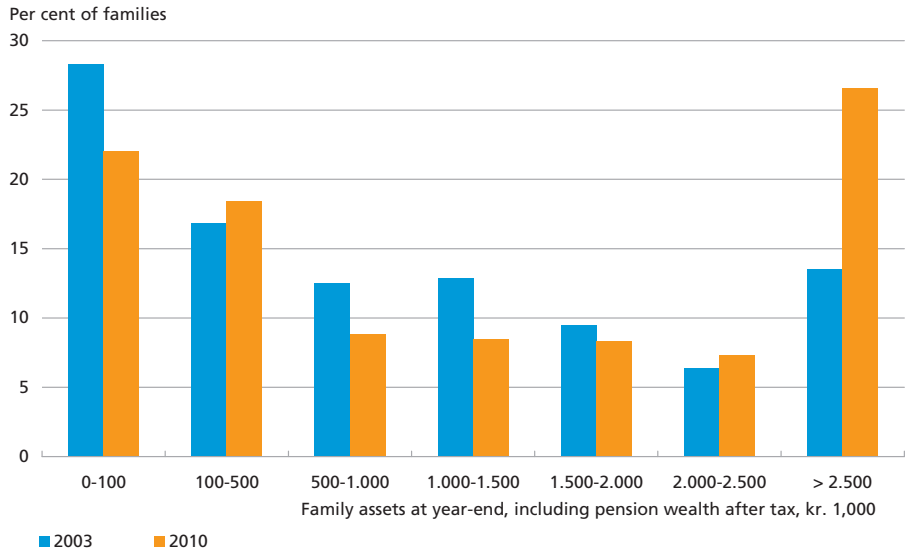
Since almost all pension wealth is taxed on disbursement, the figures are not comparable with other assets, which are generally not taxed. This is partly taken into account in Chart 14, where 60 per cent of the

DISTRIBUTION OF TOTAL FAMILY PENSION WEALTH Chart 13



Note: Pension wealth has been calculated before tax.
Source: Own calculations on the basis of register data from various institutions, cf. Box 4.

DISTRIBUTION OF FAMILY ASSETS INCLUDING PENSION WEALTH AFTER TAX Chart 14



Note: Pension wealth has been calculated after tax, i.e. with deduction of estimated future income tax on disbursements. The value of family pension wealth thus becomes comparable with other financial savings, which are not deductible and thus not taxable.
Source: Own calculations on the basis of register data from Statistics Denmark and other institutions, cf. Box 4.

GROSS DEBT STOCK BY SIZE OF FAMILY ASSETS, INCLUDING PENSION WEALTH, EXCLUDING HOMES IN DENMARK

Chart 15

Note: Pension wealth has been calculated after tax, i.e. with deduction of estimated future income tax on disbursements. The value of family pension wealth thus becomes comparable with other financial savings, which are not deductible and thus not taxable.

Source: Own calculations on the basis of register data from Statistics Denmark and other institutions, cf. Box 4.

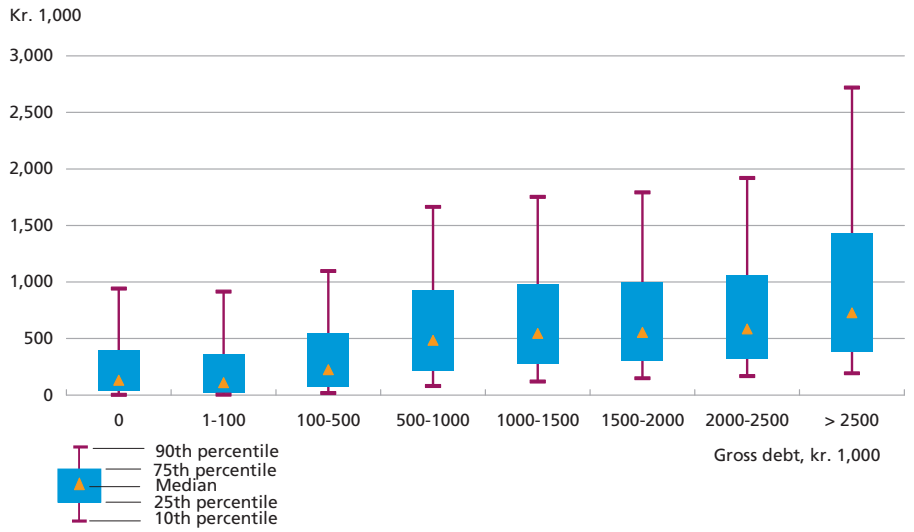
pension wealth is added to the value of other assets, corresponding to a tax rate of 40 per cent on disbursement. According to this calculation, more than one out of four families had assets exceeding kr. 2.5 million in 2010.

Chart 15 shows that gross debt is primarily found among the families with most financial assets, including pension wealth after tax. This trend was somewhat more pronounced in 2010 than in 2003. This picture differs from the picture emerging after exclusion of pension wealth, cf. the top right-hand part of Chart 12. But the overall impression that debt is generally concentrated in families who have the funds to meet the related obligations is reinforced.

Below we take a closer look at the link between pension wealth and gross debt. Pension wealth tends to be higher, the larger the family's gross debt, cf. Chart 16. But this relationship is weaker than that for the other assets, as illustrated in Chart 12. The positive correlation between gross debt and pension wealth first and foremost reflects that pension schemes are predominantly mandatory, in that a certain percentage of income has to be contributed to the scheme, and at the same time high gross debt is found particularly among high-income families.

However, it cannot be ruled out that there is also a direct causal link between the size of pension wealth and gross debt, particularly for fam-

DISTRIBUTION OF FAMILY PENSION WEALTH AFTER TAX ACROSS GROSS DEBT INTERVALS, 2010 Chart 16



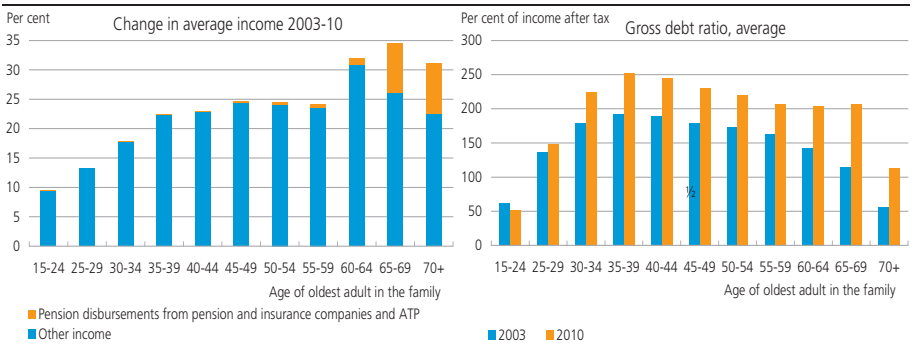
Note: Pension wealth has been calculated after tax, i.e. with deduction of estimated future income tax on disbursements. The value of family pension wealth thus becomes comparable with other financial savings, which are not deductible and thus not taxable.

Source: Own calculations on the basis of register data from Statistics Denmark and other institutions, cf. Box 4.

ilies around retirement age. Large pension wealth thus ensures higher current income after retirement than if no pension scheme had applied. This will enable many families to service the debt far into their retirement.

Chart 17 compares the changes since 2003 in gross debt and income, respectively, for different age groups. The families in the top age groups are the ones accounting for the strongest increase in the debt-to-income ratio relative to 2003, cf. the right-hand part of the Chart. At the same

CHANGE IN INCOME AND GROSS DEBT RATIO, 2003-10, BY AGE GROUP Chart 17



Source: Own calculations on the basis of register data from Statistics Denmark.

RELATIONSHIP BETWEEN GROSS DEBT RATIO AND PENSION WEALTH RATIO AMONG FAMILIES IN THE SAME INCOME AND AGE GROUPS Table 5

Gross debt ratio, per cent of income after tax, median	Pension wealth ratio (quartile)			
	1	2	3	4
Family's oldest adult 60-61 years				
1st income quartile	13.5	44.4	41.9	86.5
2nd income quartile	37.7	60.6	48.5	45.9
3rd income quartile	152.3	161.7	158.7	159.6
4th income quartile	209.4	197.6	194.1	184.7
Family's oldest adult 62-63 years				
1st income quartile	8.4	45.2	48.3	87.9
2nd income quartile	40.0	55.2	52.3	65.1
3rd income quartile	154.7	163.6	153.7	161.1
4th income quartile	209.6	197.5	195.9	177.0
Family's oldest adult 64-65 years				
1st income quartile	7.0	34.1	38.3	104.8
2nd income quartile	35.1	49.9	48.4	77.0
3rd income quartile	157.8	157.3	162.7	158.2
4th income quartile	206.6	195.2	183.6	180.5

Note: The Table shows the median for the gross debt ratio for various combinations of age, income, and pension wealth ratio (pension wealth as a percentage of income after tax). Families have been grouped according to pension wealth ratio on a quartile basis. The quartiles have been established within each age and income group. Consequently, the limits between quartile groups vary across age and income groups, so it is not immediately possible to make comparisons in the vertical dimension of the Table. A criterion for the selection of families is that at least one adult member of the family has a job.

Source: Own calculations on the basis of register data from Statistics Denmark and other institutions, cf. Box 4.

time, the growth in income from 2003 to 2010 was highest for this group of families, which can be attributed especially to higher pension disbursements, cf. the left-hand part of the Chart. However, this does not immediately provide for concluding that the rise in gross debt for this group of families was caused by expansion of pension wealth. Many other factors influencing gross debt have changed since 2003, including in particular house prices.

Table 5 examines the link between pension wealth and gross debt in 2010 among families in the same age and income groups who are active in the labour market. Both pension wealth and gross debt are here seen as ratios of income after tax. If there is a direct causal effect from the size of pension wealth to gross debt, families with a large pension wealth ratio will, all else equal, have a higher gross debt ratio than other families in the same age and income groups. Among families in the bottom income quartiles, such a positive link is actually indicated since the gross debt ratio (measured by the median) increases with the ratio of pension wealth to income after tax in all age groups. This can be interpreted as an indication that the growing pension wealth has contributed to the rise in gross debt in this group of families. But the link is not very strong in the second income quartile and there are no

signs of a link among the families in the upper income quartiles, no matter which age group is considered. All in all, there is no clear basis for concluding that direct causality exists between the accumulation of pension wealth and the increased gross debt. But the accumulation of pension wealth has enabled a reversal of Denmark's foreign debt to net foreign assets at the same time as the increase in family gross debt.

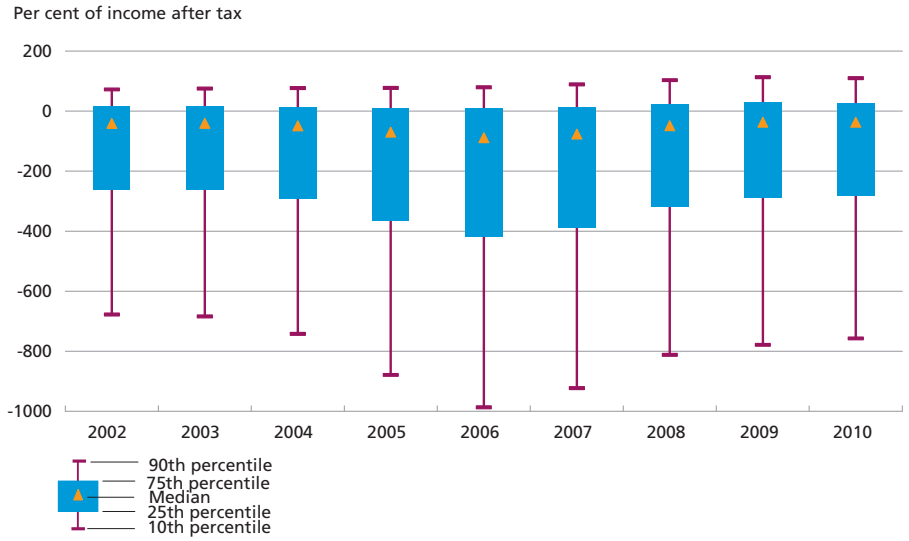
5. FAMILY NET DEBT

Net debt excluding pension wealth

Family net debt is the value of their gross debt less the value of their assets, excluding pension wealth. Chart 18 shows the development over time in the net debt ratio, i.e. net debt as a ratio of income after tax.

A clear pattern appears in that most families have net wealth, which is shown as negative net debt in the Chart. However, at least one out of three families has net debt, and for the 10 per cent most heavily indebted families, net debt has grown more than income in the period under review, so that in 2010 net debt amounted to more than 100 per cent of the annual income after tax. It should be emphasised that wealth does not include pension wealth or durable consumer goods such as cars. Among the 10 per cent of the families with the largest net wealth (smalllest net debt), wealth increased from being at least 6.8 times the size of income in 2002 and 2003 to at least 9.9 times in 2006 and then it

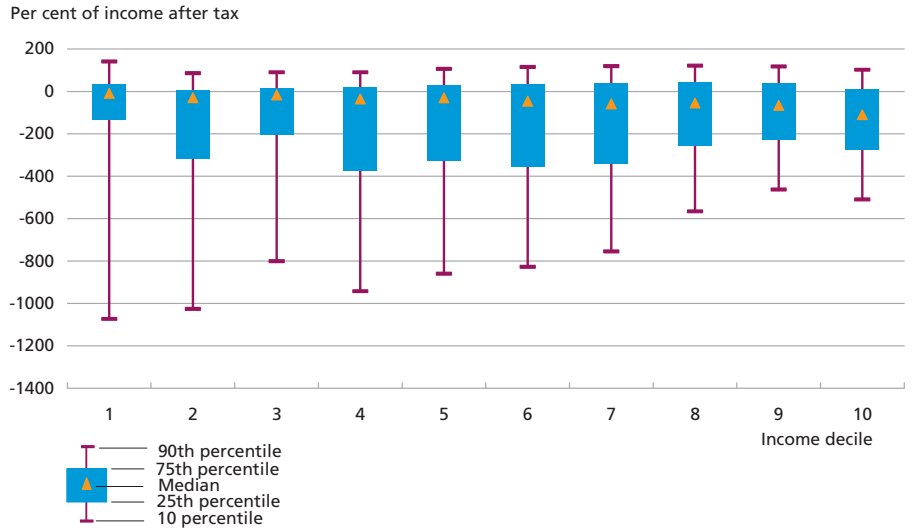
DISTRIBUTION OF FAMILY NET DEBT RATIO OVER TIME — Chart 18



Source: Own calculations on the basis of register data from Statistics Denmark.

DISTRIBUTION OF FAMILY NET DEBT RATIO ACROSS INCOME DECILES, 2010

Chart 19



Source: Own calculations on the basis of register data from Statistics Denmark.

fell back to just under 8 times the size of income after tax in 2010. This particularly reflects property price developments in this period.

The net debt ratio is not strongly dependent on income, cf. Chart 19. The median families have a falling net debt ratio (rising net wealth ratio) with increasing income despite the fact that the gross debt ratio grows with income, as shown above. High-income families' large gross debt is thus generally offset by their acquisition of assets. Another observation is that the wealth-to-income ratio is very high for the 10 per cent most affluent in the lowest income decile, but this probably reflects that this group comprises a relatively high number of elderly with low income and some wealth, not necessarily large wealth in absolute terms.

At end-2010, more than one out of three families had net debt. Families with net debt deviate from families with net wealth in several respects, cf. Table 6.

Families with net debt include a relatively high number of young people and relatively few homeowners. At the same time, these families have been harder hit by prolonged periods of unemployment than other families. The average gross debt in this group was kr. 180,000 larger than that of other families, while assets were, on average, around kr. 1,200,000 lower, which can be attributed to the relatively small share of homeowners, among other factors. This is also reflected in the fact that the gross debt of families with net debt is primarily debt to banks, while the other families' gross debt is primarily debt to mortgage banks.

DESCRIPTIVE STATISTICS FOR FAMILIES WITH NET DEBT RELATIVE TO OTHER FAMILIES, 2010 Table 6

	Families with net debt	Other families
Number of families	862,371	1,708,147
Age, family size and housing type		
Average age of oldest adult in family	41.5	56.3
Share of families with two adults, per cent	42.7	48.2
Average no. of children in family	0.6	0.4
Share of homeowners, per cent	27.5	55.5
Income, assets and liabilities, etc.		
Average income after tax, kr.	297,861	311,652
Share of total liabilities at year-end, per cent	39.5	60.5
Share of total assets at year-end, per cent	12.8	87.2
Average liabilities, kr.	806,392	624,735
Average assets, excl. pension wealth, kr.	500,827	1,720,979
Avg. assets, excl. pension wealth and housing in DK, kr.	48,183	147,120
Average net assets, kr.	-305,564	1,096,244
Gross debt ratio, median, per cent	117.6	27.0
Net debt ratio, median, per cent	61.6	-168.0
Average contributions to pension schemes, kr.	33,240	37,906
Average pension wealth after tax, kr.	318,685	712,015
Composition of liabilities		
Bank debt as share of total liabilities, aver. percentage	77.0	41.0
Bond debt as share of total liabilities, aver. percentage	22.2	58.6
Social and economic events		
Share of families affected by divorce or death of spouse within the last two years, per cent	3.6	3.2
Share of families affected by at least six months' unemployment within the last two years, per cent	5.7	2.6

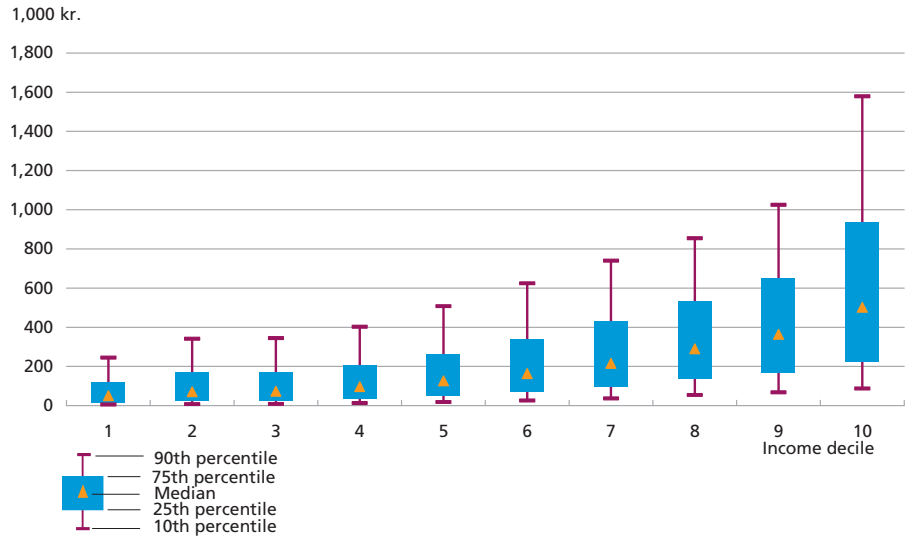
Note: The calculation of average pension contributions includes all families in each group, including families who do not contribute to pension schemes. The calculations of the average shares of bond debt and bank debt, respectively, relative to the family's total debt do not include debt-free families. Unemployment figures at individual level are only available up to and including 2009. The share of families who have been affected by at least six months' unemployment within the last two years has therefore been calculated as at the end of that year. For example, the figure in the first column indicates the number of families affected by at least six months' unemployment in the years 2008-09, relative to the number of families with net debt at end-2009.

Source: Own calculations on the basis of register data from Statistics Denmark and other institutions, cf. Box 4.

Only families with net debt are considered in Chart 20. Among these families, net debt increases with income after tax. This Chart does not show debt as a ratio of income after tax, but the absolute size of the debt.

In 2010, the net debt of families with net debt totalled just under kr. 265 billion. This net debt is concentrated in families with the highest incomes after tax, since families in the two top income deciles account for around kr. 100 billion of this amount, cf. Chart 21. The Chart shows for each income decile how much of this net debt is attributable to families with net debt living in cooperative housing, since these families' assets in the form of the value of the cooperative housing are not in-

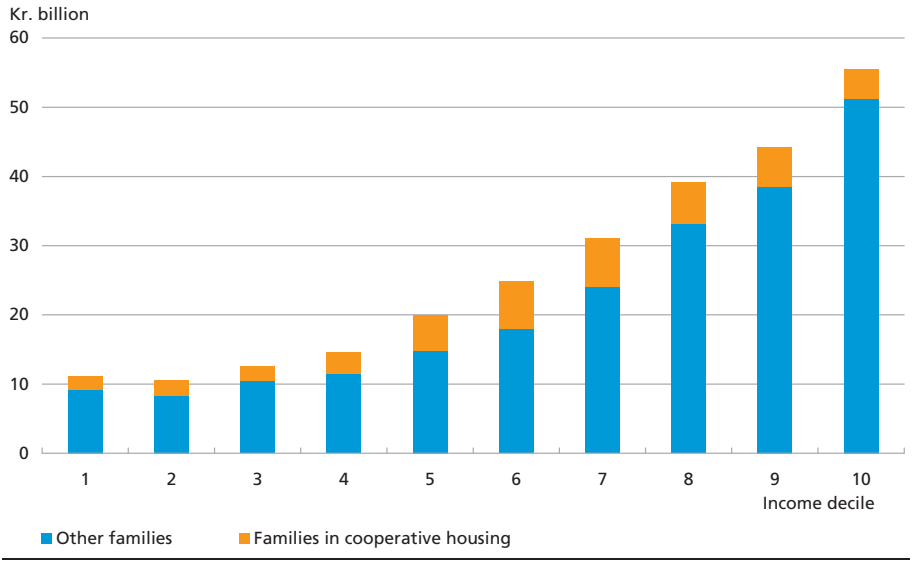
DISTRIBUTION OF FAMILY NET DEBT, ONLY FAMILIES WITH NET DEBT, 2010 Chart 20



Source: Own calculations on the basis of register data from Statistics Denmark.

cluded in the calculation. As a result, families living in cooperative housing tend to have net debt in this calculation to a higher degree than other families. Almost exactly half of the families living in cooperative housing have net debt, compared with one third of all families.

TOTAL NET DEBT BY INCOME DECILE AND OWNERSHIP OF FAMILY HOME, ONLY FAMILIES WITH NET DEBT, 2010 Chart 21



Source: Own calculations on the basis of register data from Statistics Denmark.

SHARE OF FAMILIES WITH NET DEBT BY AGE AND INCOME DECILE Table 7

Per cent of all families in same age group and income decile	Income decile									
	1	2	3	4	5	6	7	8	9	10
Oldest member										
15-24 years	37.6	43.2	49.0	53.1	53.0	55.5	59.9	64.2	55.2	32.8
25-29 years	61.5	61.0	60.8	61.5	62.2	62.6	64.8	66.7	62.8	51.8
30-34 years	67.3	66.1	60.6	60.9	62.3	62.1	62.1	62.3	58.0	49.6
35-39 years	65.7	63.7	56.5	55.6	56.6	56.4	55.3	53.0	48.9	40.2
40-44 years	63.1	60.8	54.1	50.8	51.6	51.5	49.1	45.8	41.0	33.8
45-49 years	61.1	57.9	52.6	48.2	46.4	46.3	43.1	39.6	34.6	28.5
50-54 years	57.0	50.9	48.8	42.6	40.5	39.6	37.3	32.3	27.8	22.8
55-59 years	46.4	41.1	42.8	36.4	32.0	31.8	29.6	23.6	20.2	17.2
60-64 years	30.8	22.9	32.8	28.1	21.6	20.1	16.8	14.5	13.4	12.5
65-69 years	14.3	18.0	24.2	14.6	12.7	12.3	10.4	9.4	8.5	8.8
70+ years	3.5	7.1	9.6	5.1	8.6	5.8	4.8	4.1	3.4	3.4

Source: Own calculations on the basis of register data from Statistics Denmark.

Table 7 shows a more detailed breakdown of the propensity to have net debt in various age and income intervals. There is generally a clear pattern.

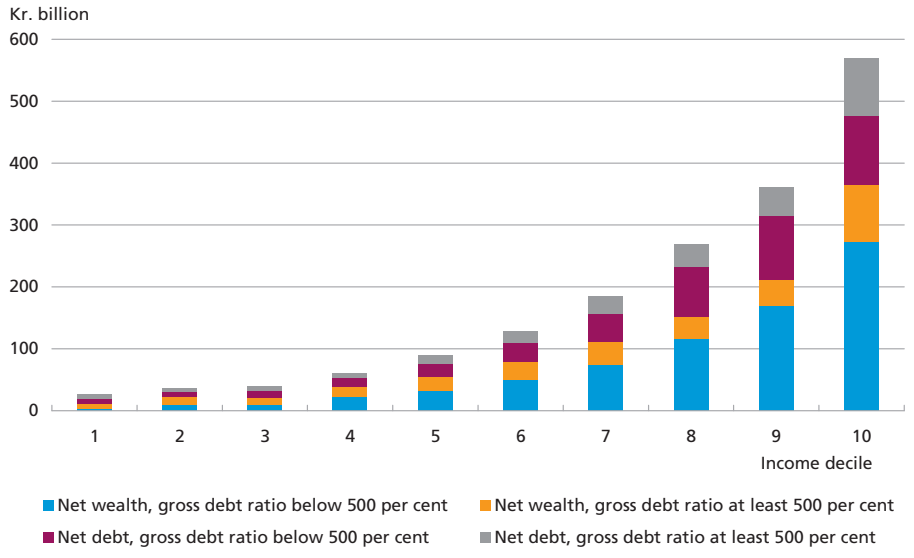
Firstly: the higher the age of the family, the lower the frequency of net debt. This applies to all income deciles. However, the very young stand out in that fewer of these families have net debt compared with the 25-29 age group. Debt raised for education purposes is one of the explanations of the high prevalence of net debt among young families. To this should be added, of course, debt incurred in connection with purchases of durable consumer goods and cooperative housing. The general pattern should therefore be regarded as natural. This entails that households with net debt generally have a number of years in the labour market ahead of them.

Secondly: in almost all age groups, the frequency of net debt declines with income after tax. It is more difficult to have an opinion on this pattern beforehand. However, the share of families with net debt is rather high in all income deciles as long as the oldest member is below 50. This pattern is different from the one observed for gross debt.

It should be emphasised that the number of families in each combination of age group and income decile varies. As appeared from Table 3, the youngest and oldest families are overrepresented in the low income deciles, while the 30-59-year-olds are overrepresented in the high income deciles.

Chart 22 shows the distribution of total gross debt on families in different income deciles, depending on whether or not the family has net debt and whether the gross debt is over or under five times the size of the family income after tax.

COMPOSITION OF GROSS DEBT STOCK BY FAMILY CHARACHTERISTICS, 2010 Chart 22



Source: Register data from Statistics Denmark and own calculations.

In an assessment of the financial sector's risk of losses, families with net debt play a key role, and within this group especially families with a high ratio of gross debt to income. As appeared from e.g. Chart 8, the gross debt of the 10 per cent of families with the largest gross debt tends to be more than around 5 times the size of income after tax in most age and income groups. A distinction is therefore made between families with gross debt of over or under five times the size of income after tax. In 2010, families with both net and gross debt of more than five times their income after tax accounted for a total of around kr. 260 billion of total family gross debt of kr. 1,763 billion. These families had net debt of around kr. 80 billion all in all. As the Chart clearly shows, gross debt is concentrated in the three top income deciles, and this is also the case for net debt.

The drop in house prices from 2006-07 to 2010 has prompted special interest in homeowners' wealth and vulnerability. Table 8 shows some characteristics of homeowners broken down by families with net debt and other homeowners.

General characteristics of families who own their home while having net debt are that they are far younger than other homeowners, consist of two adults with children and that their incomes are considerably higher than those of other homeowners. Their average income after tax is in the second highest income decile.

DESCRIPTIVE STATISTICS FOR FAMILIES WITH NET DEBT RELATIVE TO OTHER FAMILIES, ONLY HOMEOWNERS, 2010 Table 8

	Homeowner families with net debt	Other homeowner families
Number of families	236,916	948,234
Age, family size and housing type		
Average age of oldest adult in family	43.1	57.9
Share of families with two adults, per cent	79.9	68.7
Average no. of children in family	1.1	0.6
Share of homeowners, per cent	100.0	100.0
Income, assets and liabilities, etc.		
Average income after tax, kr.	468,391	394,321
Share of total liabilities among homeowner families, per cent	33.2	66.8
Share of total assets among homeowner families, per cent	12.8	87.2
Average liabilities, kr.	2,107,081	1,058,754
Average assets, excl. pension wealth, kr.	1,609,762	2,742,954
Avg. assets, excl. pension wealth and housing in DK, kr.	91,730	220,347
Average net assets, kr.	-497,319	1,684,200
Gross debt ratio, median, per cent	402.9	235.5
Net debt ratio, median, per cent	76.7	-327.4
Aver. contributions to pension schemes, kr.	65,333	55,057
Aver. pension wealth after tax, kr.	574,859	983,327
Composition of liabilities		
Bank debt as share of total liabilities, aver. percentage	26.1	26.7
Bond debt as share of total liabilities, aver. percentage	72.5	72.9
Social and economic events		
Share of families affected by divorce or death of spouse within the last two years, per cent	3.1	2.7
Share of families affected by at least six months' unemployment within the last two years, per cent	4.4	2.6

Note: The calculation of average pension contributions includes all families in each group, including families who do not contribute to pension schemes. The calculations of the average shares of bond debt and bank debt, respectively, relative to the family's total debt do not include debt-free families. Unemployment figures at individual level are only available up to and including 2009. The share of families who have been affected by at least six months' unemployment within the last two years has therefore been calculated on the basis of data from that year.

Source: Own calculations on the basis of register data from Statistics Denmark and other institutions, cf. Box 4.

The average net debt among homeowners with net debt is kr. 500,000 per family. Particularly in this group of high-income families many have bought a home in recent years, when house prices were higher than they are now, and have had expenses for renovation of their homes and for durable consumer goods, including cars. In the present macro-economic climate, these families are not very likely to have problems servicing their loans, but at the same time, families in this group will be vulnerable in case of long periods of unemployment or rapidly increasing interest rates.

Significance of certain social events

Table 9 shows that families affected by long periods of unemployment deviate from other families in several respects. Incomes after tax are almost 10 per cent lower than those of other families despite the fact that many of these families include two adults. The average gross debt does not differ much, but the average asset value is almost kr. 500,000 lower. There are relatively fewer homeowners among families who are affected by long periods of unemployment, and the debt tends to be bank debt to a higher degree.

Table 10 shows corresponding conditions for families affected by divorce or the death of a spouse in 2009 and 2010. Naturally, far fewer of these families consisted of two adults at end-2010. Consequently, their family income is about half the income of other married couples and registered partners. Accounting for the difference in the number of

DESCRIPTIVE STATISTICS FOR FAMILIES AFFECTED BY AT LEAST SIX MONTHS' UNEMPLOYMENT WITHIN THE LAST TWO YEARS RELATIVE TO OTHER FAMILIES, 2009

Table 9

	Families affected by unemployment	Other families
Number of families	92,276	2,456.98
Age, family size and housing type		
Average age of oldest adult in family	43.2	51.5
Share of families with two adults, per cent	53.2	46.3
Average no. of children in family	0.7	0.5
Share of homeowners, per cent	37.8	46.1
Income, assets and liabilities, etc.		
Average income after tax, kr.	271,731	295,053
Share of total liabilities at year-end, per cent	3.3	96.7
Share of total assets at year-end, per cent	2.4	97.6
Average liabilities at year-end, kr.	621,777	674,564
Average assets at year-end, kr.	833,993	1,297.57
Average net assets at year-end, kr.	212,216	623,009
Gross debt ratio, median, per cent	109.0	85.4
Net debt ratio, median, per cent	6.4	-40.0
Average contributions to pension schemes, kr.	22,990	41,423
Composition of liabilities		
Bank debt as share of total liabilities, aver. percentage	66.1	56.6
Bond debt as share of total liabilities, aver. percentage	33.0	42.9
Social and economic events		
Share of families affected by divorce or death of spouse within the last two years, per cent	3.1	3.4

Note: The calculation of average pension contributions includes all families in each group, including families who do not contribute to pension schemes. The calculations of the average shares of bond debt and bank debt, respectively, relative to the family's total debt do not include debt-free families.

Source: Own calculations on the basis of register data from Statistics Denmark.

DESCRIPTIVE STATISTICS FOR FAMILIES AFFECTED BY DIVORCE OR DEATH OF SPOUSE WITHIN THE LAST TWO YEARS RELATIVE TO OTHER FAMILIES, 2010 Table 10

	Families affected by divorce or death of spouse	Other families, total	Other married couples or registered partners
Number of families	85,015	2,466,298	915,807
Age, family size and housing type			
Average age of oldest adult in family	55.7	51.3	55.5
Share of families with two adults, per cent	14.5	47.5	100.0
Average no. of children in family	0.5	0.5	0.9
Share of homeowners, per cent	38.6	46.6	77.4
Income, assets and liabilities, etc.			
Average income after tax, kr.	257,570	309,281	456,448
Share of total liabilities at year-end, per cent	3.1	96.9	64.8
Share of total assets at year-end, per cent	3.1	96.9	64.0
Average liabilities at year-end, kr.	637,396	690,327	1,204,917
Average assets at year-end, kr.	1,223,216	1,321,200	2,277,043
Average net assets at year-end, kr.	585,820	630,873	1,072,126
Gross debt ratio, median, per cent	90.9	85.4	216.4
Net debt ratio, median, per cent	-41.4	-37.9	-136.8
Average contributions to pension schemes, kr.	27,379	36,766	62,470
Composition of liabilities			
Bank debt as share of total liabilities, aver. percentage	58.1	56.7	37.8
Bond debt as share of total liabilities, aver. percentage	41.2	42.8	61.7
Social and economic events			
Share of families affected by at least six months' unemployment within the last two years, per cent	3.3	3.6	7.0

Note: The calculation of average pension contributions includes all families in each group, including families who do not contribute to pension schemes. The calculations of the average shares of bond debt and bank debt, respectively, relative to the family's total debt do not include debt-free families. Unemployment figures at individual level are only available up to and including 2009. The share of families who have been affected by at least six months' unemployment within the last two years has therefore been calculated on the basis of data from that year.

Source: Own calculations on the basis of register data from Statistics Denmark.

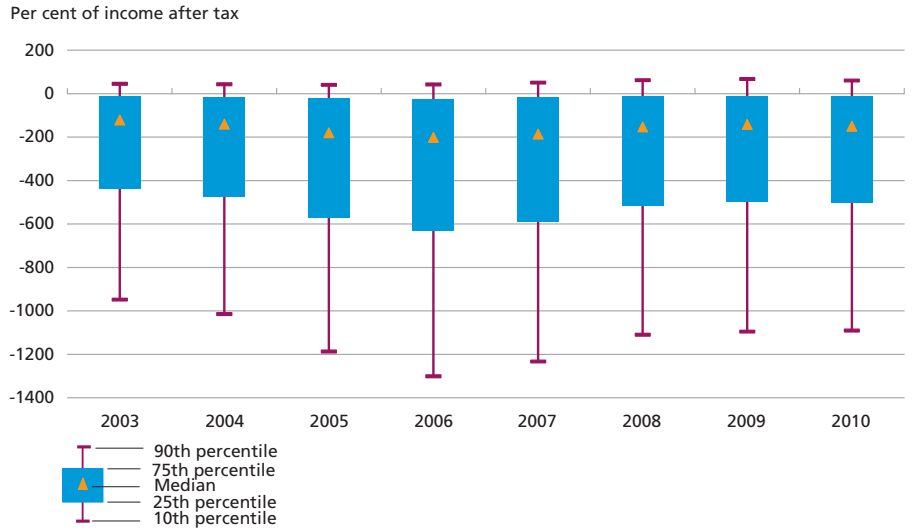
adults, there is no clear systematic, negative development in wealth for families affected by divorce or the death of a spouse.

Net debt with pension wealth as an asset

If family pension wealth after deduction of deferred tax is included in the calculation, cf. Chart 23, less than one in four families had net debt in 2010. Excluding pension wealth, this is one out of three, as mentioned earlier. The median family had net wealth (negative net debt) of 1.5 times its income after tax, compared to 0.4 times its income if pension wealth is not included, which appeared from Chart 18. Whether or not it is relevant to include pension wealth depends on the purposes of the

DISTRIBUTION OF FAMILY NET DEBT RATIO INCLUDING PENSION WEALTH OVER TIME

Chart 23



Note: Pension wealth has been calculated after tax, i.e. with deduction of estimated future income tax on disbursements. The value of family pension wealth thus becomes comparable with other financial savings, which are not deductible and thus not taxable.

Source: Own calculations on the basis of register data from Statistics Denmark and other institutions, cf. Box 4.

analysis, but pension savings are of such magnitude that they are likely to be considered in many families' consumption and debt decisions, so they cannot be disregarded with reference to their illiquid nature.

As appears from Chart 24, pension wealth entails that the net wealth ratios of median families tend to rise with increasing income (the negative net debt ratio becomes numerically larger). This is opposed to the pattern in Chart 19, which excludes pension wealth. In the five top income deciles, median families have net wealth of 2-3 times their annual income after tax.

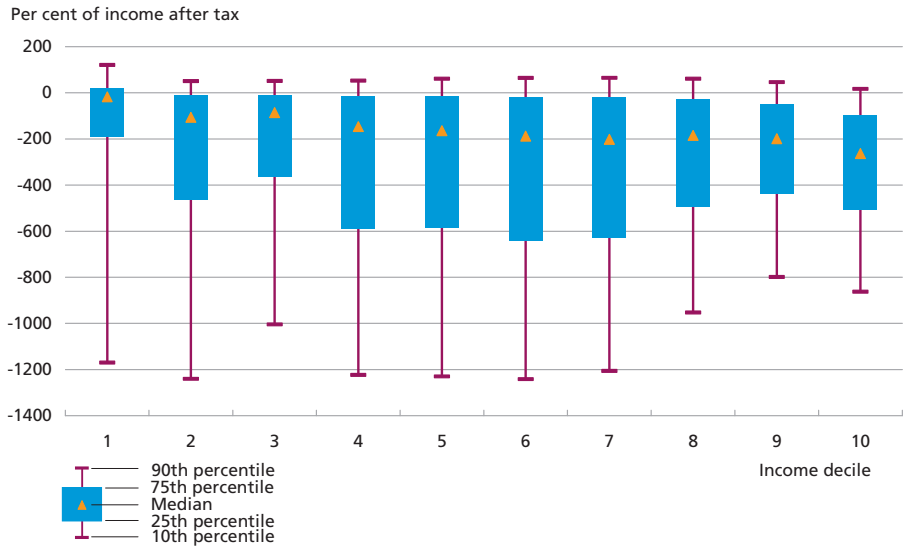
Chart 25 clearly shows that the distribution of wealth becomes strongly dependent on age when including pension wealth on the assets side, which is also to be expected. However, this underlines that a considerable share of the families have assets of such value that they will easily be able to service their gross debt also after retirement.

Change in debt and wealth items since 2003

Table 11 shows that Danish families taken as one have increased their financial net assets since 2003.[1] Although gross debt has increased by kr.

[1] Income and wealth data based on notices of assessment go back to 2002 in our data set, whereas pension wealth data is only available back to 2003. In this section we therefore consider the development since 2003.

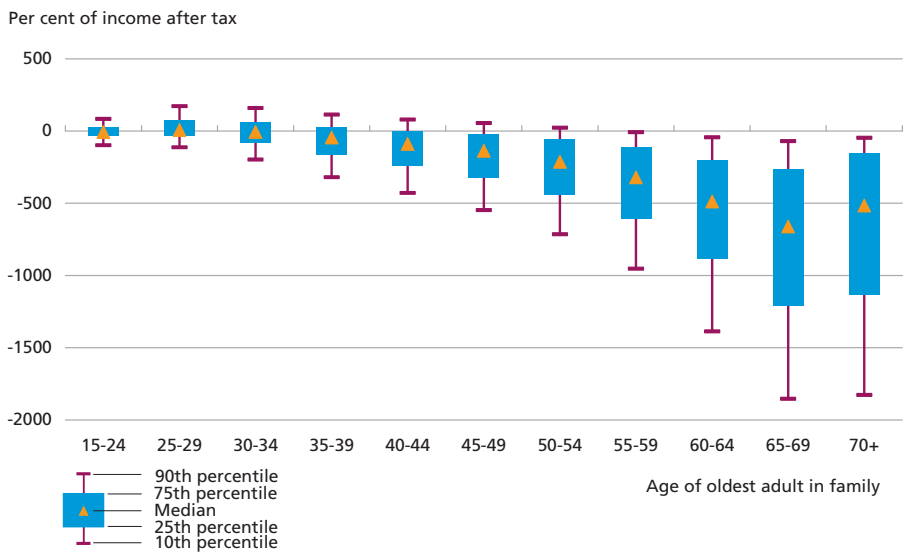
DISTRIBUTION OF FAMILY NET DEBT RATIO INCLUDING PENSION WEALTH ACROSS INCOME DECILES, 2010 Chart 24



Note: Pension wealth has been calculated after tax, i.e. with deduction of estimated future income tax on disbursements. The value of family pension wealth thus becomes comparable with other financial savings, which are not deductible and thus not taxable.

Source: Own calculations on the basis of register data from Statistics Denmark and other institutions, cf. Box 4.

NET DEBT RATIO INCLUDING PENSION WEALTH, BY AGE, 2010 Chart 25



Note: Pension wealth has been calculated after tax, i.e. with deduction of estimated future income tax on disbursements. The value of family pension wealth thus becomes comparable with other financial savings, which are not deductible and thus not taxable.

Source: Own calculations on the basis of register data from Statistics Denmark and other institutions, cf. Box 4.

CHANGE IN DEBT AND WEALTH ITEMS 2003-10, SELECTED GROUPS Table 11

Kr. billion	All families	10th income decile	10th gross debt decile	Families with positive net debt before pension wealth
Gross debt	734	240	348	346
Assets excluding pension wealth after tax	1,212	360	411	212
- housing in Denmark	930	284	346	192
- other assets	282	77	65	20
Assets incl. pension wealth after tax	1,740	487	520	329
- pension wealth after tax	528	127	110	117

Note: The Table shows the absolute changes from 2003 to 2010 in the sum for the variable in question among the families in each of the segments shown. For example, the figure in the top right-hand corner of the Table indicates the absolute difference between total gross debt in 2010 among families with positive net debt at end-2010 and the corresponding sum in 2003 for families with positive net debt that year.
Source: Own calculations on the basis of register data from Statistics Denmark and other institutions, cf. Box 4.

734 billion, pension wealth after tax has risen by kr. 528 billion, and assets other than housing, i.e. predominantly financial assets, have grown by kr. 282 billion. This implies an improvement in the net financial position by approximately kr. 75 billion, and in addition the value of housing has increased by kr. 930 billion.

However, the overall picture masks substantial differences between the individual families, as shown in the previous sections. Since 2003 the gross debt in families with net debt (excluding pension wealth) has increased by kr. 346 billion, which is almost half the increase in total gross debt. At the same time, such families have increased their financial assets by kr. 20 billion, and their pension wealth after tax has risen by kr. 117 billion. Even including pension wealth, the net financial position has thus deteriorated by kr. 210 billion in the period under review, a somewhat stronger deterioration than the growth in the value of their owner-occupied homes.

Despite the generally positive development in wealth since 2003, some groups are thus showing different and far more negative patterns.

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Denmark's Competitiveness and Export Performance

Christian Helbo Andersen, Jacob Isaksen and Morten Spange, Economics

1. INTRODUCTION AND SUMMARY

The Danish economy is characterised by close integration with the rest of the world in both financial and real economic terms. The sum of Denmark's imports and exports almost matches the total gross domestic product, GDP, and one in every four jobs depends directly or indirectly on exports. While Danish exports of goods and services in volume terms have doubled since 1995, exports have fallen as a share of the overall import market. Part of this fall reflects the increased emerging market share of world trade, but that is not the whole explanation.

Exports make up the difference between the influx of resources (production and imports) on the one hand, and domestic absorption (consumption and investment) on the other. During periods of strong domestic demand, a smaller share of output will be left for exports compared with periods of normal economic conditions. This was the case during the boom years in the mid-2000s.

Periods of strong domestic demand are usually characterised by a tight labour market. This normally leads to wage increases exceeding what is warranted by productivity growth. The result is an adverse impact on competitiveness and squeezed exports. In recent years, Danish firms' international competitiveness has deteriorated when calculated on the basis of relative unit labour costs, reflecting both higher wage growth and weaker productivity growth in Denmark than abroad.

Under a fixed-exchange-rate regime such as the Danish one, where the principal objective of monetary policy is to keep the krone stable, fiscal policy is the primary instrument for managing domestic demand. Denmark's competitiveness calculated as production costs relative to international production costs thus depends on the fiscal policy pursued.

A country's export performance is not just dependent on the corporate sector's ability to compete with foreign firms through low production costs. The composition of exports across product groups and destination countries also plays a role. By being present in expanding markets, Denmark may see its share of global exports grow, even if its market

shares in individual submarkets remain unchanged. We find that the composition of Denmark's exports of goods across product groups since 1995 has made a moderately positive contribution to the market shares in its eight largest export markets. The composition across countries has made a largely neutral contribution to the market share over the period as a whole.

Low-tech products account for a large share of Denmark's exports compared with the other OECD countries. This reflects Denmark's specialisation in food, beverages and tobacco, among other products. On the other hand, Danish firms are underspecialised when it comes to high-tech products. What is important is that Denmark is present in industries offering opportunities to benefit from a high level of knowledge in order to cover the high Danish wages. This is also possible in industries other than the high-tech ones. For example, the technological level of the manufacturing process may be high, even for low-tech products. The ability to be present in the fastest growing markets through flexibility and adaptability is also an expression of competitiveness. This ability is best promoted through structural-policy measures that ensure free competition and a flexible labour market.

Traditionally, Denmark's competitiveness has been associated with price competitiveness, which is calculated on the basis of the prices of goods manufactured in Denmark relative to goods manufactured in competitor countries. But in recent years there has been growing focus on non-price competitiveness. Non-price competitiveness comprises non-price factors that affect competitiveness. For example, the ability to manufacture particularly high-quality products or products otherwise differing from those of the competitors has a positive effect on competitiveness.

It is difficult to measure a country's non-price competitiveness, so it is usually assessed on the basis of indicators. Examples include research and development expenditure, the number of patents awarded and the level of education of the labour force. Assessed on the basis of these indicators, Denmark's non-price competitiveness is good compared with other Western countries. For instance, Denmark's research and development expenditure as a ratio of GDP is higher than for the OECD countries overall. Presumably, this is an important reason why Denmark is also at a high level in terms of patents awarded per capita. Furthermore, the improvement in the terms of trade is seen as an indication of Danish firms' ability to compete on other factors besides price. Since the terms of trade indicate the price of exports relative to the price of imports, improved terms of trade reflect that Danish goods have become relatively more expensive. Hence, there are indications that in Den-

mark's case, non-price competitiveness has to some extent been able to compensate for the high unit labour costs.

In order to analyse the drivers of export market growth for a group of OECD countries, we construct an econometric model. The model explains exports in terms of both price and non-price factors. While there is a clear relationship between the development in a country's price competitiveness and its export performance, the effect of non-price competitiveness is less evident. However, countries where research and development expenditure has risen relatively markedly have tended to perform better. The analysis also confirms that in Denmark, price competitiveness has curbed exports, while non-price competitiveness has made a positive contribution.

Despite the loss of market shares, the Danish economy continues to be in a relatively favourable position. The balance of payments displays a surplus, and structural unemployment is moderate. For this development to continue, it is crucial that fiscal policy and the other economic policies are designed so as to ensure that domestic demand develops in accordance with the output potential of the economy. This offers the best conditions for stable export growth combined with wage increases in step with the growth in productivity.

Furthermore, being present in the fastest growing markets may also have a favourable effect. This applies across both countries and product groups. The composition of Danish exports across countries and markets is largely a result of Denmark's business structure, which evolves only slowly over time.

It is difficult to predict the markets where demand will see the strongest future growth. However, it is important to focus on the flexibility and adaptability of the Danish economy to ensure that production resources will be attracted to the industries that are internationally competitive. Finally, the ability to compete on other factors besides price may be improved, e.g. through stronger focus on research and development. While there is a clear favourable effect of adapting fiscal policy to cyclical developments, the other ways to improve competitiveness are associated with a higher degree of uncertainty.

2. BALANCE OF PAYMENTS, EXPORTS AND MARKET SHARES

In 2010, Denmark's external trade in goods and services accounted for 96 per cent of its GDP, a higher share than in most other countries, cf. Table 2.1. Small economies generally tend to be more open than large ones. The Dutch economy is more open than the Danish one, but this should be viewed in the light of the Netherlands' sizeable transit trade, primarily out

EXPORTS AND IMPORTS OF GOODS AND SERVICES AS A SHARE OF GDP AT CURRENT PRICES Table 2.1

	1995	2000	2005	2010
Denmark	71	87	93	96
Germany	47	66	77	88
UK	57	57	56	63
Sweden	73	87	89	94
USA	23	26	26	29
France	44	57	53	53
Norway	70	76	73	71
Netherlands	113	135	131	149

Source: OECD, *Economic Outlook*, No. 90.

of Rotterdam. The position of the Netherlands as the European sea freight hub is the reason why the import content of its exports is particularly large. A large import content of exports implies that domestic value added is lower than indicated by the export figures at first sight.

Balance of payments

Danish hourly wage costs are among the highest in the world. Nevertheless, Denmark has had large current-account surpluses in recent years. In 2011, the current account displayed a surplus of kr. 115.8 billion, or around 6.7 per cent of GDP, which is a large surplus by international standards. The current-account surplus can be attributed mainly to a large surplus on trade in goods. Moreover, while Denmark has a small surplus on trade in services, its position as a creditor country has resulted in a rising investment income surplus, cf. Chart 2.1.

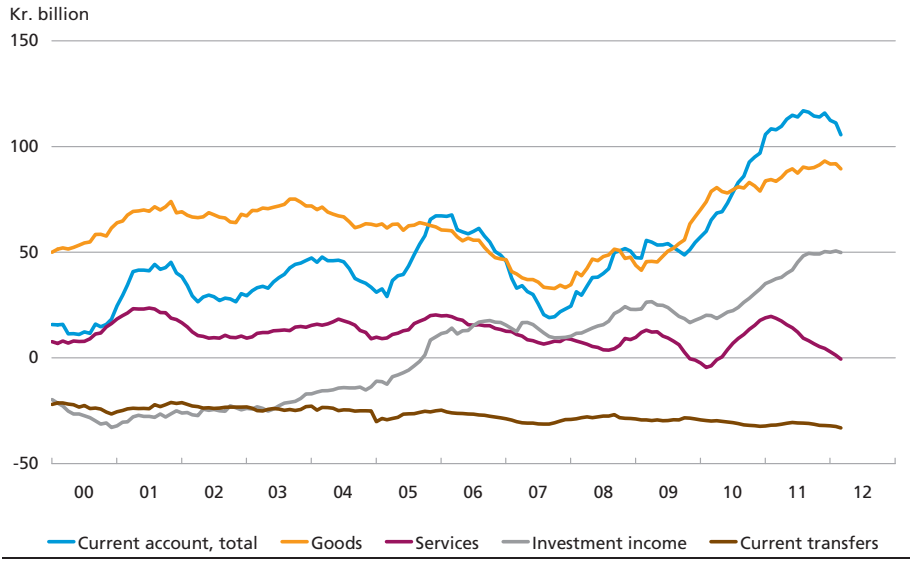
Denmark is a net exporter of oil and gas, and since 1998, the value of Danish oil and gas production in the North Sea has contributed significantly to the trade surplus. The trade balance excluding energy has also displayed a substantial surplus, cf. Chart 2.2. The trade balance weakened during the boom years in the mid-2000s, but it has improved considerably since 2007, partly as a result of a more pronounced slowdown in domestic demand in Denmark than abroad.

Danish export performance in an international context

Since 1995, Denmark's total exports of goods and services in volume terms have grown by approximately 5 per cent p.a., cf. Chart 2.3, which is somewhat more than the country's GDP growth. At the same time, global trade has grown at a faster rate than the global economy over the last 15 years. The trend towards increased trade implies that exports now have a greater impact on the Danish economy.

The development in Danish exports in volume terms reflects a steady upward trend from 1995 to mid-2008. In the latter part of 2008, exports

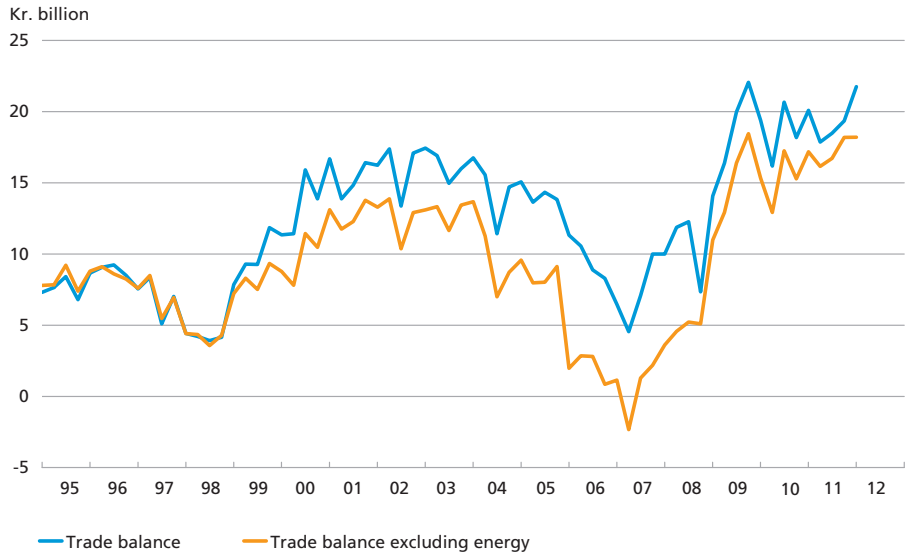
CURRENT ACCOUNT OF THE BALANCE OF PAYMENTS — Chart 2.1



Note: Calculated as 12 month running sums. The most recent observations are from March 2012.
Adjustment has been made to the effect that bunkering in relation to sea freight is included under services rather than under goods.
Source: Statistics Denmark, Balance-of-payments statistics.

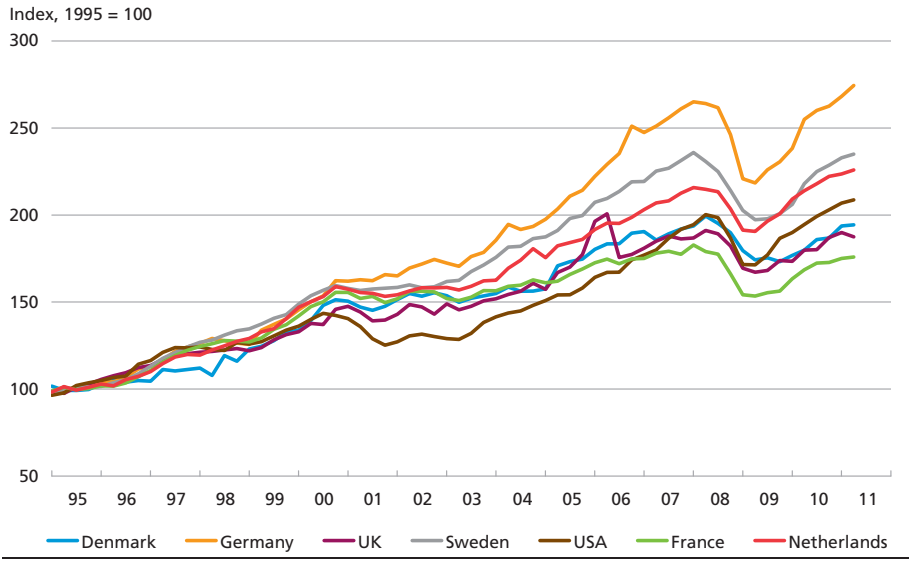
were hit by the international economic downturn and fell considerably as in other countries. Exports levelled off in the course of 2009 and have picked up again since 2010. Over the period 1995-2011 taken as one,

TRADE BALANCE EXCLUDING ENERGY IN CURRENT PRICES — Chart 2.2



Note: Quarterly observations. Seasonally adjusted. The most recent observations are from the 1st quarter of 2012.
Source: Statistics Denmark, External trade statistics.

EXPORTS OF GOODS AND SERVICES IN VOLUME TERMS Chart 2.3



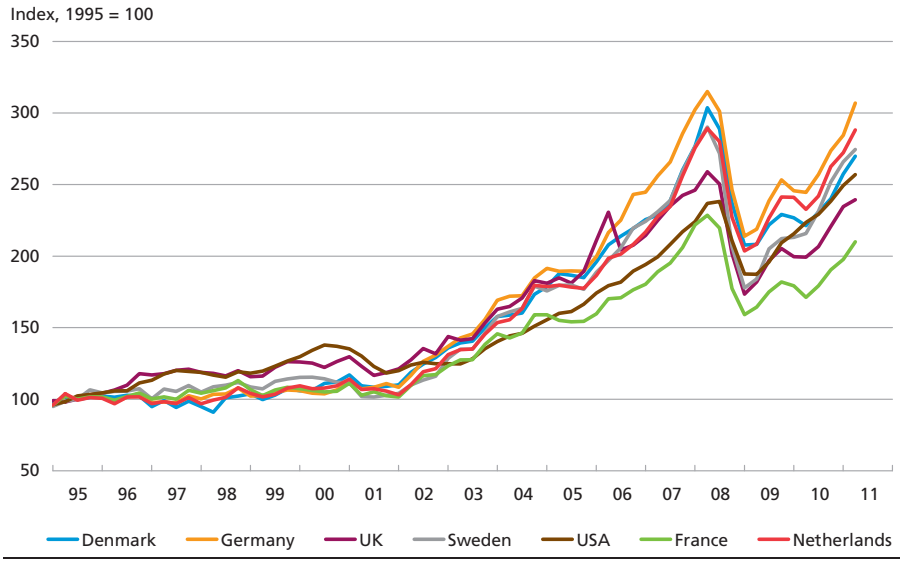
Note: Quarterly observations. The most recent observations are from the 2nd quarter of 2011.
Source: OECD, *Economic Outlook*, No. 90.

Danish export growth in volume terms matched that of the UK, France and the USA, but was less favourable than the growth rates in the Netherlands, Sweden and Germany.

Danish exports fared better in value than in volume terms, cf. Chart 2.4, reflecting that Denmark's terms of trade have improved, i.e. the price of exports relative to the price of imports has risen, cf. Chart 2.5. As a result of its improved terms of trade, Denmark has to export less in order to be able to import a given volume of goods and services, which is beneficial to the country's overall economic welfare. Hence, a boost in the terms of trade is positive in so far as it reflects increased demand for Danish goods relative to foreign goods.

Chart 2.4 shows the value of the countries' exports of goods and services in dollars. This measure is sensitive to fluctuations in exchange rates between the dollar and the euro, pound sterling and Swedish krona, respectively. For example, a strengthening of the dollar vis-à-vis the euro means that Danish exports are worth less compared with US exports when the value of Danish exports is exchanged for dollars. While the calculation in volume terms is most relevant for output and employment, the calculation in value terms is most relevant for the purchasing power and thus the economic well-being of the population. Besides, the value of exports affects the balance of payments. The improvement in the terms of trade has thus contributed to the current-account surplus.

EXPORTS OF GOODS AND SERVICES IN VALUE TERMS, IN DOLLARS — Chart 2.4



Note: Quarterly observations. The most recent observations are from the 2nd quarter of 2011.
Source: OECD, *Economic Outlook*, No. 90.

The calculation of the price of exports, the deflator, is subject to uncertainty, and for that reason the calculation of exports in value terms is more reliable than the calculation in volume terms.

TERMS OF TRADE — Chart 2.5

Note: Quarterly observations. The most recent observations are from the 1st quarter of 2012.
Source: Statistics Denmark.

CALCULATION OF MARKET SHARES Box 2.1

Danish export market shares indicate Denmark's exports as a share of the size of a weighted export market. The market share at the time is defined as:

$$DK\_MA_t = \frac{X_{DK,t}}{DK\_XMKT_t}$$

Here, $X_{DK,t}$ is total Danish exports at time t to a group of N countries, and DK_XMKT_t is the size of the export market at time t.

Our calculation of market shares is based on an export market defined as a weighted average of our trading partners' imports, in which the weightings reflect the country's impact on Danish exports. The Danish market share of the country concerned *i* in a given base year, here set at 2005, is used as weights. This approach is also applied by e.g. the OECD.

The total Danish export market, DK_XMKT_t, is defined as:

$$DK\_XMKT_t = \sum_{i=1}^{N} \frac{X_{DK,i,2005}}{X_{total,i,2005}} M_{total,i,t}$$

Here, $X_{DK,i,2005}$ is Denmark's exports in 2005 to country *i* in dollars; $X_{total,i,2005}$ is total world exports to country *i* in 2005 in dollars; ($X_{DK,i,2005}$ / $X_{total,i,2005}$) is the fixed weight to country *i* when calculating the export market; and $M_{total,i,t}$ is country *i*'s total imports at time t in 2005-dollar terms.

Market-share-based measuring of export performance implies the assumption that Danish exporters compete only with the exporters of other countries and not with manufacturers in the domestic market. For example, our market share in Germany will only measure how well we doing in terms of competition with other exporters to Germany, and not how well we are doing in relation to German manufacturers.

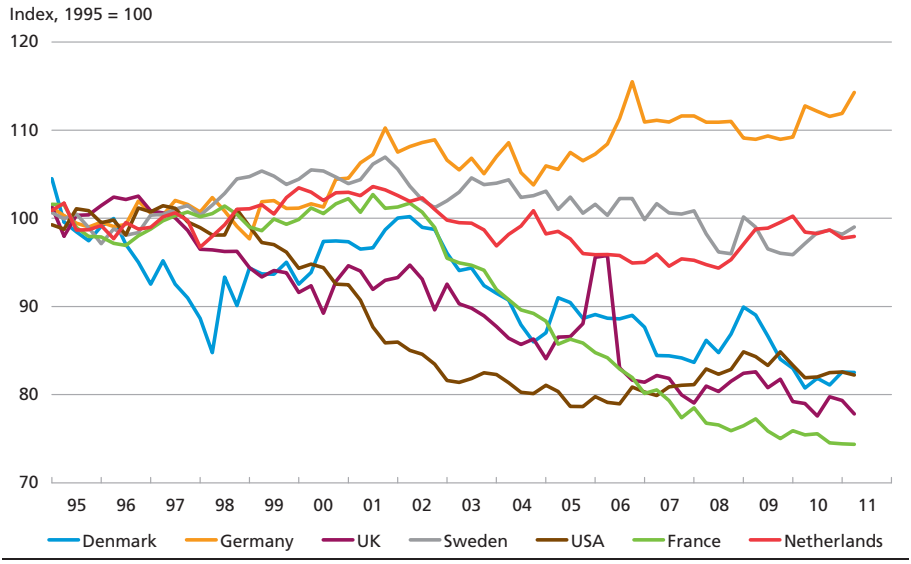
Market shares in volume terms

A country's market share is measured as its exports relative to the development in its export markets, cf. Box 2.1. Like France and the UK, Denmark has been unable to maintain its market share for exports of goods and services in volume terms, cf. Chart 2.6. The loss of market shares reflects that import volumes abroad have grown at a faster rate than Danish exports. Part of the rise in import volumes can be attributed to increased international division of work and integration of e.g. the BRIC countries in the world economy.[1] Since this development is not linked to exports from Western European countries and the USA, it entails a re-

[1] The BRIC countries, i.e. Brazil, Russia, India and China, are often highlighted as examples of countries whose relative weights in the world economy have increased substantially in recent years.

MARKET SHARES FOR EXPORTS OF GOODS AND SERVICES IN VOLUME TERMS

Chart 2.6



Note: Quarterly observations. The most recent observations are from the 2nd quarter of 2011.
Source: OECD, *Economic Outlook*, No. 90.

duction of those countries' market shares that does not reflect a deterioration of competitiveness. However, Denmark's loss of market shares in volume terms is relatively large compared with other Western European countries.

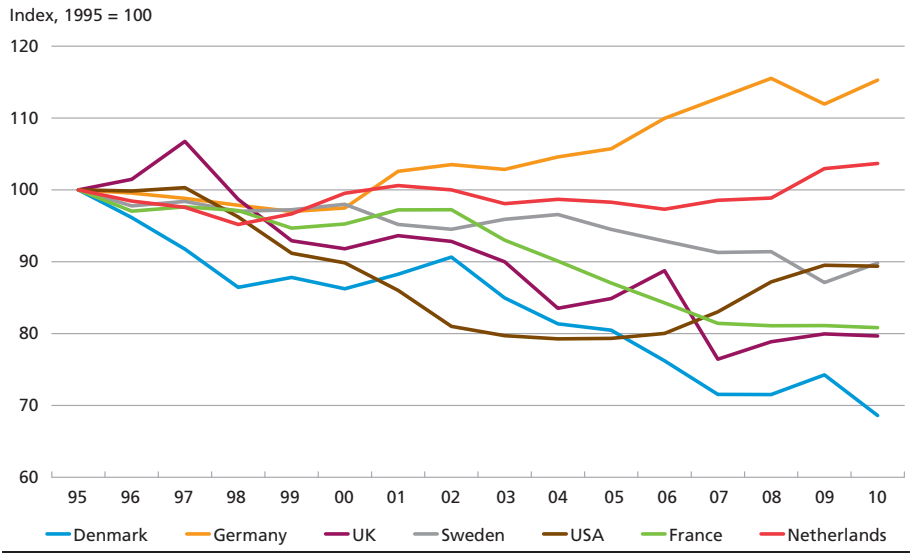
Denmark's loss of market shares is even more pronounced when considering goods exports alone, cf. Chart 2.7. This reflects how the market share for total exports is supported by growth in sea freight exports. Shipping is Denmark's second-largest export sector after manufacturing industry. This contributes to explaining why exports of services constitute just over one third of Denmark's total exports, while trade in services only accounts for around one fifth of total international trade.

In the short term, Danish exports tend to gain market shares during international downturns while losing market shares during upswings, cf. Chart 2.8. This reflects that Danish exports are to a large extent made up of goods that are less cyclical than goods in our export markets, including e.g. medicines and many agricultural products.

Market shares in value terms

The market share for Danish exports of goods and services has been flat over the period 1999-2009, cf. Chart 2.9. Hence, the fact that Danish firms have achieved higher price increases on their export products and higher revenue growth from services than the average rise in import

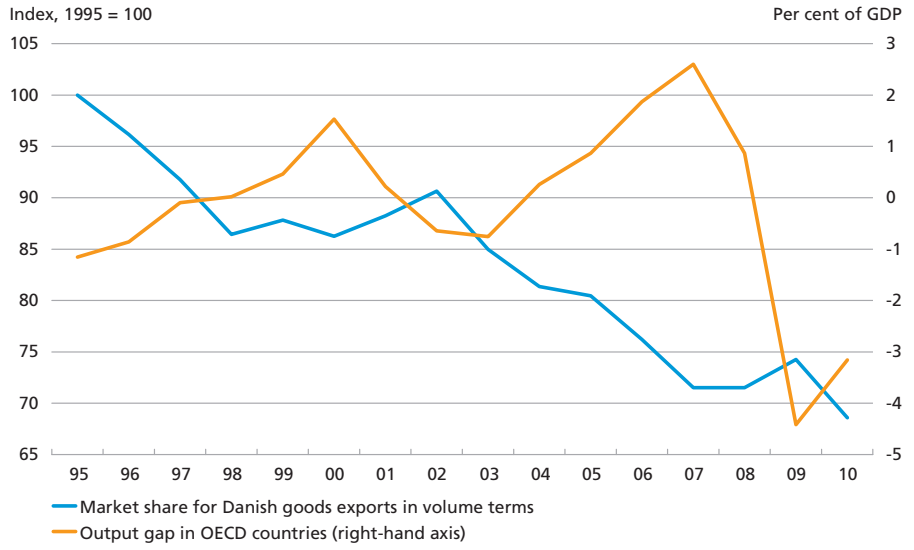
MARKET SHARES FOR EXPORTS OF GOODS IN VOLUME TERMS — Chart 2.7



Note: Annual observations. The most recent observations are from 2010.
Source: OECD, *International Trade Statistics*, OECD, *National Accounts*, and own calculations.

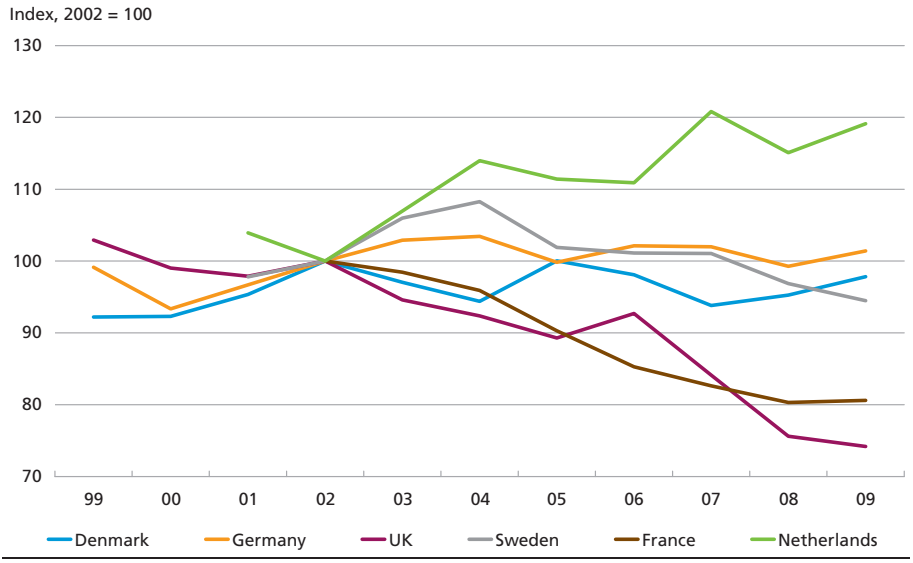
prices for goods and services in Denmark's destination countries has to a substantial degree made up for the loss of market shares in volume terms. The market share for exports of goods and services in value terms has evolved more or less in parallel with that of Sweden, even though

DANISH MARKET SHARE AND THE INTERNATIONAL BUSINESS CYCLE — Chart 2.8



Note: Quarterly observations. The most recent observations are from the 2nd quarter of 2011.
Source: OECD, *International Trade Statistics*, OECD, *Economic Outlook*, No. 90 and own calculations.

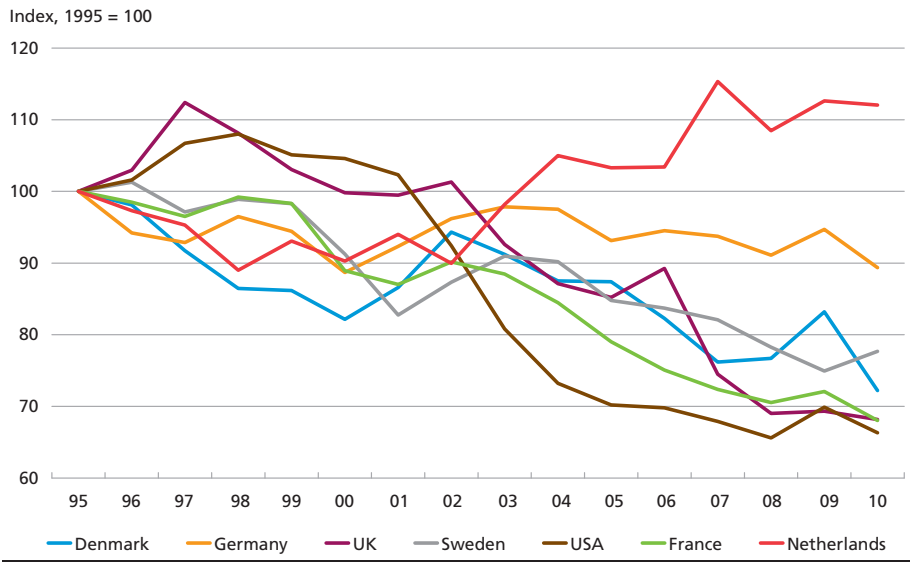
MARKET SHARES FOR EXPORTS OF GOODS AND SERVICES IN VALUE TERMS Chart 2.9



Note: Annual observations. The most recent observations are from 2009.
Source: OECD, *International Trade Statistics*, OECD, *Balance of Payments Statistics* and own calculations.

the development in the Swedish market share in volume terms was much more favourable during the same period. This means that the Swedish terms of trade for goods and services taken as one did not improve to the same degree as in Denmark.

MARKET SHARES FOR EXPORTS OF GOODS IN VALUE TERMS Chart 2.10



Note: Annual observations. The most recent observations are from 2010. The market shares are calculated as the country's exports of goods.
Source: OECD, *International Trade Statistics* and own calculations.

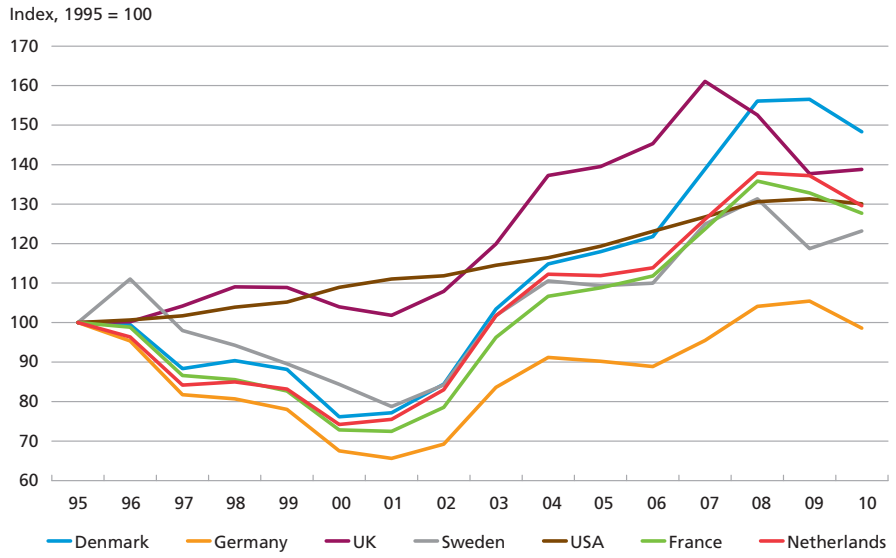
Denmark has lost market shares in terms of value when trade in services is excluded from the calculation, cf. Chart 2.10. The loss of market share in volume terms for Danish exports of goods equalled just over 30 per cent over the period 1995-2010, cf. Chart 2.7, while the loss in value terms was slightly smaller, cf. Chart 2.10. Consequently, the almost flat profile for the market share in value terms for total exports of goods and services reflects that Denmark has gained market shares in the services market while losing market shares in the goods market. The positive evolution in the market share for services market can be attributed to Denmark's substantial sea-freight exports.

3. PRICE COMPETITIVENESS

Products are priced with a mark-up over production costs. In 2011, labour costs amounted to about one third of the total production costs of Danish firms and two thirds of gross value added. So when assessing price competitiveness on a cost basis, it is important to consider unit labour costs in a common currency, to allow for the development in labour costs, currencies and productivity across countries. Over the period 1995-2010, the rise in unit labour costs was higher in Denmark than in most comparable countries, cf. Chart 3.1.

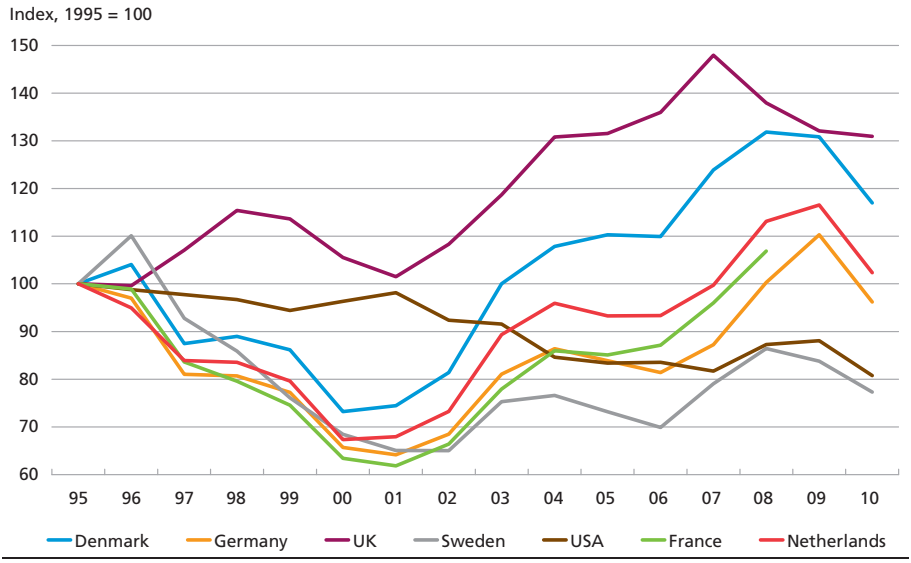
Industrial products account for the largest share by far of exports of goods. Unit labour costs in manufacturing have generally grown more

UNIT LABOUR COSTS FOR THE OVERALL ECONOMY IN DOLLARS — Chart 3.1



Note: Annual observations. The most recent observations are from 2010.
Source: OECD, *Main Economic Indicators*.

UNIT LABOUR COSTS FOR MANUFACTURING IN DOLLARS Chart 3.2



Note: Annual observations. The most recent observations are from 2010 with the exception of France, for which the most recent observations are from 2008.
Source: OECD, *Main Economic Indicators*.

moderately than for the economy overall. However, Danish unit labour costs in manufacturing have risen compared with other countries, cf. Chart 3.2.

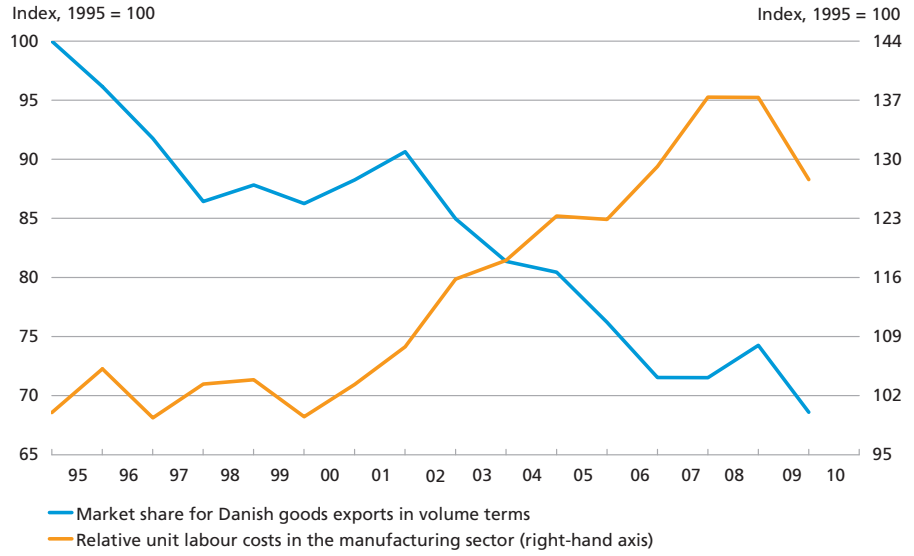
The development in wages and productivity in Denmark compared with abroad can be measured as one by considering the relative unit labour costs in manufacturing. The loss of market shares for Danish exports of goods in volume terms has coincided with the rise in relative unit labour costs, cf. Chart 3.3.

Exchange rate and production costs

As a consequence of the fixed-exchange-rate policy, the krone is stable against the euro, while it has fluctuated somewhat against a number of non-euro currencies. For the period taken as one, the krone exchange rate has remained almost unchanged, however, cf. Chart 3.4. Hence, the development in exchange rates cannot explain the rise in relative unit labour costs in manufacturing since 1995.

Since 1995, countries that have seen the strongest deterioration of wage competitiveness in manufacturing have tended to show the poorest performance in the export markets, cf. Pedersen and Riishøj (2008). Wages in Denmark have increased compared with wages in most other countries since 1995, and especially since 2000, cf. Chart 3.5. In 1995, Danish labour costs were already high compared with other countries, cf. Beier and Pedersen (2005). Conversely, German exports have

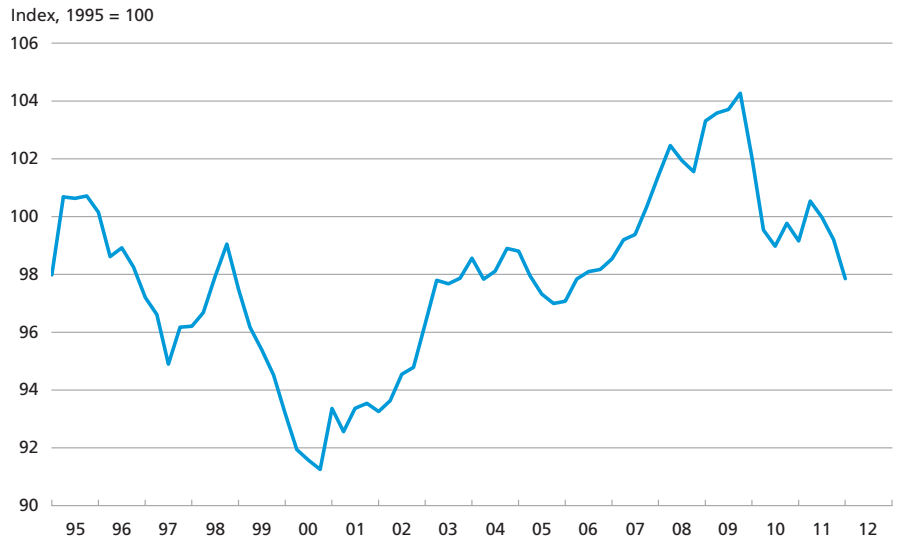
DANISH MARKET SHARE AND UNIT LABOUR COSTS — Chart 3.3



Note: Annual observations. The most recent observations are from 2010. Relative unit labour costs in manufacturing are weighed together using weights from the krone effective exchange rate index.
Source: OECD, *International Trade* Statistics, OECD, *Economic Outlook*, No. 90 and own calculations.

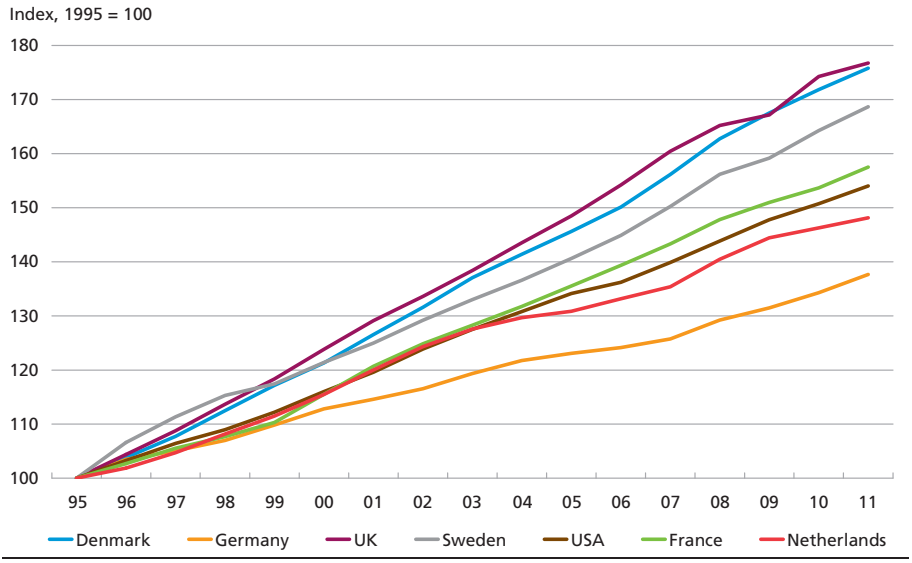
gained market shares in volume terms since 1995, and wage growth in Germany was noticeably lower than in other countries over the period 1995-2010. This should be seen in the light of higher unemployment

NOMINAL KRONE EFFECTIVE EXCHANGE RATE — Chart 3.4



Note: Quarterly observations. The most recent observations are from the 1st quarter of 2012. The krone effective exchange rate shows its strength vis-à-vis the currencies of 27 of Denmark's largest trading partners. An increase in the index indicates a stronger Danish krone.
Source: Danmarks Nationalbank.

HOURLY WAGES IN MANUFACTURING, NATIONAL CURRENCY Chart 3.5



Note: Annual observations. The most recent observations are from 2011.
Source: OECD.

throughout the 1990s. Since the mid-2000s extensive labour market reforms have been implemented, which has helped increase the supply of labour and reduce wage pressures in the short term.

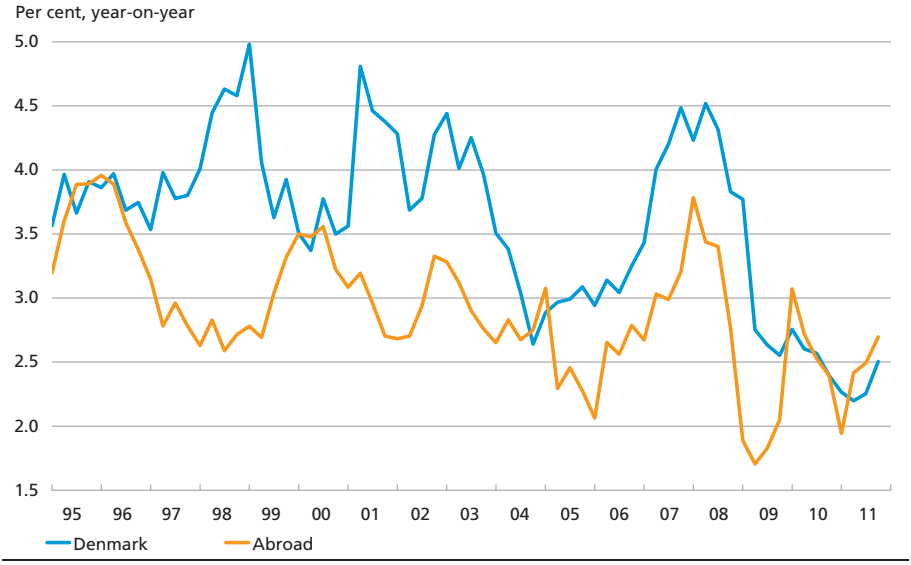
Wage inflation in Danish manufacturing industry was substantially higher than abroad throughout most of the period, and only in 2010 and 2011 did Danish wages increase by less than abroad for several successive quarters, cf. Chart 3.6. This explains a large part of the rise in relative unit labour costs in manufacturing.

In addition to wages, raw materials account for a substantial part of total production costs. Energy is generally a weighty cost item for industrial production. However, compared with other countries, energy consumption in Denmark is low in relation to the size of the economy. This means that the pass-through from higher energy prices to product prices is less pronounced in Denmark than in competitor countries. According to Pedersen and Riishøj (2009), a doubling of energy prices in the world market would improve the price competitiveness of Danish exports by approximately 2 per cent.

Productivity

Productivity growth in the Danish economy since 1995 has been low in relation to a number of comparable countries, cf. Chart 3.7. Over the period 1995-2010, labour productivity in Danish manufacturing industry increased by approximately 2 per cent p.a., while Sweden and the USA

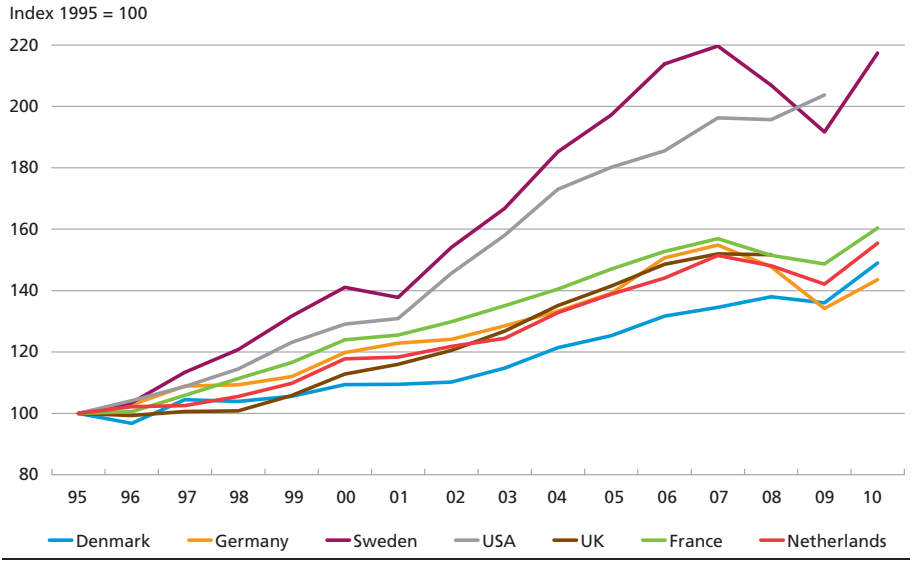
WAGE INFLATION IN THE MANUFACTURING SECTOR — Chart 3.6



Note: Annual observations. The most recent observations are from the 4th quarter of 2011. Wage inflation abroad is based on weighting together weights from the krone effective exchange rate index.
Source: OECD.

saw annual productivity growth of just over 5 per cent. German manufacturing industry achieved labour productivity growth of 3.5 per cent on average up to 2007. In 2008 and 2009, labour productivity in German manufacturing industry declined considerably, partly reflecting the

HOURLY PRODUCTIVITY IN MANUFACTURING — Chart 3.7



Note: Annual observations. The most recent observations are from 2010.
Source: Eurostat (Denmark, Germany, Sweden, France and the Netherlands) and the OECD (the UK and the USA).

higher level of job protection in the German labour market than in the Danish one. So when global demand fell in 2008 as a result of the crisis, it was more difficult for German firms to reduce employment.

The weak Danish productivity growth poses a particular challenge to competitiveness. Andersen and Spange (2012) discuss how to boost productivity growth. In addition to increased flexibility and openness, reinforced education and research initiatives are emphasised. The weak Danish productivity growth has also attracted political attention, and in 2012, the government set up a commission of independent experts who are to present concrete ideas on how to strengthen productivity in Denmark.

Overall, the above analysis indicates that the substantial fall in Danish market shares for exports of goods in volume terms over the last 15 years reflects a marked deterioration of wage competitiveness vis-à-vis abroad. This can be attributed to the fact that despite weak productivity growth, Danish wage increases have for some years been substantially higher than those abroad.

4. DISAGGREGATED ANALYSIS OF DENMARK'S EXPORT PERFORMANCE

Sections 2 and 3 primarily discussed the link between export performance and price competitiveness. However, Denmark's export performance does not only depend on its ability to compete with foreign manufacturers within individual product groups. The composition of exports across products and destination countries also plays a role. Being present in expanding markets may cause Denmark's total market share to grow, even if its market shares in individual submarkets remain unchanged. Thus, the ability to be present in these markets through flexibility and adaptability is also an expression of competitiveness.

Structure effect and submarket-share effect

In the following, we decompose the development in Denmark's aggregate market share of goods into two overall effects, i.e. the structure effect and the submarket-share effect.[1] The *structure effect* indicates the hypothetical change in the aggregate export market share which would have occurred if Denmark's market share had remained unchanged across product groups and destination countries. A positive structure effect thus reflects relatively strong growth in Denmark's primary export markets. The *submarket-share effect* is the difference between the over-

[1] A comparable analysis was conducted by the ECB (2005). The Ministry of Finance has conducted similar analyses on previous occasions, see e.g. Ministry of Finance (1986).

all change in the market share and the structure effect. This effect is thus an expression of exporters' performance in the individual submarkets. The structure effect can be further decomposed into three components: the *product effect*, measuring how export performance is affected by the composition of exports across products; the *market effect*, measuring how export performance is affected by the composition of exports across markets; and a third component, which captures the interaction between the product and market effects. This component is called the *mixed structure effect*. Box 4.1 shows the detailed calculations of the individual effects.

The analysis is conducted on the basis of detailed data for trade in goods with Germany, France, the UK, Italy, the Netherlands, Norway, Sweden and the USA. These eight countries together have accounted for a total of approximately 60 per cent of Denmark's exports of goods since 1995. We use data broken down by goods according to the Standard International Trade Classification (SITC) at two-digit level. To prevent the results from being dominated by the large energy price fluctuations in recent years, the main category, "Mineral fuels, lubricants, etc.", is left out. The category entitled "Various goods and transactions not included elsewhere" is also excluded. This leaves 59 different product groups.

Data are only available in value terms. This means that an increase in Denmark's market share may reflect both strong export growth in volume terms and improved terms of trade. Since exports are measured in dollars, they are affected by changes in the dollar exchange rate. If, say, the share of Denmark's exports denominated in dollars is smaller than the share of the eight OECD countries' imports denominated in dollars, an increase in the dollar exchange rate will, all else equal, lead to a decline in Denmark's market share, even if the volumes remain unchanged. This is captured by the submarket-share effect.

Due to the distinction between product groups and export markets, the data basis differs from the one used in section 2. Overall, Denmark's export market share in value terms declined by approximately 25 per cent from 1995 to 2010, cf. Chart 4.1. This was caused by a loss in competitiveness in the individual submarkets. It supports the assumption that Denmark's export performance has been impeded by the rise in Danish export prices relative to the prices abroad. Moreover, the growing importance of emerging markets to global trade will contribute to reducing Denmark's market share, cf. section 2 of this article.

On the other hand, the composition of Danish exports of goods across countries and product groups has contributed to increasing Denmark's market share, cf. the red curve. This reflects a negative structure effect up to 2000, after which time the structure effect has been positive.

DECOMPOSITION OF DENMARK'S EXPORT PERFORMANCE Box 4.1

The basis of the decomposition of Denmark's export performance is that the change in market shares from one year to the next (the total effect) can be broken down as follows:[1]

$$g - g^* = \left[\sum_i \sum_j \left(\theta_{ij} - \theta_{ij}^*\right) g_{ij}^*\right] + \left[\sum_i \sum_j \theta_{ij}\left(g_{ij} - g_{ij}^*\right)\right] \quad (1)$$

where:

$$g = \frac{X_t - X_{t-1}}{X_{t-1}} \quad \left(g^* = \frac{M_t - M_{t-1}}{M_{t-1}}\right)$$

is the percentage growth in Danish exports to the eight OECD countries included in the analysis (the eight OECD countries' total imports) in period t

$$\theta_{ij} = \frac{X_{ij,t-1}}{X_{t-1}}$$

is exports of product i to market j as a share of Denmark's total exports to the eight countries in period t-1

$$g = \sum_i \sum_j \theta_{ij} g_{ij} \quad \left(g^* = \sum_i \sum_j \theta_{ij}^* g_{ij}^*\right)$$

where g_{ii} $\left(g_{ii}^*\right)$ is the percentage change in Denmark's exports to the eight OECD countries (the eight OECD countries' total imports) of product i to/from country j.

The first term in (1) is the structure effect. This effect will be positive if Denmark's exports to the eight OECD countries are more concentrated on products and markets with high growth than total OECD imports. The structure effect can be decomposed into three components:

$$\textit{Product effect} = \sum_i \left(\theta_i - \theta_i^*\right) g_i^*$$

$$\textit{Market effect} = \sum_j \left(\theta_j - \theta_j^*\right) g_j^*$$

$$\textit{Mixed structure effect} = \sum_i \sum_j \left[\left(\theta_{ij} - \theta_{ij}^*\right) - \left(\theta_i - \theta_i^*\right)\frac{\theta_{ij}^*}{\theta_i^*} - \left(\theta_j - \theta_j^*\right)\frac{\theta_{ij}^*}{\theta_j^*}\right] g_{ij}^*$$

where:

$$\theta_i = \sum_j \theta_{ij} \quad \left(\theta_i^* = \sum_j \theta_{ij}^*\right)$$

is product i's share of Danish exports to the eight OECD countries (the eight OECD countries' total imports) in period t-1

[1] The decomposition is in accordance with ECB (2005).

CONTINUED Box 4.1

$$\theta_j = \sum_i \theta_{ij} \quad \left(\theta_j^* = \sum_i \theta_{ij}^* \right)$$

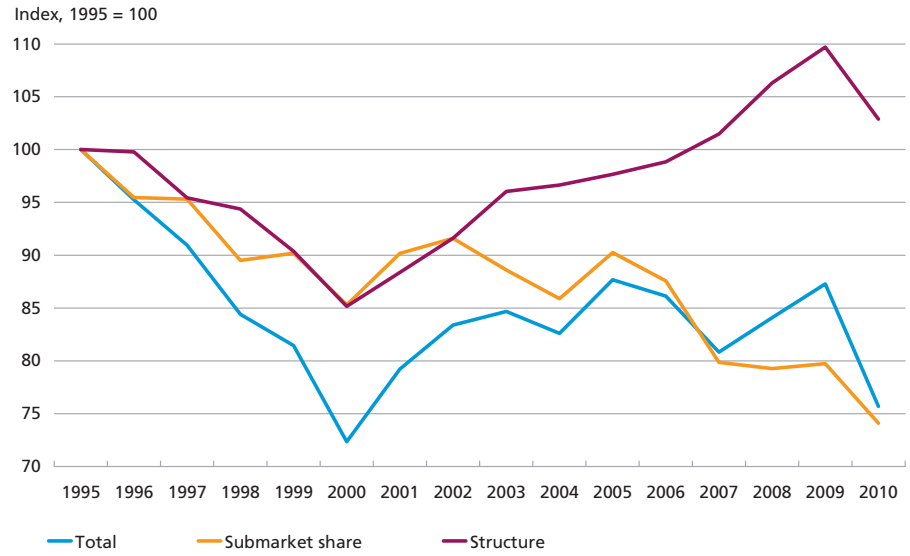
is country j's share of Danish exports to the eight OECD countries (the eight OECD countries' total imports) in period t-1

$$g_i^* = \frac{\sum_j \theta_{ij}^* g_{ij}^*}{\theta_i^*} \quad g_j^* = \frac{\sum_i \theta_{ij}^* g_{ij}^*}{\theta_j^*}$$

is growth in the eight OECD countries' imports of product i (goods from country j) in period t.

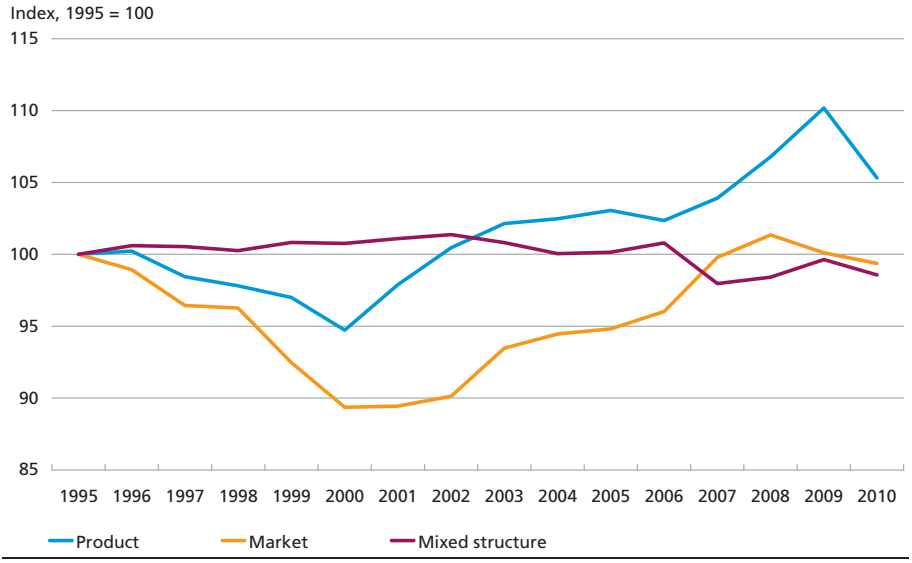
The positive structure effect reflects that Danish exports are concentrated on product groups for which the destination market has grown since 2000 relative to the total export market, cf. Chart 4.2. The composition of exports across the eight countries had a negative impact on Danish export growth in the period 1995-2000, primarily because import growth in the USA was much higher during that period than import growth in the European countries. Since Denmark's presence in the US market is relatively weak, this contributes to reducing Denmark's total market share.

MARKET SHARE, GOODS Chart 4.1



Source: OECD and own calculations.

MARKET SHARE, GOODS, STRUCTURE EFFECT — Chart 4.2



Source: OECD and own calculations.

Specialisation of Danish exports

The following section analyses the composition of Danish exports across product groups. Low-tech products as a percentage of exports have declined considerably over the last 50 years, cf. Table 4.1, the primary rea-

COMPOSITION OF DANISH EXPORTS — Table 4.1

	1960-69	1970-79	1980-89	1990-99	2000-10
Food, beverages and tobacco (FOD)	53.7	39.9	35.5	29.4	23.2
Textile and leather apparel (TEX)	5.4	7.2	6.9	7.1	7.5
Wood and wood products (WOD)	3.1	3.9	5.9	7.0	5.4
Paper and paper products	0.7	1.0	1.4	1.5	1.3
Non-metallic mineral products (MNM)	1.2	1.8	1.8	1.8	1.7
Basic metal industries (BMI)	1.6	2.6	3.0	2.4	2.7
Fabricated metal products (BMA)	1.8	2.5	2.9	3.6	3.8
Low-tech, total	67.5	58.9	57.4	52.8	45.6
Chemical products (CHE)	6.3	7.9	10.2	11.6	15.8
- of which medicines and pharmaceutical products	1.8	2.1	3.2	5.2	9.0
Manufacture of agricultural and industrial machinery (MAI)	14.6	17.2	16.0	16.2	18.3
Manufacture of transport equipment (MTR)	5.4	6.5	5.5	5.7	5.2
Medium-tech, total	26.3	31.6	31.7	33.5	39.3
Professional and scientific equipment (MIO)	2.2	3.3	4.6	5.7	6.0
Manufacture of electrical machinery (MEL)	4.0	6.3	6.4	8.0	9.1
High-tech, total	6.2	9.6	11.0	13.7	15.1

Source: OECD and own calculations. The breakdown by industry follows from Anderton (1999).

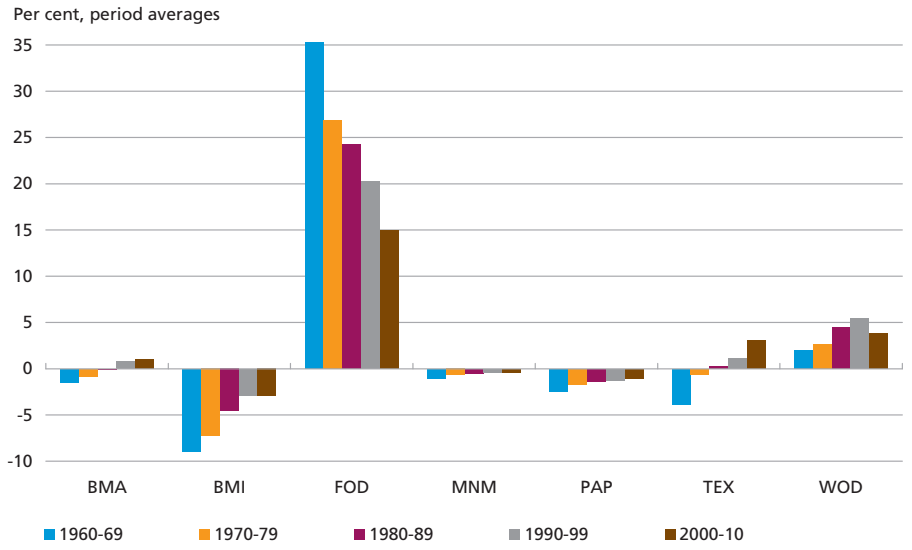
son being the declining importance of agricultural exports. From constituting more than half of Denmark's total exports, food, beverages and tobacco now account for less than one fourth. On the other hand, the share of goods from medium-tech sectors has increased substantially, mainly because Denmark has generated very considerable exports of medicines and other pharmaceutical products.

The shift across sectors towards more high-tech products reflects the general increase in wealth experienced by all countries. As a result of rising incomes, high-tech products will generally account for a larger part of consumption. Compared with the rest of the OECD, agriculture has traditionally made up a substantial part of Danish exports, cf. Chart 4.3. This is still the case, although it is less pronounced than previously.

On the other hand, Denmark used to be underspecialised in metals, but that trend has also been less pronounced in recent decades.

The increasing relative specialisation in textiles is attributable to the decline in the sector's share of total OECD exports, while its share of Danish exports has been relatively stable since the 1970s. However, the large volume of textile exports may to some extent reflect that Danish firms import textiles from less cost-intensive countries in order to re-export them to its neighbouring markets. But the extent of this effect cannot be illustrated on the basis of the data set used. Overall, due to its

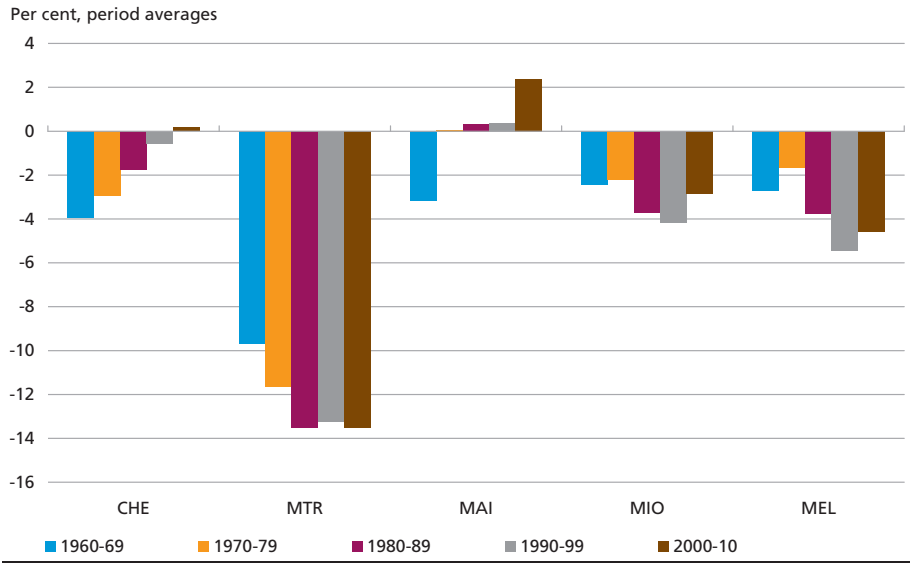
DENMARK'S RELATIVE SPECIALISATION IN LOW-TECH PRODUCTS Chart 4.3



Note: The indicator shows the difference between a sector's share of Danish exports and its share of OECD exports. A high value indicates that Denmark has a relatively high level of specialisation in the sector under review. BMA: fabricated metal products; BMI: basic metal; FOD: food, beverages and tobacco; MNM: non-metallic mineral products: PAP: paper and paper products; TEX: textile and leather apparel; WOD: wood and wood products.
Source: OECD and own calculations.

DENMARK'S RELATIVE SPECIALISATION IN MEDIUM-TECH AND HIGH-TECH PRODUCTS

Chart 4.4



Note: The indicator shows the difference between a sector's share of Danish exports and its share of OECD exports. A high value indicates that Denmark has a relatively high level of specialisation in the sector under review. CHE: chemical products; MTR: manufacture of transport equipment, MAI: manufacture of agricultural/industrial machinery, MIO: professional and scientific equipment, MEL: electrical machinery.

Source: OECD and own calculations.

large agricultural exports, Denmark continues to be relatively specialised in low-tech products compared with the OECD as a whole.

Compared with the other OECD countries, Denmark is underspecialised in medium-tech and high-tech products, cf. Chart 4.4. The negative specialisation in medium-tech products is mainly attributable to Denmark not having an auto manufacturing sector. However, compared with the OECD as a whole, Denmark is specialised in manufacturing agricultural/industrial machinery. The negative specialisation in high-tech production is broadly based across the scientific equipment and electrical machinery industries.

In some low-tech industries it may be difficult for individual manufacturers to differentiate their products from those of their competitors. Consequently, low costs of production have a major impact on competitiveness. A high technological level in the manufacture of low-tech products will often be associated with high productivity, which reduces costs. Advanced economies may therefore have a comparative advantage when it comes to the production of low-tech products.

Sectors manufacturing more sophisticated products provide better opportunities for individual firms to manufacture products that differ from those of their competitors and thus to obtain higher prices. This

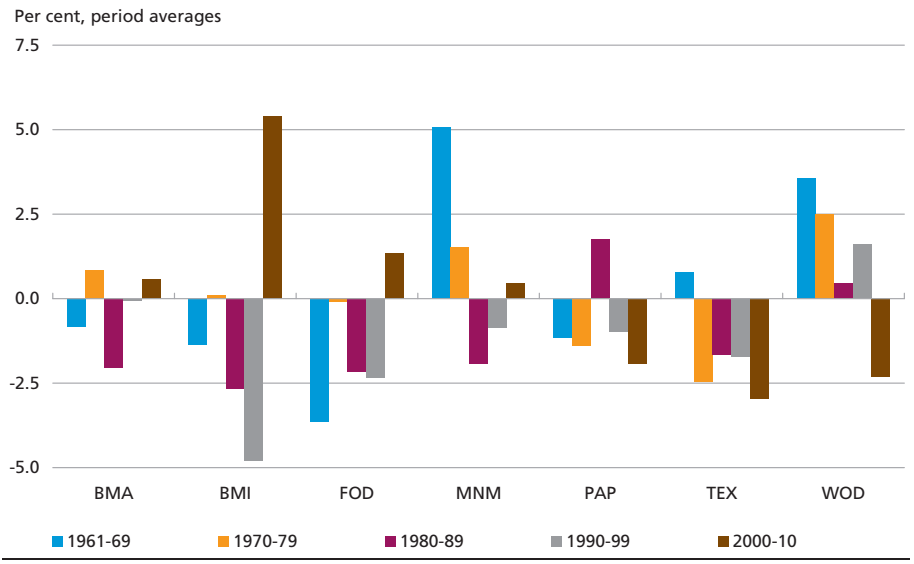
often requires a well-educated labour force and investment in research and development in the corporate sector. Accordingly, innovation is key in terms of staying competitive in high-tech industries.

Looking forward, it is important to ensure that labour and the other production resources will be attracted to those industries and firms with the highest level of international competiveness. Measures ensuring free competition among firms and a flexible labour market may therefore have a favourable effect on Denmark's export performance.

Dynamic OECD export sectors

It is crucial for Danish export growth that the categories of goods for export are in demand. However, growth in OECD exports in the textiles and wood product sectors, where Denmark is relatively specialised, has been weak in the last decade compared with growth in total OECD exports, cf. Chart 4.5. On the other hand, OECD exports of food and machinery, where Denmark is also relatively specialised, have grown more than average. Presumably, the positive growth indicator of basic metal and food exports since 2000 reflects to some extent that the prices of many commodities have risen substantially. Unless commodity prices increase further, the indicators for those sectors can be expected to become negative again in the future, as was the case before 2000.

SECTOR DYNAMICS IN OECD EXPORTS – LOW-TECH PRODUCTS Chart 4.5

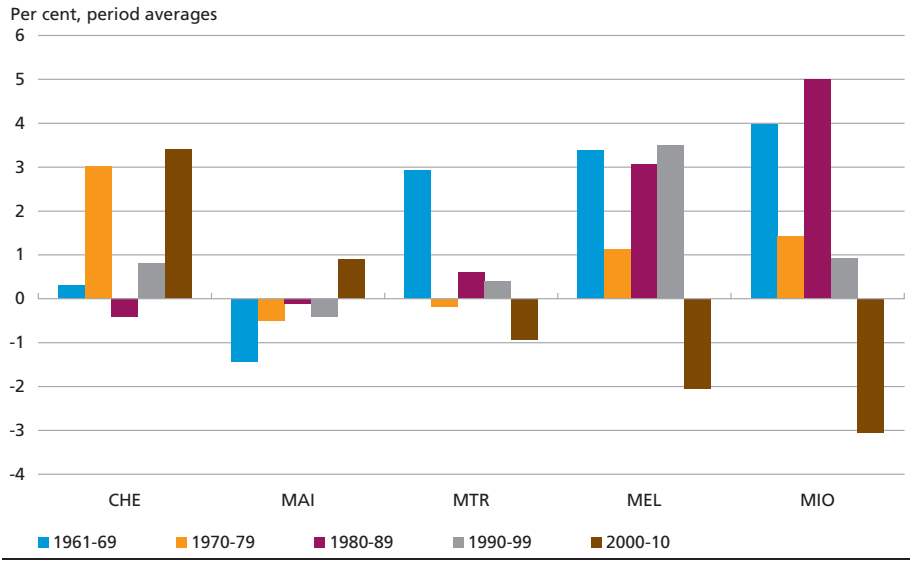


Note: The indicator shows the difference between growth in OECD exports for a given sector and growth in total OECD exports. A positive value indicates that exports in a given sector are higher than the total growth in exports. For the names of sectors, see the note to Chart 4.3.

Source: OECD and own calculations.

SECTOR DYNAMICS IN OECD EXPORTS – MEDIUM-TECH AND HIGH-TECH PRODUCTS

Chart 4.6



Note: See the note to Chart 4.5. For the names of sectors, see the note to Chart 4.4.
Source: OECD and own calculations.

Metals and chemical products are the industries in which total OECD exports have seen the fastest growth since 2000. Denmark has gradually become increasingly specialised in the sector of chemical products so that the sector's share of Danish exports now matches its share of OECD exports. This mainly reflects the good performance of the Danish pharmaceutical industry in the export markets. At the same time, the pharmaceutical industry is more dynamic in the OECD export market than the chemical industry as a whole, thereby contributing positively to Denmark's export performance.

Exports of high-tech products as a percentage of OECD exports have declined since 2000, cf. Chart 4.6. The negative indicator of electrical equipment reflects weak growth in exports of both telecommunications equipment and other electronics. The indicator of professional and scientific equipment is pushed down mainly by a large negative contribution from office equipment. Denmark is relatively less specialised in this industry than the OECD countries as a whole. Part of the explanation for the relatively weak growth in OECD exports of high-tech products is that a large proportion of this production now takes place in the Asian emerging market economies that used to manufacture primarily relatively simple products.

Denmark's relative export specialisation is generally neither unequivocally good nor bad. The relative specialisation in low-tech products may

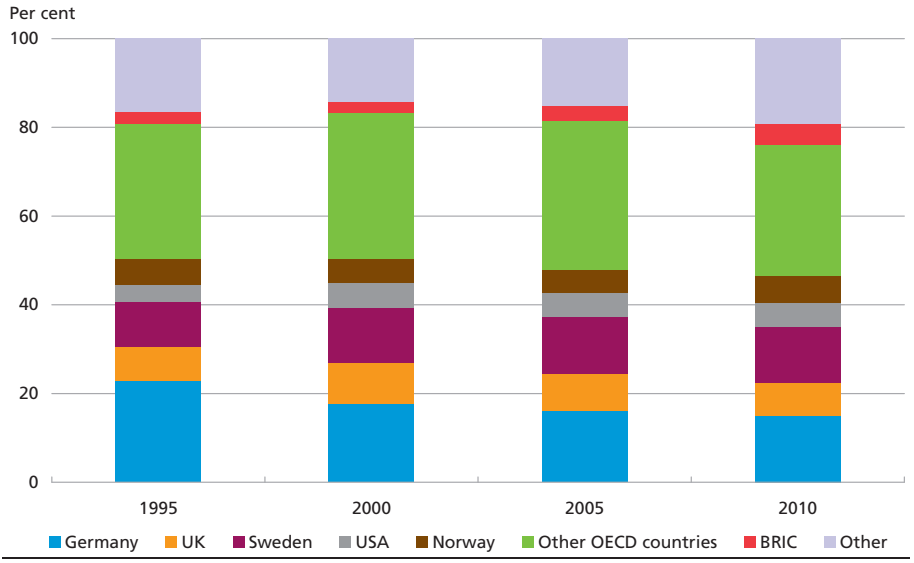
seem to be a cause for concern, but there is no unequivocal connection between a sector's value added and the technological content of its products. Thus, because of improvements in the technology of production, labour productivity growth, e.g. in the agriculture sector, has exceeded the average productivity growth in the economy for many years. This has resulted in high value added within the sector, even though it is categorised as low-tech. OECD high-tech exports, where Denmark is relatively underspecialised, experienced high growth until 2000. However, this trend was broken in the last decade during which high-tech exports in value terms grew by less than total OECD exports.

Exports to emerging market economies

Traditionally, Denmark's exports have been aimed at the old industrialised countries. Germany is the largest individual market, accounting for 15 per cent of Denmark's exports of goods in 2010. In second place, Sweden accounts for around 13 per cent, cf. Chart 4.7. On the other hand, only around 24 per cent of Denmark's exports go to non-OECD markets, and that share has risen only slightly since 1995.

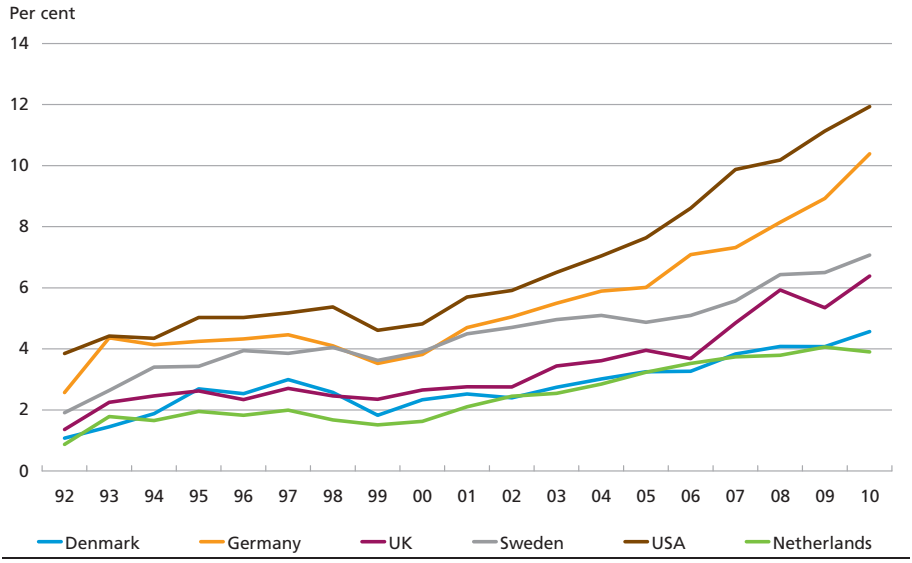
The BRIC countries' impact on world trade has increased in recent years. Together, the four countries now take 10 per cent of German exports and as much as 12 per cent of US exports, cf. Chart 4.8. Even though Denmark's exports to the BRIC countries have also increased, they still constitute less than 5 per cent of Denmark's total exports. The

COMPOSITION OF DANISH EXPORTS OF GOODS IN VALUE TERMS — Chart 4.7



Note: The BRIC countries are Brazil, Russia, India and China.
Source: OECD and own calculations.

EXPORTS TO THE BRIC COUNTRIES Chart 4.8



Source: OECD and own calculations.

BRIC countries' imports can be expected to continue their strong growth in the future, so it is attractive to be present in those markets.

There may be several reasons why Denmark's trade with distant markets is relatively limited. One of the reasons is of a technical nature. Because the distance from an average firm to the nearest border is greater in a large country, firms in a small country will always have a larger share of their near market abroad. Hence, exports to neighbouring countries will account for a larger share of firms' sales in a small country. As a consequence, exports to distant markets will automatically account for a smaller share of the country's total exports. But this does not explain why Danish exports to the BRIC countries are considerably smaller than e.g. Swedish exports. One possible reason is that Danish exports include many relatively expensive quality products. Demand for such products will typically be higher in countries with high average incomes. Hence, Denmark's exports to the BRIC countries may grow with rising incomes in those countries.

Small firms in particular may find it difficult to venture into new markets. Denmark's limited presence in the BRIC markets may thus reflect that small and medium-sized Danish firms are to a large extent subcontractors to e.g. German exporters to BRIC. In that case, Danish exports will also benefit from growing BRIC imports. Compared with the EU as a whole, Denmark is not a country where small firms account for an unusually large percentage of employment, cf. Table 4.2. In large countries

SMALL AND MEDIUM-SIZED ENTERPRISES IN THE NON-FINANCIAL SECTOR, 2006 Table 4.2

Per cent of total employment	Micro (1-9 employees)	Small (10-49 employees)	Medium-sized (50-249 employees)	Small and medium-sized enterprises, SMEs (1-249 employees)	Large (250+ employees)
Denmark	19.7	25.2	21.0	66.0	34.0
Sweden	24.7	20.9	18.1	63.7	36.3
Netherlands	29.2	21.1	17.0	67.3	32.7
UK	21.5	17.9	15.4	54.8	45.2
Germany	19.3	21.8	19.3	60.5	39.5
France	24.7	20.8	16.2	61.7	38.3
Italy	46.9	21.6	12.5	81.0	19.0
Spain	37.7	25.5	14.8	78.0	22.0
EU27	29.7	20.7	17.0	67.4	32.5

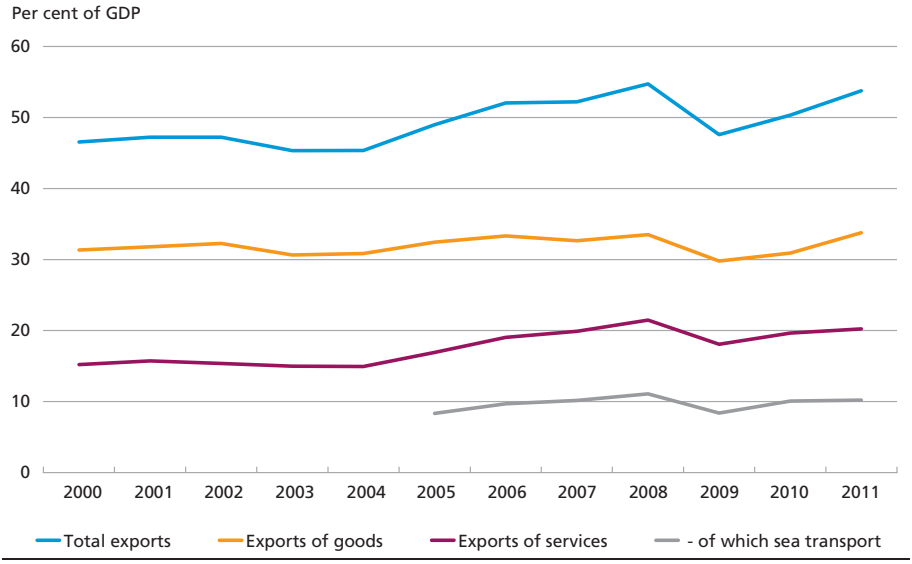
Note: The non-financial sector comprises manufacturing, building and construction and non-financial services. For the Netherlands, the data are from 2005.
Source: Eurostat, *European Business Economy Overview*, 2009.

like Germany, France and the UK, large firms account for a greater part of total employment, however. But in overall terms, it is difficult to identify structural conditions that would make it particularly hard for Danish firms to set up in distant markets compared with the EU as a whole.

Trade in services

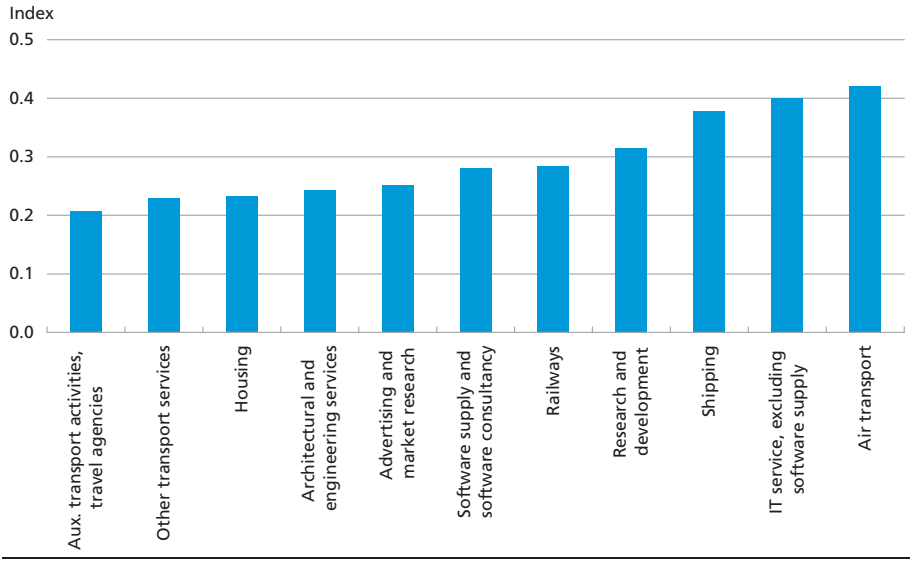
The above analysis concerns trade in goods, reflecting that Denmark's exports of goods are more than twice the size of its exports of services,

EXPORTS OF GOODS AND SERVICES Chart 4.9



Source: Statistics Denmark.

TRADE POTENTIAL FOR SERVICES IN DANISH INDUSTRIES Chart 4.10



Source: Borchsenius et al. (2010).

cf. Chart 4.9. Besides, Denmark's trade in services is dominated by sea freight.

It is an open question whether Denmark makes sufficient use of its export potential for services, however. Borchsenius et al. (2010) identify a number of highly specialised services which all offer significant potential for international trade, cf. Chart 4.10. The authors use a method comparing the domestic geographical concentration of production and consumption, respectively, of a particular type of service. The idea is that if production of the service in question is concentrated in one particular area, while consumption is spread across the country, this implies that the service is tradable over distances, and it may therefore be assumed that the service can also be traded internationally. By specialising in services such as advisory services, IT services and research and development, Denmark may seek to compensate for declining exports of goods and thus benefit from its highly educated labour force.

5. NON-PRICE COMPETITIVENESS

Competitiveness often implies price competitiveness calculated on the basis of relative unit labour costs, for example. But competitiveness depends on other factors besides prices, wages and productivity. In this section, we look into a number of indicators of non-price competitive-

ness that may impact a country's export performance. The concept of using other parameters besides price to explain a country's exports is based on recent trade theory, see e.g. Krugman (1989). In addition to price, a firm can differentiate its products from those of other firms by improving product quality or by expanding its product range. This enables the firm to raise its prices by making it more difficult for consumers to substitute these products for other products. Hence, it is necessary to consider other parameters besides price when explaining a country's export performance.

According to a survey by the Ministry of Economic and Business Affairs (2007), Denmark ranks second in Europe in terms of manufacturing quality goods. In 2005, quality goods – defined as goods exported at a premium of minimum 15 per cent in relation to average export prices for the EU15 member states – accounted for more than 40 per cent of Denmark's total exports of goods, second only to Ireland. Pedersen and Riishøj (2008) also conclude that Denmark has specialised in products that sell at very high prices in the global market.

High prices do not necessarily equal quality, however. Instead, they may imply that Denmark has higher costs of production than its competitors, and that Danish firms consequently have to charge higher prices. If that is the case, it will further reduce Denmark's market share. It is therefore important to analyse the extent to which the high prices of Danish goods reflect a quality edge.

Indicators of non-price competitiveness

Because it is difficult to measure differentiation by other parameters than price, the use of indicators is necessary. In recent years, policymakers have increasingly focused on indicators of non-price competitiveness. For example, the Ministry of Business and Growth issues an annual competitiveness report, in which they evaluate Denmark's position relative to abroad based on a number of indicators (Ministry of Economic and Business Affairs, 2011).

Some of the indicators of non-price competitiveness are firm-specific, while others are of a more structural nature. The firm-specific indicators include technology, expenditures on research and development and the number of patents, among others, while the structural indicators include the level of education, infrastructure, export barriers, etc. Where the structural indicators measure the extent to which the corporate sector of a country is generally in a position to manufacture products of higher quality and export them, the firm-specific indicators reflect the competitive position of individual exporters in the export market.

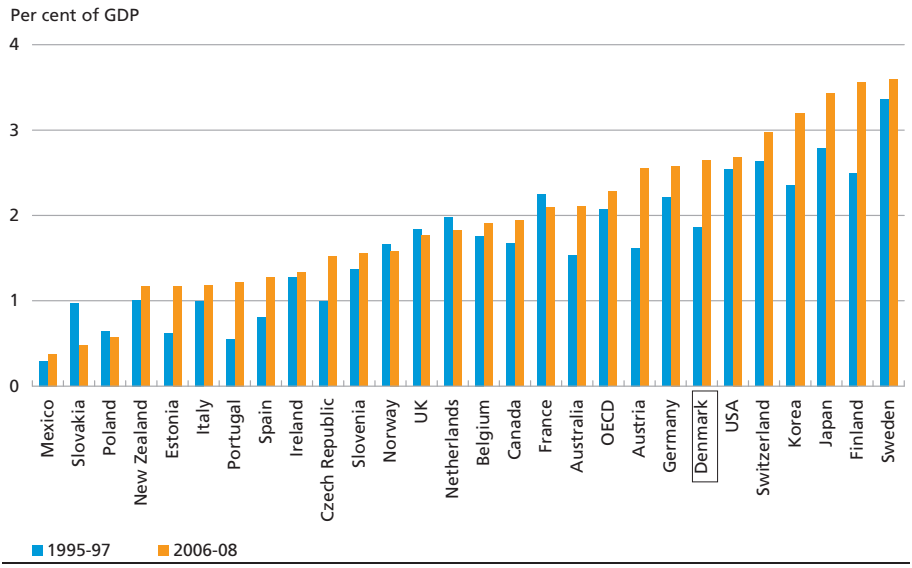
Firm-specific indicators

According to the Ministry of Economic and Business Affairs, firms manufacturing quality goods have a higher share of employees with tertiary education and invest more in research and development than other exporters. It is therefore interesting to analyse Denmark's general performance compared with its trading partners in terms of these indicators of non-price competitiveness. In Denmark, as in e.g. Sweden and Finland, research and development account for a relatively large share of GDP, cf. Chart 5.1. From 1995 to 2009, expenditure in Denmark rose by almost 1 percentage point, moving Denmark from a below-average to an above-average position in an OECD context. This is a possible indication of improved non-price competitiveness.

In Denmark, the corporate sector contributes two thirds of the funds for research and development with the education sector largely accounting for the last third, cf. Table 5.1. Compared with the euro area, the contribution from the education sector in Denmark is substantially larger, while the contribution from the rest of the public sector is smaller.

In view of the high research and development expenditure, it may seem strange that Danish exports are specialised in low-tech products, while medium-tech and high-tech products account for smaller shares of Denmark's exports than is the case for the OECD countries overall, cf.

EXPENDITURE FOR RESEARCH AND DEVELOPMENT — Chart 5.1



Note: The Chart shows a country's expenditure for research and development as an average share of GDP for the periods 1995-97 and 2006-08. For Mexico and New Zealand, an average for the period 2005-07 instead of 2006-08 is used for data availability reasons.

Source: OECD.

EXPENDITURE FOR RESEARCH AND DEVELOPMENT, PER CENT OF GDP, 2009 Table 5.1

Unit	Private firms	Private non-profit sector	Education sector	Other public sector	Total
Denmark	2.08	0.01	0.90	0.06	3.06
France	1.39	0.03	0.47	0.37	2.26
Norway	0.93	-	0.58	0.29	1.80
Sweden	2.54	0.00	0.91	0.16	3.61
Germany	1.91	-	0.50	0.42	2.82
UK	1.12	0.05	0.52	0.17	1.86
USA	2.02	0.11	0.36	0.30	2.79
The euro area	1.27	0.02	0.47	0.29	2.06

Note: The figure for the expenditure of the rest of the public sector for research in the US does not include military research. The figures for the USA refer to 2008.
Source: Eurostat.

section 4. It should be noted, however, that the breakdown of products according to technology level does not necessarily imply that high-tech products generate the highest value added. For example, it may be pointed out that Denmark is highly specialised in the pharmaceutical industry, which is classified as medium-tech, but which requires a well-educated labour force and provides good opportunities for a high return on investments in research and development.

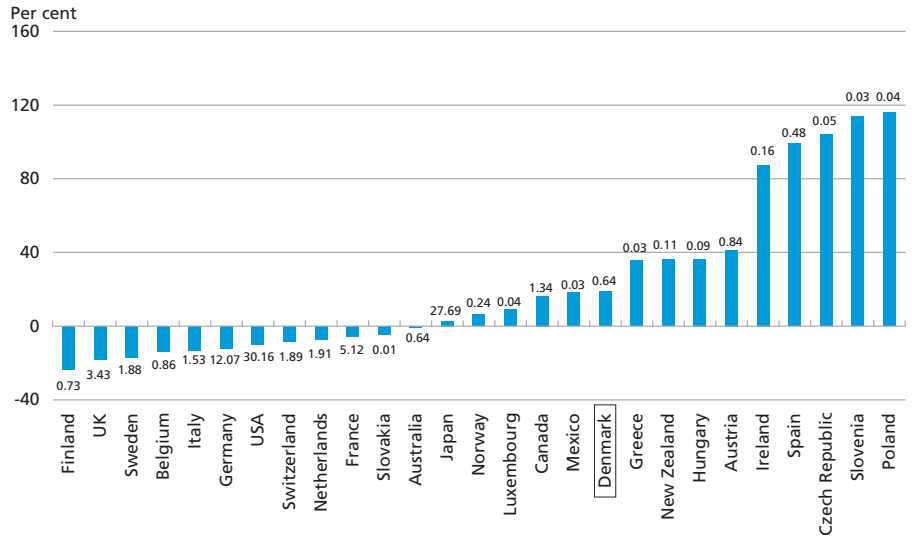
In addition to having an expected positive effect on a firm's product quality and range, research and development may contribute to reducing costs. For example, research and development may reduce costs in low-tech sectors such as agriculture by increasing productivity. On the other hand, an expansion of the product range is more likely in the medium-tech and high-tech sectors. One example that has been described in the media is Nokia, the Finnish firm which has lost its position as the highest selling mobile phone manufacturer to Samsung. Nokia's failure to develop a competitive smartphone has been cited as one of the reasons for this.

When research and development result in new products, firms will often apply for a patent. In 2007-09, Denmark accounted for 0.64 per cent of the total number of patents taken out according to the OECD triadic database, cf. Chart 5.2.[1] This is an increase by almost 20 per cent compared with 1995-97. Most of Denmark's main trading partners, on the other hand, have seen a decline in their shares of patents issued, so our non-price competitiveness has developed positively in terms of the number of patents issued.

Other firm-specific indicators of non-price competitiveness include foreign direct investment (FDI) in Denmark. Based on all sectors except

[1] The OECD triadic database weights together patents issued by the European, US and Japanese patent offices, i.e. a patent issued in all three offices counts only as a single patent.

DEVELOPMENT IN THE COUNTRIES' SHARES OF PATENTS ISSUED Chart 5.2



Note: The bars show the growth in the countries' shares of patents taken out from 1995-97 to 2007-09. The figure by the bar indicates the share for the period 2007-09.
Source: OECD.

the service sector, Denmark is in the bottom half, cf. Chart 5.3.[1] Large countries such as Germany, Italy, France, the USA and Japan all have smaller shares than Denmark and other small countries. Sweden and the Netherlands have considerably larger shares, however.

Structural indicators

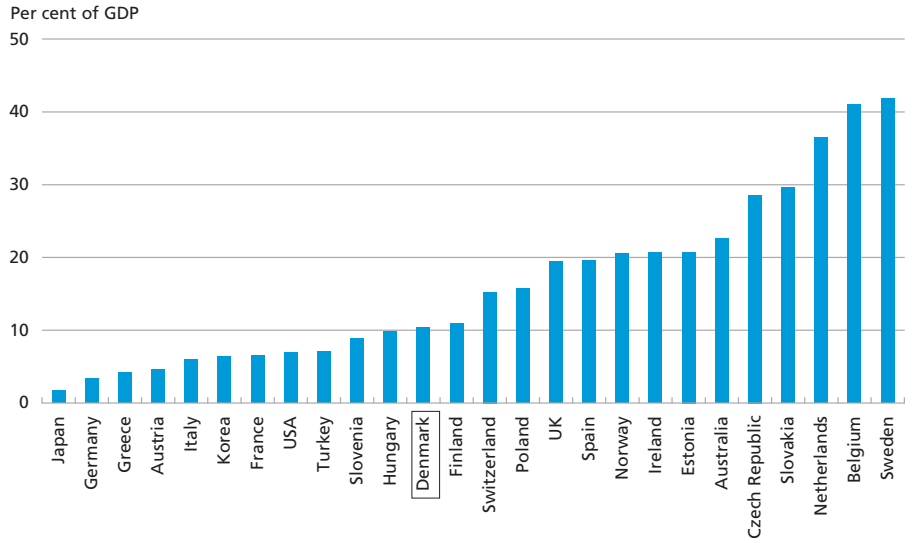
The level of education is an important structural indicator of non-price competitiveness. Improvement of the level of education of the labour force may both improve the quality of manufactured goods and facilitate expansion of the product range. From 1999 to 2006, the share of the Danish population with tertiary education increased by almost 10 percentage points. This is slightly more than in a number of comparable countries, cf. Chart 5.4.

In addition to the level of education, there are many other structural indicators of non-price competitiveness. For example, the World Bank collects data on infrastructure, the openness of a country, the costs of exporting, etc.

Overall, Denmark has done relatively well in terms of the indicators of non-price competitiveness. The indicators can only hint at the development in competitiveness, however. Analysing more disaggregated data

[1] Incoming FDI to the service sector accounted for almost 80 per cent of total incoming FDI in the period under review.

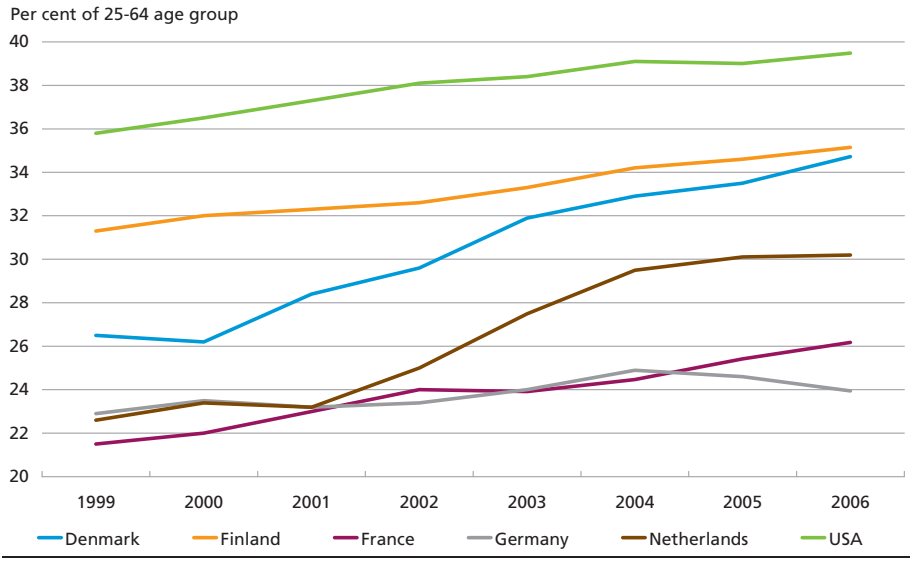
VOLUME OF INCOMING FDI FOR NON-SERVICE SECTORS Chart 5.3



Note: The Chart shows the average volume of incoming foreign investments made in all sectors except the service sector in the period 2008-2010. For Estonia, Germany, Poland and Spain, the average relates to the period 2007-09.
Source: OECD.

at firm level may provide a clearer answer. Based on data for 15,000 European firms, Navaretti et al. (2010) find that size, productivity, the skill intensity of the workforce and the ability to innovate are positively related to a firm's export performance. Danish firms are not included in the analysis so in this article we use macroeconomic indicators instead.

SHARE OF THE POPULATION WITH TERTIARY EDUCATION Chart 5.4



Source: OECD.

Econometric analysis of OECD countries' export performance

In this section we analyse how a country's export performance is dependent on price and non-price factors, respectively. To that end we construct a model for export market growth estimated on the basis of data for 17 OECD countries, including Denmark, for the period 1995-2010, cf. Box 5.1. The model includes indicators of price and non-price

MODEL FOR EXPORT PERFORMANCE — Box 5.1

The econometric analysis is based on the following log-linearised model for market shares

$$\log(ma)_{it} = \alpha_i + \gamma \cdot trend + \beta_1 \log(rpx)_{it} + \beta_2 \log(rip)_{it} + \varepsilon_{it}$$

The market share, ma, is calculated as described in Box 2.1. α_i are country-specific constants included to allow for basic differences across countries. *trend* is a common trend that is included because the increased market shares of China and other high-growth countries in country *i*'s export market causes the export market to grow more than the exports of country *i*. The parameter estimate of the trend coefficient is therefore expected to be negative. *rpx* is used as an indicator of price competitiveness and is the relative export prices (in a common currency), calculated as country i's export price, *px*, relative to the export prices of country *i*'s competitors, cpx

$$rpx = \frac{px}{cpx}.$$

We expect the price elasticity to be negative, i.e. $\beta_1 < 0$. *rip* is the relative indicators of non-price competitiveness and, like the price, is calculated by taking the indicator of country *i* relative to that of its competitors. We expect non-price competitiveness to have a positive impact on export performance, i.e. $\beta_2 > 0$.

The competitors' export prices and the indicators of non-price competitiveness are calculated by weighting together country *i*'s competitors in accordance with the calculation in the OECD Economic Outlook:

$$cpx_{it} = \sum_{p=1, p\neq i}^{N} \frac{x_{i\rightarrow p,2005}}{x_{world\rightarrow p,2005} - x_{i\rightarrow p,2005}} * \frac{1}{x_{i\rightarrow world,2005}} * \sum_{r=1, r\neq i,p}^{N} x_{r\rightarrow p,2005} * px_{r,t}$$

x is exports in value terms, and the arrows indicate the direction of exports. px indicates the export price when calculating the competitors' price. For data availability reasons, country *p*'s imports from the world are used instead of exports from the world to country *p*.

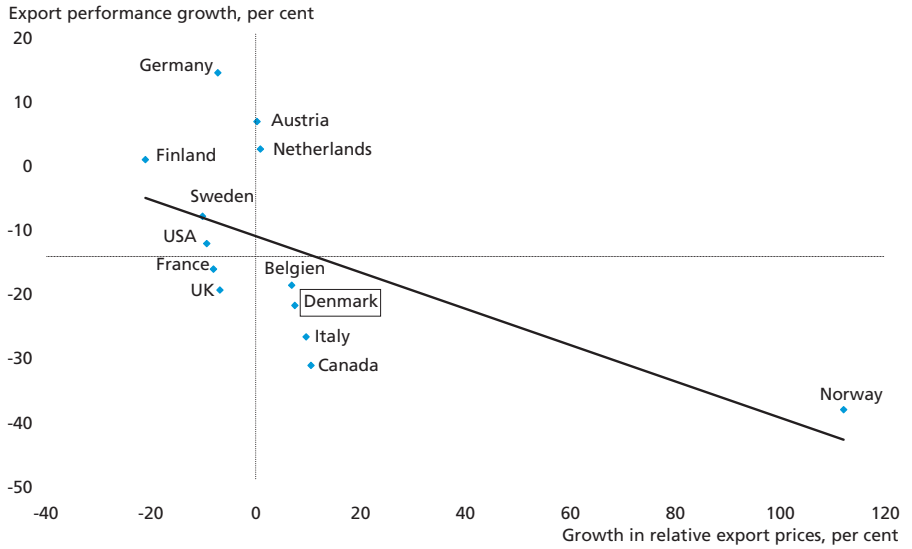
The model is estimated on the basis of a panel of 17 OECD countries: Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Norway, Spain, Sweden, Switzerland, UK and USA. The selection of countries ensures that they are suitably homogeneous. The model is estimated on the basis of annual data for the period 1995-2009.

competitiveness. Export performance is evaluated based on developments in market share. Focus is on goods, while exports of services, which in Denmark's case consist mainly of sea transport, are not included in the model. Competitiveness for this sector depends only to a limited extent on Denmark's performance in terms of the indicators of non-price competitiveness under review. On the basis of the model, market-share developments since 1995 are decomposed to get an indication of the impact of non-price competitiveness on the countries' export performance.

As expected, there is a negative relationship between a country's export performance and the development in its relative export prices from 1995-99 to 2006-10, cf. Chart 5.5. While its market shares declined by approximately 20 per cent during that period, Denmark's export prices increased by around 7 per cent vis-à-vis its competitors.

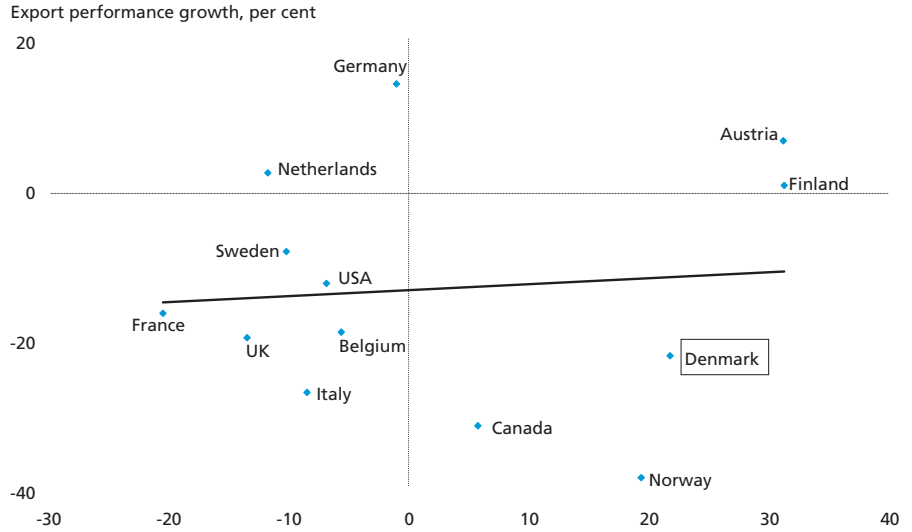
The link between export performance and relative prices is not unequivocal across countries. Hence, large countries such as Sweden, the USA, France and the UK have seen their market shares shrink despite improved price competitiveness. Part of this trend reflects the general decline in the OECD countries' market shares due to the increasing importance of the emerging market economies to world trade. It may also have to do with the fact that the large countries compete more in distant markets where direct competition with the countries in the Chart

EXPORT PERFORMANCE AND RELATIVE EXPORT PRICES — Chart 5.5



Note: The percentage change is calculated on the basis of average values for the periods 1995-99 and 2006-10. It should be noted that the negative relation also exists if Norway is excluded from the analysis.
Source: OECD.

EXPORT PERFORMANCE AND RELATIVE EXPENDITURE FOR R&D Chart 5.6



Note: Expenditure for research and development is stated per capita. The percentage change is calculated on the basis of average values for the periods 1995-99 and 2006-10.
Source: OECD.

is less intense, while competition from e.g. the Asian countries is stronger. Furthermore, non-price competitiveness may have been critical to market-share developments.

The link between the development in export performance and non-price competitiveness calculated by expenditure for research and development per capita is not particularly strong, cf. Chart 5.6. Although Denmark is among the countries that have improved the most over the period under consideration in terms of expenditure for research and development, it is also among the countries that have suffered the largest loss of market shares. This presumably reflects a substantial deterioration of Denmark's price competitiveness during the same period. Besides, research and development will often impact corporate performance only with a certain lag.

Structural indicators are not included in the econometric analysis due to insufficient data availability over time and across countries. Moreover, several of the structural indicators develop sluggishly over time, so including them as explanatory variables would not make sense. On the other hand, the country-specific effects included in the model capture differences in the structural conditions across countries.

The model of export performance is estimated with and without indicators of non-price competitiveness. The basic model explains export performance by a set of country-specific constants, a common trend and

ESTIMATION RESULTS FOR EXPORT PERFORMANCE Table 5.2

Unit	Model 1	Model 2	Model 3	Model 4	Model 5
Price competitiveness	-0.367***	-0.357***	-0.356***	-0.400***	-0.379***
Trend	-0.013***	-0.013***	-0.012***	-0.014***	-0.013***
Expenditure for R&D per capita				0.213**	0.142*
Share of R&D conducted by firms			0.434*		0.292
Expenditure for R&D as a share of GDP		0.134	-0.022		

Note: The models are estimated using panel estimation with country-specific constants (fixed effects). P values are based on White's period robust standard errors which allow for autocorrelation in the error terms. *** (**) (*) indicate that the estimate is significant at a 1 (5) (10) per cent significance level.
Source: OECD and own calculations.

the development in relative export prices. The estimates of the trend and price elasticity are both significant with the expected signs, cf. Table 5.2.[1] In addition, they are largely unaffected by the inclusion of an indicator of non-price competitiveness in the model[2].

Of the indicators of non-price competitiveness, expenditure for research and development as a share of GDP turns out to have a positive impact on export performance, but the effect is not significant at a 10 per cent significance level. If R&D is calculated per capita instead, the correlation is significantly positive. Another indicator is the share of research and development conducted in firms. The coefficient on this indicator is significantly positive in model 3 where total expenditure for R&D is calculated as a share of GDP, as opposed to model 5 where R&D is measured per capita. Overall, the results show that the estimate of the impact of price competitiveness on export performance is robust to the inclusion of indicators of non-price competitiveness. Non-price competitiveness also seems to have a positive impact on exports, although the results are less clear.

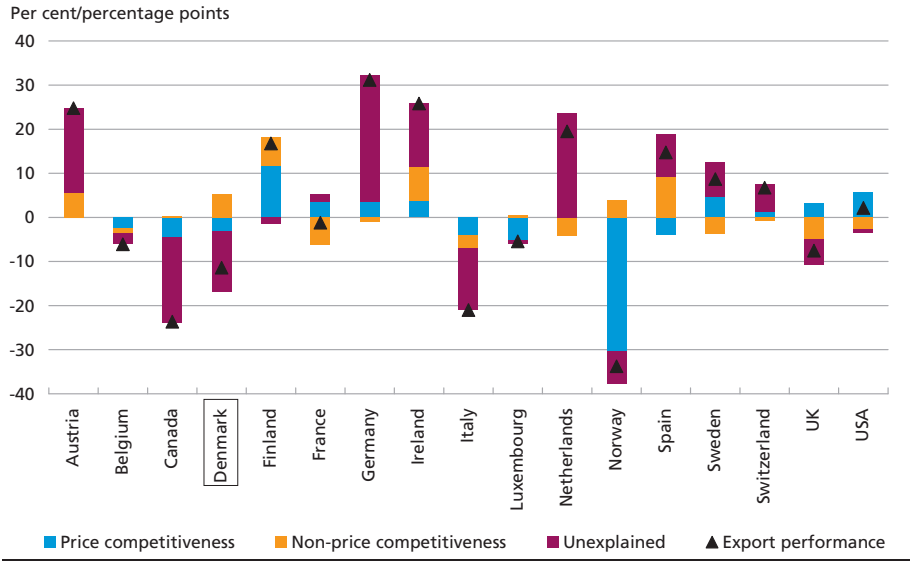
Our results are generally in line with Monteagudo and Montaruli (2009), although they find slightly clearer effects of non-price competitiveness. The authors analyse the exports of 12 euro-area member states using a dynamic panel data analysis. They find that expenditures on research and development as a share of GDP has a delayed, positive, but minor impact on exports of goods. They also find that the number of

[1] The fact that price elasticity is less than -1 does not really make sense economically, since firms would be able to increase turnover by raising prices. Balistreri & McDaniel (2003) point out that an analysis based on more disaggregated data would result in higher price elasticity. Disaggregation implies that the goods would have to be closer substitutes for each other, thereby increasing the impact of price on demand and thus on price elasticity.

[2] We have also estimated the model with an output gap for each country in order to model a possible cyclical effect on exports. We did not find a significant effect, nor did the inclusion of the output gap affect the other estimates.

DECOMPOSITION OF TREND-ADJUSTED DEVELOPMENT IN EXPORT PERFORMANCE

Chart 5.7



Note: The decomposition has been performed around the negative common trend, showing whether the two measures of competitiveness have improved or reduced the countries' export performance relative to trend. The development is based on the average value for the period 1995-97 to 2008-10. For Luxembourg, the data are from 2000-02 to 2008-10, for Switzerland, the data are from 1996-98 to 2006-08, and for the USA, the data are from 1995-97 to 2007-09.

Source: OECD and own calculations.

patents in the manufacturing sector has a significant effect. Monteagudo and Montaruli (2009) argue that using stocks rather than new patents is more appropriate, which may explain why we do not find a significant effect of this indicator in our model.

Based on the estimated export relation, the export performance of individual countries can be decomposed into contributions from price competitiveness, the indicator of non-price competitiveness and a contribution that cannot be explained by the model. For about half the countries, export performance has been improved by better price competitiveness, and for the remaining countries, it has been improved by non-price competitiveness, cf. Chart 5.7. For Belgium and Italy, price competitiveness and non-price competitiveness have both curbed their export performance, while the opposite is the case for Finland and Ireland.

As far as Denmark is concerned, the decomposition shows that improved non-price competitiveness has supported exports. Conversely, reduced price competitiveness has had a downward effect on export performance. The part of export growth that cannot be explained by the model varies across countries, being relatively large for Denmark. This indicates that some factors impacting a country's exports are not captured by the model.

The results indicate that export performance across countries does not depend only on the countries' price competitiveness. Other ways to differentiate products, which we refer to as non-price competitiveness, may impact a country's export performance and the prices firms are able to charge for their products. The link between the indicators of non-price competitiveness and export performance is not clear, however. In addition, it is subject to considerable uncertainty.

As illustrated above, Denmark is placed at the low end in terms of price competitiveness. Denmark is better placed if the comparison is based on indicators of non-price competitiveness, its position having improved over the last 15 years. This may contribute to explaining the improvement in Denmark's terms of trade, but the effect of non-price competitiveness is generally subject to considerable uncertainty.

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