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Regional differences in house prices and debt

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Regional differences in house prices and debt

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House prices and household debt are closely linked. Both house prices and household debt have been rising faster than household income for a longer period. In order to assess household vulnerabilities, debt relative to both income and the value of the dwelling are relevant variables. The analysis is based on data for publically registered housing transactions linked with tax records for household income and debt in order to shed light on regional differences in house prices and homebuyers' debt. We find that for households that purchased a dwelling in 2014, debt relative to total income was higher than for homebuyers in 2009. This suggests that homebuyers have become more vulnerable to interest rate increases and a loss of income. The total debt to income ratio was highest for homebuyers in urban areas, reflecting the fact that house prices relative to income are highest in urban areas. At the same time, debt relative to the price of the dwelling is lower in urban areas than elsewhere in the country, and this ratio fell between 2009 and 2014.

1 Data sets for housing transactions, income and debt

The data underlying our analyses have been obtained from several sources. Information about registered housing transactions has been obtained from Ambita AS's property register. This register contains information on real properties obtained from the land registry, as well as information about land property, location and buildings obtained from the Cadastre property register.[2] The data cover all registered housing transactions for owner-occupied dwellings from 1993 and all housing cooperative units from 2007. The data set contains information on the publically registered date of sale, purchase price, size, year of construction, location and dwelling type for each transaction. Our analysis covers only properties sold on the open market.

Income statistics for households has been obtained from Statistics Norway and contain among other things information on income, net wealth and debt

[1] The views and conclusion in this publication are those of the authors and do not necessarily reflect the views of Norges Bank. The authors would like to thank Henrik Borchgrevink, Torbjørn Hægeland, Kristine Høegh-Omdal and Kjersti Næss Torstensen for their helpful suggestions and comments.

[2] The Cadastre is Norway's official register of real property, including buildings, residential units and addresses.

among Norwegian taxpayers. National identity numbers in both the income statistics and property register have been replaced by anonymised serial numbers. With the aid of these serial numbers, we link these two data sets, obtaining for each homebuyer information on their income, net wealth and debt. In addition, the income statistics contain Statistics Norway's serial numbers for households, which allow us to aggregate these variables to the household level. We have access to income statistics up to and including 2014. The data set analysed in this commentary covers the period between 2009 and 2014. In all, the data set contains on the order of 100 000 home purchases each year.

We use the linked data set to calculate measures of house prices relative to income, debt relative to house prices (debt to value ratio) and debt relative to income (debt to income ratio) for households that purchased a dwelling. For housing cooperatives, we have added the share of common debt to the dwelling's purchase price. We calculate the median of the various measures for the largest urban areas and a number of smaller cities and other areas. These measures are constructed for each of the years between 2009 and 2014. We link the medians for different areas to map coordinates from the Norwegian Mapping Authority. The map coordinates allow us to construct a cartographic representation of the regional differences for the various measures. The maps are based on data for 43 geographical areas (see Appendix 1). Other figures are based on 12 geographical areas (see Appendix 2).

We also use the data to estimate simple hedonic regression models to construct house price indexes for the 12 geographical areas. These models contain dwelling size, dwelling type (detached, terraced, two-family detached and apartment)[3], dummy variables controlling for seasonal variation through the year and postal code dummies controlling for location. In addition, the models contain year dummies. We use a “log-log” specification, which greatly simplifies the construction of house price indexes, since the index value in a particular year is given by the exponent of the coefficient of the year dummy in that year divided by the exponent of the year dummy in the base year. We estimate such a model for each area to take account of the fact that various attributes are valued differently in different locations. For example, an extra square metre may be valued differently in Oslo and Bergen. The indexes are used to calculate house price inflation in each of the areas for the period 2009 to 2014.

[3] We allow the effect of an extra square metre on house prices to vary independently of dwelling type. This is because an extra square metre for an apartment may be valued higher than an extra square metre for a detached house. We also include square metres squared, to capture the fact that an extra square metre may depend on dwelling size. The effect of this is also allowed to vary across dwelling types.

2 House prices

2.1 Nominal house prices

House price levels differ considerably across Norway. The price per square metre is highest in the largest cities and in some adjacent areas, while prices are substantially lower elsewhere in the country. Measured as the median price per square metre for registered housing transactions in 2014, the price was highest in Oslo, at NOK 48 000 per square metre (Table 1). Prices are also high in the areas surrounding Oslo and in other large urban areas. In many parts of the country, the price per square metre was below NOK 25 000 in 2014 (Chart 1).

Dwelling sizes vary. In general, dwellings are smaller in urban areas and larger elsewhere in the country (Table 1). Consequently, the median price of sold dwellings shows less variation than prices per square metre. The areas with the highest house prices in 2014 were Asker and Bærum, where both prices per square metre were high and dwellings fairly large. The median house price was higher in Stavanger than in Oslo, while prices were lowest in the smaller urban areas and elsewhere in the country.

Table 1: Median number of square metres, price per square metre and price per dwelling in 2014 and house price inflation between 2009 and 2014 in some areas

Area	NOK per m^2 (median)	Number of m^2 (median)	NOK per dwelling (median)	House price inflation 2009-2014 in percent
Oslo	48 000	82	3 660 000	41
Stavanger	43 000	104	3 820 000	39
Asker and Bærum	42 000	117	4 700 000	37
Trondheim	41 000	92	3 120 000	47
Bergen	38 000	97	3 140 000	40
Tromsø	35 000	106	3 340 000	47
Nedre Romerike	30 000	114	3 180 000	41
Drammen	29 000	98	2 580 000	40
Kristiansand	26 000	115	2 880 000	16
Other urban areas	24 000	115	2 540 000	41
Rest of Norway	21 000	127	2 360 000	41
Whole country	***28 000***	***112***	***2 880 000***	***41***

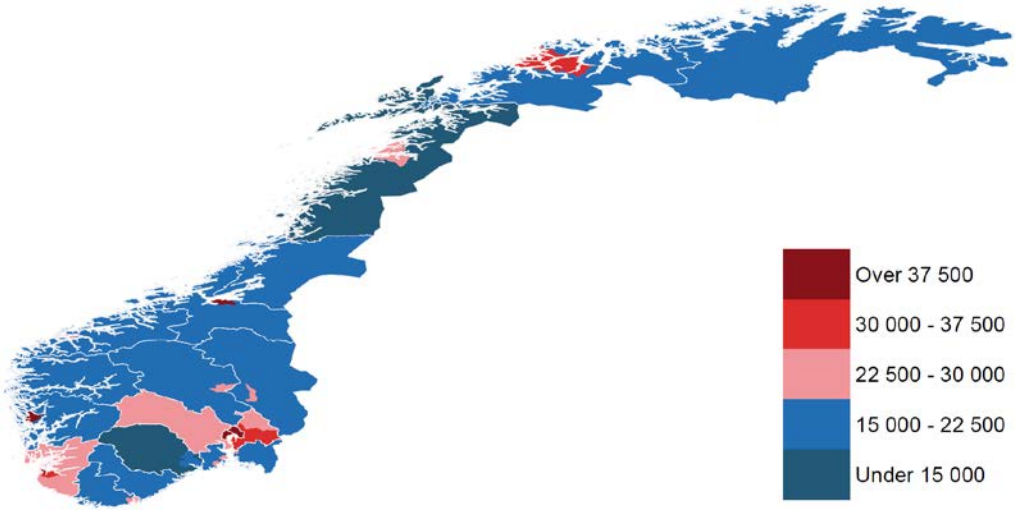
Sources: Ambita and Norges Bank

On the basis of our house price index, we find that house prices have risen by around 40 percent in the period 2009 to 2014. The rise in prices was highest in Trondheim and Tromsø, while it was weakest in Kristiansand (Table1).[4] In the rest of the country, house price inflation was fairly the same.

[4] In each of these areas, house price inflation is calculated on the basis of the house price indexes we have constructed (see Section 1). This means that the calculation of house price inflation takes account of differences in size, dwelling type and location in the various areas.

House prices rose considerably in the years prior to 2007, while prices fell during the financial crisis. After 2009, house price inflation has largely been high, but it is especially over the past year that house price inflation has accelerated. House prices showed a sharp increase in Oslo and eastern Norway in particular over the past year, while the rise in prices was weak in Stavanger and in much of western Norway.[5]

Chart 1: Median price per square metre for sold dwellings in 2014. In NOK



Sources: Ambita, Norwegian Mapping Authority, Statistics Norway and Norges Bank

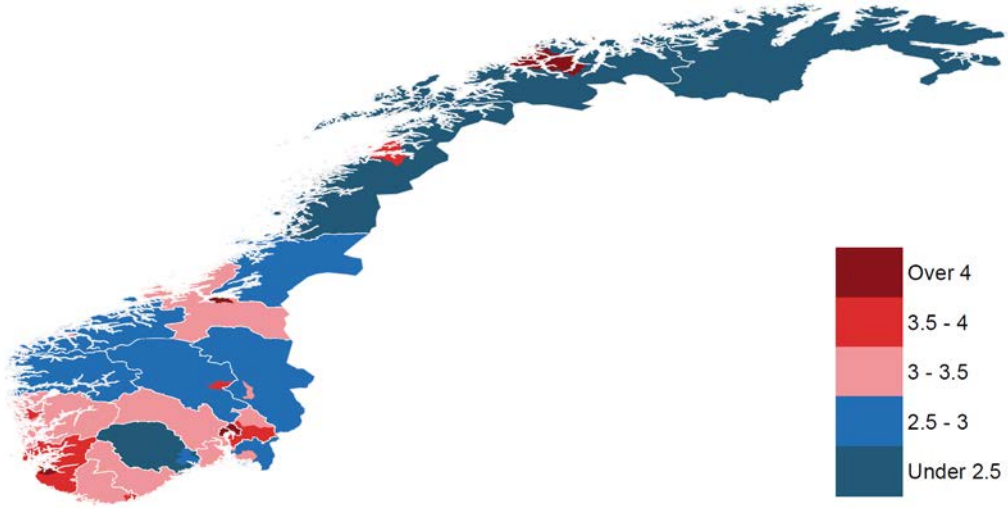
2.2 House price to income ratio

The house price to income ratio is an indicator of how many annual incomes homebuyers spend to purchase a dwelling. Although the income level is somewhat higher in some of the larger urban areas than elsewhere in the country, house prices are substantially higher in urban areas. House price to income ratios are thus higher in urban areas than elsewhere in the country. In the largest urban areas, house prices were approximately four times the annual income of households purchasing a dwelling in 2014, while in some other areas, this ratio was below 2.5, measured as the median of this ratio (Chart 2).

The median house price to income ratio for homebuyers has risen in recent years. In many of the largest urban areas, house prices rose from just over three times income in 2009 to around four times income in 2014 (Chart 3a). In smaller urban areas and elsewhere in the country, the ratio for these areas as a whole increased from below three times income in 2009 to above three times income in 2014 (Chart 3b).[6]

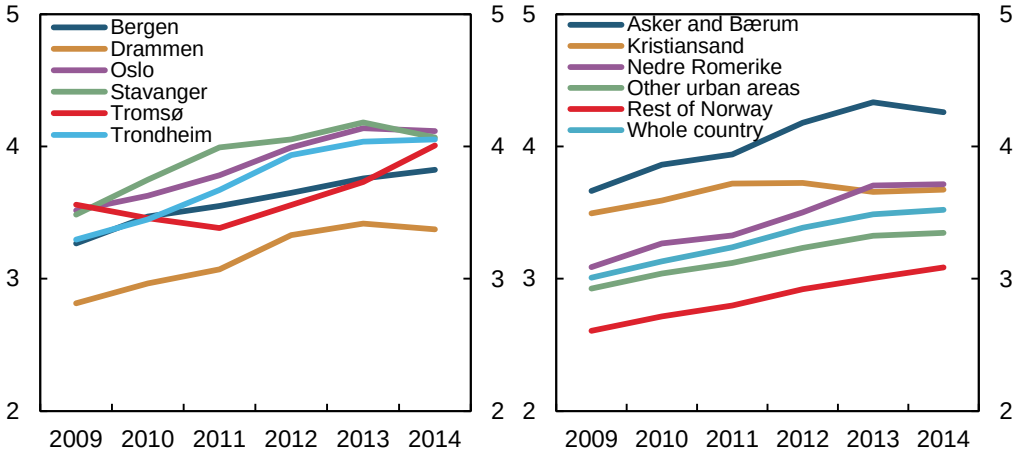
[5] According to data from Eiendomsverdi, Finn.no and Real Estate Norway.
[6] The presentation on the map is more detailed, with a total of 43 different areas, while Chart 3b and similar charts in this commentary show the median when many of these areas are combined. “Other urban areas” is the median of Bodø, Fredrikstad, Hamar, Haugesund, Larvik, Lillehammer, Moss, Porsgrunn, Sandefjord, Sandnes, Sarpsborg, Skien, Tønsberg and Ålesund taken together. “Rest of Norway” is the median for the

Chart 2: Median house price to income ratio for homebuyers in 2014



Sources: Ambita, Norwegian Mapping Authority, Statistics Norway and Norges Bank

Charts 3a and b: Developments in median house price to income ratios for homebuyers. 2009–2014



Sources: Ambita, Statistics Norway and Norges Bank

For first-home buyers, defined as households purchasing a dwelling without assessed housing wealth in the year prior to the purchase, house price to income ratios were fairly similar to those for other homebuyers. First-home buyers are often younger and their incomes are lower, but they purchase correspondingly less expensive dwellings.

whole country excluding all cities/areas specified in Charts a and b. “Whole country” shows the median of all areas as a whole.

3 Homebuyers' debt

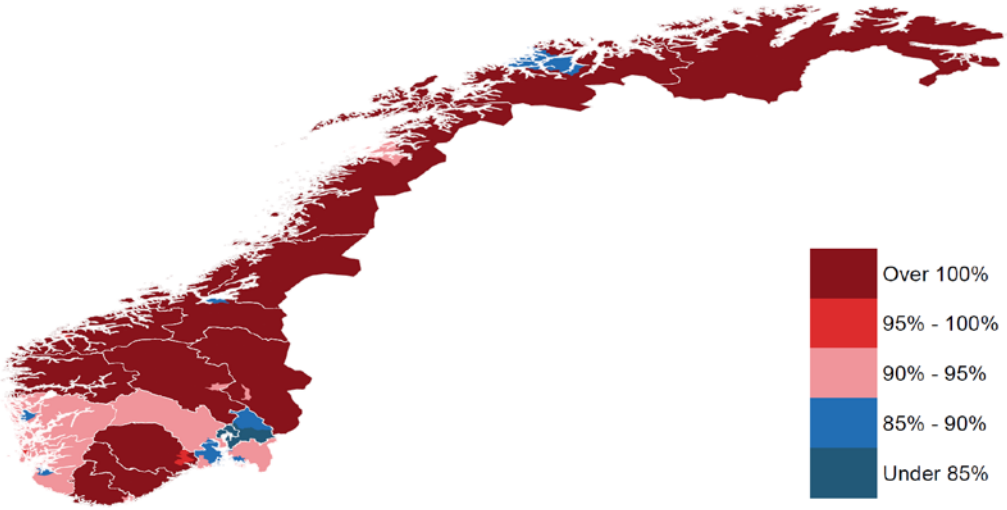
3.1 Debt relative to house price – debt to value ratio

The median debt to value ratio, ie debt relative to the house price, for households purchasing a dwelling in 2014 was lower in urban areas than elsewhere in the country (Chart 4). In many areas, the median debt to value ratio was above 95 percent. The high level reflects the fact that the calculation is based on total household debt excluding student loans, and not only on the debt secured on the purchased dwelling. Furthermore, it does not take into account that homebuyers may have collateral other than the dwelling. For example, collateral in the form of a holiday home or secondary dwelling is not included. In connection with purchase of a secondary dwelling, the debt to value ratio from our calculation may be very high, since all debt held by the household is compared with the value of the secondary dwelling.

The regional differences in debt to value ratios reflect the higher level of house prices in urban areas than elsewhere in the country (Section 2). For example, an auto loan of a given size will pull up the debt to value ratio more in those parts of the country where the level of house prices is lower. For the same residential mortgage loan to value ratio in urban areas and elsewhere in the country, the debt to value ratio will be higher outside of urban areas if homebuyers also have an auto loan, consumer debt or debt secured on other assets.

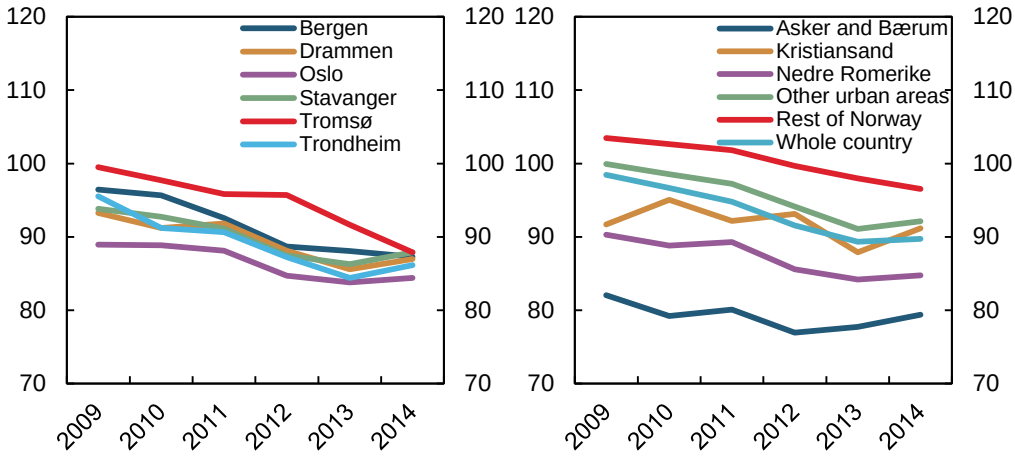
Debt to value ratios fell in all areas between 2009 and 2014 (Charts 5a and 5b). In many of the large urban areas, debt declined from between 90 to 100 percent to around 85 percent of the dwelling's value. The decline in debt to value ratios may be related to the introduction by Finanstilsynet (Financial Supervisory Authority of Norway) of guidelines for residential mortgage lending in 2010, which recommended a maximum loan to value ratio of 90 percent. In 2011, the requirement was tightened to 85 percent. The decline may also reflect the fact that house prices rose faster than other prices during the period. This may have helped to reduce the impact on debt to value ratios of debt for purposes other than housing, such as auto loans, compared with previously. In 2014, there was a slight rise in debt to value ratios in many areas.

Chart 4: Median debt to value ratios for all homebuyers in 2014



Sources: Ambita, Norwegian Mapping Authority, Statistics Norway and Norges Bank

Charts 5a and b: Developments in median debt to value ratio for homebuyers. 2009–2014



Sources: Ambita, Statistics Norway and Norges Bank

In our calculations, we find that the share of homebuyers with a debt to value ratio above 85 percent was over 60 percent in much of the country (Chart 6). The share of homebuyers with a high debt to value ratio was lower in urban areas than elsewhere in the country, likewise for the median debt to value ratio. The share fell between 2009 and 2013, but edged up between 2013 and 2014 in a number of locations (Charts 7a and 7b). Our definition of the debt to value ratio differs from the one applied in the guidelines and the regulation on requirements for new residential mortgage loans.[7] There the requirement is for debt secured by the dwelling not to exceed 85 percent of the dwelling's value including any additional collateral in the form of security on other property or a

[7] The recommendation for a maximum loan to value ratio of 85 percent was laid down in the form of a regulation from 1 July 2015. At the same time, banks were allowed to depart from the requirement for 10 percent of its loans (see the Ministry of Finance's regulation on requirements for new residential mortgage loans of 15 June 2015).

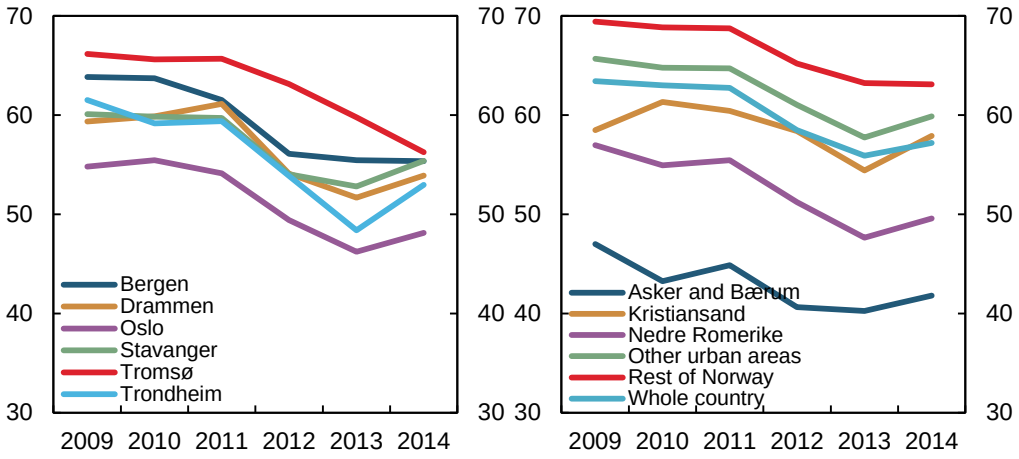
guarantee.[8] The result is that the debt to value ratio we calculate is often considerably higher than the loan to value ratio calculated under the guidelines and regulation.

Debt to value ratios for first-home buyers were generally higher than for other homebuyers. Regional differences and developments over time were broadly the same for first-home buyers as for all homebuyers.

Chart 6: Percentage of homebuyers in 2014 with a debt to value ratio over 85 percent

Sources: Ambita, Norwegian Mapping Authority, Statistics Norway and Norges Bank

Charts 7a and 7b: Developments in the percentage of homebuyers with a debt to value ratio over 85 percent. 2009–2014



Sources: Ambita, Statistics Norway and Norges Bank

[8] See the Regulation on requirements for new residential mortgage loans and Circular 29/2011, Guidelines for prudent residential mortgage lending practices from Finanstilsynet.

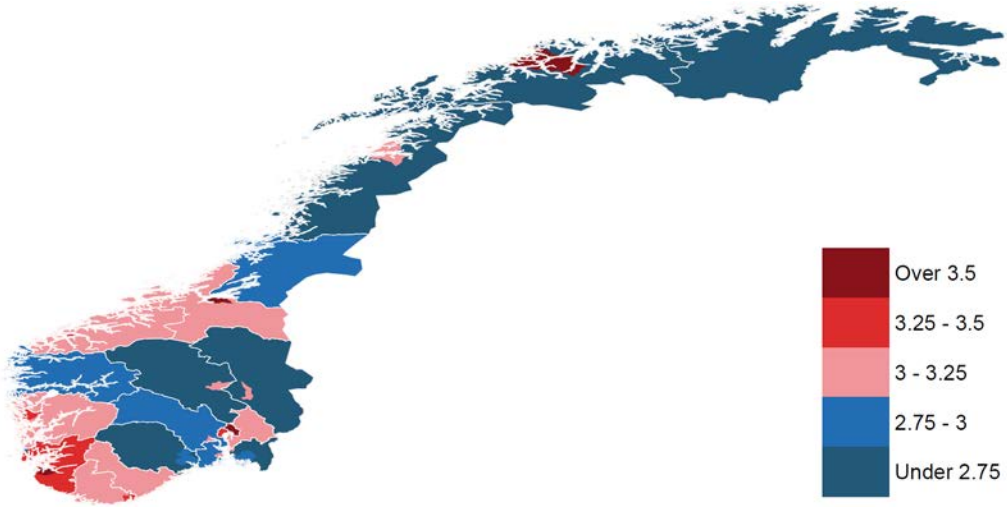
3.2 Debt relative to income - debt to income ratio

Homebuyers' total debt (including student loans) relative to total gross annual income, the debt to income ratio, was higher in urban areas than elsewhere in the country in 2014 (Chart 8). The high debt to income ratios in urban areas reflects the fact that house prices relative to income are highest in urban areas (see Section 2.2).

The median debt to income ratio rose in all areas between 2009 and 2014 (Charts 9a and 9b). Debt to income ratios rose by broadly the same degree in smaller urban areas and elsewhere in the country as in the large urban areas. In many of the large urban areas, the debt to income ratio rose from just above 3 in 2009 to around 3.5 in 2014. Stavanger showed the highest debt to income ratio in 2014, nearly 3.7.

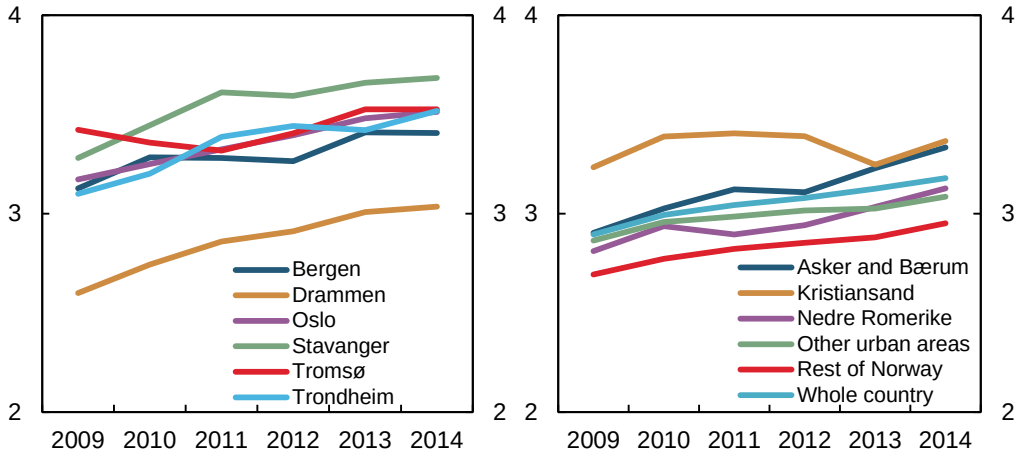
Debt to income ratios for first-home buyers were generally higher than for other homebuyers, likely because first-home buyers often have less equity and lower incomes than other homebuyers. First-home buyers are often younger than other homebuyers. This means they have more years to pay down debt and probably higher expected income growth ahead. Regional differences and developments over time were approximately the same for first-home buyers as for all homebuyers.

Chart 8: Median debt to income ratio for homebuyers in 2014



Sources: Ambita, Norwegian Mapping Authority, Statistics Norway and Norges Bank

Charts 9a and 9b: Developments in median debt to income ratio for homebuyers. 2009–2014



Sources: Ambita, Statistics Norway and Norges Bank

Similar to the median debt to income ratio, the percentage of households purchasing a dwelling with a debt to income ratio above 5 was highest in urban areas in 2014 (Chart 10). The percentage rose throughout the country in the period 2009 to 2014 (Charts 11a and 11b). Among the largest urban areas, Stavanger and Trondheim showed the highest percentage of homebuyers with a high debt to income ratio in 2014, while the share was lowest in Drammen. For the country as a whole, the share was 18 percent in 2014, up from 14 percent in 2009. These percentages are broadly consistent with Finanstilsynet's residential mortgage survey for 2016, which showed that 16 percent of new repayment loans for house purchases had a debt to income ratio above 5.[9]

From 1 January 2017, the Ministry of Finance tightened the Regulation of requirements for new residential mortgage lending.[10] Among the changes was a new requirement limiting total debt to a maximum of five times income. Our definition of the debt to income ratio is broadly consistent with the definition in the regulation. All debt held by households is counted in both definitions, while the definitions of income may diverge somewhat. Our definition of income includes all income, like wage income, benefits, capital income, etc. According to guidelines from Finanstilsynet,[11] income under the regulatory requirement is, in principal, personal income or ordinary income as defined in the Tax Act, whichever is higher. For normal wage earners and benefit recipients, the definition under the regulation will be fairly similar to ours, while our definition

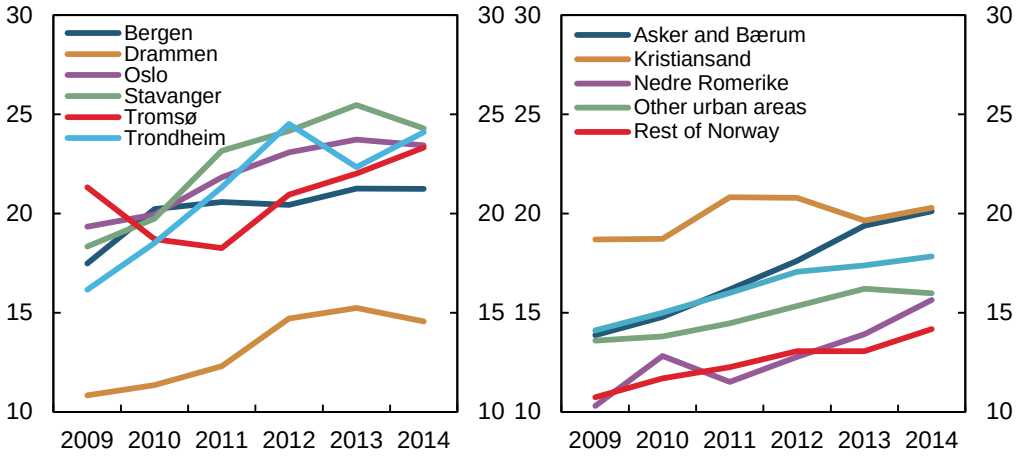
[9] See *Boliglånsundersøkelsen 2016* [Residential mortgage lending survey 2016], Finanstilsynet (Norwegian only).
[10] See the Ministry of Finance's Regulation on requirements for new residential mortgage loans of 14 December 2016.
[11] See Circular 23/2016 on requirements for new residential mortgage loans from Finanstilsynet (Norwegian only).

can result in a higher income for households with high capital income from capital etc.[12]

Chart 10: Percentage of homebuyers in 2014 with a debt to income ratio of more than 5

Sources: Ambita, Norwegian Mapping Authority, Statistics Norway and Norges Bank

Charts 11a and b: Developments in the percentage of households with debt to income ratios of more than 5. 2009–2014



Sources: Ambita, Statistics Norway and Norges Bank

[12] For households with low capital income, personal income, which comprises wage income, benefits etc., will be higher than ordinary income. Personal income will then correspond approximately to our definition of income. The ordinary income of households with high capital income will often be higher than their personal income. Ordinary income is reduced by a number of allowances, such as interest expenses. We do not deduct such allowances in our definition of income.

4 Conclusion

Our analyses show that debt relative to the price of the dwelling for households purchasing a dwelling were lower in urban areas than elsewhere in Norway in 2014. At the same time, homebuyers' debt relative to income was higher in urban areas than elsewhere in the country, reflecting high house prices in urban areas.

Our analyses also show fairly similar house price inflation in most areas of the country in the period 2009 to 2014. House prices were substantially higher in urban areas than in the rest of the country over the entire period.

We find that debt relative to the price of the dwelling for households that purchased a dwelling in 2014 was lower than for those who purchased a dwelling in 2009. This suggests that there is more collateral securing homebuyers' borrowing in 2014. At the same time, debt relative to income rose in the period. This increases homebuyers' vulnerability to interest rate increases and loss of income.

Appendix

A. Data underlying the maps (rounded)

Area	Chart 1: Median price per m^2	Chart 2: Median price to income ratio	Chart 4: Median debt to value ratio	Chart 6: Share debt to value ratio above 85 percent	Chart 8: Median debt to income ratio	Chart 10: Share debt to income ratio more than 5
Asker	42 000	4.3	79	41	3.3	20
Aust-Agder	20 000	3.1	102	65	3.2	19
Bergen	38 000	3.8	87	55	3.4	21
Bodø	29 000	3.5	91	61	3.2	15
Buskerud excluding Drammen	23 000	3.1	91	59	2.9	13
Bærum	42 000	4.2	80	42	3.3	20
Drammen	29 000	3.4	87	54	3.0	15
Finnmark	18 000	2.3	105	75	2.7	11
Follo	33 000	3.9	84	47	3.2	17
Fredrikstad	22 000	3.2	90	57	2.9	13
Hamar	23 000	3.4	90	57	3.0	15
Haugesund	25 000	3.1	96	62	2.9	14
Hedmark excluding Hamar	16 000	2.7	101	66	2.6	11
Hordaland excluding Bergen	22 000	3.4	92	58	3.2	18
Kristiansand	26 000	3.7	91	58	3.4	20
Larvik	18 000	3.2	94	62	3.0	14
Lillehammer	23 000	3.6	91	55	3.1	20
Moss	28 000	3.4	88	54	3.0	13
Møre og Romsdal excluding Ålesund	21 000	3.0	101	70	3.0	13
Nedre Romerike	30 000	3.7	85	50	3.1	16
Nord-Trøndelag	18 000	2.8	103	69	2.9	13
Nordland excluding Bodø	15 000	2.4	106	74	2.6	10
Oppland excluding Lillehammer	15 000	2.7	102	67	2.6	12
Oslo	48 000	4.1	84	48	3.5	23
Porsgrunn	17 000	2.9	100	67	3.0	15
Rogaland excluding Haugesund, Sandnes and Stavanger	27 000	3.7	91	60	3.4	18
Sandefjord	25 000	3.3	90	56	2.9	15
Sandnes	34 000	4.1	89	57	3.7	23
Sarpsborg	17 000	3.0	92	61	2.8	13
Skien	18 000	2.9	100	67	2.9	13
Sogn og Fjordane	21 000	2.9	102	69	3.0	15
Stavanger	43 000	4.1	88	55	3.7	24
Sør-Trøndelag excluding Trondheim	21 000	3.2	101	67	3.1	14
Telemark excluding Skien and Porsgrunn	13 000	2.3	107	71	2.5	10
Troms excluding Tromsø	15 000	2.3	104	72	2.6	8
Tromsø	35 000	4.0	88	56	3.5	23
Trondheim	41 000	4.1	86	53	3.5	24
Tønsberg	30 000	3.3	90	57	3.0	15
Vest-Agder excluding Kristiansand	18 000	3.0	102	68	3.1	16
Vestfold excluding Larvik, Sandefjord and Tønsberg	21 000	3.2	90	57	2.8	14
Ålesund	27 000	3.5	99	66	3.4	22
Østfold excluding Fredrikstad, Moss and Sarpsborg	19 000	2.9	92	58	2.6	11
Øvre Romerike	26 000	3.4	89	58	3.0	14

B. Data underlying a and b charts (rounded)

Charts 3a and b: Median house price to income ratio

Area	2009	2010	2011	2012	2013	2014
Bergen	3.3	3.5	3.6	3.7	3.8	3.8
Drammen	2.8	3.0	3.1	3.3	3.4	3.4
Oslo	3.5	3.6	3.8	4.0	4.1	4.1
Stavanger	3.5	3.7	4.0	4.1	4.2	4.1
Tromsø	3.6	3.5	3.4	3.6	3.7	4.0
Trondheim	3.3	3.4	3.7	3.9	4.0	4.1
Asker and Bærum	3.7	3.9	3.9	4.2	4.3	4.3
Kristiansand	3.5	3.6	3.7	3.7	3.7	3.7
Nedre Romerike	3.1	3.3	3.3	3.5	3.7	3.7
Other urban areas	2.9	3.0	3.1	3.2	3.3	3.3
Rest of Norway	2.6	2.7	2.8	2.9	3.0	3.1
Whole country	***3.0***	***3.1***	***3.2***	***3.4***	***3.5***	***3.5***

Charts 5a and b: Median debt to value ratio for homebuyers

Area	2009	2010	2011	2012	2013	2014
Bergen	96	96	93	89	88	87
Drammen	93	91	92	88	86	87
Oslo	89	89	88	85	84	84
Stavanger	94	93	91	87	86	88
Tromsø	99	98	96	96	92	88
Trondheim	96	91	91	87	84	86
Asker and Bærum	82	79	80	77	78	79
Kristiansand	92	95	92	93	88	91
Nedre Romerike	90	89	89	86	84	85
Other urban areas	100	99	97	94	91	92
Rest of Norway	103	103	102	100	98	97
Whole country	***98***	***97***	***95***	***92***	***89***	***90***

Charts 7a and b: Percentage of homebuyers with a debt to value ratio above 85 percent

Area	2009	2010	2011	2012	2013	2014
Bergen	64	64	62	56	55	55
Drammen	59	60	61	54	52	54
Oslo	55	55	54	49	46	48
Stavanger	60	60	60	54	53	55
Tromsø	66	66	66	63	60	56
Trondheim	62	59	59	54	48	53
Asker and Bærum	47	43	45	41	40	42
Kristiansand	58	61	60	58	54	58
Nedre Romerike	57	55	55	51	48	50
Other urban areas	66	65	65	61	58	60
Rest of Norway	69	69	69	65	63	63
Whole country	***63***	***63***	***63***	***59***	***56***	***57***

Charts 9a and b: Median debt to value ratio for homebuyers

Area	2009	2010	2011	2012	2013	2014
Bergen	3.1	3.3	3.3	3.3	3.4	3.4
Drammen	2.6	2.7	2.9	2.9	3.0	3.0
Oslo	3.2	3.2	3.3	3.4	3.5	3.5
Stavanger	3.3	3.4	3.6	3.6	3.7	3.7
Tromsø	3.4	3.4	3.3	3.4	3.5	3.5
Trondheim	3.1	3.2	3.4	3.4	3.4	3.5
Asker and Bærum	2.9	3.0	3.1	3.1	3.2	3.3
Kristiansand	3.2	3.4	3.4	3.4	3.2	3.4
Nedre Romerike	2.8	2.9	2.9	2.9	3.0	3.1
Other urban areas	2.9	3.0	3.0	3.0	3.0	3.1
Rest of Norway	2.7	2.8	2.8	2.9	2.9	3.0
Whole country	***2.9***	***3.0***	***3.0***	***3.1***	***3.1***	***3.2***

Charts 11a and b: Percentage of homebuyers with a debt to income ratio of more than 5

Area	2009	2010	2011	2012	2013	2014
Bergen	17	20	21	20	21	21
Drammen	11	11	12	15	15	15
Oslo	19	20	22	23	24	23
Stavanger	18	20	23	24	25	24
Tromsø	21	19	18	21	22	23
Trondheim	16	19	21	25	22	24
Asker and Bærum	14	15	16	18	19	20
Kristiansand	19	19	21	21	20	20
Nedre Romerike	10	13	12	13	14	16
Other urban areas	14	14	14	15	16	16
Rest of Norway	11	12	12	13	13	14
Whole country	***14***	***15***	***16***	***17***	***17***	***18***