Analyses of mortgage lending requirements

Attachments to Norges Bank's consultation response on the regulation on requirements for new residential mortgage loans

Norges Bank

November 8, 2016

Attachment A: How have first-time buyers adjusted to changes to mortgage lending guidelines?

To assess the effect of tighter credit standards, the analysis focuses on first-time buyers aged 18-39 who borrowed to purchase a home.[1] The analysis utilises housing transaction data from Ambita Land Registry, based on registration of title deeds, linked to tax assessment data from Statistics Norway.[2]

Chart 1, left panel, shows the distribution of loan-to-value (LTV) ratios for first-time buyers before and after the introduction of guidelines for prudent residential mortgage lending in March 2010.[3] Between 2009 and 2010, there was a decline in the share with an LTV ratio of around 100 percent, while the share with an LTV ratio of around 90 percent rose sharply.[4] This is line with the guidelines, which specified that LTV ratios should not normally exceed 90 percent. At the same time, the analyses indicate that a large group of first-time buyers with a high LTV ratio appear to be unaffected by the requirements. This may reflect the fact that many homebuyers have access to additional collateral in the form of security on other real property.[5]

In December 2011, the recommended maximum LTV ratio in the guidelines was tightened from 90 to 85 percent. Between 2011 and 2012, the share of loans with an LTV around 90 percent fell, while the share with an LTV of around 85 percent rose markedly (Chart 1, right panel).[6]

[1] First-time buyers are defined as home buyers without housing wealth according to the previous year's tax assessment statistics and who have not purchased or sold a home after 2006. Persons with a loan-to-value (LTV) ratio above 110 percent and persons with positive self-employment income have been excluded from the analysis.

[2] Includes only residential properties with buildings sold on the open market with a purchase amount in the interval NOK 500 000 - NOK 10 000 000 (in 2014 NOK).

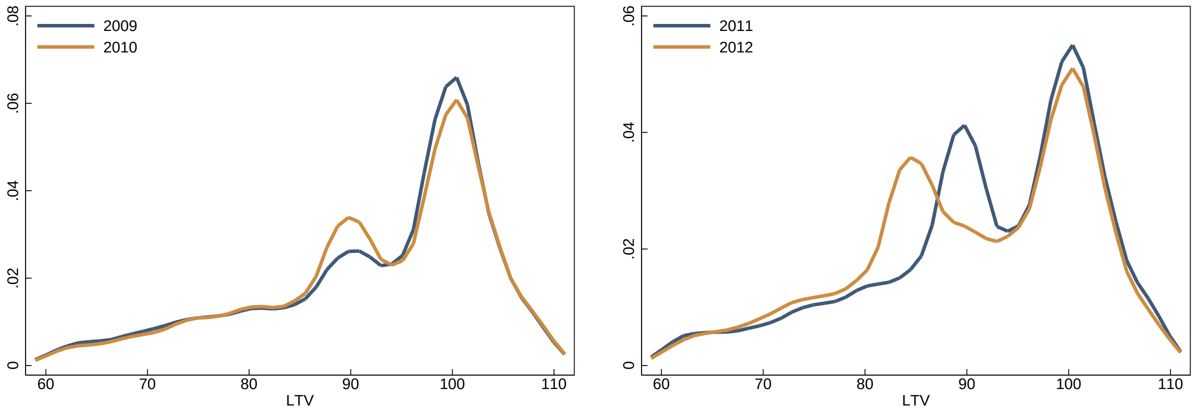
[3] The LTV ratio is estimated as borrowing in the year of a home purchase, excluding changes in student loans and housing cooperative debt, relative to the borrower's share of the purchase amount. Owing to insufficient information, additional collateral is not taken into account in the analysis.

[4] A regression analysis of the effect of the introductions of guidelines in 2010 on first-time buyers' LTV ratios, controlled for a number of personal and household attributes and regional economic developments, shows a statistically significant decline in the average LTV ratio for borrowers with an LTV ratio between 90 and 100 percent, while the fall in the average LTV ratio for borrowers with an LTV ratio between 85 and 90 percent or over 100 percent is not significant.

[5] Borrowing for purposes other than a home purchase is also a possible explanation for why many have a high LTV ratio.

[6] A regression analysis of the effect of changes in the guidelines in 2011 on first-time buyers' LTV ratios, controlled for a number of personal and household attributes and regional economic developments, shows a statistically significant decline in LTV ratios for first-time homebuyers with an LTV above 85 percent. The decline is most pronounced for persons with an LTV ratio in the interval 85 to 90 percent.

Figure 1: Change in the distribution of LTV ratios before and after changes in guidelines.[1),2)]



[1)] The distribution is calculated using a kernel density estimation (Epanechnikov with 50 points) for persons with an LTV in interval 60-110. The area under the curve sums to 1.
[2)] The distributions for 2009 and 2010 are calculated for buyers in the period April to December.
Sources: Ambita Land Registry, Norwegian Mapping Authority, Statistics Norway and Norges Bank

Attachment B: Have younger persons been prevented from purchasing their first home?

The share of persons buying their first home fell between 2007 and 2009, but has since remained relatively stable (Table 1).[7] Developments in the share purchasing a home are likely influenced by a number of individual and household characteristics as well as regional economic developments. To analyse whether access to the housing market by young non-homeowners has been restricted following regulatory changes, the effect of guideline changes in 2010 and 2011 is estimated on the probability that non-homeowners will purchase their first home.[8] The estimation controls for a number of factors that may influence whether young persons purchase their first home. However, the results must be interpreted with caution, since the regulatory changes may have coincided with other changes in the economy that are not captured by the variables included in the model. Therefore, the estimated effects of the regulatory changes cannot be interpreted as causal effects.

The effect of regulatory changes on home purchase probability is estimated using a logit model that includes a variable that takes the value 1 after the change and 0 prior to it. The analysis utilises data around the time of the change.[9] The analyses indicate that the probability that young persons will buy their first home is not significantly lower after the changes in the guidelines in 2011 (Table2).[10] This applies both when one looks at the group of young first-time buyers as a whole (column 1) and when one allows the effect of changes in the guidelines to vary across groups on the basis of income (column 2), age (column 3), gross financial wealth (column 4), place of residence (column 5) and parents' housing wealth (column 6).[11]

[7]The analysis utilises housing transaction data from Ambita Land Registry, based on registration of title deeds, linked to tax return data from Statistics Norway. Potential first-time buyers are defined as persons without housing wealth according to tax assessment statistics from the previous year, and who did not purchase or sell a home after 2006.

[8]Owing to a lack of data, the effect of the implementation of the guidelines in a regulation in 2015 has not been analysed.

[9]For the regulatory change in December 2011, homebuyers are analysed in the period January to November 2012, against the control group, which is homebuyers in the period January to November 2011. The month in which they are homebuyers is the month the purchase was registered. According to Statistics Norway, the registration date is in average one month after the purchase contract was signed (see her).

[10]A similar analysis of the effect of the introduction of guidelines in 2010 shows a slight, statistically significant, increase in home purchase probability after the introduction. This may be due to omitted variables in the analysis. Prior to the introduction of guidelines in March 2010, homebuyers are analysed in the period April to December 2010, against the control group, which is homebuyers in the period April to December 2009.

[11]This analysis is based on a broad sample of first-time buyers. However, there may be groups, eg based on various combinations of characteristics, with reduced home purchase probability, which are not uncovered by this analysis.

Table 1: Share of non-homeowners purchasing their first home in the age group 18-39, by age and quintiles for income and gross financial capital.[1)] Percent.

	2007	2008	2009	2010	2011	2012	2013	2014	2015
	4,8	4,1	3,7	3,9	4,2	4,1	4,1	4,0	4,1
Age									
18-24	3,0	2,6	2,5	2,5	2,7	2,7	2,6	2,6	2,7
25-29	7,8	6,5	5,9	6,2	6,7	6,7	6,7	6,6	6,9
30-34	5,9	5,1	4,5	4,8	5,1	5,2	5,0	4,7	4,7
35-39	3,7	3,4	3,1	3,3	3,5	3,4	3,2	3,2	3,1
Gross income quintile[2)]									
1	1,0	0,7	0,7	0,8	0,8	0,8	0,7	0,7	0,7
2	3,2	2,6	2,3	2,4	2,5	2,5	2,4	2,3	2,4
3	6,2	5,5	4,9	5,1	5,3	5,1	5,1	4,9	5,2
4	9,2	8,1	7,8	8,1	9,2	9,0	9,4	9,2	9,7
5	10,4	8,8	8,4	9,2	10,8	11,4	11,6	11,0	11,0
Gross financial capital quintile[3)]									
1	3,0	2,6	2,2	2,3	2,3	2,1	2,0	2,2	2,1
2	3,8	3,3	2,8	2,8	2,8	2,6	2,5	2,2	2,3
3	5,0	4,3	3,8	4,0	4,2	4,0	3,9	3,8	3,9
4	6,1	5,1	4,8	5,2	5,8	5,8	5,9	5,7	6,1
5	7,8	6,5	6,6	7,1	8,2	9,0	9,4	9,2	9,6

[1)] Income and financial capital quintiles have been calculated for all persons aged 18-39.

[2)] Figures for 2015 are estimated on the basis of gross income in 2014.

[3)] Gross financial capital at the beginning of the year.

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

Table 2: Estimated effect of guideline changes in 2011 on home purchase probability for non-homeowning young persons.

	(1)	(2) Inntekt	(3) Alder	(4) Formue	(5) By/land	(6) Foreldre
$reform_{2011}$	1.000	0.991	0.977	0.974	0.996	0.988
	(0.0336)	(0.0302)	(0.0420)	(0.0442)	(0.0339)	(0.0325)
$reform_{2011} \times kvintil2$		1.003		0.966		0.979
		(0.0324)		(0.0472)		(0.0299)
$reform_{2011} \times kvintil3$		0.979		0.968		1.019
		(0.0354)		(0.0447)		(0.0234)
$reform_{2011} \times kvintil4$		0.991		1.017		1.006
		(0.0210)		(0.0379)		(0.0266)
$reform_{2011} \times kvintil5$		1.086**		1.147***		1.053**
		(0.0350)		(0.0462)		(0.0227)
$reform_{2011} \times alder25-29$			1.014			
			(0.0351)			
$reform_{2011} \times alder30-34$			1.065**			
			(0.0322)			
$reform_{2011} \times alder35-39$			1.046			
			(0.0320)			
$reform_{2011} \times Storby$					0.969	
					(0.0284)	
Observasjoner	1705450	1705450	1705450	1705450	1705450	1705450
AUROC	0.810	0.811	0.811	0.811	0.811	0.811

Coefficients show odds rates. Coefficients above 1 indicate increased probability, while coefficients below 1 indicate reduced probability. Robust standard errors in brackets. Asterisks indicate significance level: * = 10%, ** = 5% and *** = 1%. AUROC (area under receiver operating characteristic) is a measure of the model's predictive power. A perfect model has an AUROC = 1, while a model without information has an AUROC = 0.5.

Column 2 divides the sample by income quintile, column 4 by gross financial capital quintile at the beginning of the year (including inheritance received the same year) and column 6 by parents' housing wealth quintile.

Control variables: Person: third degree polynomial for age, real gross income, real gross financial wealth and dummy variables for income and wealth quintile and parents' housing wealth quintile; Household: dummy variables for marital status, change in marital status, number of adults and children in the household and change ($+/ = /-$) in the number of children. County: expected output in the region from the regional network, unemployment, vacancies and local fixed effects.

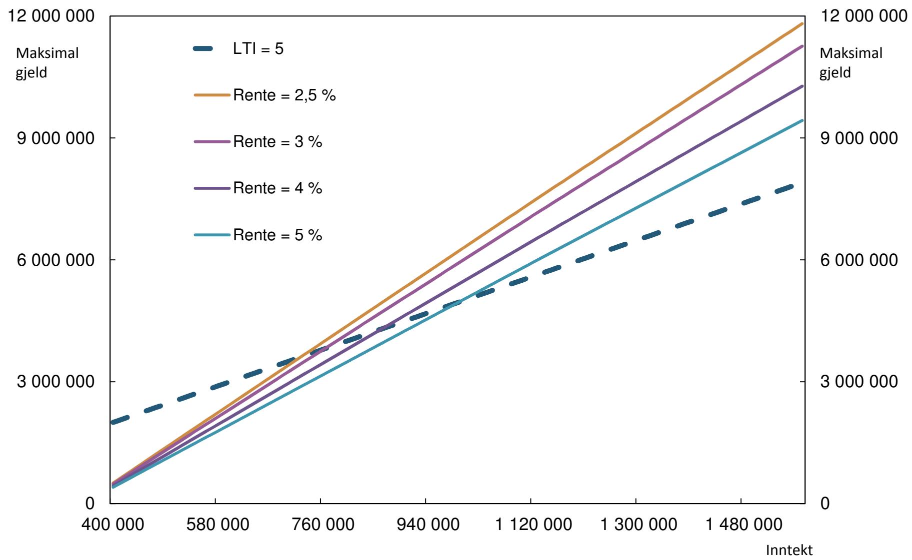
Sources: Ambita Land Registry, Norwegian Mapping Authority, Statistics Norway and Norges Bank

Attachment C: Debt-servicing capacity and LTI requirements

Finanstilsynet (Financial Supervisory Authority of Norway) has proposed introducing a loan-to-income (LTI) requirement of five times gross income as a supplement to the requirement to be able to service debt in the event of a 5 percentage point interest rate increase. The LTI requirement depends only on household income, while the debt-servicing capacity requirement also varies according to household size, tax level and interest rates. To extent to which the LTI requirement limits borrowing depends on household composition and the interest rate level. In the following, the effects of the two requirements are compared.

The debt-servicing capacity requirement is based on a standard household budget from the National Institute for Consumer Research (SIFO), hereinafter referred to as expenses for necessities.[12] It is assumed that the incomes in two-income households are of equal size. The tax system for 2016 is applied.[13] It is assumed that the mortgage is a 30-year self-amortising loan. The stress test of debt-servicing capacity starts with the current interest rate plus five percentage points. The analysis shows the effect for lending rates of 2.5, 3, 4 and 5 percent, which results in interest rates in the stress test ranging between 7.5 and 10 percent.

Figure 2: Maximum debt under requirements for an LTI ratio of 5 and debt-servicing capacity under various interest rate assumptions. Couples with two children and two incomes. [1]



1) Income stated for households as a whole. Income is assumed to be divided equally.

Sources: National Institute for Consumer Research (SIFO) and Norges Bank

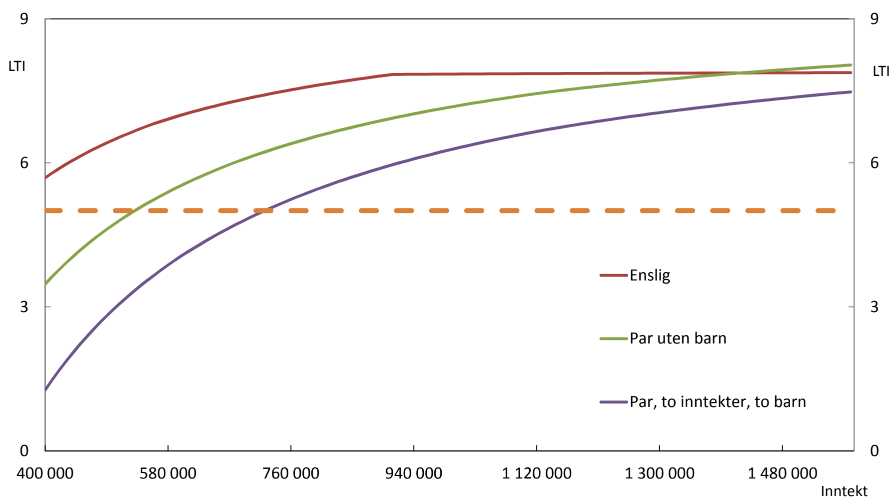
The debt-servicing capacity requirement will have a more restrictive effect, the

[12] This amounts to NOK 282 500 for a family with two children, NOK 204 240 for a couple without children and NOK 129 132 for a single-person household. For couples, a supplement of NOK 60 000 is routinely added for housing expenses and for single-person households, a supplement of NOK 30 000.

[13] This includes a personal allowance in tax class 1, minimum deduction and child care deduction, 25 percent tax on ordinary income and bracket tax on personal income.

higher the interest rate, the higher expenses for necessities are (ie the larger the household) and the lower the income is. For a family with two incomes and two children under age 18, the maximum borrowing amount under the debt-servicing capacity requirement will be lower than five times gross income, if gross income is below NOK 750 000 at an interest rate of 2.5 percent, and for a gross income of up NOK 1 000 000 at an interest rate of 5 percent (Chart 2). On the other hand, single persons without children will be bound be an LTI requirement of 5 at an income of NOK 400 000 (Chart 3). These calculations illustrate that for many groups an LTI requirement at the current interest rate level will be a real tightening compared with the current debt-servicing capacity requirement. However, at a higher interest rate level, the debt-servicing capacity requirement will dominate.

Figure 3: Maximum LTI ratio if borrower exactly satisfies the debt-servicing capacity requirement. Various household types.[1]



1) For couples, it is assumed that income is divided equally.
Sources: National Institute for Consumer Research (SIFO) and Norges Bank

Attachment D: Debt in excess of requirements given borrowing in 2014

To shed light on how the various requirements in the regulation will affect borrowing, actual borrowing in 2014 will be analysed.[14] The results show the share of borrowing in 2014 that would have been outside the limits of Finanstilsynet's (Financial Supervisory Authority of Norway) proposed revision of the regulation if the regulation had been strictly applied.

For first-time buyers, the sales price is identified from title deed figures made available by Ambita Infoland and the Norwegian Mapping Authority. Since the sales price provides a precise indication of the dwelling's value in the year it was sold, it is the correct basis for estimating the loan-to-value (LTV) ratio associated with the home purchase. For the population as a whole, Statistics Norway's estimated house values are applied. There is reason to believe that these estimated values understate the value of the collateral households have at their disposal.[15] The data set does not contain information on the use of additional collateral, which means that the results overestimate the effect of the LTV requirement. For estimating debt-servicing capacity, an interest rate of 2.5 percent plus 5 percentage points is applied.

For households in the age group 18-39 that bought a home for the first time 2014, the LTV requirement would have had most pronounced effect, followed by the debt-servicing capacity requirement (Chart 4). Most first-time buyers that would have been affected by the LTI requirement would have already been bound by the debt-servicing capacity requirement. According to this analysis, the new LTI requirement will have little effect on young first-time buyers in the housing market. If instead of the sales price, the dwelling's tax value is applied, the LTV requirement will have a stronger effect (Chart 4 (b)).

For the population as a whole, we look at home-owning households with income that borrow in 2014.[16] These households are divided into three age and income groups and two dwelling groups - households with one dwelling and households with more than one dwelling (the term "dwelling" does not include holiday homes). Slightly below 10 percent of households owned more than one dwelling in 2014.

According to tax assessment figures, persons under age 40, the lowest income deciles and purchasers of more than one home would have been hit hardest by the requirements if the regulation had been strictly applied (Table 3). For the group under age 40, the LTV ratio would have been the most important requirement. For the lowest income deciles, the three criteria would have been binding to about the same degree. Borrowing by households with more than one dwelling in particular would have breached the LTI and debt-servicing capacity requirements. This reflects the fact that the borrowing on two dwellings may be high compared with current income. If one purchases a home

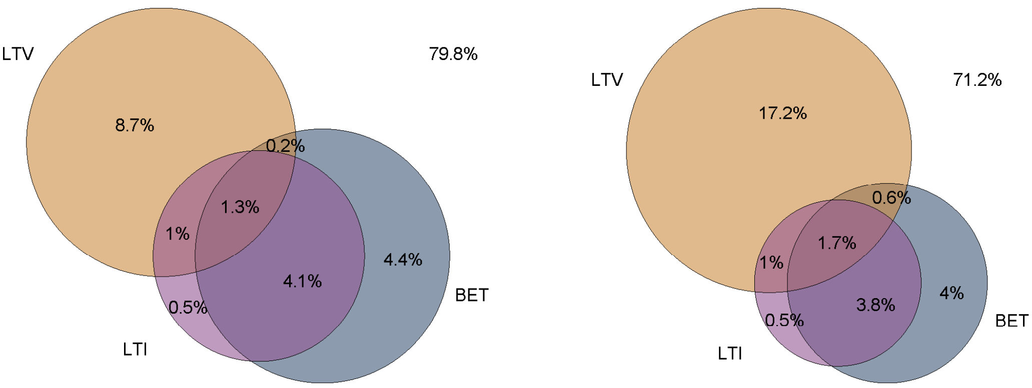
[14] 2014 is the last year with overviews of household income and wealth. Figures for 2015 will be available in spring 2017.

[15] The estimated value is used for determining tax rates and is an unbiased estimate of the house value, but it is calculated on the basis of information regarding size and regional location and does not take into account peculiarities such as view and standard. The distribution of actual house values will therefore differ from the distribution of estimated house values. There is reason to believe that persons who own homes that are worth more than the estimated value may have more debt than households with homes that are worth less than the estimated value. Use of estimated values may thus result in overestimations of actual LTV ratios.

[16] Approximately 40 percent of households borrowed in 2014.

Figure 4: Borrowing in excess of the requirements for first-time buyers aged 18-39.

(a) Sales price of dwelling **(b)** Tax value of dwelling



LTV indicates the share of borrowing in excess of 85 percent of the purchase amount. LTI indicates the share of borrowing in excess of five times gross income. BET indicates the share of borrowing that breaches a liquidity margin enabling the borrower to cover necessary expenses and a 5 percentage point interest rate increase. Overlapping areas indicate the share of borrowing in breach of more than one criterion.
The chart is a Venn diagram in which the size of the circles are intended to reflect the relative importance of the various requirements.
First-time buyers are households without housing wealth in the tax assessment statistics in 2013 and who have not purchased or sold a home after 2006, but who purchase a home in 2014. Households with positive self-employment income and households that do not borrow in the year they purchase a home have been excluded from the analysis. Includes only residential properties with buildings sold on the open market with a purchase amount in the interval NOK 500 000 - NOK 10 000 000.
Sources: Ambita Land Registry, Norwegian Mapping Authority, Statistics Norway, National Institute for Consumer Research (SIFO) and Norges Bank

with the expectation of future rental income, gross income during the purchase year may underestimate income expectations.

Table 3: Borrowing in excess of requirements. Share of group total and share of group in breach of requirements in 2014

Group	Share	LTI	BET	LTV	Combi	LTI not BET
–39	44,15	16,15	19,42	27,87	4,31	6,77
40-64	48,28	9,26	10,27	14,92	2,02	3,66
64+	7,57	11,41	10,67	9,56	2,29	4,21
1-5	38,59	18,06	22,29	24,25	4,55	8,56
6-8	30,86	10,24	11,72	19,98	2,49	3,15
9-10	30,56	7,66	6,96	15,41	1,73	2,63
One dwelling	70,57	10,39	14,06	23,46	2,94	4,47
Own more than one dwelling	29,43	17,45	15,03	12,50	3,33	6,53
All	100,00	12,47	14,34	20,23	3,05	5,07

LTV indicates the share of borrowing in excess of 85 percent of the purchase amount. LTI indicates the share of borrowing in excess of five times gross income. BET indicates the share of borrowing that breaches a liquidity margin enabling the borrower to cover necessary expenses and a 5 percentage point interest rate. "Combi" indicates debt that is bound by all three requirements simultaneously. «LTI not BET» is the share of debt bound by the new LTI requirement, but that would not have been bound by the existing debt-servicing capacity.
Sources: Statistics Norway, National Institute for Consumer Research (SIFO) and Norges Bank