STAFF MEMO

Residential construction and household formation

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Population growth in Norway over the past 10-15 years has been strong, while residential construction activity has been fairly low. At the same time, household size continues to decline. The increase in the number of households has been higher than the increase in the number of new housing units built, particularly in urban areas. This construction shortfall has contributed to rapid house price inflation in this period. Since end-2015, population growth has slowed and the number of new units built has increased, which has reduced the construction shortfall.

Key words: Residential construction, households, urbanisation.

1. Introduction

Residential construction and house prices are determined by supply and demand. Demand not only depends on household formation, but also on household income and preferences, household lending rates, and households' access to credit and expectations. Among other things, supply is influenced by physical and regulatory constraints for construction, construction costs and contractors' access to credit. All households require a place to live and there should therefore be long-term balance between the number of households and the number of housing units. If an excess supply of housing were to build up as a result of construction substantially outpacing household formation, it could indicate a future marked decline in both house prices and residential construction. At the same time, household formation that substantially outpaces the number of new units built over time may imply a sharp future rise in house prices, and, in turn, in residential construction activity. In this article, we take a closer look at historical developments in residential construction and household formation, and examine whether there is an excess or shortfall of new units built today. We also examine developments in the overall housing stock and number of households.
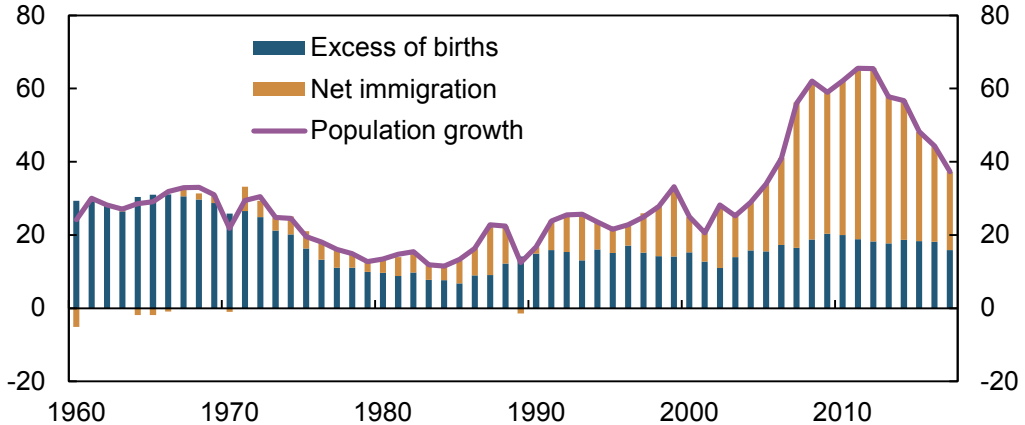
Population growth has been strong for a long period, particularly since EU enlargement in 2004 and the subsequent increase in labour immigration to Norway (Chart 1). At the same time, household sizes have declined (Appendix Chart A.1), which provides a greater contribution to household formation than what population growth in isolation implies. The decline in household size was strongest leading

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up to the 1990s, but population growth has provided the most important contribution to household formation in recent years (Appendix Chart A.2).[2] We use the increase in the number of households as an indicator of the need for new housing. This is because there is often more than one person per household, and in this way household formation is more pertinent than population growth with regard to the need for new housing.

In the next section we assess whether there has been any particular divergence between the number of new units built and household formation in Norway over time, also using different measures of residential construction activity. The regional distribution of new units built and household formation is skewed, which is examined more closely in Section 3. In Section 3, the differences across counties are discussed first. Since there has been an intra-county urbanising migration trend, we also examine the differences between municipalities. Section 4 concludes.

Chart 1: Population growth by excess of births and net immigration. In thousands of persons. 1960 – 2017

Sources: Statistics Norway and Norges Bank

Box 1: Definitions

Households
A household consists of persons that live at the same residential address. In producing household statistics, shortcomings in the underlying data nevertheless suggest that a direct link between persons and a residential address is not possible. Statistics Norway has therefore developed a statistical approach to household formation that implies that there can be more than one household at the same residential address.

Housing unit
A housing unit comprises one or more rooms, has been built or rebuilt for use as a year-round private residence for one or more persons, with a separate access that does not pass through another unit. Housing statistics are based on the land register, which is Norway's official register of real property.

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[2] Figures for the number of households are only available for each decade up to end-2004. To construct annual figures for the period between 1960 and 2004, figures for the number of persons per household have been derived by linear interpolation. The total number of persons in households has been interpolated by adding the growth rate of annual population statistics. Annual figures for the number of households are estimated based on the interpolated figures for the number of persons per household and total number of persons in households. From 2004, annual figures from Statistics Norway are used. Household figures before 2013 have been revised because of changes to Statistics Norway's production routines.

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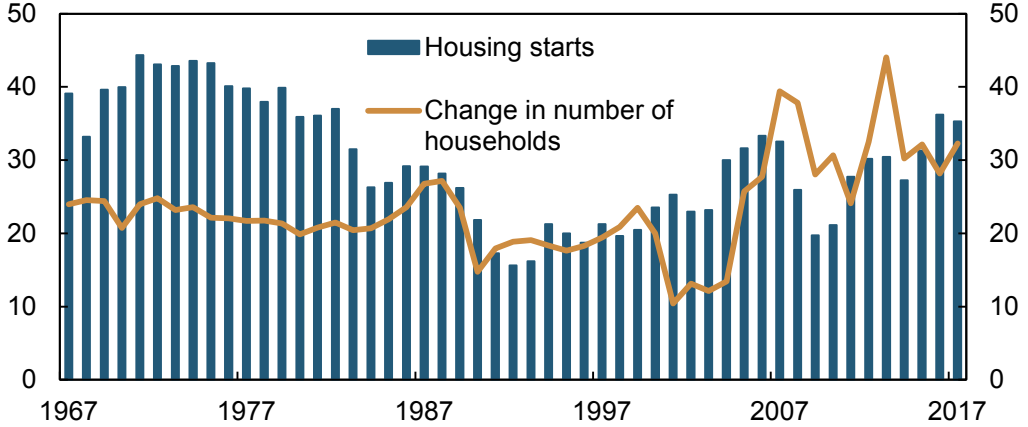
2. National developments

Residential construction activity, measured as the number of building permits issued, substantially outpaced household formation in the 1970s and 1980s (Chart 2). This reflects the substantial post-war housing shortage, and the housing policy objective of meeting demand by building much affordable housing as possible. In the 1970s, for example, the objective was to produce 40 000 housing units annually through government mortgage lending (Sørvoll 2011).

In the 1990s, these two variables were in better balance, but by the early 2000s, the number of new units built again outpaced household formation. From 2007, the number of new units built declined and long remained outpaced by household formation. In 2016, developments reversed again, owing to both increased residential construction activity and reduced immigration. So far in 2018, residential construction activity remains high, while population growth continues to slow.

The number of new housing units built and household formation vary substantially from year to year. To assess the balance between the two variables, we accumulate annual differences between them for periods between different base years, starting with 1966, up until end-2017 (Chart 3). The chart shows substantial excess construction at the beginning of the period.[3] The sharp rise in the number of new units built over the period is likely ascribable to the substantial postwar housing shortage. The housing shortage reflects presumably overcrowded housing conditions and a migration pattern showing an urbanising trend, with an associated need for new housing in urban areas. In addition, demolitions have not been taken into account, and it is possible that many low quality units in the postwar period were eventually torn down. Following the Second World War, and until the 1980s, a number of regulations and subsidies were put in place to address the housing shortage. From the end of the 1970s, however, regulations and subsidies were gradually scaled back. This was primarily justified by the high level of residential construction activity, the sharp increase in prosperity in the postwar period, and the ability of most people's to meet their housing needs in a market driven by supply and demand (Sørvoll 2011).
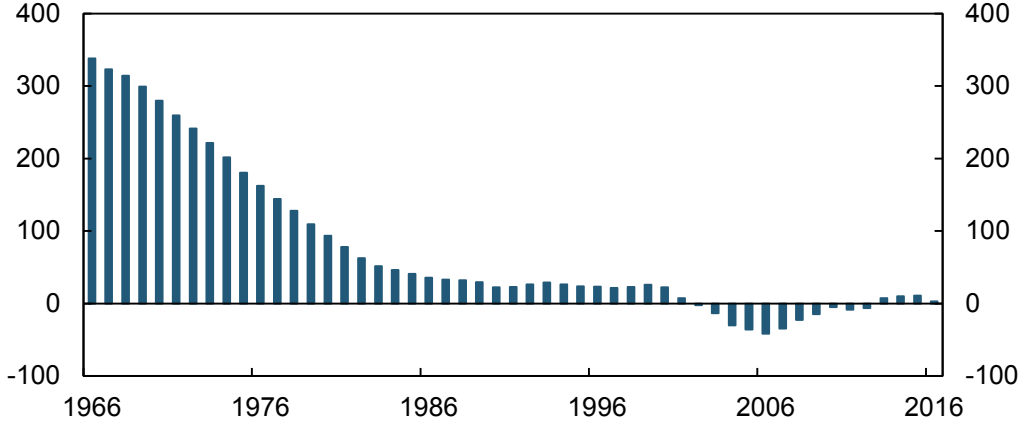
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[3] End-1966 is used as a base year, since Statistics Norway's housing starts data series begins with 1967.

Chart 2: Number of housing starts and change in the number of households. In thousands. 1967 – 2017

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Sources: Statistics Norway and Norges Bank

Chart 3: Cumulative excess construction (number of housing starts less change in number of households) at end-2017 from the end of different base years (vertical scale). In thousands. 1966 – 2016

Sources: Statistics Norway and Norges Bank

Chart 3 further shows that overall imbalances between residential construction activity and household formation after the end of the 1980s have been relatively small. For example, in the period between end-1992 and end-2017, approximately 26 000 more units were built than the number of additional households, or 1.4 percent of the number of households in 1992. Since end-2005, around 36 000 fewer units were built than the number of additional households, or 1.8 percent of the number of households in 2005. This suggests a fairly good balance between household formation and residential construction activity, as measured by housing starts, from the 1990s up to 2017.

So far, we have used housing starts data to describe developments in residential construction activity. These data indicate the number of units for which municipal authorities have issued building permits. Most of these units are eventually built, but not all. During downturns in particular, a number of building projects may not be started or are postponed after permits have been issued. Housing starts data are therefore not a direct measure of the actual increase in the number of units. Nor does the data take account of housing units that are

demolished, destroyed by fire or for other reasons removed from the housing stock, so-called housing stock losses, or conversions of buildings into housing units.[4] Statistics Norway's data for housing stock losses and conversions are historically recent, but in recent years housing stock losses have outpaced conversions somewhat more (Chart 4). This indicates that the supply of housing, as measured by housing starts, may be somewhat higher than the actual increase in the number of housing units.[5] This claim is supported by data for the total housing stock, which also takes into account conversions and losses. Annual change in the housing stock is generally somewhat lower than the number of housing starts and somewhat higher than the number of completions (Appendix Chart A.3).

Even though the balance between residential construction activity and household formation has been fairly good over time, there may have been pressures in the housing market for the entire period. To assess this, we compare the number of units and the number of households. The number of units exceeded the number of households by 10 percent at end-2005 and this difference fell to 6 percent in 2017 (Chart 5).[6] If it is assumed that a unit can only be occupied by a single household, the difference between the number of units and the number of households could be an indicator of the number of unoccupied units. Assessing how few unoccupied units there needs to be to generate pressure in the housing market is difficult because it is natural for the housing stock to exceed the number of households. For example, there are always some households that relocate and it takes time for new households to occupy a unit after the previous household has vacated. Some households also own more than one dwelling, for example, for recreational purposes, although they may not be registered as holiday homes or as commuter accommodation.
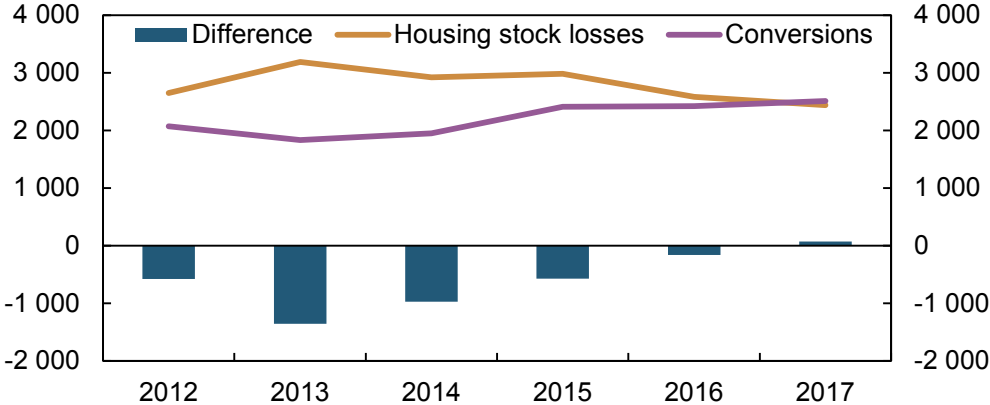
In the period between end-2005 and 2017, the increase in the number of households has outpaced the number of new housing units by approximately 54 000. This figure is somewhat higher than when measured in terms of housing starts (Chart 3). The difference likely reflects the inclusion of housing stock losses in the data for the total number of units and the fact that not all housing starts are completed.

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[4] Conversions refer here to buildings that have been converted into a higher number of housing units without demolishing the building's structure. Examples include office buildings that have been converted into flats, or detached houses that have been converted into multi-unit buildings. If the entire building is demolished and then rebuilt, the resulting units are included in housing starts data.

[5] The data for housing stock losses and conversions are somewhat uncertain. Not all housing demolitions are registered and not all new housing units built are registered as conversions. For example, is unlikely for all bedsits or studio apartments to be registered as individual housing units.
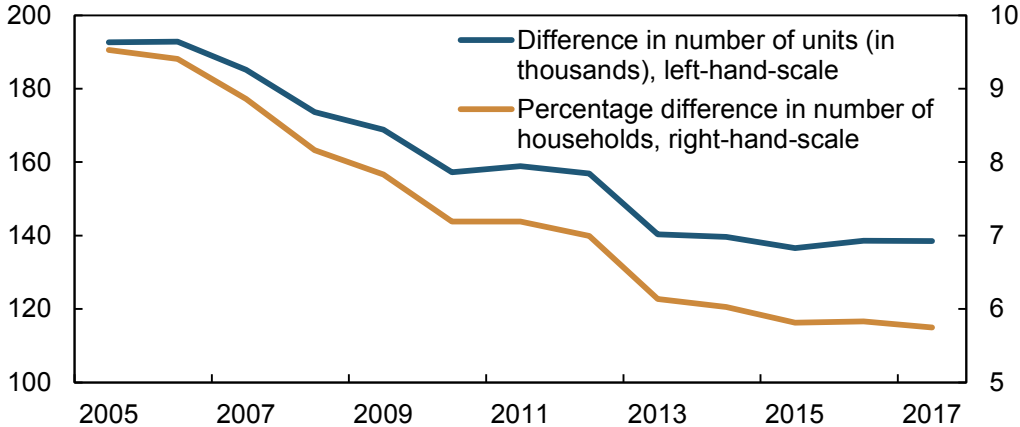
[6] Statistics Norway's overall housing stock data are from end-2005.

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Chart 4: Conversions and housing stock losses. Number of units. 2012 – 2017

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Sources: Statistics Norway and Norges Bank

Chart 5: Difference between number of units and number of households. In thousands and as a percentage of households. 2005 – 2017

Sources: Statistics Norway and Norges Bank

Both measures of new residential construction activity thus indicate that at the national level, housing completions have been outpaced by household formation since end-2005. This suggests increased pressure in the housing market, which may have fuelled the rapid rise in house prices in recent years. At the same time, there are a number of unoccupied units on a national basis.
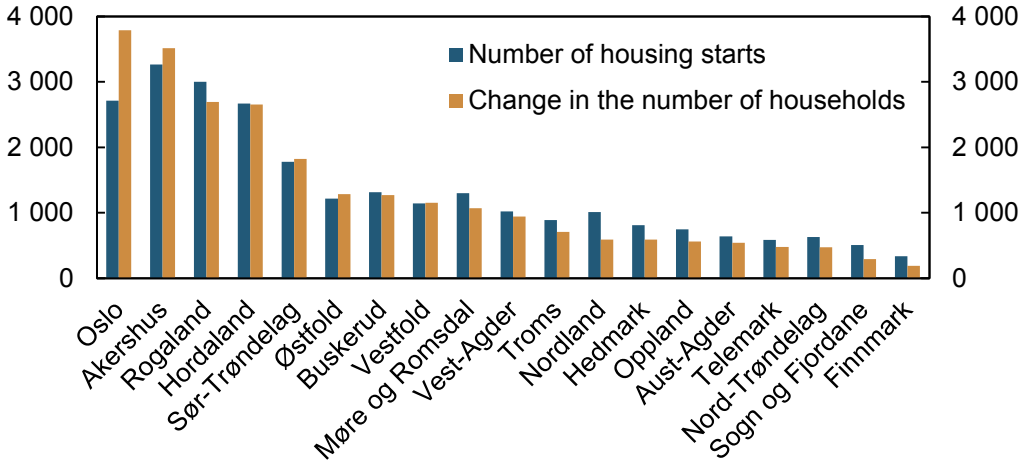
3. Regional developments

In the previous section, we analysed the number of new units built and household formation for Norway as a whole. However, regional differences are likely to exist. An available single-family house in a rural area is not necessarily an option for a household looking for an apartment in a city. In this section, we look at differences in the gap between the number of new units built and the household formation, at both the county and municipal level.

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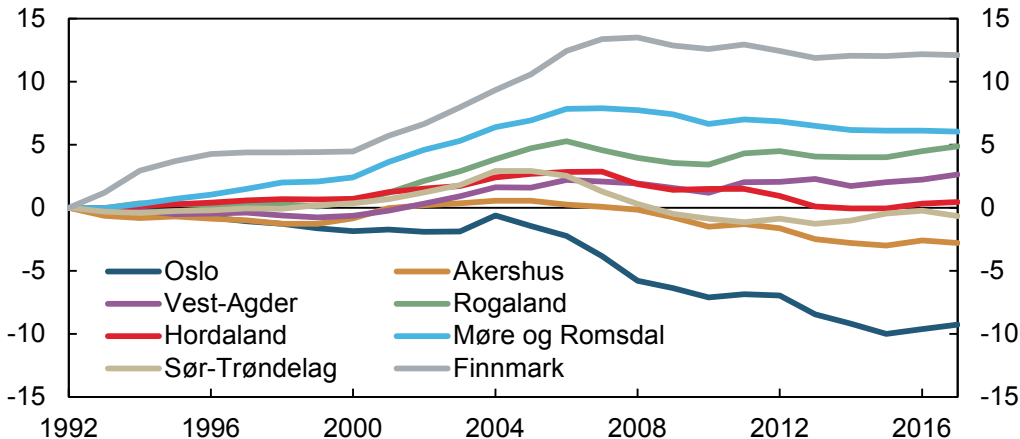
Differences across counties

Household formation has increased most in the counties with the largest cities and in Akershus (Chart 6 (see also Appendix Chart A.4)). It is also in these counties where most housing has been built in terms of the number of building permits issued. Especially in Oslo, but also to some extent in Akershus, between 1993 and 2017, fewer new units were built than warranted by the increase in the number of households.[7] In counties with the lowest increase in household formation, the number of new units built has generally outpaced household formation.

Chart 6: Housing starts and change in the number of households by county. Annual average for the period 1993 – 2017. In thousands

Sources: Statistics Norway and Norges Bank

Chart 7: Cumulative excess construction (housing starts less change in the number of households) since end-1992 for selected counties. As a percentage of the number of households at the beginning of each year. 1992 - 2017

Sources: Statistics Norway and Norges Bank

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[7] We begin in 1993 because that is the first year for which statistics for housing starts by county were compiled.

Especially after 2004, after EU enlargement led to increased labour immigration to Norway, household formation in Oslo has outpaced the number of new units built (Chart 7). In 2016 and 2017, however, the number of new units built in Oslo exceeded the increase in the number of households, reducing somewhat the construction shortfall. In Akershus, somewhat fewer units have been built over several years than the increase in the number of households. The increase in household formation in Akershus has primarily been driven by domestic migration from other counties, particularly Oslo. This may indicate that a tight housing market in Oslo has prompted many to relocate to Akershus, where the number of new units built has been higher and larger dwellings are built. This would, for example, be relevant for young families with a need for more space.
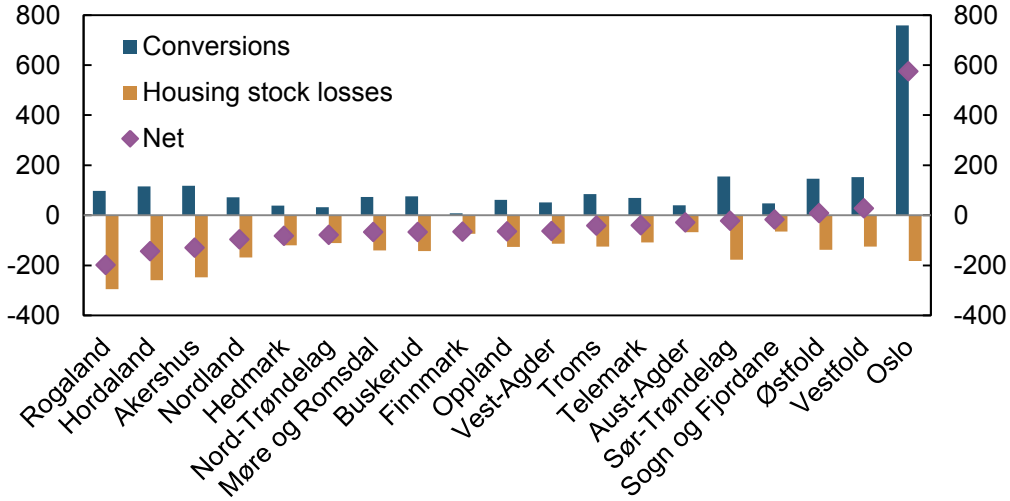
In Sør-Trøndelag and in Hordaland, the number of new units built exceeded the increase in the number of households between 1992 and the years prior to the financial crisis. Household formation picked up beginning in 2004, and the number of new units built increased in the pre-crisis years. After the crisis, the number of new units built fell, while household formation held steady, reducing excess construction. The counties with the largest cumulative excess construction since 1992 are Finnmark and Møre og Romsdal, where the number of new units built greatly exceeded the increase in the number of households prior to the financial crisis. In subsequent years there has been a better balance between the number of new units built and household formation. For the other counties, the gaps are narrower.

In Section 2, we showed that the number of conversions and of housing stock losses is approximately equal, so that housing starts data are a fairly reliable estimate of changes in the overall national housing stock. However, conversions and housing stock losses are not evenly distributed across the country. The number of conversions has been fairly high in Oslo in particular (Chart 8). In the period for which data are available (2012-2017), conversions and housing stock losses contributed a net addition of around 600 units per year on top of housing starts. For most of the other counties, housing stock losses exceed the number of conversions, so that the growth in the housing stock is somewhat lower than indicated by housing starts data.

To account for housing stock losses and conversions, we compare developments in the total housing stock with the number of households at county level for the period 2005 to 2017. The difference between the total housing stock and the number of households is used as an indicator of the number of unoccupied units, as in Section 2. The number of unoccupied units has declined in nearly all counties between end-2005 and 2017 (Chart 9), which may reflect a somewhat tighter housing market in most parts of the country. Another reason for fewer unoccupied units may be that local authorities have conducted reviews of the register of properties and decided to list more units as lost. The considerable decline in the number of unoccupied units in some counties, such as Sør-Trøndelag, Møre og Romsdal and Nordland may
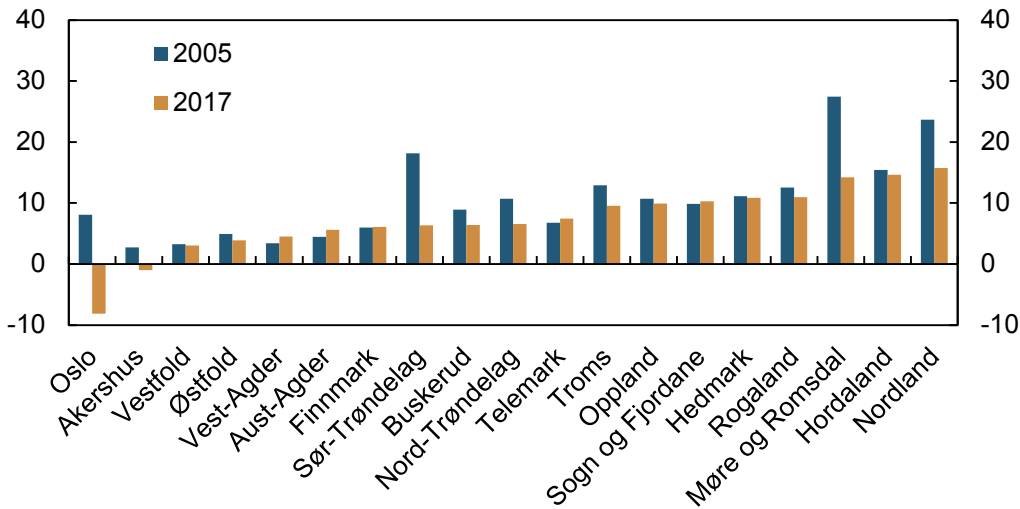
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perhaps reflect such clean-ups of the property register. In that case, the real decline in the number of unoccupied units is not as pronounced.

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Chart 8: Conversions and housing stock losses by county. Annual average for the period 2012 - 2017. Number of units

Sources: Statistics Norway and Norges Bank

Chart 9: Number of unoccupied housing units (number of units – number of households) by county at end-2005 and end-2017. In thousands

Sources: Statistics Norway and Norges Bank

It is not surprising that there are more units than households, in part because a single household can have more than one unit, as described in Section 2. In Oslo and Akershus, however, there were more households than units at end-2017. One reason is that not all dwellings are reported to the property register as separate housing units and thereby captured by the statistics, eg a studio or "granny flat" in a house or apartment. More than one household can also be registered in the same unit, eg in a shared housing arrangement. Over time, a wide gap between the number of units and the number of households may prompt households to adjust to the number of new units built for

example by increasing the number of persons per household when housing is scarce.

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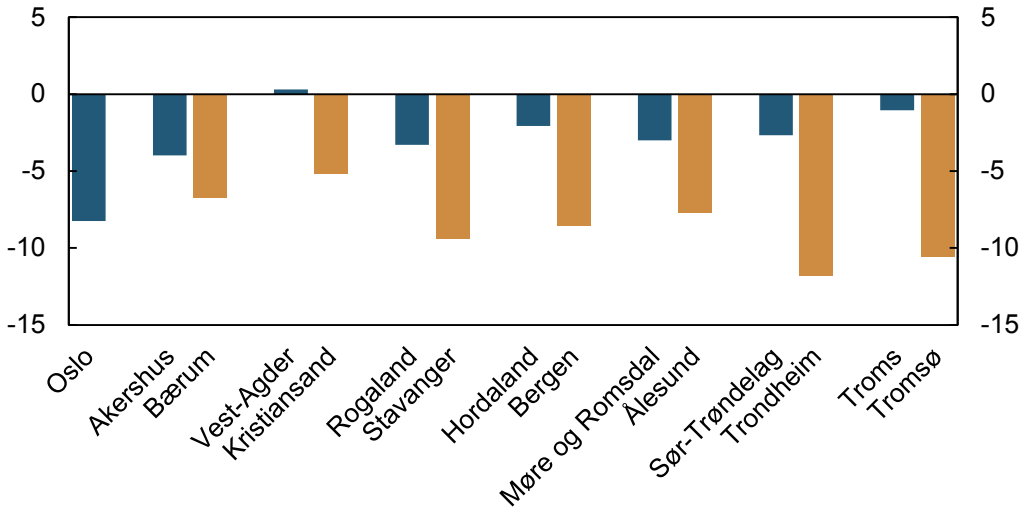## Differences across municipalities by degree of urbanisation

In addition to considerable differences across counties, there is also substantial intra-county variation in the number of new units built and household formation. The Ministry of Local Government and Modernisation (2018) finds that every county has municipalities with strong population growth and municipalities with declining population, which reflects the municipality's degree of urbanisation. We compare excess residential construction, measured as the difference between the increase in the housing stock and the increase in the number of households, for some of Norway's largest urban municipalities with adjacent counties. There are larger construction shortfalls, ie lower growth in the housing stock than in the number of households, in all urban municipalities than in the adjacent counties between end-2005 and 2017 (Chart 10). It may thus appear that the degree of urbanisation plays a role in the size of the construction shortfall.

To investigate whether the number of new units built and household formation vary systematically with the degree of urbanisation, we use data for the number of housing units and households at municipal level. We also use Statistics Norway's new urbanisation index (*sentralitetsindeks*), in which all municipalities in Norway are scored according to travel times to work and various kinds of goods and services.[8] Municipalities are also sorted into six urbanisation classes on the basis of the index (see Høydahl (2017); see also Appendix Table A.1). The most highly urbanised municipalities are in class 1, while the least urbanised are in class 6.

Throughout the postwar period, the domestic migration pattern has shown an urbanising trend (see Østby (2005)). In the years 2006 to 2017, net migration to the three most urbanised classes has varied between around 5 000 to 10 000 persons per year, with corresponding outmigration from the less urbanised classes (Chart 11). The urbanising migration trend slowed in the post-crisis years, but has since gathered pace and in 2017 was at its highest level in the period. Over time, such a unidirectional migration pattern may lead to a skewed distribution of the construction shortfall, especially if the number of new units built does not satisfy households' housing preferences.
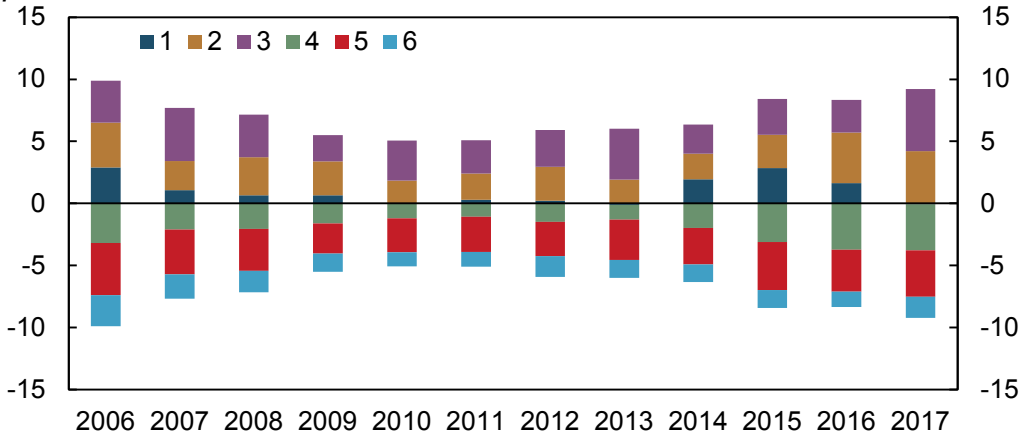
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[8] Statistics Norway's urbanisation index is a measure of a municipality's degree of urbanisation (see Høydahl (2017)). Norway's 422 municipalities (at 1 January 2018) are allocated a score between 0 and 1000, where a higher value denotes a greater degree of urbanisation. The lowest score is given to Utsira, with an index value of 315, while the highest score is given to Oslo, with an index value of 1000.

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Chart 10: Excess construction (change in the number of housing units less change in the number of households) from end-2005 to 2017 for selected counties and municipalities. As a percentage of the number of households at end-2005
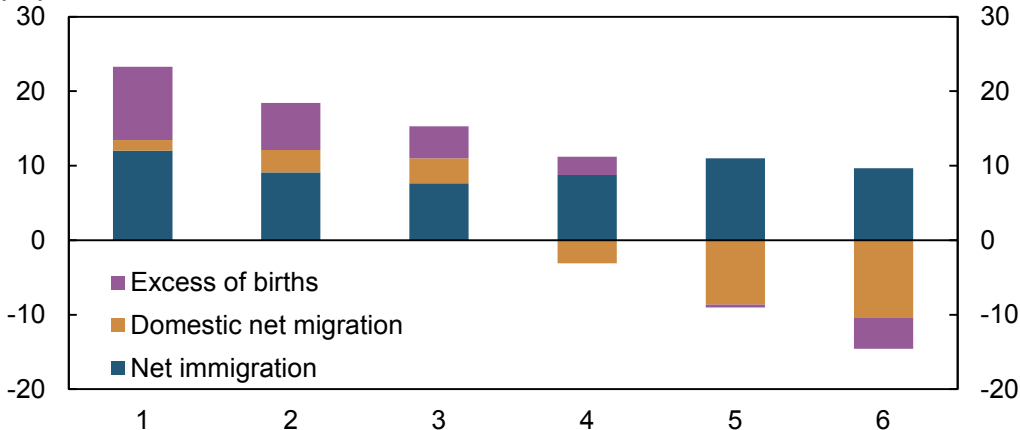

Sources: Statistics Norway and Norges Bank

Chart 11: Domestic net migration by urbanisation class. In thousands of persons. 2006 - 2017

Sources: Statistics Norway and Norges Bank

Chart 12: Contributions to total population growth for the period 2005 to 2017 by municipalities' urbanisation class. As a percentage of the population of urbanisation classes at end-2005

Sources: Statistics Norway and Norges Bank

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A high excess of births and high levels of immigration have been the most important population growth drivers in the most urbanised municipalities (Chart 12). The domestic migration pattern has been of considerable importance for developments in more sparsely populated areas. The relatively high contribution from the excess of births in the most urbanised municipalities reflect the migration pattern, since newly established young households in particular tend to migrate to urbanised areas (see Ministry of Local Government and Modernisation (2018)).
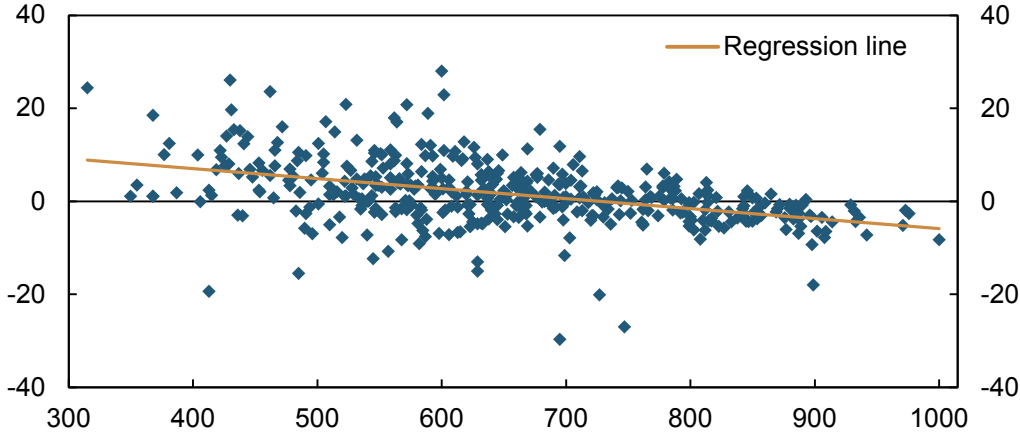
Excess construction, measured as the difference between growth in the housing stock and household formation, from end-2005 to 2017 in Norwegian municipalities is illustrated in Chart 13. There is a clear tendency for excess construction to fall with the degree of urbanisation. The increase in the number of households between end-2005 and 2017 has been highest in the most urbanised municipalities (Chart Appendix A.5). The majority of municipalities have recorded an increase in the number of households in the period, but in several of the least urbanised municipalities there has been a decline or zero increase in the number of households, in line with the urbanising migration pattern. In the same period, the increase in the housing stock has been highest in the most urbanised municipalities (Appendix Chart A.6). In some municipalities with a low degree of urbanisation there has been a decline in the housing stock, which reflects housing stock losses in excess of new construction.

A possible explanation for why residential construction activity has lagged behind household formation in a number of urbanised municipalities is that there were previously a large number of unoccupied units in these municipalities. To assess this, we compare the total numbers of housing units and households in the municipalities, as we did above at county and national level.

There are few unoccupied housing units, defined as the difference between the total number of units and the number of households, in the urbanised areas (Chart 14).[9] At end-2017, around 80 percent of the country's unoccupied units were in the three least urbanised classes, where 28 percent of households live. This may reflect some households' use of units in less urbanised areas as holiday homes, but the most important reason is probably the urbanising migration pattern. There has been a decline in the number of unoccupied units in the most urbanised municipalities between 2005 and 2017, while the number of unoccupied units the less urbanised municipalities has risen, in line with the findings above.
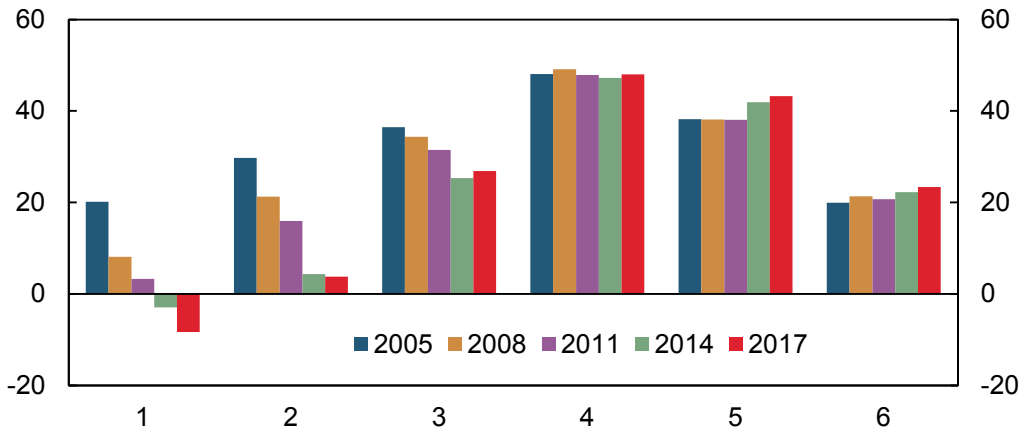
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[9] More households than housing units in most urbanised classes may reflect the failure of the statistics to capture all units and the possibility that more than one household is registered in the same unit.

Chart 13: Excess construction (change in the number of housing units less the change in the number of households) from end-2005 to 2017 as a percentage of the number of households at end-2005 (vertical scale). By municipalities' urbanisation score (horizontal scale)

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Sources: Statistics Norway and Norges Bank

Chart 14: Number of unoccupied housing units (number of units less number of households) by municipalities' urbanisation class. In thousands

Sources: Statistics Norway and Norges Bank

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4. Conclusion

When we look at the period from the 1990s to 2017 as a whole, household formation and the number of new housing units built on a national basis were fairly in balance. However, after 2005, fewer housing units were built than the increase in the number of households. This is due to the fairly low number of new units built and a pronounced increase in the number of households. The construction shortfall has likely helped to fuel strong house price inflation over a long period. Over the past few years, the number of new units built has been higher than the increase in the number of households, helping to reduce the construction shortfall.

We find considerable regional differences between the number of new units built and household formation. The most urbanised areas have experienced the strongest increase in household formation. Even if the number of new units built has also been highest there, fewer new units were built than the increase in household formation. Moreover, there are few unoccupied units in the most urbanised areas. At the same time, there are an increasing number of unoccupied units in less urbanised areas, which reflects an urbanising migration pattern. Owing to the urbanisation trend, the total number of new units built at national level may be larger than the increase in the number of households, without providing grounds for concluding that too many housing units are being built, assuming that the new units are built in areas with net immigration.

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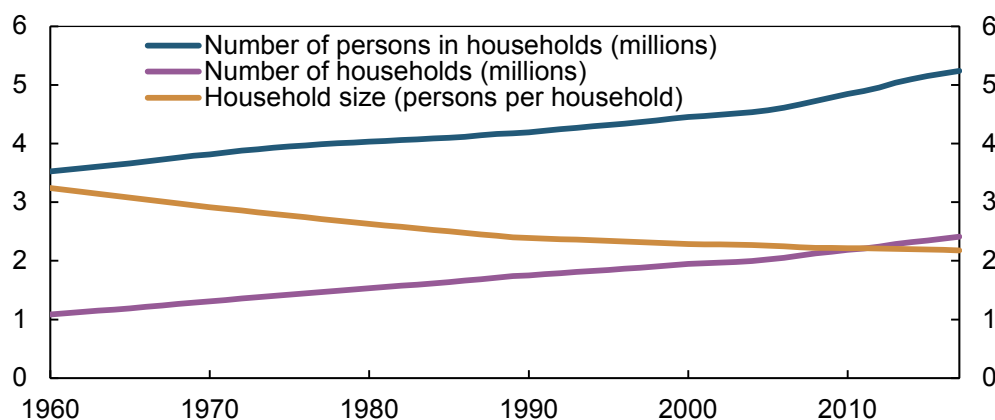
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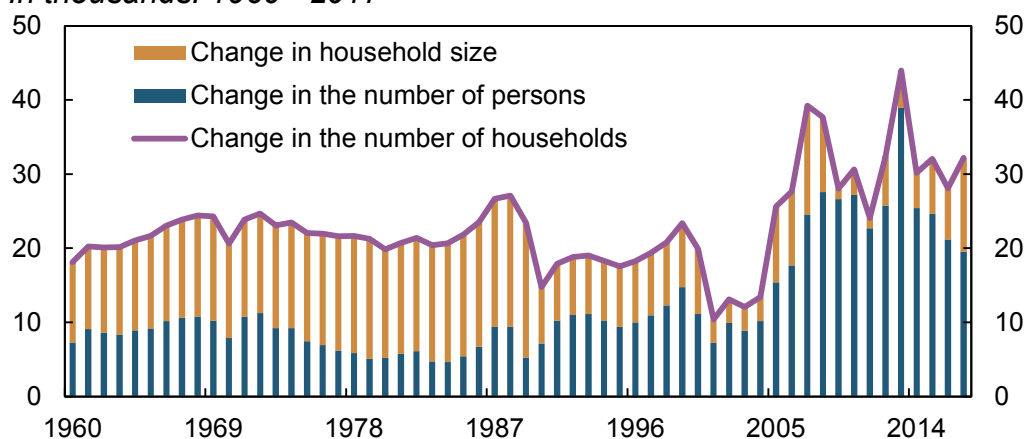
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Appendix

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Chart A.1: Number of persons in households, number of households and household size. 1960 – 2017
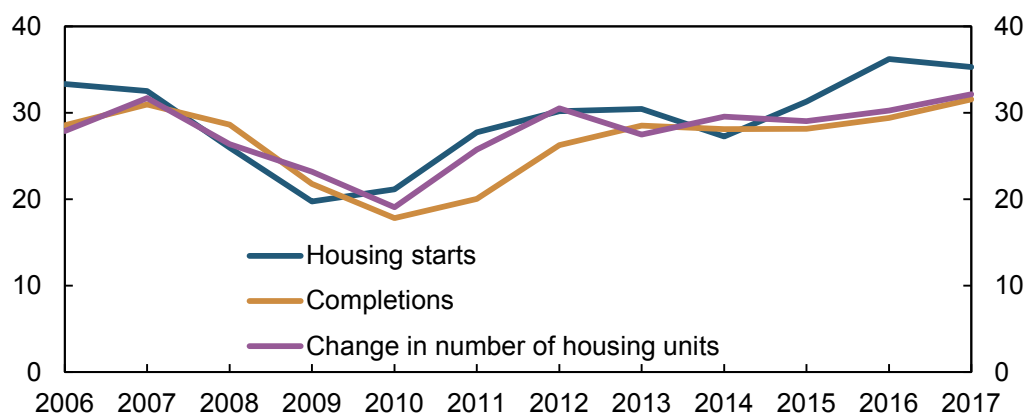

Sources: Statistics Norway and Norges Bank

Chart A.2: Annual change in the number of households decomposed by the change in the number of persons in households and household size. In thousands. 1960 - 2017
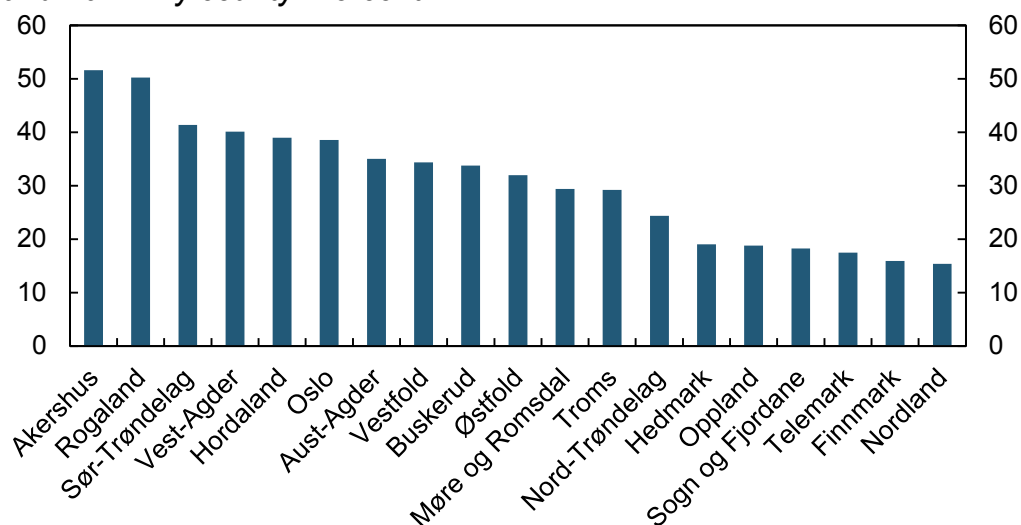

Sources: Statistics Norway and Norges Bank

Chart A.3: Housing starts, housing completions and change in total housing stock. In thousands. 2006 – 2017

Sources: Statistics Norway and Norges Bank

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Chart A.4: Increase in the number of households between end-1992 and 2017. By county. Percent
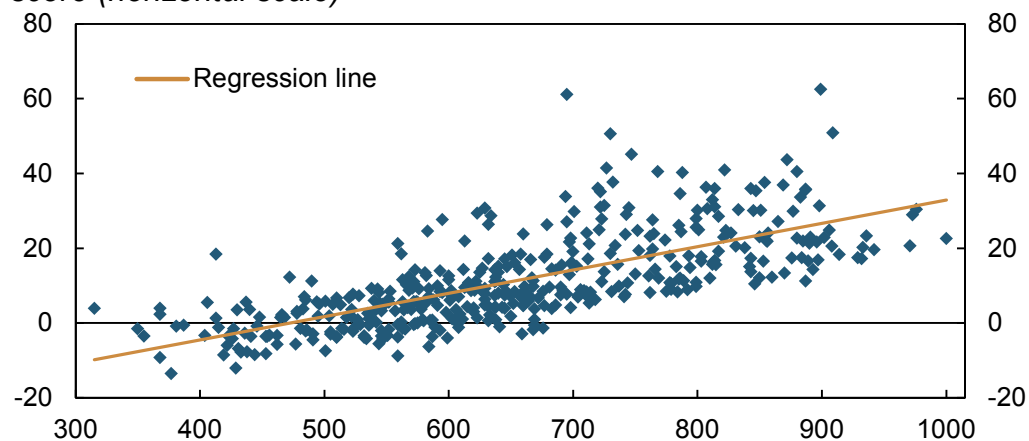

Sources: Statistics Norway and Norges Bank

Table A.1: Urbanisation classes based on the urbanisation index at 1 January 2018

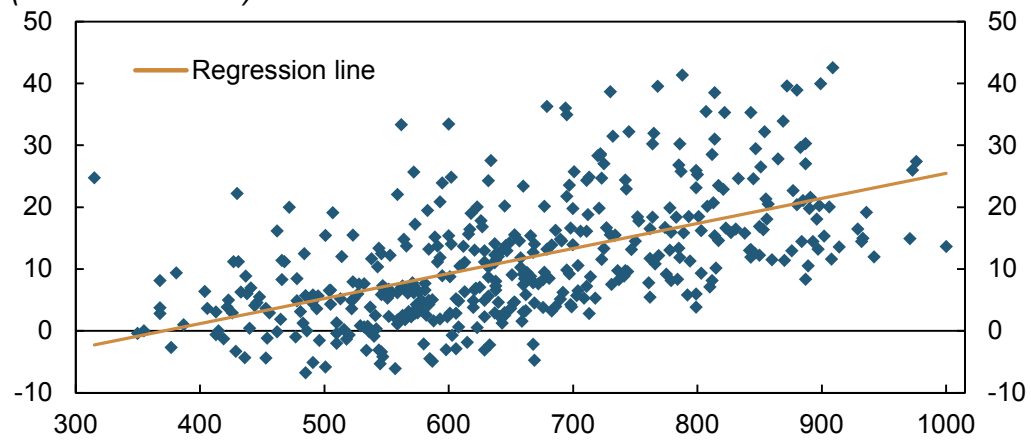| Class	Urbanisation index	Number of municipalities	Share of the population	Share of households	Share of housing units
1	930 – 1000	8	20.2	21.1	19.8
2	870 - 929	26	24.9	25.2	24.0
3	770 -869	63	25.6	25.1	24.8
4	650 – 769	105	17.3	16.8	17.7
5	550 – 649	119	8.7	8.4	9.7
6	0 - 549	101	3.3	3.2	3.9

Sources: Statistics Norway and Norges Bank

Chart A.5: Increase in the number of households between end-2005 and 2017 in percent (vertical scale). By municipality's urbanisation score (horizontal scale)

Sources: Statistics Norway and Norges Bank

Chart A.6: Increase in the number housing units between end-2005 and 2017 in percent (vertical scale). By municipality's urbanisation score (horizontal scale)

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Sources: Statistics Norway and Norges Bank