THE DRIVERS OF NORWAY’S HOUSE PRICES

ECONOMICS DEPARTMENT WORKING PAPERS No. 1599

By Urban Sila

OECD Working Papers should not be reported as representing the official views of the OECD or of its member countries. The opinions expressed and arguments employed are those of the author(s).

Authorised for publication by Isabell Koske, Deputy Director, Country Studies Branch, Economics Department.


JT03457395

This document, as well as any data and map included herein, are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.
OECD Working Papers should not be reported as representing the official views of the OECD or of its member countries. The opinions expressed and arguments employed are those of the author(s).

Working Papers describe preliminary results or research in progress by the author(s) and are published to stimulate discussion on a broad range of issues on which the OECD works.

Comments on Working Papers are welcomed, and may be sent to the Economics Department, OECD, 2 rue André-Pascal, 75775 Paris Cedex 16, France, or by e-mail to econ.contact@oecd.org.


This document and any map included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

© OECD (2020)

You can copy, download or print OECD content for your own use, and you can include excerpts from OECD publications, databases and multimedia products in your own documents, presentations, blogs, websites and teaching materials, provided that suitable acknowledgment of OECD as source and copyright owner is given. All requests for commercial use and translation rights should be submitted to rights@oecd.org
Abstract/Résumé

The Drivers of Norway’s House Prices

In this paper, we explore the drivers of house prices in Norway, using a cross-country panel framework. Empirical results confirm that house prices are determined by numerous demand and supply factors, including income, demographics, macroeconomic conditions, stock of housing and institutional features. The results suggest that high and rising house prices in Norway are principally driven by market fundamentals – high household incomes, wealth, low interest rates and a growing population. Yet, despite strong fundamentals, comparing predicted house prices as estimated by the model and observed house prices suggests that house prices in Norway have been overvalued to a degree since the global financial crisis. Some structural and regulatory features of the Norwegian housing market also put upward pressure on prices: the favourable tax treatment of home ownership, strict rent controls and lax tenant-landlord regulations. Improving further the responsiveness of housing supply to demand could also ease price pressures.

Keywords: Norway, house prices, housing market, panel estimation, land-use and rental regulations, mortgage markets.


JEL codes: R21, R31, R38, H20, H24, G21.

Les déterminants des prix des logements en Norvège

Dans cet article, nous explorons les moteurs des prix des logements en Norvège, en utilisant un cadre de panel transnational. Les résultats empiriques confirment que les prix des logements sont déterminés par de nombreux facteurs de demande et d’offre, notamment le revenu, la démographie, les conditions macroéconomiques, les réserves de logements et les caractéristiques institutionnelles. Les résultats suggèrent que les prix élevés des logements et leur augmentation sont principalement dus aux fondamentaux du marché – revenus élevés des ménages, richesse, faibles taux d’intérêt et croissance démographique. Pourtant, malgré des fondamentaux solides, la comparaison entre les prix des logements, prévus tel qu’estimés par le modèle, et les prix des logements observés suggère que les prix des logements en Norvège ont été surévalués dans une certaine mesure depuis la crise financière mondiale. Certaines caractéristiques structurelles et réglementaires du marché du logement norvégien ont également exercé une pression croissante sur les prix : le traitement fiscal favorable de l’accès à la propriété du logement, le contrôle strict des loyers et la réglementation locataires-propriétaires laxiste. Une amélioration dans la réactivité de l’offre et la demande des logements pourrait également atténuer les pressions sur les prix.

Mots-clés: Norvège, prix des logements, marché du logement, estimation par panel, réglementation de l’utilisation des sols et de la location, marchés hypothécaires.


JEL codes: R21, R31, R38, H20, H24, G21.
Table of contents

The housing market in Norway 6
House prices and fundamentals 13
Demand, supply and institutional factors 13
House prices and fundamentals – empirical estimation 19
Overvaluation and undervaluation of house prices in Norway 21
House prices and institutional factors – empirical estimation 22
Conclusion 24
References 26

Tables

Table 1. House prices and fundamentals – cross-country panel model 20
Table 2. House prices and fundamentals – dynamic specification 21
Table 3. House prices and policy variables 24

Figures

Figure 1. Real house prices have roughly tripled over two decades 6
Figure 2. Price to income and price to GDP ratios are now slowing 7
Figure 3. Overall rise in house prices mask some regional variation 7
Figure 4. The price to rent ratio has risen 8
Figure 5. Household indebtedness has risen 9
Figure 6. Household indebtedness is high in international comparison 9
Figure 7. The household debt service ratio has risen 10
Figure 8. Housing cost burden for households is high 11
Figure 9. Quality of housing in Norway is high 11
Figure 10. Real investment in housing has risen 12
Figure 11. The number of dwellings per thousand inhabitants has risen strongly 12
Figure 12. Robust economy, income and population growth and low interest rates support the demand for housing 14
Figure 13. Price elasticity of housing supply across OECD countries, 2019 15
Figure 14. Tax relief on debt financing cost of homeownership, 2009 16
Figure 15. Recurrent taxes on immovable property across OECD countries 17

THE DRIVERS OF NORWAY’S HOUSE PRICES

Unclassified
Figure 16. Private rental market regulations

Figure 17. Norwegians predominantly own their houses

Figure 18. Valuation gap of house prices in Norway
The housing market in Norway

By Urban Sila

House prices have roughly tripled over two decades starting in 1995, with a marked slowdown since 2017 (Figure 1). In a number of OECD countries, including Norway, after a short stall during the global financial crisis, steady growth in house prices resumed soon after. In many other countries, on the other hand, the crisis brought large and more persistent corrections in housing markets. House prices have also grown faster than incomes and GDP (Figure 2), with accelerated growth during 2015 and 2016 and a correction since 2017.

Figure 1. Real house prices have roughly tripled over two decades

Source: OECD Economic Outlook (database).

1 Urban Sila is an Economist in the Country Studies Branch of the OECD Economics Department. For valuable comments and suggestions the author would like to thank Philip Hemmings, Sebastian Barnes and Boris Cournède (all from OECD Economics Department). Excellent statistical assistance from Béatrice Guérard and Federico Giovannelli and editorial assistance from Michelle Ortiz were also greatly appreciated.
House prices have recorded large rises all across Norway. The overall rising trend nevertheless masks some regional heterogeneity (Figure 3). In particular, in regions highly dependent on the oil sector (Stavanger and Oil region in Figure 3), house price fluctuations can be high, and sensitive to the oil price variation. Moreover, in Oslo, prices have risen disproportionately quickly in recent years, and despite the recent slowdown, they are roughly 250% higher than 15 years ago.

Source: Statistics Norway and calculations.

THE DRIVERS OF NORWAY’S HOUSE PRICES
The price-to-rent ratio, another measure indicating potential overvaluation of house prices, has also risen strongly in Norway (Figure 4). This measure takes the view of housing as an asset with a yield reflected by the rent. It can also be interpreted as the cost of owning versus renting a house. When house prices are too high relative to rents, potential buyers may prefer to rent instead. The growth of the price-to-rent ratio in Norway has outstripped the estimated user cost of homeownership (fundamental price to rent ratio in figure 4) as computed following the methodology in Girouard et al. (2006). The user cost of home ownership takes account of the financial returns associated with owner-occupied housing, as well as differences in risk, tax benefits, property taxes, depreciation and maintenance costs, and any anticipated capital gains from owning the house. Equilibrium in the housing market arguably occurs when the expected annual cost of owning a house equals that of renting, that is when the two indicators move together.

Figure 4. The price to rent ratio has risen

Source: Author's calculations based on data from OECD Analytical House Price Indicators (database) and methodology in Girouard et al. (2006).

Household debt is elevated, close to 240% of disposable income (Figure 5), one of the highest levels in the OECD (Figure 6). Once principal repayments are included, the household debt-servicing ratio is 15% (Figure 7), a high level historically in Norway. According to Norges Bank’s financial stability assessments, this ratio would increase significantly in the event of higher mortgage rates, in particular as in Norway most mortgages are variable rate. Higher interest rates would reduce the room for consumption. The household debt service ratio signals high risk in the heat map for monitoring systemic risk of the Norges bank (2019a).
Figure 5. Household indebtedness has risen

Household debt in % of net disposable income

Note: OECD unweighted average excluding Iceland, Israel, Mexico and Turkey.
Source: OECD National Accounts at a Glance (database).

Figure 6. Household indebtedness is high in international comparison

Household debt in % of net disposable income, 2018 or nearest year

Source: OECD National Accounts at a Glance (database).
House prices have been rising faster than incomes for quite a while, raising affordability concerns. Oslo is one of the least affordable cities in the world, with respect to housing (Geng, 2017). Households’ housing cost burden measured by mortgage and rent as a share of disposable income is one of the highest in the OECD (Figure 8). Yet, to a degree, high prices reflect high quality of housing in Norway. The number of rooms per inhabitant is high in comparison to other OECD countries and the incidence of overcrowding is low (Figure 9).

Analysis conducted by Norges Bank shows that housing affordability - based on household’s capacity to debt-finance a home - has remained roughly unchanged over the 2008-2016 period (Norges Bank, 2019b, and Lindquist and Vatne, 2019). This is measured as the share of homes sold that households are able to debt-finance based on their income and consumption expenditure. In particular, the big drop in interest rates has in effect improved affordability. Yet, the analysis also indicates that for households at the bottom of the income distribution affordability has worsened since 2009. Furthermore, extreme price rises in certain cities, such as Oslo, worsened affordability towards the end of the analysed period. Because mortgages in Norway are given predominantly at flexible rates, housing affordability could deteriorate quickly, if interest rates were to rise.
Figure 8. Housing cost burden for households is high

Median of the mortgage burden (principal repayment and interest payments) or rent burden (private market and subsidized rent) as a share of disposable income, 2014 or latest year available

Source: OECD, Affordable Housing Database (AHD); https://www.oecd.org/social/affordable-housing-database.htm.

Figure 9. Quality of housing in Norway is high

A. Average number of rooms per household member

Source: OECD, Affordable Housing Database (AHD); https://www.oecd.org/social/affordable-housing-database.htm.

THE DRIVERS OF NORWAY’S HOUSE PRICES
When housing demand pressures rise, residential investment is welcome, as it helps adjust housing supply to the rising demand. The surge in housing prices has been accompanied by booming housing investment, including in Norway (Figure 10), and the stock of housing per inhabitant has risen in recent decades (Figure 11). However, a fast growing construction sector often heavily relies on credit, adding additional vulnerability in the event of a house-price shock.

**Figure 10. Real investment in housing has risen**

Index, 1995 = 100

![Real investment in housing has risen](source)

Source: OECD Economic Outlook Database.

**Figure 11. The number of dwellings per thousand inhabitants has risen strongly**

Number of dwellings per thousand inhabitants

![The number of dwellings per thousand inhabitants has risen strongly](source)

Source: OECD, Affordable Housing Database (AHD); [https://www.oecd.org/social/affordable-housing-database.htm](https://www.oecd.org/social/affordable-housing-database.htm).
House prices and fundamentals

Persistent rises in house prices, as seen in Norway, do not necessarily imply a house bubble or excessive growth. House prices are determined by numerous demand and supply factors, reflecting various medium- to long-term determinants, including households’ disposable income, demographics, macroeconomic conditions and permanent features of institutions and policies within a country. The pace at which the supply of housing is able to respond to demand pressures also determines how quickly and strongly prices will react in a given market.

In this section, we first look at the developments and situation of demand, supply and institutions in Norway. We then use a cross-country panel framework to assess the impact of fundamental drivers, including selected policy features, on house prices in Norway.

Demand, supply and institutional factors

Demand for housing has been rising strongly

Robust income growth, strong economy with low unemployment, and rising household incomes and household wealth all potentially contribute to rising demand for owner-occupied housing (Figure 12). In addition, population has grown in Norway, despite population ageing and declining natural rate of growth, due to substantial net immigration. An increasing rate of urbanisation likewise exerts pressures for housing in the main urban areas.

Housing demand has also likely been fuelled by declining interest rates (Figure 12). Lower interest rates, ceteris paribus, reduce the debt-servicing burden of households. Furthermore, housing finance markets have changed drastically over recent decades. Financial deregulation has significantly lowered borrowing costs for housing, resulting in a substantial expansion in the supply of mortgage loans (Girouard et al., 2006; Andrews et al., 2011).
Figure 12. Robust economy, income and population growth and low interest rates support the demand for housing

1. Interest rates on outstanding loans secured on dwellings in total.
Source: OECD Economic Outlook database; Statistics Norway; OECD Regional demographic Statistics database.
The housing stock has risen due to shifts in demand

The supply of new housing coming onto the housing market can importantly affect prices. The relationship between new supply and the fundamental drivers of housing needs, including demographic developments is particularly relevant. Although in Norway residential investment has grown significantly over recent decades following increases in incomes and population, it has remained below the demand for housing implied by demographic trends for extended periods putting pressures on prices (Geng, 2018). These pressures have recently moderated somewhat, with lower population growth on the back of weaker economy and reduced immigration.

In the medium- to long-term housing markets are shaped by the responsiveness of housing supply to changes in price signals. In rigid supply environments, increases in housing demand are more likely to be capitalised into house prices than to spur increases in the quantity of housing, creating the potential for economic instability via house-price bubbles and high debt. A more responsive housing supply can reduce real house price volatility. At the same time, however, greater responsiveness can generate economic instability via boom and bust cycles in residential investment.

In a recent OECD Working paper, Cavalleri et al. (2019) provide estimates of the price elasticity of residential investment for 25 economies using a multi-factor panel error-correction model based on data from the 1980s to the end of 2017. The results show that that housing responsiveness varies substantially across countries (Figure 13). Norway’s housing supply is more responsive than on average among the countries for which estimates are available, although significantly lower than in Sweden and Denmark. As discussed in Andrews et al. (2011) supply responsiveness depends on geographical and urban characteristics but also on public policies, such as housing market regulations. In particular, cumbersome land use and planning regulations are associated with a less responsive housing supply across countries.

The price elasticity of housing supply reflects structural and institutional issues of the housing market; it is therefore reasonable to believe that it does not change much from year to year. That said, research by Aastveit et al. (2019) shows that the housing supply elasticity has fallen markedly in the United States over the last two decades.

Figure 13. Price elasticity of housing supply across OECD countries, 2019

Source: Cavalleri et al., 2019.
Taxation favours homeownership

Taxation is another important policy factor influencing housing demand. As argued in previous OECD Surveys (OECD, 2018), Norway’s taxation is quite generous towards home owning. Most notably, mortgage interest is deductible, while there is no inclusion of imputed rent in taxable income. The OECD indicator on the tax relief on debt financing of buying a house shows that Norway has one of the highest tax reliefs among the countries included (Figure 14). Moreover, taxes on real estate are low in Norway (Figure 15). Compared with other assets, owner-occupied housing enjoys a large discount in tax base calculation for wealth taxation (25 percent of market value for primary dwellings and 90 percent for secondary dwellings). There is also no capital gains tax if a house has been owned for more than one year and the owners have used it as their own home for at least 12 out of the past 24 months (Geng, 2017).

The favourable tax treatment of owner occupation is often justified by the positive externalities for society that may be associated with owner occupation, but it may as well crowd out capital from more productive investments than housing, resulting in efficiency losses (Andrews et al., 2011). The generous tax treatment of homeownership in Norway thus fuels demand for housing, putting upward pressure on house prices, which has been confirmed empirically (Capozza et al., 1996; Harris, 2010; Andrews et al., 2011; Geng, 2017 and 2018). All else equal, at a given level of income and interest rates, the demand for housing is expected to be higher in countries with more generous tax concessions. Finally, mortgage interest deductibility also tends to be regressive, both because higher income households are more likely to be homeowners in the absence of the subsidy and because tax relief for debt financing costs is a deduction against earned income and not a credit and, thus, it is worth more to high-income earners (Andrews et al., 2011).

Figure 14. Tax relief on debt financing cost of homeownership, 2009

Wedge increasing in the degree of tax relief

Note: This indicator takes into account if interest payments on mortgage debt are deductible from taxable income and if there are any limits on the allowed period of deduction or the deductible amount, and if tax credits for loans are available. For countries that have no tax relief on debt financing costs, this indicator takes the value of zero.

Source: Andrews et al. (2011).
Figure 15. Recurrent taxes on immovable property across OECD countries

% of GDP, 2018 or nearest year

Source: OECD Revenue Statistics database.

The rental market is limited in Norway, enabled by taxes and rental regulations

Another policy factor impacting the housing market are regulations of the rental market that aim at addressing market imperfections such as asymmetric information and unequal bargaining power between landlords and tenants. The OECD has constructed two measures of rental market regulation: a rent control indicator and a tenant-landlord relations indicator. The first measures the extent of controls on initial rent levels and rent increases. The latter measures the ease of tenant evictions, regulations concerning the length of contract, and deposit requirements (Andrews et al., 2011). Tenant-landlord regulations in Norway appear to be quite light, while rent controls are above the mean of the countries included in the indicators (Figure 16). Andrews et al. (2011) note that tenant-landlord regulations tend to be stricter in countries with stringent rent control, suggesting that if rent control is not coupled with security of tenure, landlords may have an incentive to evict tenants in order to raise rents. This is not the case in Norway, where relatively strict rent controls are coupled with light tenant-landlord regulations.
In Norway, more than three quarters of households are homeowners (Figure 17). The private rental market, on the other hand, is quite small. Limited option to rent houses in Norway means that there is no alternative, well-developed rental market that could dampen house price pressures. This can be partly explained by generous tax concessions towards homeownership, but also by rental market regulations, that may drive people to buy instead of rent. Geng (2018) reports empirical evidence that stricter rent controls raise house prices, as they prevent the efficient use of housing stock. Strict rent controls hurt supply by making housing investment less profitable (Cavalleri et al., 2019), lock-in existing tenants, reduce the rental market and create pressures on homeowner market as many young households have no other option but to buy. In addition, as noted by Geng (2017), the low protection of tenants in Norway leads to people entering the owner-occupied housing market and taking mortgages at a relatively younger age.
Figure 17. Norwegians predominantly own their houses

Share of households in different tenure types, in percent

Note: Tenants renting at subsidized rent are lumped together with tenants renting at private rent in Australia, Canada, Chile, Denmark, Mexico, the Netherlands and the United States, and are not capturing the full extent of coverage in Sweden due to data limitations.

Source: OECD, Affordable Housing Database (AHD); https://www.oecd.org/social/affordable-housing-database.htm.

House prices and fundamentals – empirical estimation

In this section, we report results from a cross-country panel model of house prices on various fundamentals discussed above. The estimated equation, as specified below, is a long-run relationship between the real house prices, and their determinants, in the form of an inverted demand function. The demand equation takes into account housing supply by controlling for the dwelling stock:

\[ hprices_{it} = \alpha_i + \beta_1 y_{it-1} + \beta_2 r_{it-1} + \beta_3 hstock_{it-1} + \beta_4 g_{it-1} + \beta_5 urbanisation_{it-1} + \beta_6 finwealth_{it-1} + \beta_7 dyear_{it} + \text{country}_i + \varepsilon_{it}, \]

where \( i \) denotes country and \( t \) denotes time (quarter). The equation regresses real house prices (\( hprices \)) on a constant, real household disposable income per capita (\( y \)), real interest rate (\( r \)), housing stock per capita (\( hstock \)), population growth (\( g \)), share of urban population (\( urbanisation \)) and real household financial net wealth per capita (\( finwealth \)).

All variables, except the interest rate, population growth and share of urban population, are in natural logarithms. The right hand side variables are lagged one period, in order to reduce potential endogeneity problems. Country-fixed effects are included to control for potentially important time-invariant influences – such as cultural attitudes toward housing and other structural features of each country. Year dummies are used to control for common shocks to house prices and to account for the fact that house prices are known to move together across countries (Girouard et al., 2006). The model is estimated on quarterly data, across...
19 OECD countries, with an unbalanced panel spanning from 1981 to 2016, depending on exact specification used.

Table 1 reports results from three specifications, going from a basic specification to one including all the aforementioned variables. In column (1), all coefficients have their expected signs. A one percent increase in household disposable income per capita results in 1.3% rise in house prices, suggesting that housing is not only a normal good, but also a luxury good (i.e. demand rises more than proportionally with rising income). The real interest rate, as expected, has a negative effect on house prices. Lower interest rates make it easier to service a mortgage for households, therefore boosting demand for housing. Likewise, as expected, more housing supply results in lower house prices, although the estimated size of the effect varies a lot across specifications. In column (2) we further include population growth (population in levels is already controlled for by including variables in per capita terms) and urbanisation rate. Population growth exerts positive pressure on house prices as does growing urbanisation. It is notable, however, that including the two population variables knocks out the significant effect of the interest rate, perhaps due to correlation between the interest rate and migration via the economic cycle. Finally, in column (3), financial net worth of households in included. This variable, however, shows a counterintuitive negative effect on house prices.

<table>
<thead>
<tr>
<th>Dependent variable : Real house prices (index)</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household disposable income p.c. (t-1)</td>
<td>1.317***</td>
<td>1.195***</td>
<td>1.002***</td>
</tr>
<tr>
<td></td>
<td>(0.0574)</td>
<td>(0.0585)</td>
<td>(0.0688)</td>
</tr>
<tr>
<td>Real interest rate (t-1)</td>
<td>-0.00850***</td>
<td>-0.000760</td>
<td>-0.00626**</td>
</tr>
<tr>
<td></td>
<td>(0.00234)</td>
<td>(0.00228)</td>
<td>(0.00245)</td>
</tr>
<tr>
<td>Housing stock p.c. (t-1)</td>
<td>-0.254**</td>
<td>-0.471***</td>
<td>-1.019***</td>
</tr>
<tr>
<td></td>
<td>(0.104)</td>
<td>(0.109)</td>
<td>(0.148)</td>
</tr>
<tr>
<td>Population growth (t-1)</td>
<td>0.357***</td>
<td></td>
<td>0.612***</td>
</tr>
<tr>
<td></td>
<td>(0.0279)</td>
<td></td>
<td>(0.0342)</td>
</tr>
<tr>
<td>Share of urban population (t-1)</td>
<td>0.0217***</td>
<td></td>
<td>0.0343***</td>
</tr>
<tr>
<td></td>
<td>(0.00586)</td>
<td></td>
<td>(0.00815)</td>
</tr>
<tr>
<td>Household financial net wealth p.c.</td>
<td></td>
<td></td>
<td>-0.224***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.0272)</td>
</tr>
<tr>
<td>Year dummies</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Fixed effects</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>No. of observations</td>
<td>1,683</td>
<td>1,466</td>
<td>1,320</td>
</tr>
<tr>
<td>Number of countries</td>
<td>19</td>
<td>19</td>
<td>18</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.723</td>
<td>0.768</td>
<td>0.782</td>
</tr>
</tbody>
</table>

Standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1). All variables are in logs, except the interest rate, population growth, and the share of urban population.

For robustness, we estimate also an alternative specification, a dynamic specification, where we specify most variables in growth terms, and include lagged dependent variable, akin to the specification in Terrones and Otrok (2004). The results in Table 2 show that growth in house prices is persistent; high growth in the previous quarter implies likely high and positive growth this quarter. Other variables have their expected signs, including household financial wealth – higher growth in household financial wealth means higher house price growth. Only the change in the share of urban population and housing stock growth have effects that are not statistically different from zero.
Table 2. House prices and fundamentals – dynamic specification

<table>
<thead>
<tr>
<th>Dependent variable : Real house prices (growth)</th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lagged dependent variable</td>
<td>0.375***</td>
<td>0.416***</td>
</tr>
<tr>
<td></td>
<td>(0.0219)</td>
<td>(0.0249)</td>
</tr>
<tr>
<td>Household disposable income p.c. (growth)</td>
<td>0.191***</td>
<td>0.193***</td>
</tr>
<tr>
<td></td>
<td>(0.0274)</td>
<td>(0.0290)</td>
</tr>
<tr>
<td>Real interest rate</td>
<td>-0.00119***</td>
<td>-0.000687**</td>
</tr>
<tr>
<td></td>
<td>(0.000257)</td>
<td>(0.000280)</td>
</tr>
<tr>
<td>Household financial net wealth p.c. (growth)</td>
<td>0.0659***</td>
<td>0.0707***</td>
</tr>
<tr>
<td></td>
<td>(0.0159)</td>
<td>(0.0170)</td>
</tr>
<tr>
<td>Population growth</td>
<td>0.0117***</td>
<td>0.0193***</td>
</tr>
<tr>
<td></td>
<td>(0.00333)</td>
<td>(0.00432)</td>
</tr>
<tr>
<td>Share of urban population (% change)</td>
<td></td>
<td>0.0223</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.0205)</td>
</tr>
<tr>
<td>Housing stock p.c. (growth)</td>
<td></td>
<td>0.214</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.145)</td>
</tr>
<tr>
<td>Year dummies</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Fixed effects</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>No. of observations</td>
<td>1,784</td>
<td>1,303</td>
</tr>
<tr>
<td>Number of countries</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.417</td>
<td>0.478</td>
</tr>
</tbody>
</table>

Standard errors in parentheses (** p<0.01, * p<0.05, p<0.1).

Overvaluation and undervaluation of house prices in Norway

The estimated relationship between house prices and fundamentals allows us to gauge how far the observed house prices are from the value determined by fundamentals at that point in time. We have shown that house prices have grown strongly and persistently in Norway over the last three decades. However, we have also shown that Norway has recorded impressive economic growth, population growth has been positive, interest rates have fallen, and housing stock seems to be less responsive than in many other OECD economies, all factors that should contribute to rising house prices. Does this mean that house prices have fundamentally followed evolution of fundamentals in Norway?

We use the above estimated models to estimate the over- and undervaluation of house prices in Norway. This is estimated by computing the difference between the observed value in each quarter and the predicted value from each model above for Norway (including the estimated fixed effects). It is important to note, however, that valuation estimated in this way can only reflect over or undervaluation of house prices in relation to the average valuation of prices over the whole sample for that particular country. In other words, due to the inclusion of country fixed effects, by construction, the residuals for each country necessarily sum to zero over the sample period. In other words, on average, house prices are assumed correctly valued over the sample for each country. The valuation does not tell us anything about the valuation of house prices in one country compared to other countries.

The results of the valuation gap based on the models reported in Table 1 are shown in Figure 18, where we also show the house price index for reference. House prices were overvalued in Norway prior to the global financial crisis, at which point the market experienced a correction towards fundamentals, and even
towards undervaluation for a short period. After 2010, however, the house prices in Norway became increasingly overvalued again, with some slowdown after 2012/2013. It is striking, that house prices in Norway have been overvalued since 2010.

It is important to note, that thus far this exercise is based on in-sample predictions and limited to up to 2016Q2, up to which point the data for all the included variables are available. More recent predictions (and estimates of over- or undervaluation) could be obtained by extrapolating the evolution of fundamentals towards more recent periods, but we leave this for future work.

**Figure 18. Valuation gap of house prices in Norway**

Note: Valuation gaps are calculated as the difference between the observed house price and the estimated house prices based on the specifications in Table 1.

Source: OECD Analytical House Price Indicators (database) and calculations.

**House prices and institutional factors – empirical estimation**

Finally, we estimate also the effects of structural and policy variables – housing taxation, elasticity of housing supply and rental regulations – on house prices. As these variables are only available as one
observation per country, their effects can be estimated indirectly, by interacting them with other demand and supply shocks. Not all of the structural/policy indicators are available for all countries, and country coverage differs among them. Including all of them at once would result in a substantial loss of sample. We therefore include them in the model one by one. The results are reported in Table 3.

In column (1) of Table 3, we interact the indicator of tax relief on debt financing with the household income and with the interest rate. The results confirm the notion discussed above, that higher tax relief amplifies the price pressures of higher household incomes. As Norway has quite a generous tax relief and one of the highest incomes among OECD countries, this ramps up the pressure on house prices. Given the level of interest rates, ceteris paribus, higher tax relief results in higher house prices. At the same time, tax relief dampens the effect of a change in interest rates on house prices. This is consistent with the fact that, while lower interest rates boost housing demand, they also reduce the interest payments of households and reduce the amount to be deducted from a taxable base.

In column (2) of Table 3, we interact the elasticity of housing supply with the household income and the interest rate. The coefficient on the interaction with the interest rate is not statistically different from zero. The coefficient on the income interaction, on the other hand, confirms that higher elasticity of housing supply reduces the medium- to long-term effect of income on house prices, as supply responds more to demand shocks. Norway has above average long-term elasticity among observed economies, but it lags significantly behind best performers such as the USA and Sweden. Further improving the responsiveness of supply could help reduce upward pressure on prices.

We next estimate the impact of rental regulations on house prices. As rental regulations directly affect households’ decisions between renting and buying a house and affect both house prices and rents, we choose the price-to-rent ratio as the dependent variable. In column (3) of Table 3, we first report the basic model, where we regress the price-to-rent ratio on household income, population growth and urbanisation rate. All of them have positive and statistically significant effects on the price-to-rent ratio. Rising income raises demand for housing, and more strongly towards buying a house rather than on the rental market. Population growth and urbanisation rate also affect house prices more strongly than rents. This can be partly explained by the fact, that rents are more heavily regulated than house prices.

In column (4) of Table 3, we focus on policy variables relevant to the interplay between the owners’ and the rental house market. We include interactions of the household income variable and the interest rate with the measure of tax relief on debt financing. The results, as expected, show that tax concessions that favour home buying put upward pressures on house prices versus rents. We also include the indicators of strictness of rent control and tenant-landlord regulations as interaction terms with the household income variable. As argued above, with stricter rent controls a demand shock from higher incomes has stronger effect on house prices. In the case of tenant-landlord regulations, on the other hand, stricter regulations imply lower pressures on house prices. This is again consistent with the argument invoked above for Norway; given the level of strictness of rent control, lower protection of tenants implies that they prefer to buy rather than rent, putting upward pressure on house prices.
Table 3. House prices and policy variables

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>(1) Real house prices</th>
<th>(2) Real house prices</th>
<th>(3) Price-to-rent ratio</th>
<th>(4) Price-to-rent ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household disposable income p.c. (t-1)</td>
<td>0.755*** (0.127)</td>
<td>1.773*** (0.125)</td>
<td>1.069*** (0.050)</td>
<td>0.608*** (0.181)</td>
</tr>
<tr>
<td>Real interest rate (t-1)</td>
<td>-0.0213*** (0.00460)</td>
<td>-0.0151** (0.00631)</td>
<td>-0.0251*** (0.00430)</td>
<td></td>
</tr>
<tr>
<td>Housing stock p.c. (t-1)</td>
<td>-0.222 (0.137)</td>
<td>-0.766*** (0.123)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population growth (t-1)</td>
<td>0.362*** (0.0291)</td>
<td>0.330*** (0.0285)</td>
<td>0.281*** (0.0243)</td>
<td>0.238*** (0.0257)</td>
</tr>
<tr>
<td>Share of urban population (t-1)</td>
<td>0.0262*** (0.00666)</td>
<td>0.00350 (0.00654)</td>
<td>0.0696*** (0.00545)</td>
<td>0.0516*** (0.00693)</td>
</tr>
<tr>
<td>Interaction terms with policy variables</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tax relief on debt financing (*disposable income) (t-1)</td>
<td>0.372*** (0.137)</td>
<td></td>
<td>0.209* (0.121)</td>
<td></td>
</tr>
<tr>
<td>Tax relief on debt financing (*interest rate) (t-1)</td>
<td>0.0205*** (0.00485)</td>
<td></td>
<td>0.0204*** (0.00437)</td>
<td></td>
</tr>
<tr>
<td>Elasticity of housing supply (*disposable income) (t-1)</td>
<td></td>
<td>-0.229*** (0.0817)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elasticity of housing supply (*interest rate) (t-1)</td>
<td></td>
<td>0.00120 (0.00500)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tenant-landlord regulations (*disposable income) (t-1)</td>
<td></td>
<td></td>
<td>-0.195*** (0.0603)</td>
<td></td>
</tr>
<tr>
<td>Rent control (*disposable income) (t-1)</td>
<td></td>
<td></td>
<td></td>
<td>0.368*** (0.0400)</td>
</tr>
<tr>
<td>Year dummies</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Fixed effects</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Observations</td>
<td>1,223</td>
<td>1,388</td>
<td>1,731</td>
<td>1,393</td>
</tr>
<tr>
<td>Number of country</td>
<td>15</td>
<td>18</td>
<td>19</td>
<td>15</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.785</td>
<td>0.775</td>
<td>0.699</td>
<td>0.703</td>
</tr>
</tbody>
</table>

Standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1). All variables are in logs, except the interest rate, population growth, and the share of urban population.

Conclusion

House prices in Norway have roughly doubled in real terms since 2000, with a slowdown since 2017. Prices have risen faster than incomes and the price-to-rent ratio has risen strongly. Household debt is elevated, at close to 240% of disposable income, presenting a systemic risk. Steep rises in house prices have raised affordability concerns and housing cost burden for households is among the highest in the OECD.

Persistent rises in house prices do not necessarily imply a house bubble or excessive growth. House prices are determined by numerous demand and supply factors, reflecting various medium- to long-term determinants, including income, demographics, macroeconomic conditions and institutional features. The pace at which the supply of housing is able to respond to demand pressures also determines how quickly and strongly prices will react in a given market.
The empirical results presented here have shown that high and rising house prices in Norway are largely driven by strong fundamentals. Nevertheless, since 2009, according to our estimates, there has been some degree of overvaluation, although not by a large amount. Another factor contributing to high house prices in Norway are structural and regulatory features of the Norwegian housing market – favourable tax treatment of home ownership, strict rent controls and lax tenant-landlord regulations - that all tend to put upward pressures on prices. The housing supply in Norway is also less responsive to demand than in Sweden or Denmark, putting additional pressure on prices.

The results support past policy recommendations by the OECD regarding the functioning of the housing market. It has been recommended before, including in the last Survey (OECD, 2018), to reform the tax mix, with the aim to reduce the tax distortions in housing. This could be done either by phasing out mortgage-interest relief or by increasing property taxes on housing. Further steps could also be taken towards aligning taxation across asset classes in wealth tax and capital-gains tax, especially as regards housing assets. Previous Surveys have also endorsed steps towards a more responsive housing supply, while recognising ongoing efforts by the authorities to lighten planning regulations and procedures. Reducing tax concessions to homeownership and easing rigidity of housing supply will also help deepen the underdeveloped rental market.
References


