MORE PUBLIC HOUSING CONSTRUCTION TO MAINTAIN CAPACITY?

An estimate of declines in construction activity due to increased interest rates for 2023-2024

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Summary

Residential construction in Germany experienced an upswing lasting more than a decade up to 2022, which was based not only on demand-side factors but also in particular on favorable financing conditions. With the energy price shocks due to the Ukraine war and the subsequent interest rate increases by the European Central Bank, the overall outlook for the construction sector has deteriorated significantly.

This Policy Brief estimates important parameters of construction activity on the basis of clear cointegration specifications and forecasts their future development. Although the estimated specifications are subject to considerable uncertainty and should therefore be viewed primarily as a risk scenario, the forecast development is substantial: according to these specifications, real residential construction investment (gross value added by the construction industry) would decline by 20.9 billion euros (13.4 billion euros) and 16.4 billion euros (10.6 billion euros) in 2023 and 2024, respectively. According to the modeled specification, construction completions will fall from 295,000 apartments in 2022 to 223,000 apartments in 2023 and 177,000 homes in 2024. The projection for 2024 only slightly exceeds the historic low in residential construction activity reached in 2009.

In the face of this looming slump in construction activity, to prevent a sustained reduction in construction capacity that would leave available supply far short of demand in the medium to long term, the Policy Brief recommends an expansion of public housing construction conditioned on actual developments in the sector.

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Introduction

Clear warnings were issued at the 14th Housing Construction Day of the Housing Construction Alliance of Associations in April 2023: In view of rapidly rising interest rates and construction costs, the downturn in the construction industry and the associated medium-term consequences could be far more serious than previously assumed and accordingly lead to a medium-term reduction in capacity (Arbeitsgemeinschaft für zeitgemäßes Bauen e.V. 2023).

It is undisputed that the outlook for the German construction industry has clouded over, also due to the now noticeable decline in demand. But it is less clear whether a dramatic slump in construction activity is actually imminent. To answer this question, this Policy Brief provides a contribution in the form of projections of key construction activity indicators for 2023 and 2024, taking particular account of the increased financing costs for residential construction.[4]

Concerns about lower construction capacity in the medium term, caused by a lack of orders from the current downturn in the construction activity, weigh heavily against the background of continuing high demand for housing. This is basically due to the lower average number of persons per household. The amount of living space used per person has risen for several reasons and is likely to continue to rise. Also influencing demand - independently of the refugee situation - are net immigration to Germany and the trend toward urban densification (Statistisches Bundesamt 2023a; UNDESA 2022). Taking into account the influencing factors mentioned above and an estimate of the replacement of existing housing that cannot be technically or economically refurbished, the Arbeitsgemeinschaft für zeitgemäßes Bauen (2023) identifies an average need of around 350,000 new apartments per year by 2045.[5]

In particular, the need for publicly subsidized housing appears to be urgent because, measured against the demand for affordable housing (close to the city), too few apartments have been offered in the recent past. In publicly subsidized housing, the rent is essentially aimed at covering the current expenses (financing and management costs) of a residential building and not at achieving the highest possible return. The percentage of renter households that spend a high share of their household income on rent can serve as an indicator of the housing shortage. Measured in terms of gross rent, Holm et al. (2021) see the percentage of renter households with rents accounting for more than 30% of net household income at around 50% (data through 2018). Moreover, more recent rent burden ratios from the Federal Statistical Office based on gross cold rent do not point to an easing (Statistisches Bundesamt 2023b; Figure 4d). In the case of specially subsidized social housing, the number of apartments for which the social commitment expired was recently more than double the number of newly built social housing units (taz 2022).

Construction capacity is also of great importance for the German government's transformative goals. The main beneficiary of energy rehabilitation is the finishing trade, which at 28% in 2021 accounted for only a slightly smaller share of total construction investment than the main

[4] At the beginning of 2022, someone who took out a mortgage in the form of an annuity loan of 500,000 euros at an effective interest rate of 1.3% with an assumed 20-year term had to shoulder a monthly burden of 2380 euros. One year later, the effective interest rate is 3.8% and the roughly threefold interest burden is reflected in a monthly amount to be paid of 3012 euros with otherwise identical conditions.

[5] The need for replacement must be seen in particular against the backdrop of the energy transformation requirements. The Arbeitsgemeinschaft für zeitgemäßes Bauen (2023: Figure 9) illustrates an annual replacement requirement of around 150,000 apartments between 2027 and 2045, which in total corresponds to around 3 million apartments or 7% of the housing stock in 2022.

construction sector (33% in 2021) and for which no comparable slump in new orders has yet been recorded (Kraus and Weitz 2022; Fig. 2a). The main construction sector is again divided into building construction and civil engineering. However, even in these sectors, low construction capacity in the medium term can have a negative impact on the achievement of the transformative goals because, for example, new building construction already takes climate-neutral adaptations into account and civil engineering plays a crucial role for the transformation of transport, especially for the expansion and new construction of rail lines.

The central result of the present analyses is a continuation of the substantial decline in new orders in the main construction sector in line with the previous increases in interest rates. Based on this, forecast values can also be determined for real residential construction investments (the gross value added of the construction sector) and completions of new apartments. Taken together, the forecast cumulative decline in real residential construction investment (the gross value added in the construction sector) up to and including 2024 amounts to 37.3 billion euros (24 billion euros). This corresponds to around 0.5% (0.3%) of gross domestic product (GDP) per year. According to the chosen forecast approach, construction completions will fall from 295,000 apartments in 2022 to 223,000 apartments in 2023 and 177,000 apartments in 2024. The forecast for 2024 only slightly exceeds the historic low in residential construction activity in Germany reached in 2009 and falls significantly short of the German government's target of 400,000 new apartments based on demand as set out in the coalition agreement.

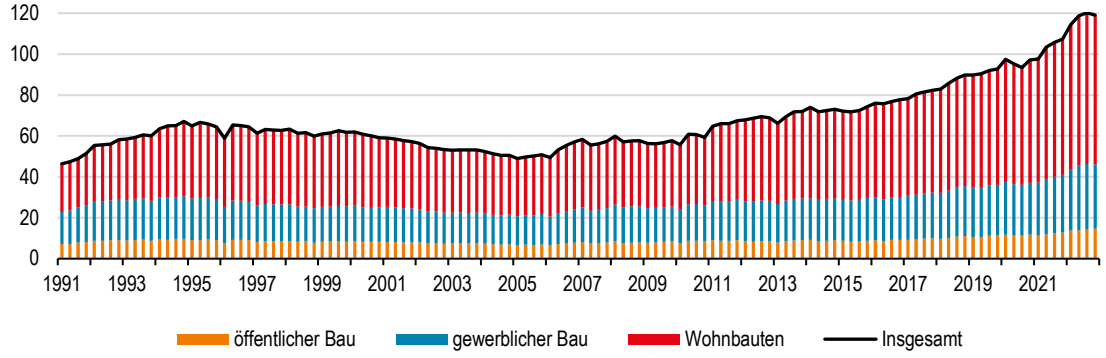
Although the results are subject to estimation uncertainty, the magnitude of the projected decline in construction activity underpins the risk of a marked reduction in capacity, while at the same time housing demand in the medium term is expected to remain high, especially for publicly subsidized housing.

The situation in the construction sector at the beginning of 2023

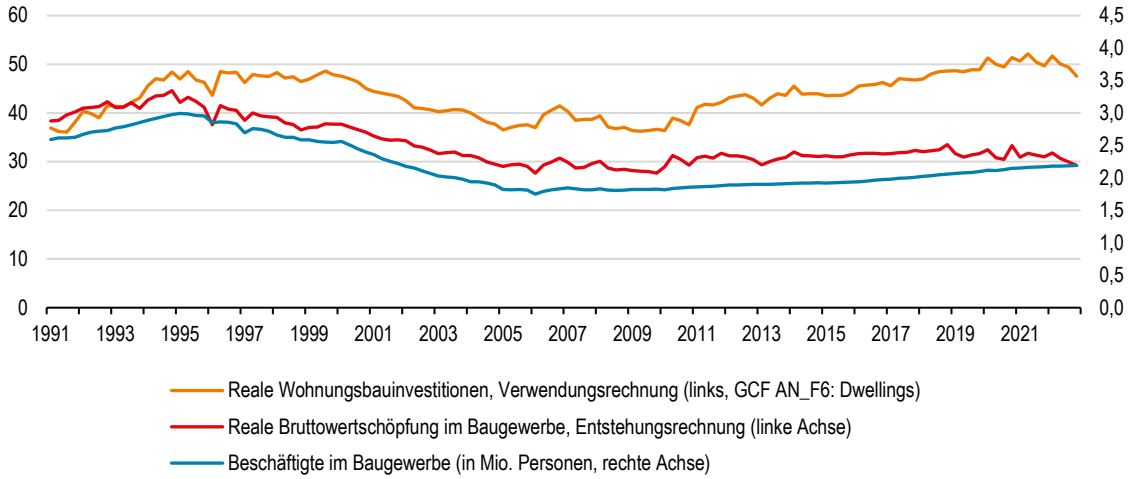
Empirically, upswing and downswing phases of the real estate and (residential) construction cycle develop in longer waves than the business cycle of the economy as a whole, which is why modeling the long-term relationship (cointegration relationship) of the relevant influencing variables plays a key role (de Bandt et al. 2010). Figure 1b illustrates this using real residential construction investment, real gross value added and employment in the construction sector. In Germany, there have essentially been two construction cycles since reunification (1991 to 2009, 2010 to the present). Although the cycles can hardly be compared one-to-one, for instance because overcapacity was built up in East Germany after reunification due to tax incentives, measured against the average of international observations, there are signs of a multi-year downturn after a ten-year upswing in the construction investment cycle (de Bandt et al. 2010).

Figure 1: Construction investment
billion euros (quaterly)

a) according to type in respective prices



b) construction activity by calculation type in constant prices



Seasonally and calendar-adjusted results according to the X13 method.

Sources: DeStatis, Eurostat.

IMK

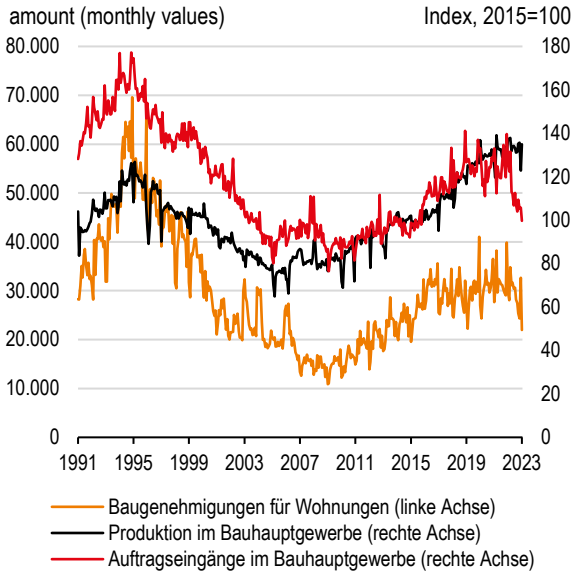
In real terms, investment in residential construction accounts for around one-and-a-half times gross value added in the construction sector and has risen much more strongly since the start of the second construction upturn in 2010. The reason for this difference is the fact that residential construction investment also includes services provided by other sectors (manufacturing, services) in addition to own work. The cycles of construction investment (building and civil engineering together) can also be seen when calculated in current prices (Figure 1a). This also shows that residential construction is by far the most important type of investment, accounting for around 60% of total construction investment, ahead of commercial and public construction.

Figure 2a shows the real economic development in the construction sector, including building permits, new orders and production in the main construction sector. Since March 2022, residential building permits and new orders in the main construction sector have collapsed. Compared to the same month last year, 9,929 fewer apartments were approved in April 2023, a decline of more than 30% and the lowest level in seven years. In April 2023, the main construction sector also

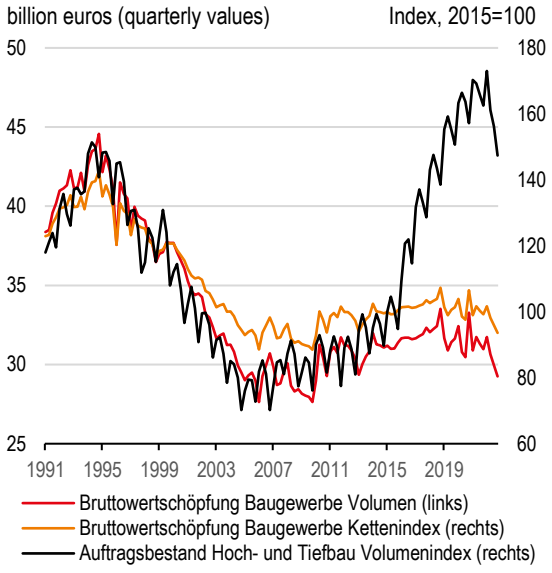
recorded around 9% fewer new orders than a year earlier. The corresponding declines in previous months were even more pronounced. The last time production fell below the January level was in October 2015. By contrast, output in the main construction sector remained largely stable (Fig. 2a). Real gross value added in the construction sector has risen comparatively moderately since the start of the construction cycle in 2010, but most recently it has also declined. In the fourth quarter of 2022, at EUR 29.2 billion, it was 5.6% lower than in the prior-year quarter and 12.1% lower than two years earlier. This corresponds to the lowest level in 12 years. A slight decline in production to date and a significant fall in new orders mean that order books are becoming increasingly empty. This is also reflected in the order backlog for building and civil engineering, which has fallen by 14.8% since the record level in the first quarter of 2022 to the fourth quarter of 2022 and thus to the level of 2018 (Figure 2b).

Figure 2: Real economic development in the construction sector

a) building permits, production, orders



b) gross value added and order backlog



Production, new orders and gross value added are adjusted for price, seasonal and calendar effects; the order backlog is adjusted for price only; building permits are original values.

Source: Statistisches Bundesamt (Destatis).

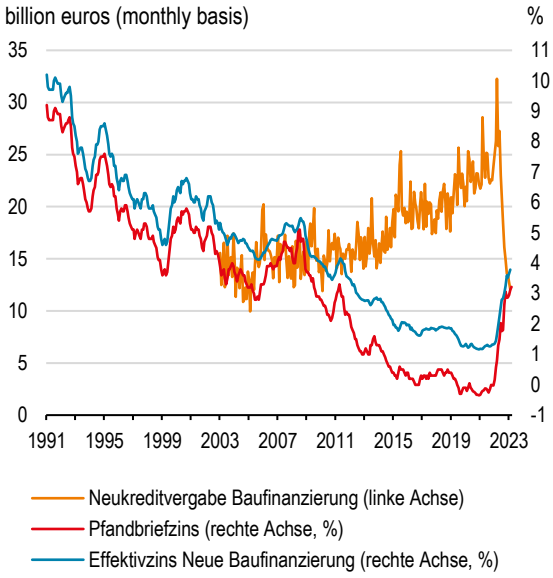
IMK

A major reason for the slump in new orders is the rapid and noticeable rise in lending rates (Figure 3a). In March 2022, bonds secured by real estate were still being issued at an average bond rate of 0.8%; a year later, it was already 3.2%. A similar trend can be seen in the effective interest rate for new construction financing, which has risen by 2.3 percentage points within a year since February 2022 and in April 2023 reached a level of 3.9%, which it last recorded before the years-long period of low interest rates in August 2011. According to an estimate by Hiller and Lerbs (2022), which differs from the regressions presented below mainly by demand-side determinants, a one percentage point increase in the capital market interest rate leads to a 4.2% decline in building permits after one year. After two years, these already fall by 12.3%. A similar trend can also be seen in the sharp drop in new business in construction financing since the start of 2022 (Fig. 3a). Compared with the same month a year earlier, new lending in April 2023 fell by

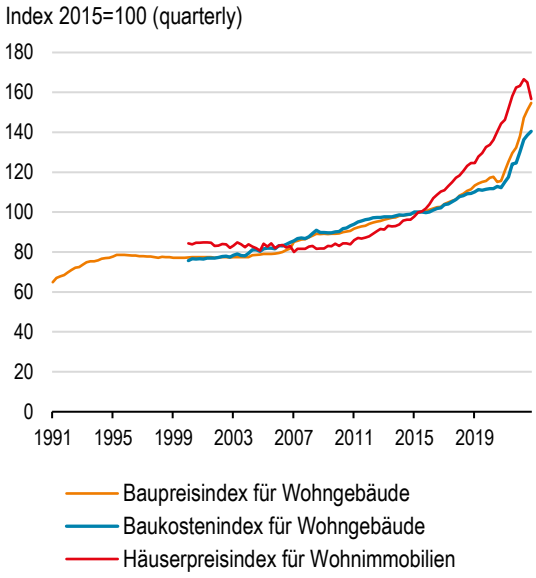
around 50% to EUR 13 billion, a low level not reached in over 10 years. In addition, according to the ECB's Bank Lending Survey, banks' lending standards were tightened more in the first quarter of 2023 than at any time since the international financial crisis. Lack of loan commitments as a result of rising interest rates empirically shows a lead time of four to six quarters for construction activity (Michelsen, 2023); therefore, the ECB's recent key interest rate hikes are expected to continue to dampen residential construction in 2024.

Figure 3: Financial indicators related to the construction industry

a) new lending and interest rates



b) house prices, construction prices, construction costs



The construction price index here reflects, from the perspective of the builder, the purchase price for new construction and maintenance of structures in building construction, while the construction cost index documents the total costs of a contractor, including material and labor costs. The house price index refers to transactions of both existing and newly built residential properties.

Sources: Deutsche Bundesbank, Macrobond, Statistisches Bundesamt (DeStatis).

Another problem for the construction sector is the sharp rise in construction costs due to shortages of materials as a result of supply chain problems. For example, construction costs for residential buildings reached a record level in the fourth quarter of 2022, having risen by almost 13% compared with the prior-year quarter and thus also being over 25% higher than two years ago. The construction price of residential buildings recorded an even stronger growth over the same period. Construction prices increased by about 17% over 2022; compared to 2020, they increased by almost 34% (Figure 3b). House prices, reflecting all transactions in the housing stock, have nearly doubled since 2010, reaching an all-time high in the second quarter of 2022. However, the sharp drop in demand is now impacting house prices. By the fourth quarter of 2022, the house price index of residential properties had fallen by almost 6% (Figure 3b).

Figure 4 shows the development of other macroeconomic indicators related to construction activity. Real disposable household incomes increased strongly until 2019, while the unemployment rate fell steadily from 2005 until the start of the Covid pandemic in 2020 (Figure

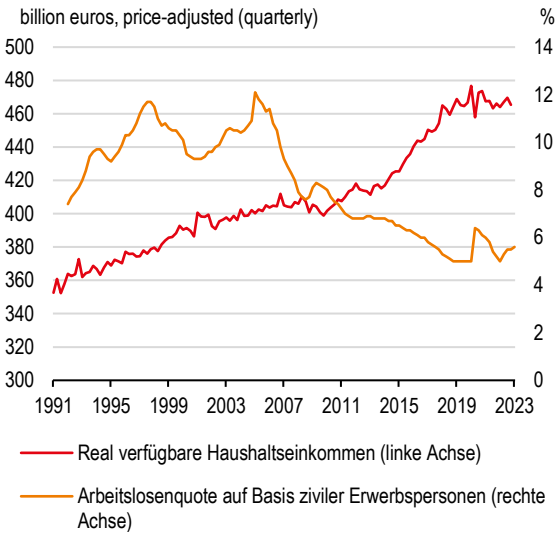
4a). Together, these two developments fueled the high demand for residential properties and thus the huge increase in house prices.

The state of the construction industry depends to a large extent on the development of mortgage rates. Empirically, there is no one-to-one correlation between capital market expectations of short-term money market rates and mortgage rates; however, Euribor market expectations are plausible guard rails for the future development of mortgage rates. Market expectations of the 3-month Euribor rate have declined slightly through 2024; however, they remain at a high level of over 3%. A similar, albeit more sideways, trajectory is laid out in the IMK's spring forecast for the money market interest rate (Dullien et al. 2023, Figure 4b). Despite the increase in household incomes, the average rent burden ratio declined only slightly from 2006 to 2018 (Holm et al. 2021, Figure 4d), which can be attributed to the fact that rent levels increased more than real disposable incomes, especially in large cities (Just, 2023). In addition, the share of the urban population in the total population has risen steadily in recent decades, according to UNDESA data (UNDESA 2022).

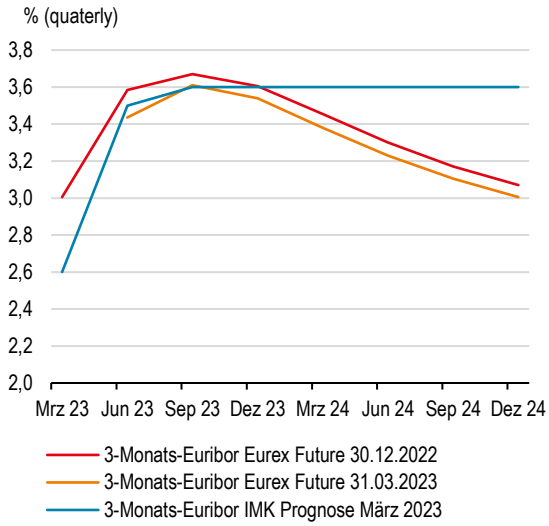
The poor order situation in the construction sector is also reflected in the ifo Business Climate Index for the main construction industry, which slumped at the start of the Ukraine war in February 2022 and has recovered only slightly since then. Capacity utilization in the construction sector has risen by a total of around 20 percentage points in the second construction cycle since 2010, although capacity utilization recorded from ifo business surveys is more volatile than data from the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR 2023), which is based on surveys by the German Chamber of Industry and Commerce (DIHK). Since the beginning of 2021, the two statistics have diverged noticeably (Figure 4c), without it being possible in our view to clearly assess which survey provides a better description of the situation. According to ifo business surveys, capacity remained at a high level of 79% in March 2023. According to the BBSR, however, capacity utilization in the construction sector fell by 5 percentage points to 70.1% from the first to the fourth quarter of 2022. At 71.2%, capacity utilization has risen again slightly at the beginning of 2023, but is well below the values of the ifo Institute. Underutilized capacity may lead to job cuts in the construction sector, which could further exacerbate the future housing shortage. Developments in the wake of the Covid pandemic have shown that some of the skilled workers who leave a particular industry in times of crisis may not return (in a timely manner), even if demand for labor in that industry rises again.

Figure 4: Other macroeconomic indicators relating to the construction industry

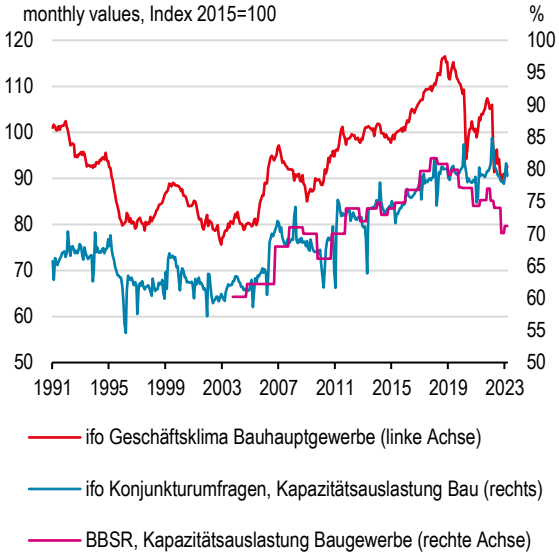
a) household income and unemployment rate



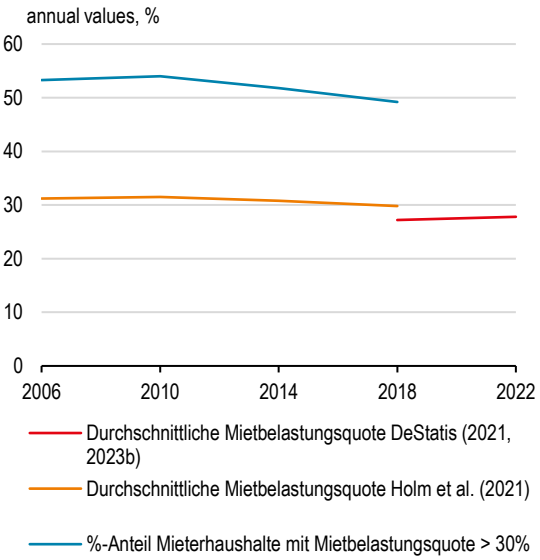
b) 3-month Euribor



c) capacity utilization and business climate



d) rent burden ratio



Data are seasonally adjusted where available. Due to different methodologies in the individual microcensus waves, the comparability of rent burden ratios over time is limited. Destatis reports the rent burden of a household as the share of gross cold rent in net household income. The gross cold rent is composed of the net cold rent (basic rent) and the cold non-operational additional costs (excluding heating and hot water costs) paid to landlords. Holm et al. (2021) relate the rent burden to the gross warm rent.

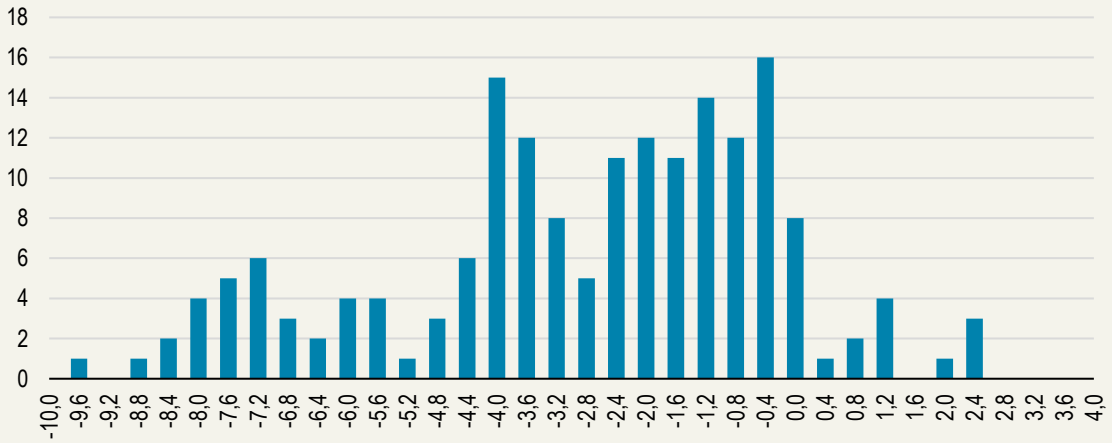
Sources: BBSR, Mikrozensus, Destatis, ifo Institut, Holm et al. (2021).

Literature review: Empirical determinants of construction activities

A look at the empirical literature reveals a range of proxy variables (building permits, construction starts, construction completions, construction investment) and modeling approaches (various single equation approaches and vector autoregressive models) for construction activity. To systematically evaluate this literature, 187 estimates from 41 suitable primary studies were identified via internet keyword search for which, in addition to an estimated coefficient of interest on construction activity, the standard error of the coefficient is also available. These are summarized and analyzed in a meta-analysis along the recommended procedure in Havránek et al. (2020).[6]

The interest rate coefficients can be standardized so that they indicate the percentage change in construction activity in response to a one percentage point increase in interest rates for all studies (interest rate semielasticity). To account for any lag structures in the empirical models and to account for the typically lagged effect of monetary policy, the cumulative effect of interest rate changes within four quarters is considered. Figure 5 shows the frequency distribution of the interest rate sensitivities calculated in this way. Most of the estimated interest rate sensitivities are negative and not symmetrically distributed between 0 and -5%. Moreover, on the left-hand side, there is a cluster of studies (around 15% of the total studies evaluated) that show a more negative interest rate semielasticity of more than -5% for construction activity.

Figure 5: Frequency distribution of interest rate sensitivities of construction activity



An Internet search was used to identify 187 estimates from 41 empirical studies for which standard errors are available in addition to the estimated coefficient of interest on construction activity. The interest rate coefficients are standardized to indicate the percentage change in construction activity in response to a one-percentage-point increase in interest rates for all studies (semi-elasticity). To account for any lag structures in the empirical models and to account for the typically lagged effect of monetary policy, the cumulative effect of interest rate changes is considered after up to 4 quarters, see Gechert and Rannenberg (2018).

Source: Calculations of the IMK.

[6] The list of considered studies is available upon request. To achieve the number of observations, no studies were excluded based on the type of interest rate considered, i.e., studies with interest rates other than the mortgage rate were accepted. The frequency distribution of interest rate semielasticities does not reveal any regional clusters; however, most of the studies in the sample relate to the United States.

The collected coefficients of interest are processed in simple metaregressions. Table 1 presents the results from three different regression models among themselves. The interest rate sensitivities from the studies are used as the dependent variable. The coefficient from the Ordinary Least Squares (OLS) method, which corresponds to the average estimate, indicates that with a one percentage point increase in interest rates, construction activity decreases by about 3%. To account for publication bias and thus heteroskedasticity in the estimate, the Weighted Least Squares (WLS) method is used as a further specification. Whether there is a genuine empirical effect here, i.e., an effect without publication bias, is tested using the Precision Effect Test (PET). The result in Table 1 shows that the relevant coefficient is not statistically significant when the standard error is considered as a regressor, even though the estimate is slightly negative (-0.1%).

In a third step, the Weighted Least Squares with Bias Correction (WLS-PEESE) method is applied. This attempts to more precisely identify an existing genuine effect (Stanley and Doucouliagos, 2012). It now uses the variance of the standard error to detect publication bias. The result is a small but significant and negative coefficient for the interest rate sensitivity of construction activity (-0.6%). At this point, however, it must be mentioned that the WLS-PEESE estimation method is not without controversy when the WLS method fails to detect a genuine effect, as in the present case. Furthermore, it should be noted that many primary studies often did not take into account the specific properties of time series data, e.g., cointegration relationships. However, these properties, especially the occurrence of long waves, appear relevant for the construction cycle.

Table 1: Regression models for interest rate sensitivities from 41 empirical studies
Dependent: Estimated percentage change in construction activity in response to an interest rate increase by 1 percentage point

Variable	Koeffizient	Standardfehler	t-Statistik
Schätzmethode: Ordinary Least Squares (OLS)			
Konstante	-3,092	0,736	-4,20
Schätzmethode: Weighted Least Squares (WLS)			
Konstante (= genuiner Effekt)	-0,102	0,192	-0,53
Standardfehler (=Publikationsverzerrung)	-2,693	0,566	-4,76
Adjustiertes R^2	0,347		
Schätzmethode: Weighted Least Squares with Bias Correction (WLS-PEESE)			
Konstante (= genuiner Effekt)	-0,577	0,187	-3,09
Standardfehler (=Publikationsverzerrung)	-0,816	0,356	-2,29
Adjustiertes R^2	0,146		
Beobachtungen	187		

Source: Calculations of the IMK.

Forecast of important parameters of construction activity

In the empirical literature on the determinants of construction activity, no clearly preferable econometric (benchmark) specification has emerged (see Infobox). Against this background, but also because construction activity moves in long waves, a clear forecasting approach is chosen below that takes into account a possible long-run relationship between the variables in the form of a single-equation cointegration relationship, as this proves to be reasonably robust in a cointegration test procedure.[7]

A vector autoregressive forecasting model, which could represent more than one cointegration relationship between the variables but requires a large number of coefficients to be estimated, is not used because of the partly small number of observations. In particular, construction completions are only available on the basis of annual data. Instead, we choose a multilevel setup in which, in the first step, new orders in the main construction sector are estimated as the dependent variable in the central specification until December 2021 and then forecast for the years 2022 to 2024 (Table 2b, Figure 6a). New orders are available at the monthly frequency, in contrast to other construction activity indicators (construction completions, real residential investment and real gross value added). The other parameters are therefore estimated and forecast in bivariate regressions as a function of new orders (Table 3a, b, Figure 6b, 7).

The explanatory variables in the initial model of new orders are real disposable household income and unemployment on the demand side and interest rates on the supply side. Adding construction prices to the model, with otherwise similar coefficients, results in a very small but significant and positive coefficient of construction prices. Theoretically, a positive sign does not seem very plausible, as the dominant effect is likely to be that higher prices deter potential builders from building, all other things being equal; therefore, construction prices are not included. Another regression can also be used to simulate how new orders in the main construction sector would have developed counterfactually since the start of 2022 without the interest rate increases (Table 2a, Figure 6a, orange line). The difference between the actual development of new orders (Figure 6a, red line) and the development simulated in this way complements the analysis of the initial model (Figure 6a, blue line), in which the influence of interest rates can be determined directly using the so-called cumulative dynamic multiplier. This is equivalent to the sum of the dynamic partial effects of an influencing factor over an entire period and thus indicates here the overall effect of an interest rate increase by one percentage point that is not changed further over a year.

For the central empirical analysis, we focus on new orders in the main construction sector as the dependent variable (y) and real disposable income (x_1), the unemployment rate (x_2) and the effective interest rate of real estate loans (x_3) as explanatory variables that can be estimated using an Autoregressive Distributed Lag model (ARDL):

$$y_t = c_0 + c_1 t + \sum_{i=1}^{p} \alpha_i y_{t-i} + \sum_{j=1}^{3} \sum_{l=0}^{q_j} \beta_{j,l} x_{j,t-l} + \varepsilon_t$$

[7] An explanatory variable or the lags in the central specification are identified as relevant on the basis of the triad of the Schwarz information criterion, the individual significance of its coefficient, and the agreement of the sign with the connection considered theoretically likely. EViews provides an automated preselection for ARDL models. The test of Phillips and Ouliaris (1990) serves as cointegration test in Tables 2a, b and 3a, b.

where the coefficients α_i measure the influence that lagged new orders have. The coefficients $\beta_{j,l}$ perform the same function for the contemporaneous and the lagged explanatory variables. ε_t denotes the estimation error at time t.

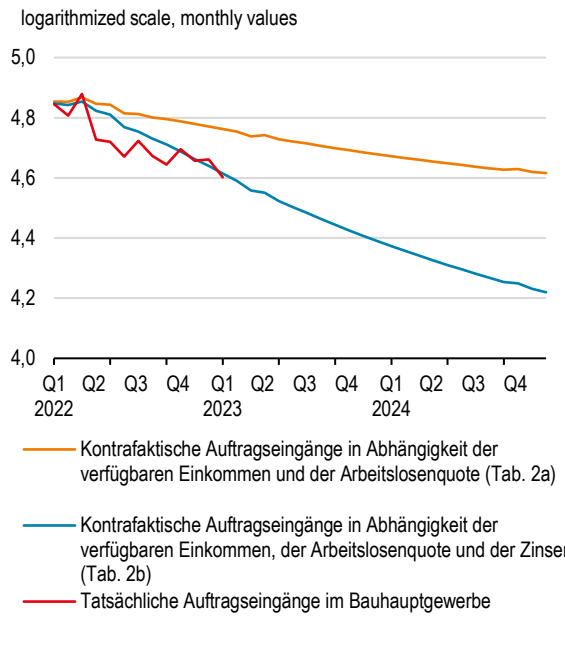
Table 2 shows the coefficients of the ARDL models estimated on a monthly basis for the sample 1991 to 2021 in error correction form. Even if the econometric specification is kept clear and modifications are conceivable, an acceptable goodness of fit is obtained (with respect to the adjusted coefficient of determination, the Durbin-Watson statistic and the Phillips-Ouliaris test for cointegration). The coefficients of the variables in the cointegration relationship provide the expected finding: A (past) increase in real disposable income is accompanied by an increase in new construction orders, while an increase in (past) unemployment and interest rates coincides with a decrease.

The cumulative dynamic multiplier of interest rates for twelve months is almost -7%, which means that the empirical model simulates a reduction in new orders in the main construction sector of this magnitude as a result of an interest rate increase of one percentage point after one year, all other things being equal. Comparing this with the interest rate sensitivities from the empirical literature (Figure 5), the estimated impact is at the left end of the distribution (i.e. is stronger than in the majority of empirical studies), but within that cluster, which still accounts for around 15% of the estimated interest rate sensitivities. The impression that interest rate sensitivity can turn out to be more negative than -5% is also corroborated if we broaden our view to (semi-)structural macroeconometric models in the literature and focus on real housing investment. For instance, the model of Iacoviello and Neri (2010: Figure 3) shows an interest rate sensitivity of around -6%. The NiGEM model, which is often used for economic policy analysis, shows a decline in residential construction of between 3.5% and 5.5% under adaptive expectation, depending on which of the major euro area countries is considered, following a one percentage point increase in interest rates.

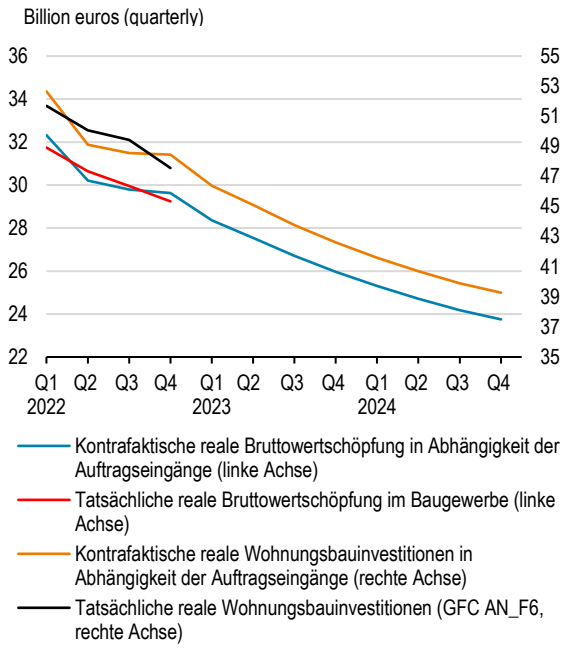
The counterfactual forecast of new orders without interest rates (orange line) represents a thought experiment. Here, new orders are calculated under the assumption that the ECB's key interest rate changes would be irrelevant for residential construction investment. In other words, the decline in new orders is exclusively attributable to the (forecast) development of disposable income and unemployment. The difference between the two forecasts once again underscores the importance of interest rate developments for construction.

Figure 6: Actual and counterfactual new orders and gross value added in the construction (main) sector

a) new orders in the main construction sector



b) real gross value added in the construction industry and residential construction investment



For the estimation, the real gross value added in the construction sector, which is actually only available on a quarterly basis, is converted to the monthly frequency by the random walk variant of the Chow-Lin method, taking into account that the sum of the monthly values corresponds to the quarterly value.

Sources: Destatis, Eurostat, IMK calculations.

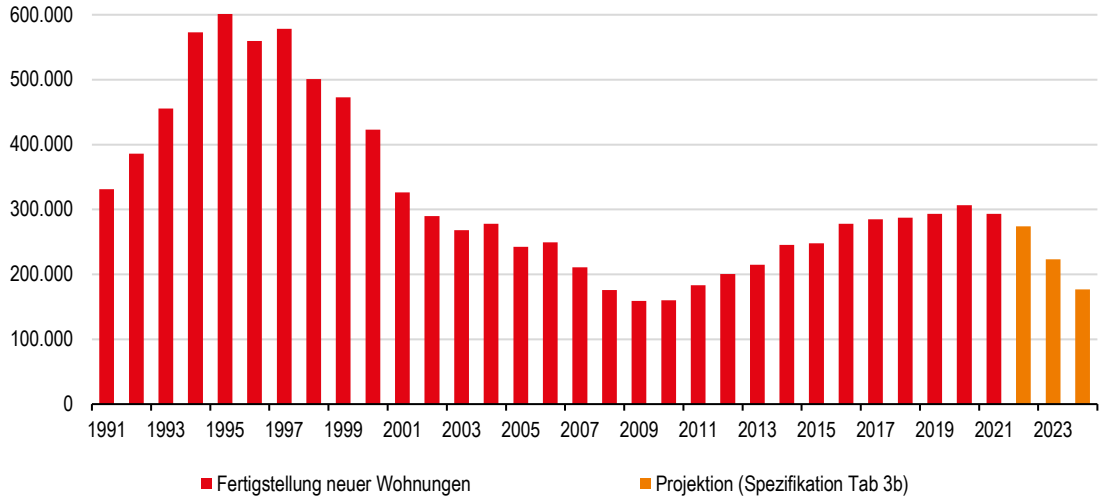
The central regression model predicts a continuation of the substantial decline in new orders in the main construction sector, taking into account increased interest rates, for the years 2023 (-26.5%) and 2024 (-20.4%). Based on this, forecast values for real residential construction investment (the gross value added of the construction industry) and residential completions can also be determined (Figure 6b, Figure 7). The predicted declines in real residential construction investment (gross value added) for 2023 and 2024 are 20.9 billion euros (13.4 billion euros) and 16.4 billion euros (10.6 billion euros), respectively, compared with the previous year. Taken together, the cumulative decline in real residential construction investment (gross value added in the construction sector) amounts to 37.3 billion euros (24 billion euros) over the two years. This corresponds to around 0.5% (0.3%) of the gross domestic product (GDP) per year. According to the chosen forecast approach, construction completions will fall significantly from 295,000 apartments in 2022 to 223,000 apartments in 2023 and 177,000 apartments in 2024. The forecast for 2024 only slightly exceeds the historic low in housing construction activity in Germany reached in 2009 (159,000).

Figure 7 shows actual housing completions up to 2021 and those projected by the empirical model beginning in 2022. The forecast for 2022 is 274,000 apartments and was made before the Federal Statistical Office reported on May 23, 2023, that the number of new apartments in 2022

was actually 295,000 (Statistisches Bundesamt 2023c). Thus, the presented empirical forecast model slightly underestimated the number of completions.

The results presented are subject to estimation uncertainty in several respects: this fundamentally concerns both the stability of cointegration relationships that account for a deterministic trend and the question of whether construction activity would not be better specified in a system of variables (with mixed frequencies). The inherent model uncertainty can also be seen in the fact that our analysis of the literature did not reveal a specification for modeling construction activity that is clearly preferable (Infobox). Moreover, the small number of observations reduces the validity of the estimate of the number of new apartments available only on an annual basis.

Figure 7: Number of new apartments (construction completions) including projection 2022-2024



Sources: Destatis, IMK calculations.

Moreover, our specification does not take into account an important refinement of residential construction investment: According to DIW's construction volume calculation, about 2/3 of the recorded residential construction investment volume is attributable to modernizations of the existing stock and only about 1/3 to new construction (Gornig 2023). In this context, it is conceivable that a large share of modernizations (for owner-occupied use) is less sensitive to interest rates than our estimates suggest. Finally, it is worth noting that the German Federal Ministry of Housing, Urban Development and Construction says it will provide additional funding of 0.5 billion euros in 2023 compared with the previous year (i.e., 2.5 billion euros in total in 2023) for social housing programs and, in addition, an expansion of the corresponding housing subsidy for the years up to 2026 (BMWSB 2023). Such discretionary interventions are not reflected in the present estimates. Nonetheless, we consider the present analyses suitable for estimating the maximum impact of interest rate increases on construction activity from a risk perspective.

Economic policy conclusions

The rapid rise in construction prices since 2021 and in key interest rates since mid-2022 have led to a slump in new orders of over 20% in the German construction sector by the beginning of 2023. Construction is still benefiting from a high order backlog; however, many orders are currently being canceled (ifo Konjunkturumfrage 2023). An end to the construction downturn does not appear to be in sight in view of the now noticeable decline in demand, further key interest rate increases by the ECB and additional tightening of lending by banks (Deutsche Bundesbank 2023). The overall decline in construction activity is likely to be substantial in this mixed situation (Meier et al. 2021, p. 90; Hiller and Lerbs 2022). Several studies see the risk of a reduction in capacity, which will also ensure that available supply will fall far short of demand in the medium term (Arbeitsgemeinschaft für zeitgemäßes Bauen 2023, Dullien and Martin 2023). The magnitude of the econometric analyses available confirm this risk. Accordingly, a cumulative decline in real residential construction investment (gross value added in the construction sector) of 37.3 billion euros (24 billion euros) is on the horizon for 2023 and 2024. Annualized, this corresponds to a good 0.5% (0.3%) of GDP. According to the forecast approach chosen, the number of new apartments will also fall close to its historic low of 2009, despite the fact that the current federal government has increased the volume of subsidies for new homes compared with previous governments.

The forecast values are subject to estimation uncertainty for several reasons explained. In particular, they are due to the high estimated interest rate sensitivity of the specification. If interest rates fall again appreciably by 2024 - in contrast to the assumption made here - the number of completed apartments is likely to be higher as a result. From a risk perspective, however, it makes little sense for economic policy to rely on this.

Rather, the question arises as to which public housing construction measures can be logically applied, provided that additional spending is made politically possible. In view of the estimated interest rate sensitivity, the most obvious option would seem to be to increase existing KfW programs for (social) housing construction, as these are generally aimed directly at reducing financing costs. In addition, leasehold offers interesting subsidy options, where the public sector can reduce construction costs both by preventing private developers from acquiring the property and by granting a time-dependent reduction in the ground rent depending on the amount of affordable housing created. Building on Dullien and Krebs (2020), Dullien and Martin (2023) also mention the expansion of three instruments with medium-term effects: firstly, the consulting company Partnerschaft Deutschland, whose tasks on behalf of municipalities include providing financing advice, conducting negotiations with bidders and building efficiency calculations; secondly, a land fund that supports municipalities in acquiring land ownership; and thirdly, an investment fund that, as a minority shareholder, strengthens the equity base of public housing companies for the purpose of expanding new construction capacity. This is also the context for the proposal by the Housing Associations' Alliance to set up a special fund of 50 billion euros that would rededicate stalled construction projects by 2025 and initiate new ones to create affordable housing with a maximum net rent of 12.50 euros/m² (Deutschlandfunk 2023).

The design as a special fund of the federal government defuses compliance with the state debt brake as one of the most frequently cited arguments against an expansion of public housing investment. In this context, a credit-financed expansion of public housing construction can be

structured as a financial transaction and thus as an exception to the debt brake if the completed apartments explicitly create assets of the state (Dezernat Zukunft 2021). It is also frequently noted that increasing the size of public companies increases the risk of mismanagement. While such cases can be found in housing companies in the past (FAZ 2009), a repetition should by now be just as impossible in public companies as in private ones due to knowledgeable and responsible supervisory boards (Institut für den öffentlichen Sektor 2023). Finally, the argument against an expansion of public housing construction is sometimes found that the additional demand created can further fuel construction prices and indirectly contribute to inflation. While in principle there is a construction price-increasing or -maintaining effect, the size of the time-dependent net effect on consumer price inflation does not seem clear given that even omitted expansions in housing supply can contribute to inflation through high rent increases.

Ultimately, the arguments against an expansion of public housing construction can be invalidated by a conditionality clause. For example, in view of existing uncertainties, an effective program can be designed in stages, so that each year it is reviewed whether an additional expansion of public housing construction is advisable, depending on the development of key indicators such as housing demand, capacity utilization in the construction sector, and the number of sectoral employees and sectoral insolvency notices. At present, this seems appropriate as a result of the risk-benefit assessment at hand.

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Appendix

Regression models for key construction activity indicators

Table 2: Regression models for the change in new orders in the construction sector

a) Dependent: Change log new orders in construction sector (sample 1991M1 - 2021M12).
Estimation method: autoregressive distributed lag (ARDL) with automated model selection (SIC).

Variable	Coefficient	Standard error	t-statistic
log new orders (-1)	-0,0538	0,022	-2,467
log real disposable income	0,2396	0,160	1,498
unemployment rate (-1)	-0,0058	0,002	-2,487
△ log new orders (-1)	-0,5607	0,053	-10,642
△ log new orders (-2)	-0,2326	0,051	-4,526
△ unemployment rate	-0,0797	0,021	3,800
constant	-0,8163	0,688	-1,187
trend	-0,0003	0,000	-2,128
adjusted R^2	0,285		
Log-Likelihood	633,504		
Schwarz-Information Criterion (SIC)	-3,269		
Durbin-Watson-Statistic	2,009		
p-value Phillips-Ouliaris Z-Statistic (H_0: Time series are not cointegrated)	0,017		

b) Dependent: Change log new orders in construction sector (sample 1991M1 - 2021M12).
Estimation method: autoregressive distributed lag (ARDL) with automated model selection (SIC).

Variable	Coefficient	Standard error	t-statistic
log new orders (-1)	-0,0699	0,022	-3,169
log real disposable income	0,2949	0,159	1,857
unemployment rate (-1)	-0,0097	0,003	-3,737
effective interest rate for new real estate business	-0,0123	0,004	-3,240
△ log new orders (-1)	-0,5661	0,052	-10,877
△ log new orders (-2)	-0,2440	0,051	-4,797
△ unemployment rate	-0,0886	0,021	-4,242
constant	-0,8564	0,679	-1,261
trend	-0,0007	0,000	-3,669
adjusted R^2	0,290		
Log-Likelihood	633,806		
Schwarz-Information Criterion (SIC)	-3,282		
Durbin-Watson-Statistic	2,027		
p-value Phillips-Ouliaris Z-Statistic (H_0: Time series are not cointegrated)	0,029		

Sources: Destatis, IMK calculations.

Table 3: Regression model for real value added in the construction sector, residential construction investment and the number of new apartments.

a) Dependent: log real gross value added construction sector (sample 1991M1 - 2021M12)
Estimation method: Fully Modified Least Squares (FMOLS)

Variable	Coefficient	Standard error	t-statistic
log new orders	0,4805	0,032	15,112
Constant	0,2164	0,157	1,378
Trend	-0,0004	0,000	-7,584
Adjusted R^2	0,916		
p-value Phillips-Ouliaris Z-Statistic	0,000		

b) Dependent: log real residential investment (sample 1991M1 - 2021M12).
Estimation method: Fully Modified Least Squares (FMOLS).

Variable	Coefficient	Standard error	t-statistic
log new orders	0,521	0,053	9,829
Constant	0,059	0,262	0,224
Trend	0,001	0,000	7,708
Adjusted R^2	0,697		
p-value Phillips-Ouliaris Z-Statistic	0,023		

c) Dependent: change log new apartments (construction completion, sample 1970 - 2021).
Estimation method: Ordinary Least Squares (OLS).

Variable	Coefficient	Standard error	t-statistic
△ log new apartments (-1)	0,348	0,066	5,248
△ log real housing investment	1,409	0,165	8,567
Constant	0,011	0,005	-2,568
Adjusted R^2	0,640		
Durbin-Watson-Statistic	2,199		

For the estimation, the real gross value added in the construction sector, which is actually only available on a quarterly basis, is converted to the monthly frequency using the random walk variant of the Chow-Lin method, taking into account that the sum of the monthly value added corresponds to that of the quarter. The goodness of the estimate of new apartments is limited by the fact that construction completions are only available at annual frequency.

Sources: Destatis, NiGEM-Database, IMK calculations.