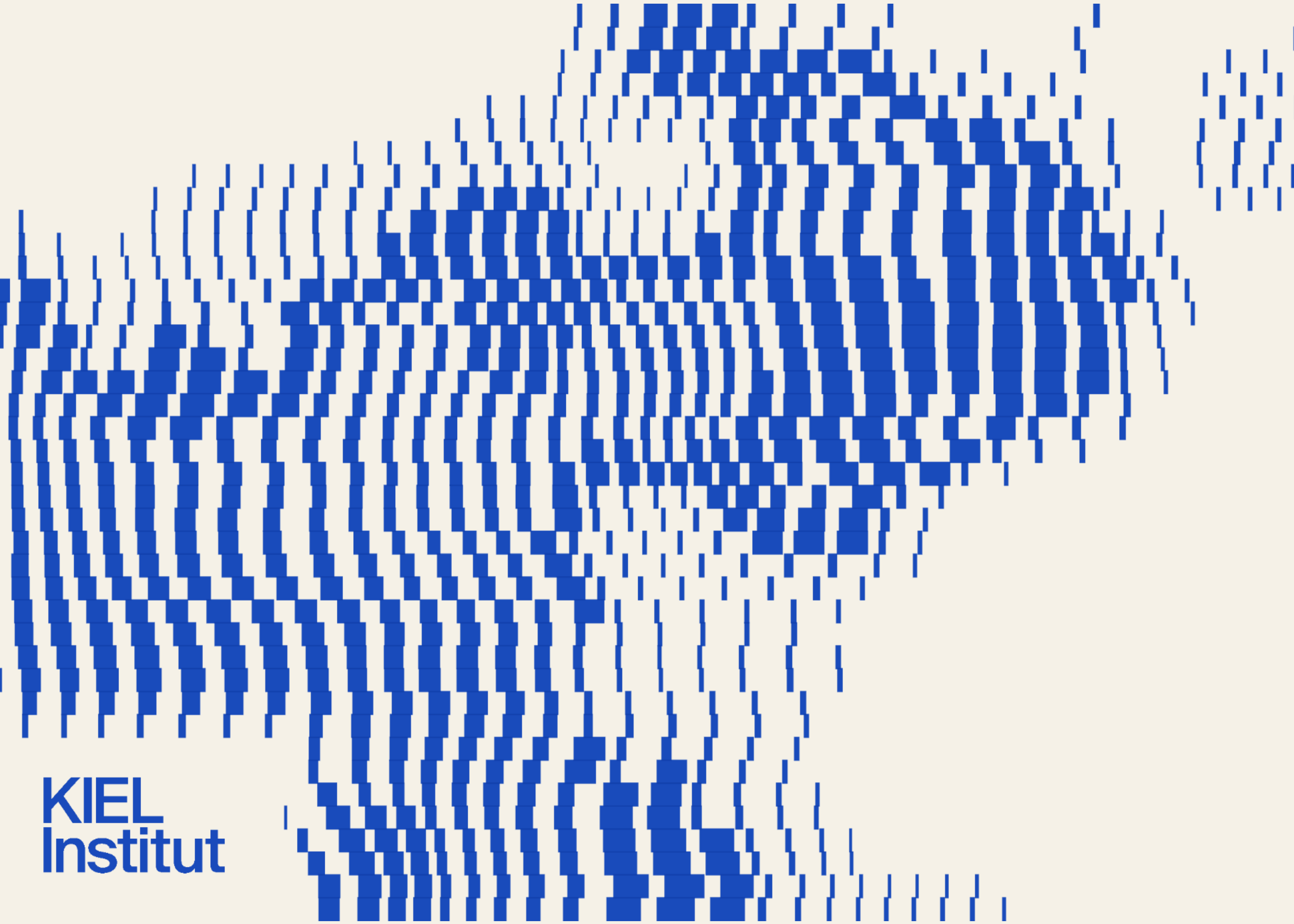
Kiel Insight Nr. 02

The influence of weather conditions on construction investment

Timo Hoffmann



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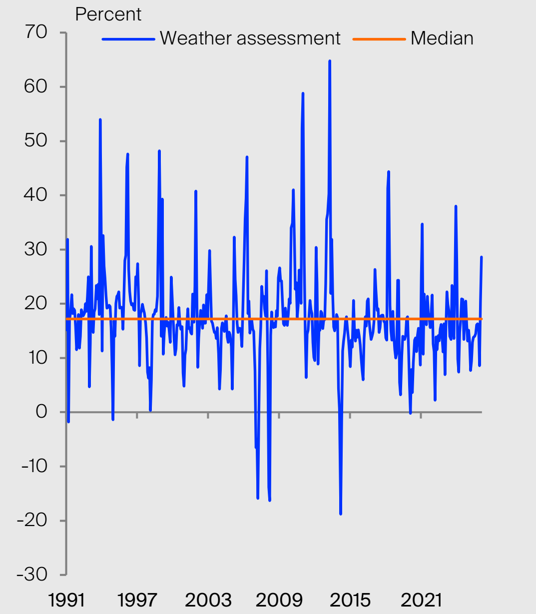
While construction investment depends on structural factors such as financing conditions in the medium to long term, weather has a substantial short-term impact on construction activity. Construction is mainly affected during periods of harsh weather, but activity usually rebounds quickly once conditions improve. Whether annual investment is unaffected depends on the severity of the disruption and on capacity utilization. These effects are examined empirically below.

At the beginning of 2026, cold weather—especially in northern and eastern Germany—likely dampened construction investment significantly. The share of construction firms reporting weather as an obstacle in surveys rose (seasonally adjusted) from about 14% in the fourth quarter to around 25% in January and February (Figure B-1). However, past periods have seen even more unfavorable conditions.

Figure B-1:
Weather as a constraint on construction activity



Monthly data: Share of construction firms reporting weather as a constraint on their activity, calendar- and seasonally adjusted.

Source: ifo Institute – Leibniz Institute for Economic Research; Kiel Institute calculations.

To model the relationship between weather and construction activity, quarterly changes in construction investment are regressed on the share of firms citing weather as a constraint, including contemporaneous, one-quarter, and two-quarter lags (Table B-1). The model also controls for construction business sentiment and yields on ten-year German government bonds, which affect construction financing costs. Additional variables are omitted to avoid excessive model complexity.

The results show a statistically significant relationship: adverse weather reduces construction investment in the same quarter, followed by a rebound in the next quarter and a dampening effect in the subsequent quarter. Further lags are not statistically significant. The effect is also economically meaningful: a 7.5 percentage point increase (one standard deviation) in the share of firms reporting weather constraints reduces construction investment by about 0.9%.[a] Including weather variables significantly improves model fit, raising the adjusted R^2 from about 0.06 in model (1) to around 0.45 in model (2). This is illustrated graphically by the fact that some of the fluctuations in the volatile investment series can be explained by fluctuations in weather (Figure B-2a).

Survey indicators of capacity utilization or production may capture similar information, but they do not identify the cause of investment changes or provide information beyond the current quarter. The monthly construction production index is also an important indicator but is published with a delay of more than two months, whereas survey data on weather are available at the end of each month.

Although capacity utilization does not improve forecasts for future quarters as reflected in model (3), it influences the magnitude of the catch-up effect: higher utilization during periods of adverse weather reduces the rebound in the following quarter.

To assess predictive performance, the quality of forecasts on new data points unknown to the model is crucial. Therefore, the data are split into training and test samples. The model is first estimated using data from 1991 to 2015 and then used to generate rolling nowcasts for the period from 2015 to 2025 (Figure B-2b). In this quasi-out-of-sample test, the model including weather variables performs better, with forecast errors approximately 20% lower than those in the model without weather (Table B-2).

Table B-1:
Models

	Δconstruction investment		
	(1)	(2)	(3)
Adverse weather		-0.119***	-0.119***
		(0.025)	(0.024)
Adverse weather lag1		0.256***	0.935***
		(0.026)	(0.259)
Adverse weather lag2		-0.061**	-0.052**
		(0.025)	(0.024)
Capacity utilization			-0.020
			-0.076
Construction business sentiment	0.092***	0.086***	0.164***
	(0.029)	(0.023)	(0.033)
Bond yields	0.242**	0.208**	
	(0.114)	(0.093)	
Adverse weather lag1 × capacity utilization lag1			-0.010***
			(0.004)
Intercept	-9.358***	-10.001***	-14.950***
	(2.906)	(2.349)	(4.781)
Observations	139	138	138
R^2	0.071	0.467	0.517
Adjusted R^2	0.057	0.447	0.495
Residual Std. Error	2.627 (df = 136)	2.020 (df = 132)	1.929 (df = 131)
F Statistic	5.186*** (df = 2; 136)	23.139*** (df = 5; 132)	23.410*** (df = 6; 131)
			*p < 0,1; **p < 0,05; ***p < 0.01

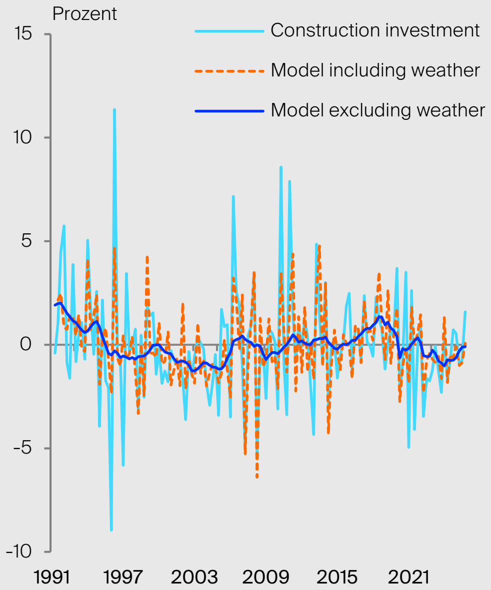
Quarterly data: Construction investment, price-, calendar-, and seasonally adjusted; change compared with the previous quarter.
Monthly data: Share of construction firms reporting weather as a constraint on their activity, capacity utilization in the main construction sector, business climate in the main construction sector, calendar- and seasonally adjusted; yield on ten-year German government bonds.

Source: Deutsche Bundesbank; Federal Statistical Office, *Fachserie 18, Series 1.3;* ifo Institute – Leibniz Institute for Economic Research; Kiel Institute calculations.

The unfavorable weather in the first two months of 2026 is therefore likely to affect construction investment in the first three quarters of the year, starting with a decline in the first quarter. To estimate the pure weather effect, two weather scenarios are simulated. In the baseline scenario, the weather indicator falls from its February value to the historical median in March and remains there for the rest of the year. In the alternative scenario, weather conditions are assumed to have been at the median level already in the first quarter. Using the difference between the resulting investment paths isolates the weather effect (Figure B-3).

A breakdown by construction segments suggests that weather affects them differently. Separate models are estimated for residential, commercial, and public construction. Survey data from the relevant companies were used for residential and commercial construction respectively. Since public construction largely comprises both civil engineering and building construction projects, the survey data for the entire construction industry are included in the model. The results indicate that weather-related declines in residential construction in the first quarter are likely to be milder than in public construction, which includes a large share of civil engineering projects.

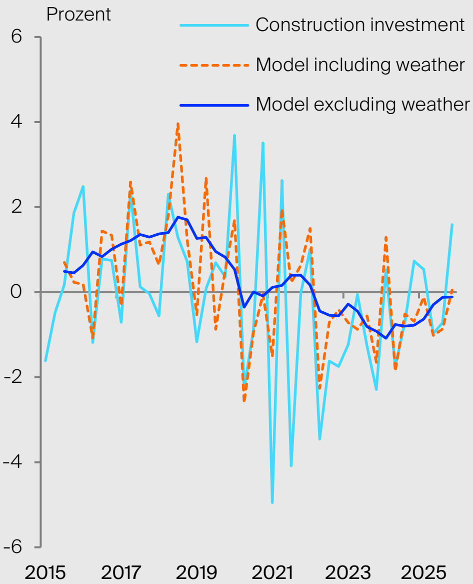
Figure B-2a:
Model fit (in-sample)



Quarterly data: Construction investment, price-, calendar-, and seasonally adjusted, quarter-on-quarter change rates, predictions of construction investment based on a linear model with and without survey-based weather conditions.

Source: Deutsche Bundesbank; Federal Statistical Office, *Fachserie 18, Series 1.3;* ifo Institute – Leibniz Institute for Economic Research; Kiel Institute calculations.

Figure B-2b:
Model fit (out-of-sample)



Quarterly data: Construction investment, price-, calendar-, and seasonally adjusted, quarter-on-quarter change rates, quasi-out-of-sample forecasts of construction investment based on a linear model with and without survey-based weather conditions.

Source: Deutsche Bundesbank; Federal Statistical Office, Fachserie 18, Reihe 1.3; ifo Institute – Leibniz Institute for Economic Research; calculations by the Kiel Institute for the World Economy.

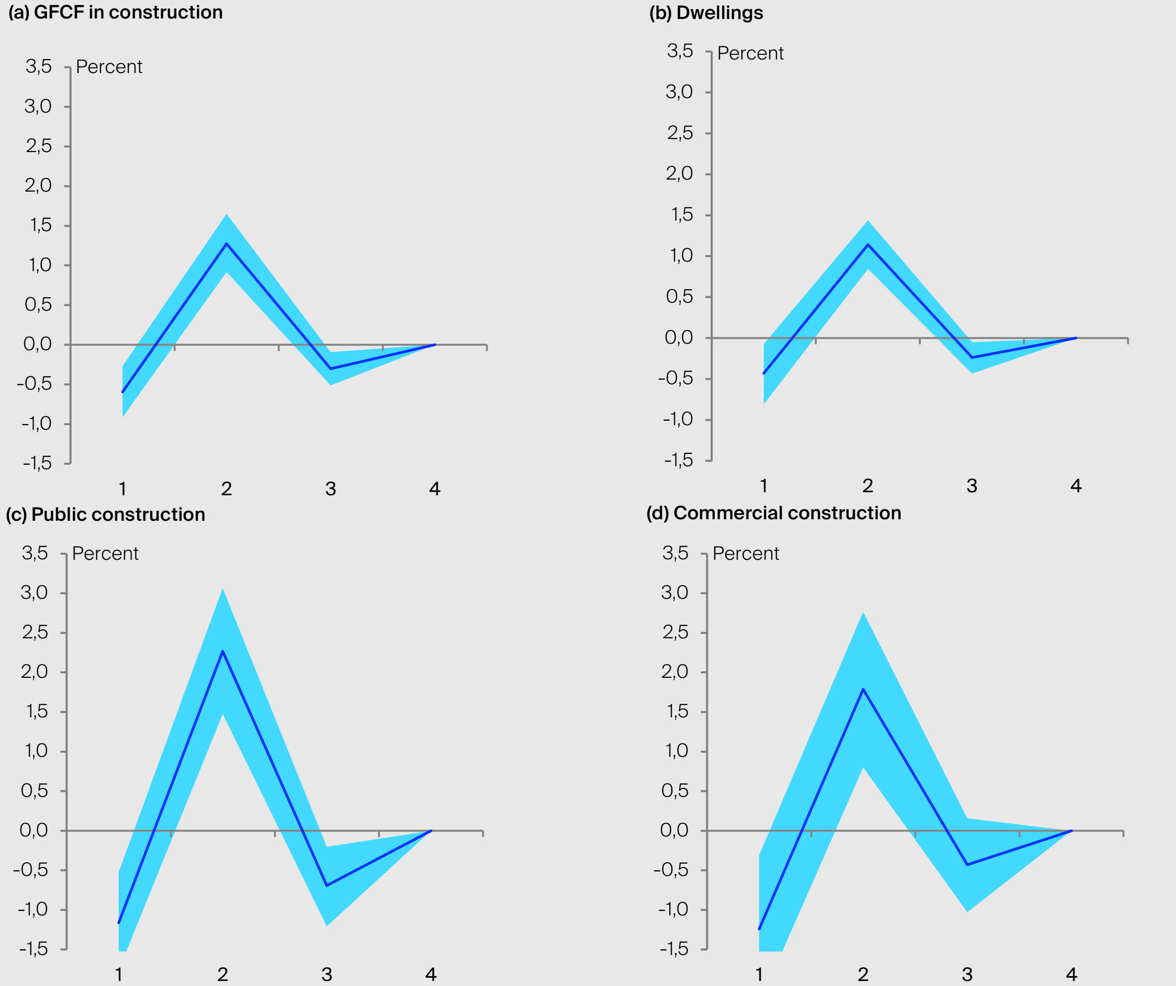
Table B-2:
Out-of-sample approach for model evaluation

	(1)	(2)	(3)
RMSFE	1.81	1.47	1.63
Theil's U		0.81	0.90
p-value CW		0.0002	0.0022
Observations	42	42	42

Quasi out-of-sample approach for model evaluation using the root mean squared forecast error (RMSFE); Theil's U relates the RMSFE of models (1) and (3) to the RMSFE of the baseline model (2); forecast accuracy is compared using the Clark–West test for nested models.

Source: Deutsche Bundesbank; Federal Statistical Office, *Fachserie 18, Series 1.3;* ifo Institute – Leibniz Institute for Economic Research; Kiel Institute calculations.

Figure B-3:
Weather effect of the year 2026 over time



Quarterly data: Estimated weather effect on construction investment; price-, calendar-, and seasonally adjusted; percentage changes. The effect is estimated as the difference between the baseline and the alternative scenario. 95% confidence interval estimated using Newey–West standard errors.
Source: Deutsche Bundesbank; Federal Statistical Office, *Fachserie 18, Series 1.3;* ifo Institute – Leibniz Institute for Economic Research; Kiel Institute calculations.

[a] The effect size depends on the construction business sentiment and interest rates, as both variables are included in the model as levels rather than rates of change. The historical median was used for both control variables.

Impressum

Kiel Institut für Weltwirtschaft
Standort Kiel
Kiellinie 66, 24105 Kiel
Telefon + 49 431 8814-1
info@kielinstitut.de

Standort Berlin
Chausseestraße 111, 10115 Berlin
Telefon +49 30 30830637-5
berlin@kielinstitut.de

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Zuständige Aufsichtsbehörde
Ministerium für Allgemeine und Berufliche Bildung, Wissenschaft, Forschung und Kultur des Landes Schleswig-Holstein
Jensendamm 5, 24103 Kiel

Umsatzsteuer ID
DE 251899169

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