

Communicating uncertainty in macroeconomic forecasts

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Introduction and motivation

Introduction and motivation

- We live in an uncertain world but how should we convey this uncertainty in our forecasts and our *Outlook*?
- Bernanke Review (2024) argued that fan charts are not the way to go since they:

have weak conceptual foundations, convey little useful information over and above what could be communicated in other, more direct ways, and receive little attention from the public

Introduction and motivation

- Currently we use fan charts based on stochastic simulation of NiGEM
- We could use fan charts based on past forecast errors (as the Bank of England does)
- But does either approach capture how uncertain we think the forecast is?
- And how should we capture the balance of risks?

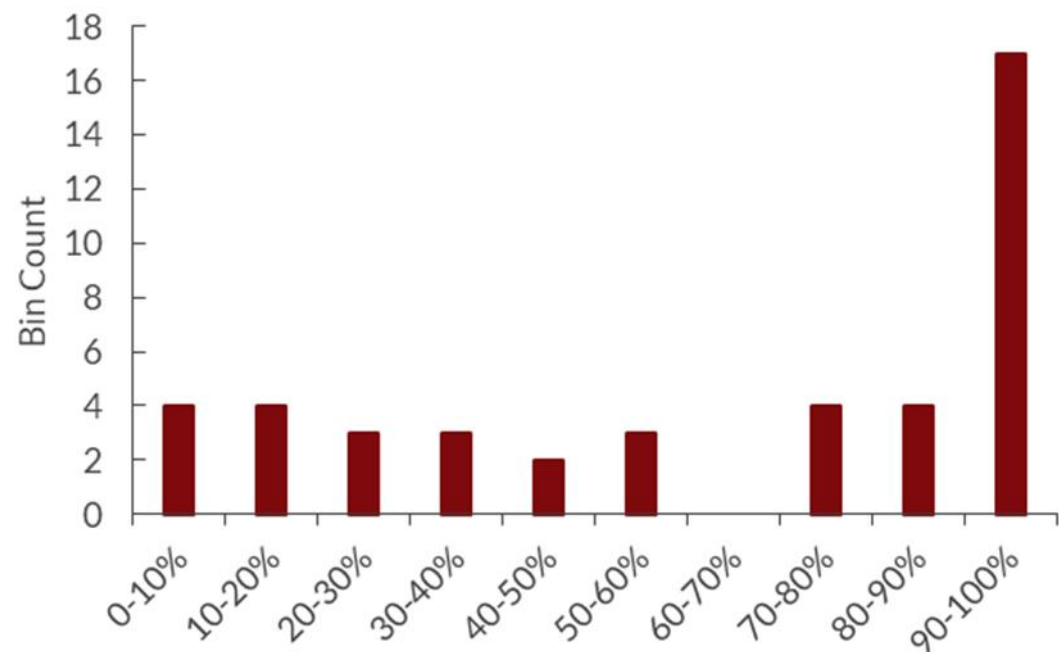
Roadmap

- Introduction and motivation
- Evaluating fan charts
- Constructing fan charts
- Calibrating the variance and skewness of fan charts
- Communicating uncertainty and risks
- Conclusion

Evaluating fan charts

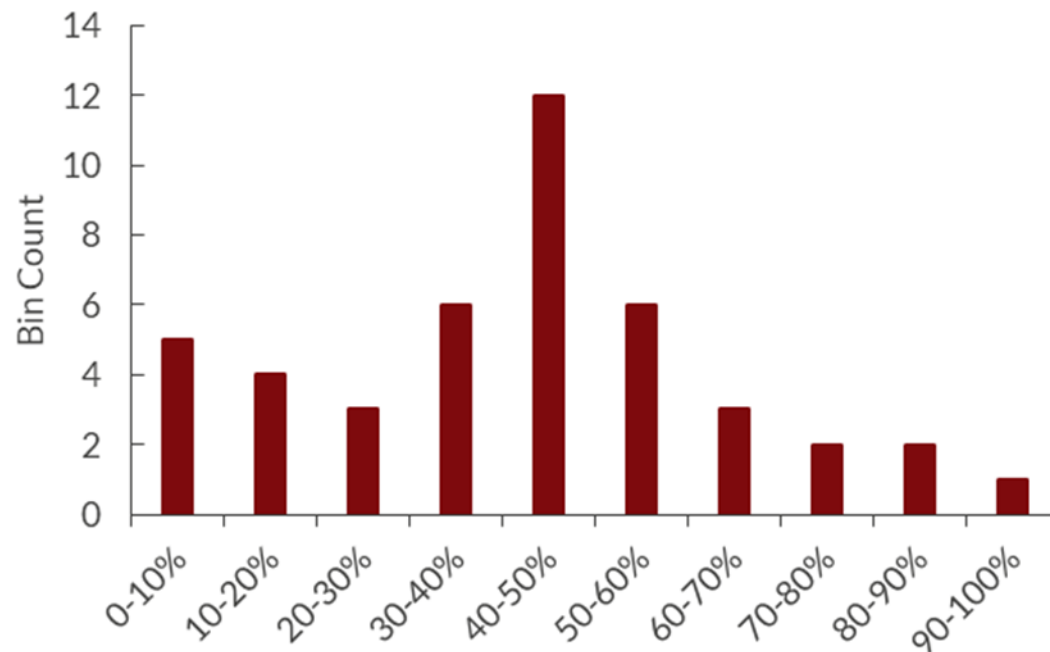
Evaluating fan charts

Histogram of PITs for NIESR one-quarter ahead annual GDP growth forecasts



Source: Author's calculations based on NIESR forecasts

Histogram of PITs for NIESR eight-quarter ahead annual GDP growth forecasts

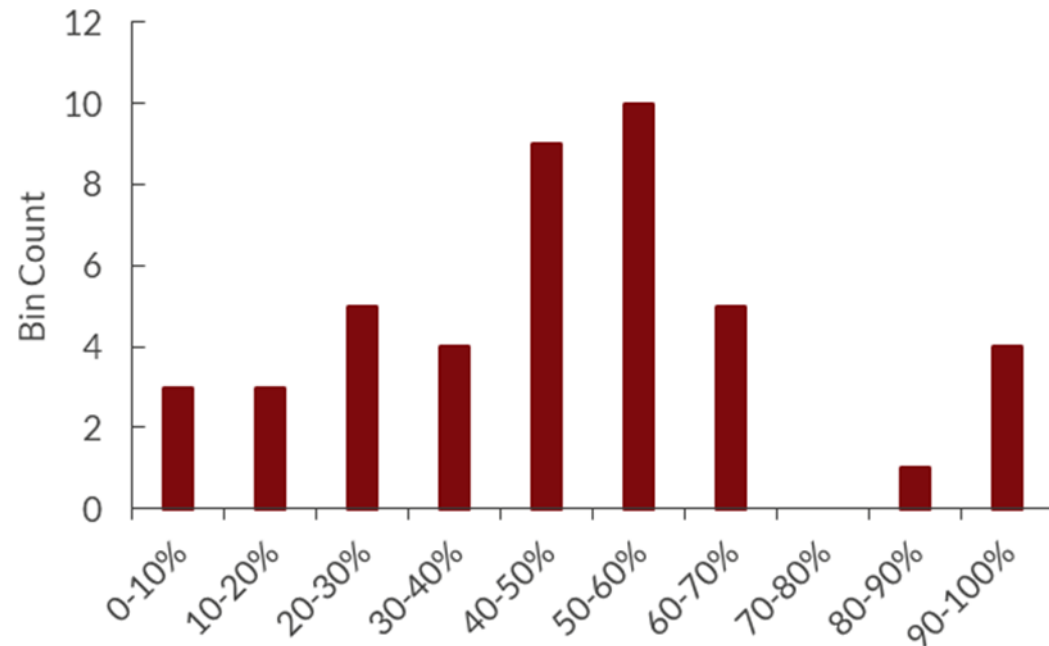


Source: Author's calculations based on NIESR forecasts

We can use Probability Integral Transforms (PITs) to assess the performance of density forecasts

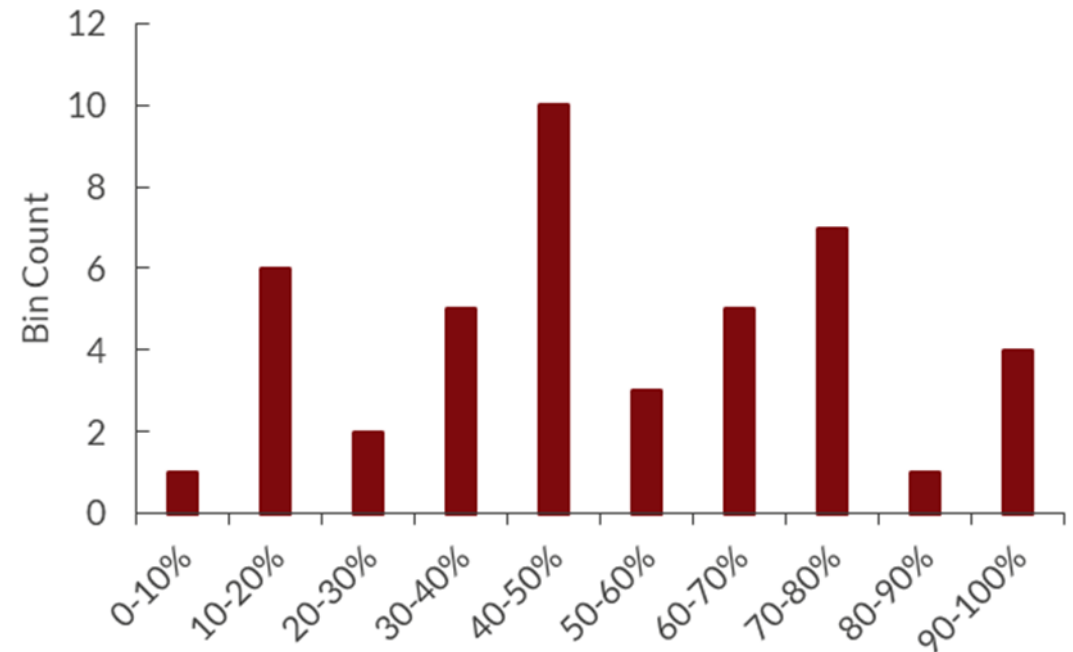
Evaluating fan charts

Histogram of PITs for NIESR one-quarter ahead annual CPI inflation forecasts



Source: Author's calculations based on NIESR forecasts

Histogram of PITs for NIESR eight-quarter ahead annual CPI inflation forecasts



Source: Author's calculations based on NIESR forecasts

We can use Probability Integral Transforms (PITs) to assess the performance of density forecasts

Evaluating fan charts

- Alternatively, we can use Brier scores to assess our ability to predict the probability of particular events:
 - Annual GDP growth being negative ('Recession')
 - Annual CPI Inflation being lower than 1 per cent, between 1 and 3 per cent or higher than 3 per cent
- For two possible outcomes: $BS = \frac{1}{N} \sum_{t=1}^N (f_t - o_t)^2$
- For three possible outcomes: $BS = \frac{1}{N} \sum_1^N \sum_{i=1}^R (f_{t,i} - o_{t,i})^2$
- Either way, we are aiming for a number close to zero

Evaluating fan charts

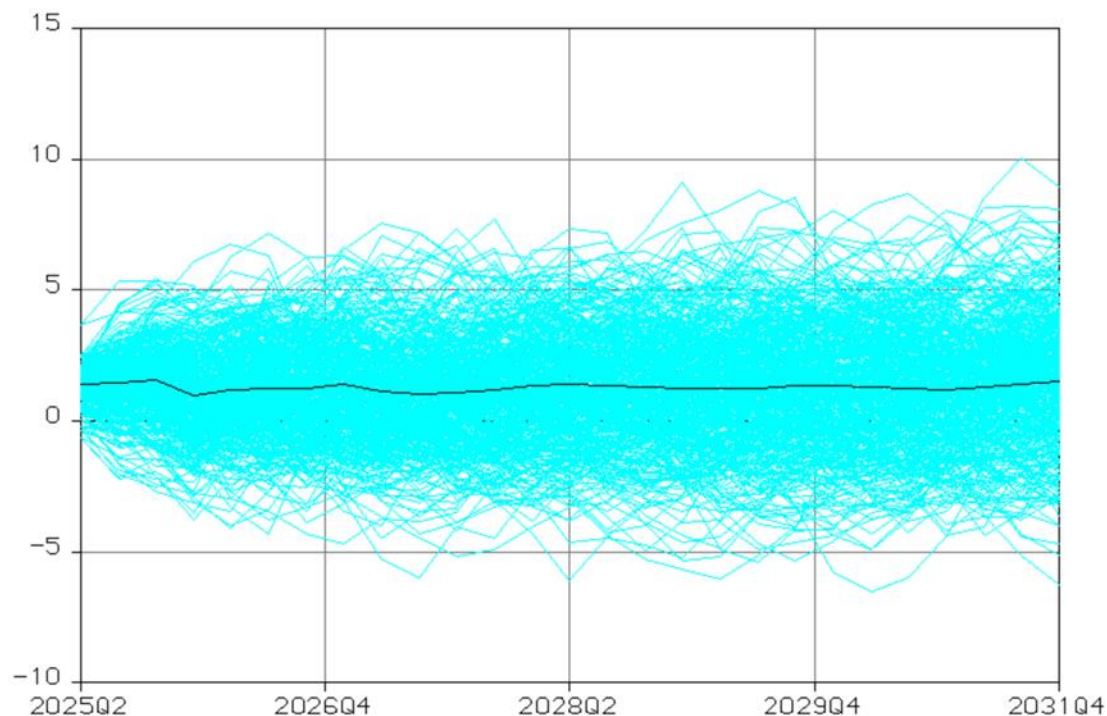
- Briar Statistics

Horizon (Quarters)	Recession probabilities	Probabilities of inflation falling into the correct bucket (<1%; 1-3%; > 3%)
1	0.092	0.130
4	0.090	0.457
8	0.086	0.623

Constructing fan charts

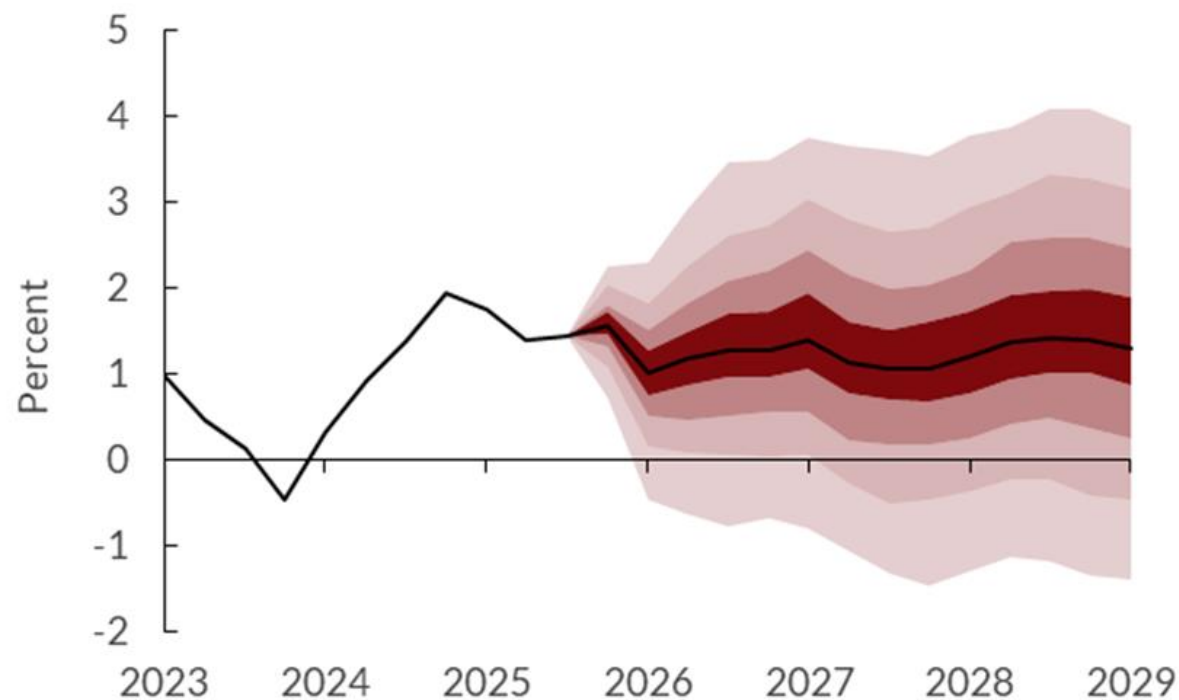
Constructing fan charts

Stochastic simulations for annual GDP growth



Source: NiGEM stochastic simulations

Fan chart for annual GDP growth

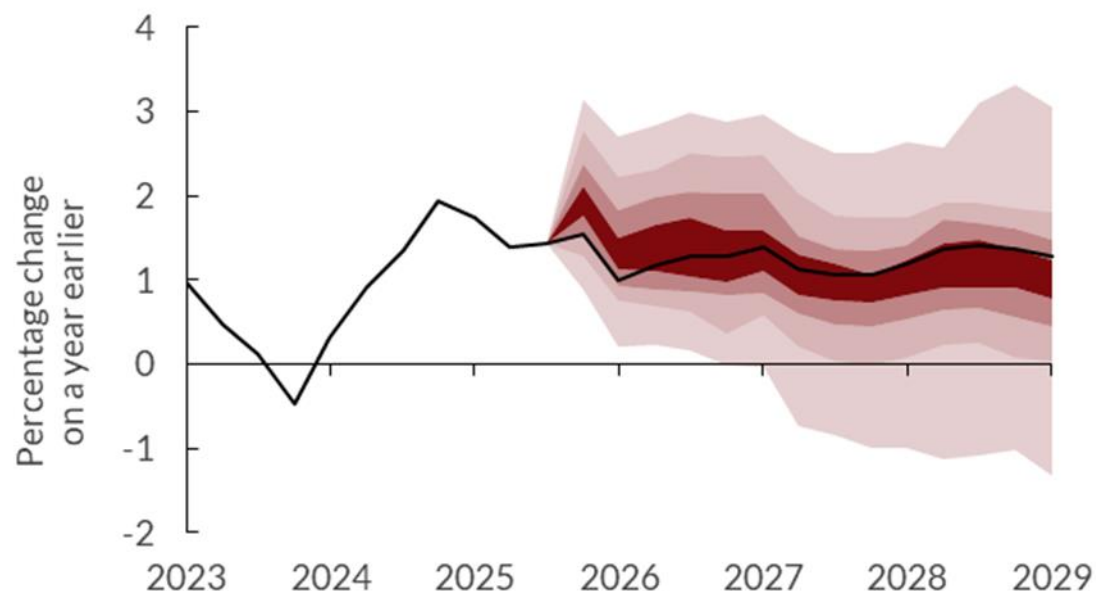


Source: NiGEM database, NIESR forecast and NiGEM stochastic simulations

We use stochastic simulations of the model to generate our fan charts

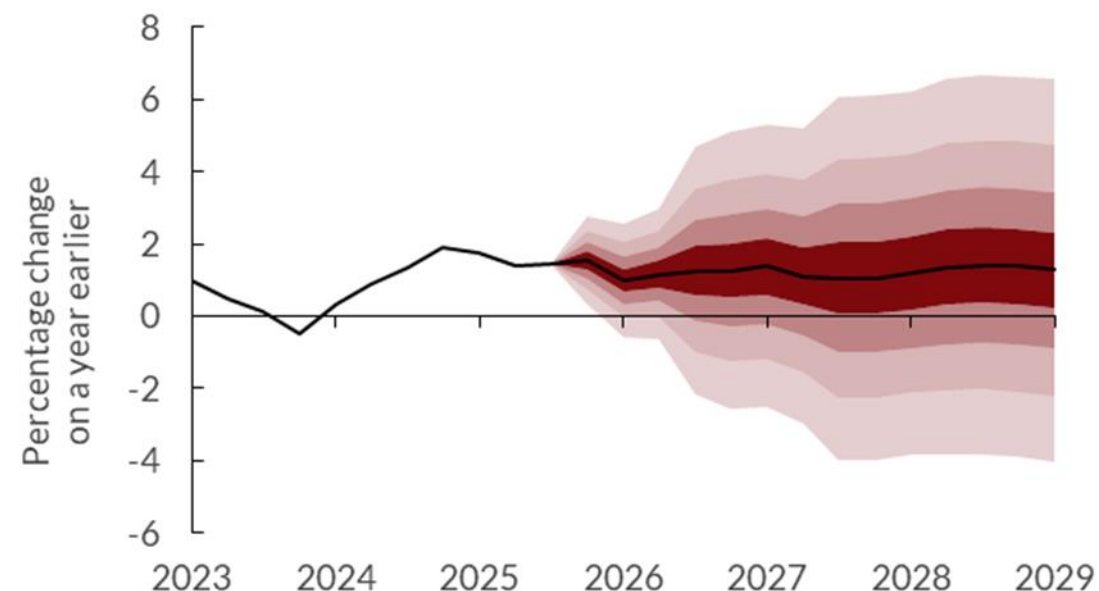
Constructing fan charts

Fan chart for annual GDP growth (historical distribution of forecast errors)



Source: NiGEM database, NIESR forecast and NiGEM stochastic simulations

Fan chart for annual GDP growth (normal distribution based on standard deviation of forecast errors)



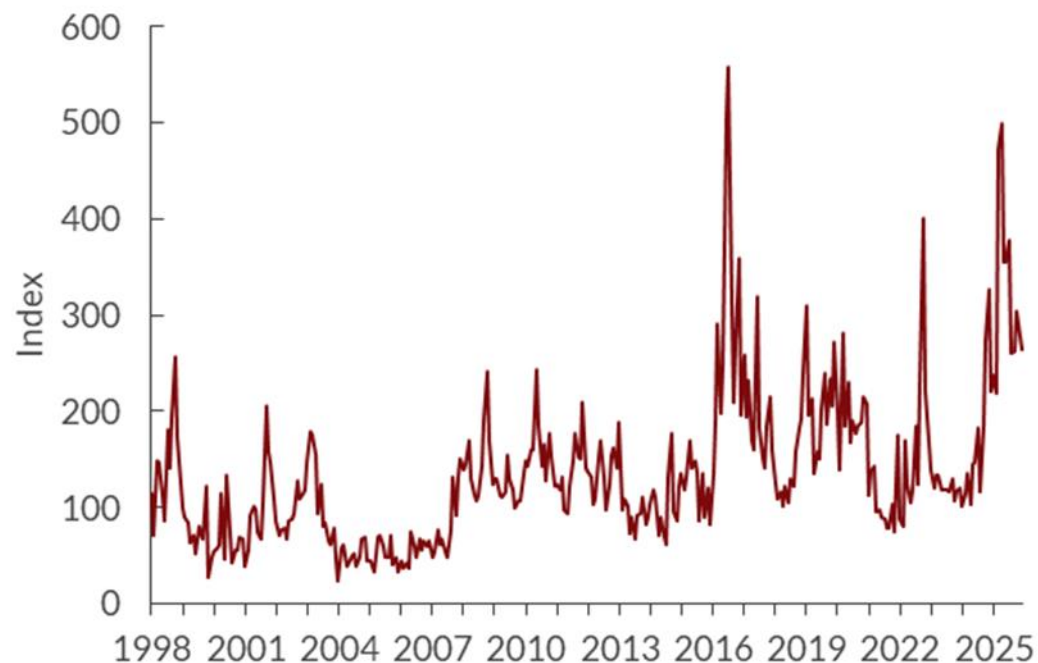
Source: NiGEM database, NIESR forecast and NiGEM stochastic simulations

But we could use the historical distribution of our forecast errors or a symmetric distribution with the historical forecast error variance

Calibrating the variance of fan charts

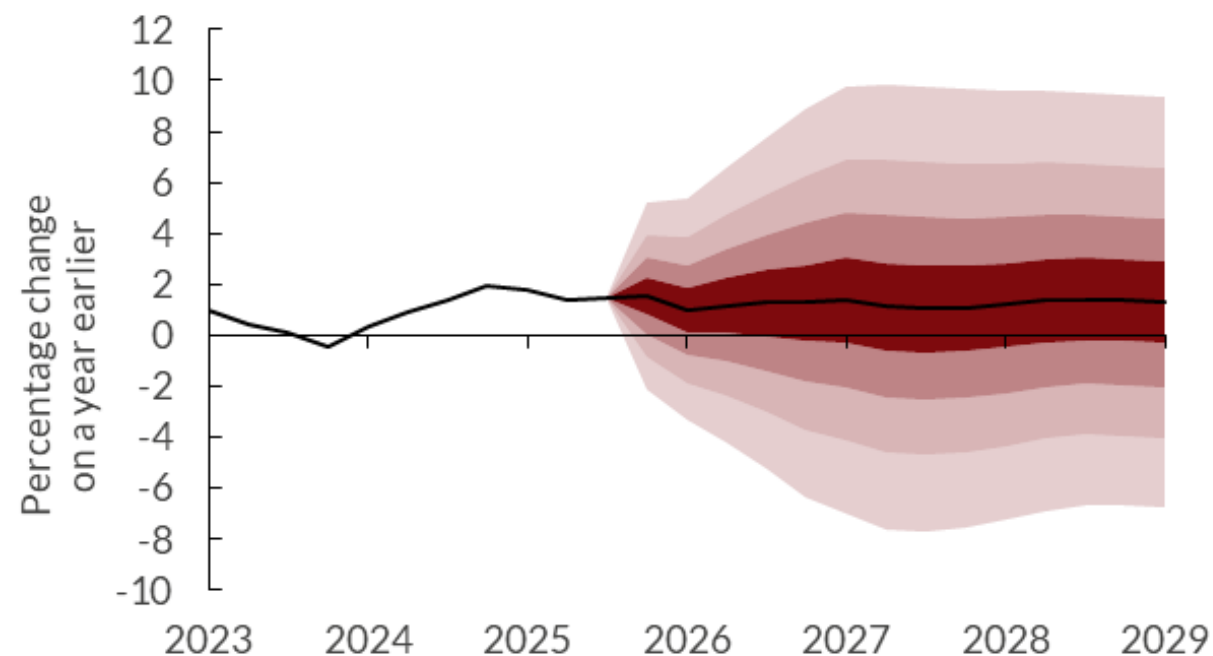
Calibrating the variance of fan charts

UK economic policy uncertainty index



Source: <https://www.policyuncertainty.com/index.html>

Fan chart for annual GDP growth (normal distribution based on Baker et al. (2016) measure of uncertainty)

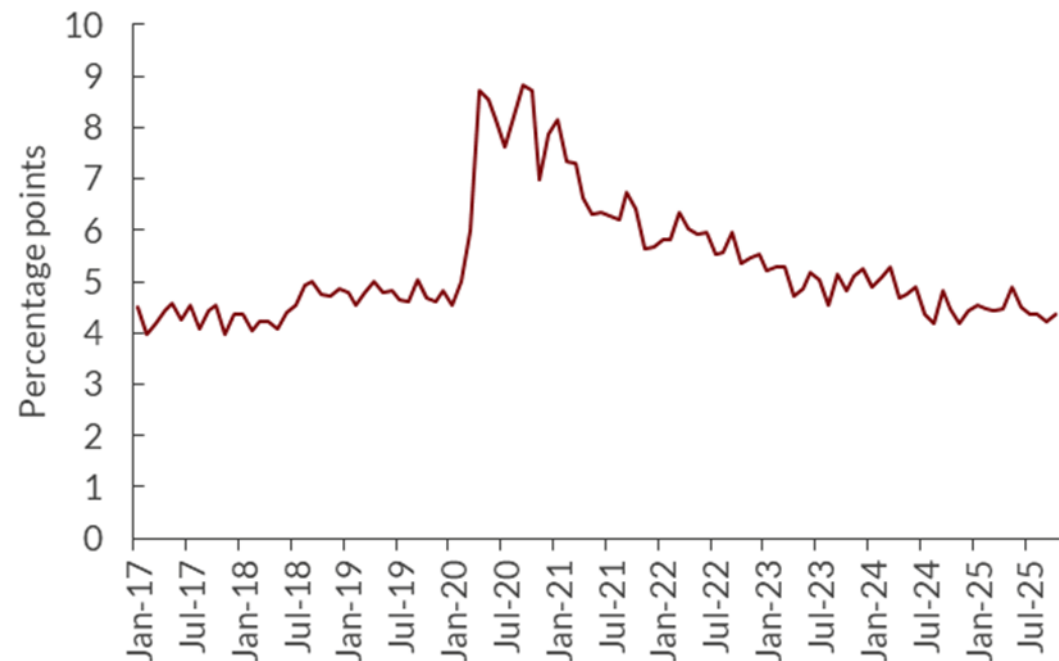


Source: Author's calculations based on NIESR forecast

We can use uncertainty measures to calibrate the width of the fan charts ...

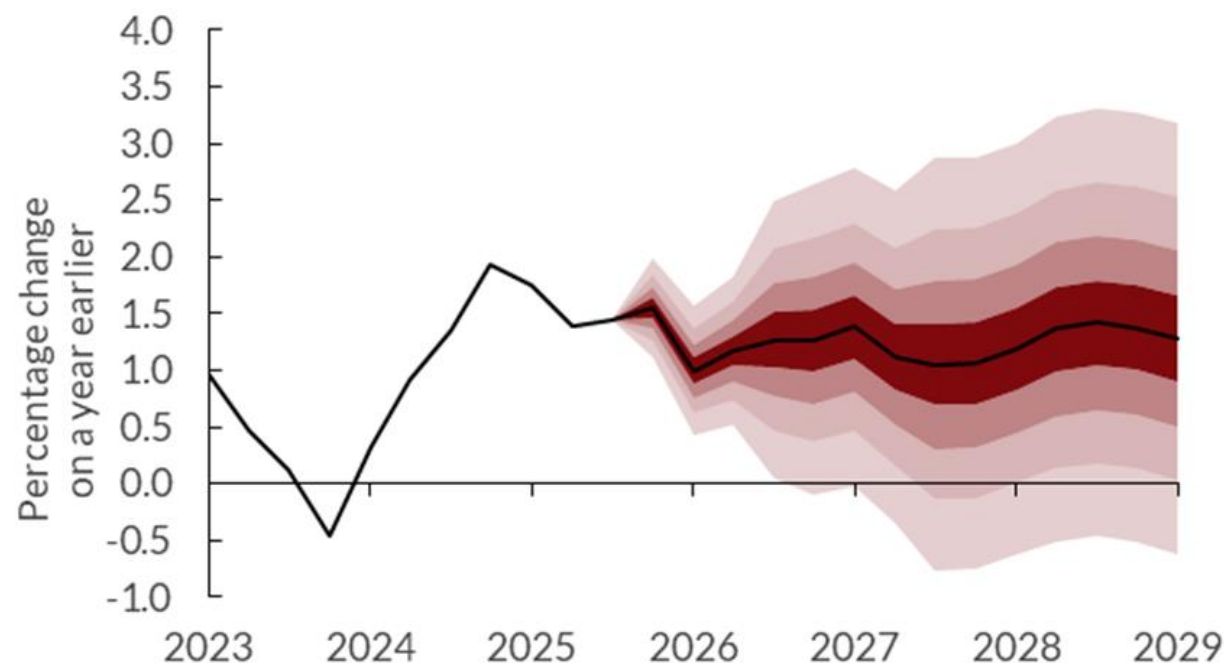
Calibrating the variance of fan charts

Subjective uncertainty around year-ahead sales from the DMP survey



Source: <https://www.policyuncertainty.com/index.html>

Fan chart for annual GDP growth (normal distribution based on DMP measure of uncertainty)



Source: Author's calculations based on NIESR forecast

We can use uncertainty measures to calibrate the width of the fan charts ...
but which measure?

Communicating uncertainty and risks

Communicating uncertainty and risks

- McMahon et al. (2025) suggests that fan charts are actually a great way of communicating uncertainty ...
- ... and can protect forecasters to a degree from criticism when large shocks mean their forecasts turn out to be badly wrong
- But our inability to accurately calibrate skew – given the absence of the information you would need – suggests that we should not even try!
- Instead, use scenarios to help explain the main risks

Conclusions

Conclusions

- Bernanke Review (2024) argued that fan charts are not the way to go since they:

have weak conceptual foundations, convey little useful information over and above what could be communicated in other, more direct ways, and receive little attention from the public

- I argue (as do others) that they are useful in conveying the degree of uncertainty around forecasts ...
- ... but that they are not useful as a tool for conveying the balance of risks