Discussion of "Monetary Policy and the Predictability of Nominal Exchange Rates" by Martin Eichenbaum, Benjamin Johannsen and Sergio Rebelo

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12 June 2017

This paper

1. Presents a new empirical fact:
   - Current level of the RER predicts NER in the long run
2. Shows that this is consistent with most New Open Economy Macro models:
   - Transitory shocks move the RER between two countries
   - Both central banks target inflation
   - So the adjustment happens mostly via the NER

- This could be a hugely influential paper!
  - For theory, applied work in academia, and policy
  - Two possible pitfalls with the empirics: intercept problem and small-sample bias
  - Both can easily be solved

Overview of the paper

- **Real exchange rate** or RER of (say) Australia *vs.* US:

$$Q_t \equiv \mathcal{E}_t \frac{P_t^*}{P_t}$$

  - price of Australian basket relative to US basket, in same currency
  - $\mathcal{E}_t$ is nominal exchange rate, USD per AUD
  - P_t^* is Australian CPI, P_t is US CPI
  - $\mathcal{E}_t \uparrow$ is nominal USD depreciation, $Q_t \uparrow$ is real USD depreciation

- In logs,

$$q_t = e_t + p_t^* - p_t$$

- A widely studied topic in intal finance

Forecasting nominal exchange rates

- EJR combine two widely-agreed upon observations:

1. $Q_t \rightsquigarrow 1$ (PPP) in the long-run, though very slow [Rogoff 1996]
2. $\frac{P_t^*}{P_t}$ stable in inflation-targeting ('Taylor rule') countries

- $\Rightarrow$ Nominal exchange rate at $t+k$:

$$\mathcal{E}_{t+k} = \mathcal{E}_t \frac{P^*_{t+k}}{P_{t+k}} \frac{P_t}{P^*_t} \frac{Q_{t+k}}{Q_t}$$

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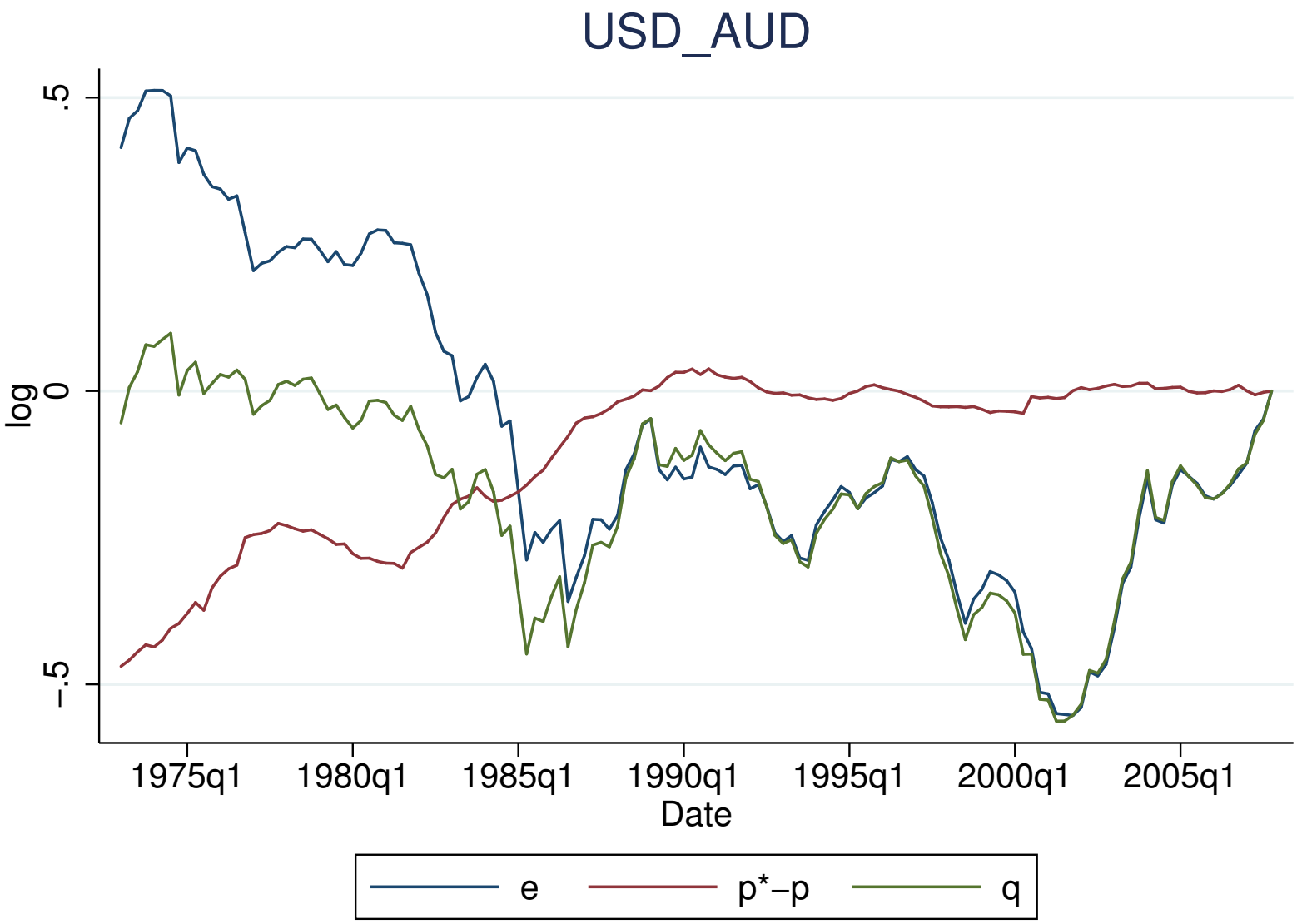
- Can this beat the random walk model? [Meese-Rogoff 1983]
  - With log RER mean-reversion coefficient of ρ, suggests forecast

$$e^f_{t+k} = e_t + k\left(\pi^* - \pi\right) + \left(\rho^k - 1\right) q_t$$

where π^*, π are inflation targets abroad and at home

Seems promising



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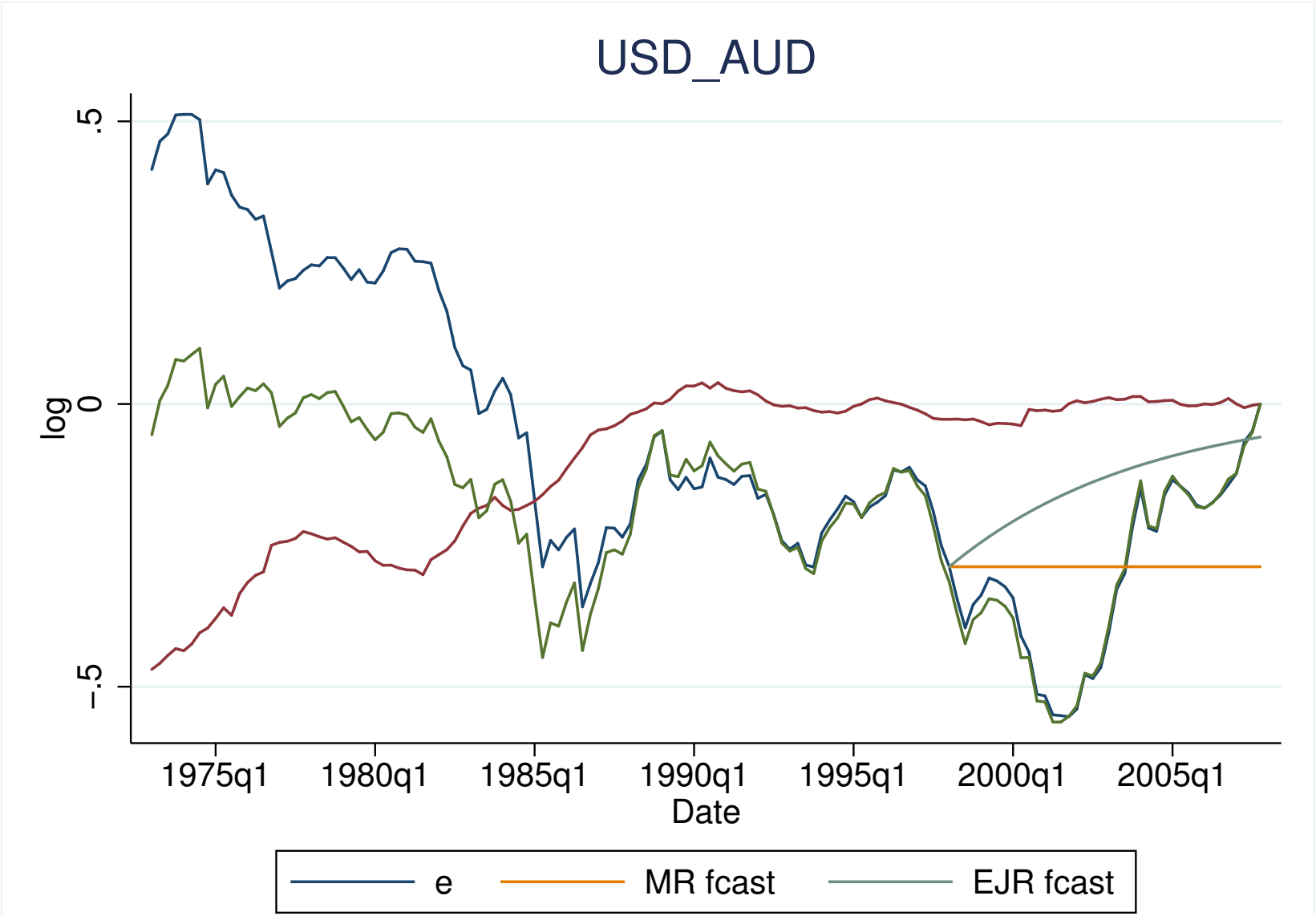
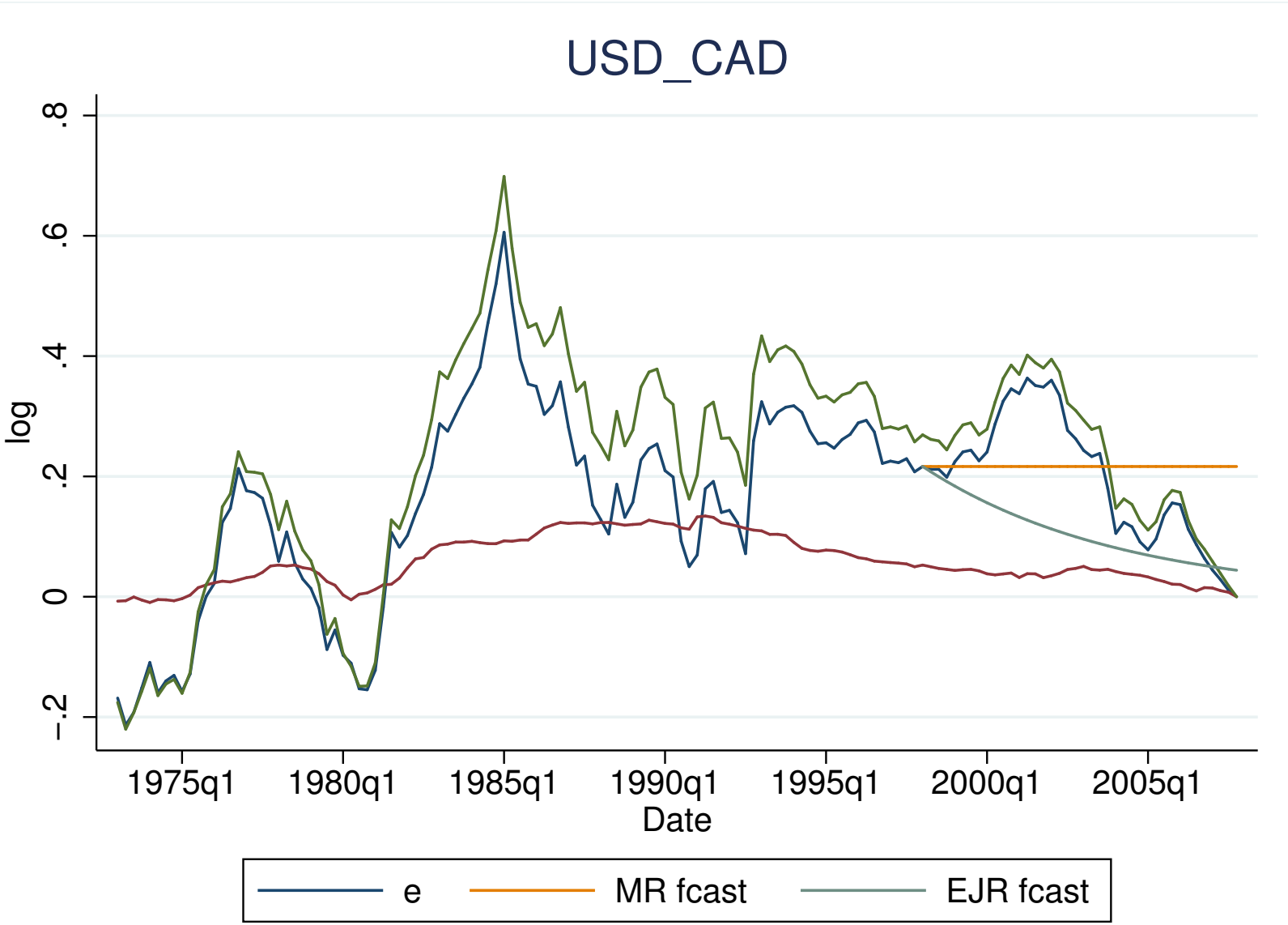


Works like a charm



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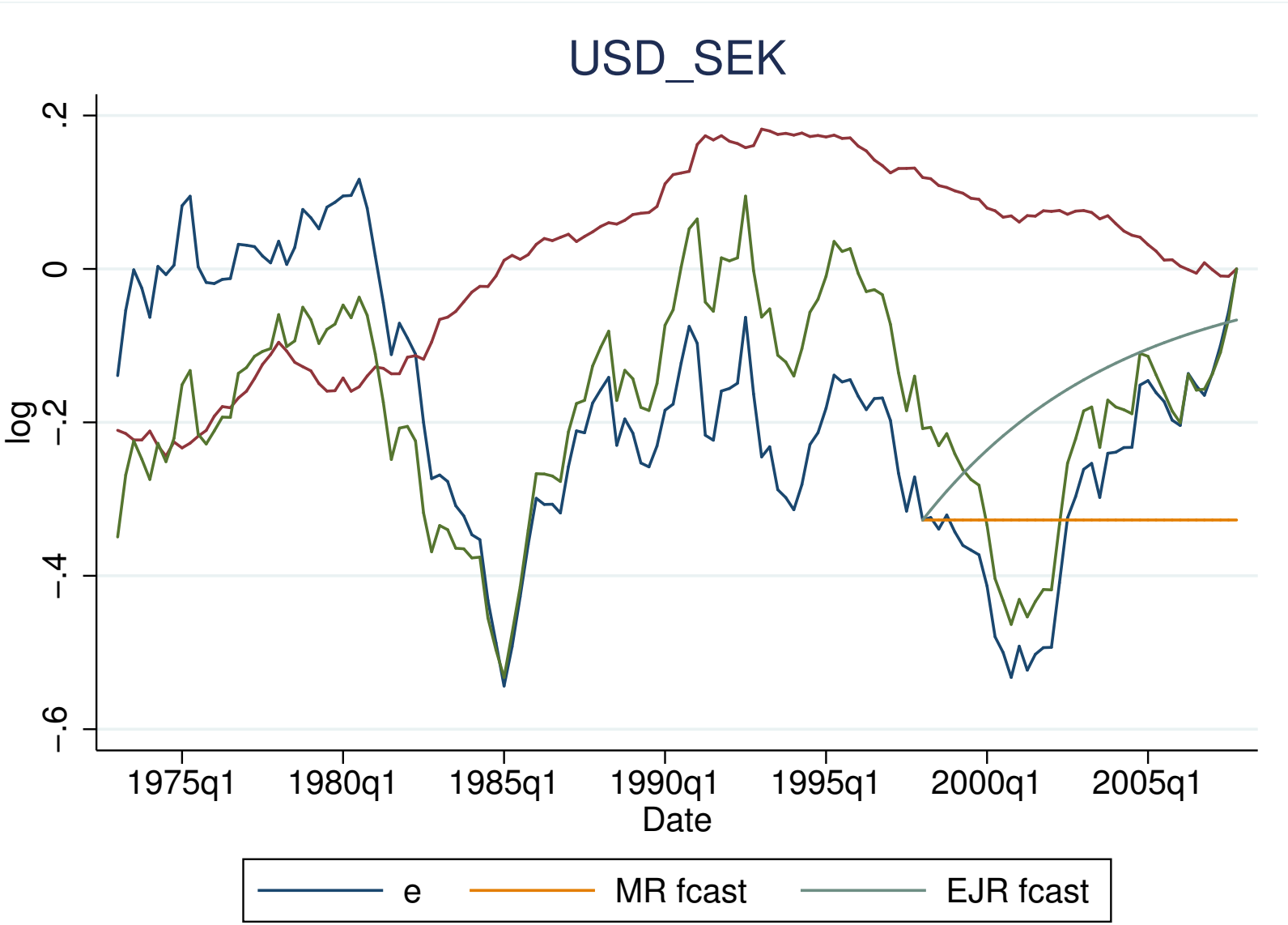


Intercept problem

- Previous graphs drawn under the normalization $q_T = 0$
- Real exchange rates always require a normalization
  - NER known, but price indices are computed relative to a base year
  - Difficult to know *in real time* what the level of Q_t is
- Not important for in-sample results, which focus on slope
  - but relevant for out-of-sample forecasts
  - and more generally for empirical exchange rate forecasting literature
- Current data uses only national price indices
  - Uses past inflation to estimate the level of Q_t
  - **Instead**: could try to get Q_t from intal goods price comparisons

Small sample bias problem

- Main estimates are for forecasting regression

$$e_{t+k} - e_t = \alpha + \beta_k \left(e_t + p_t^* - p_t\right) + \epsilon_t \tag{1}$$

  - Main finding is $\widehat{\beta}_k < 0$, with $|\widehat{\beta}_k|$ and R^2 increasing in k
  - Really nice: model generates same sign and magnitudes
- **Potential problem**: small sample bias.
- Consider a null in which e_t a random walk + no price diff

$$e_{t+1} = e_t + \eta_t$$
$$p_t^* - p_t = 0$$

- What does the following small sample regression predict?

$$e_{t+k} - e_t \mapsto e_t$$

  - Application: sample size $T = 136$ quarters, $k = 40$ quarters

Small sample bias

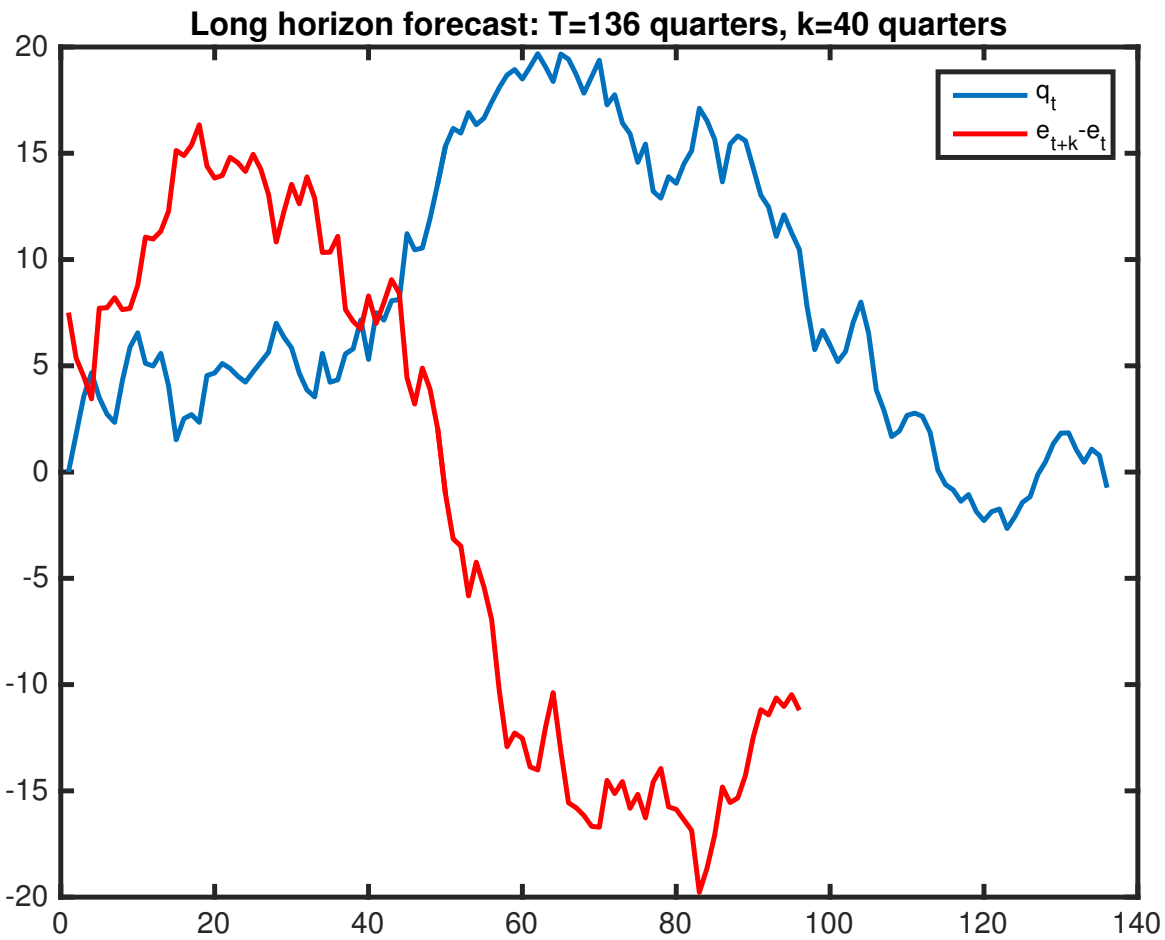
- Forecasting regression

$$e_{t+k} - e_t = \alpha + \beta_k e_t + \epsilon_t \tag{2}$$

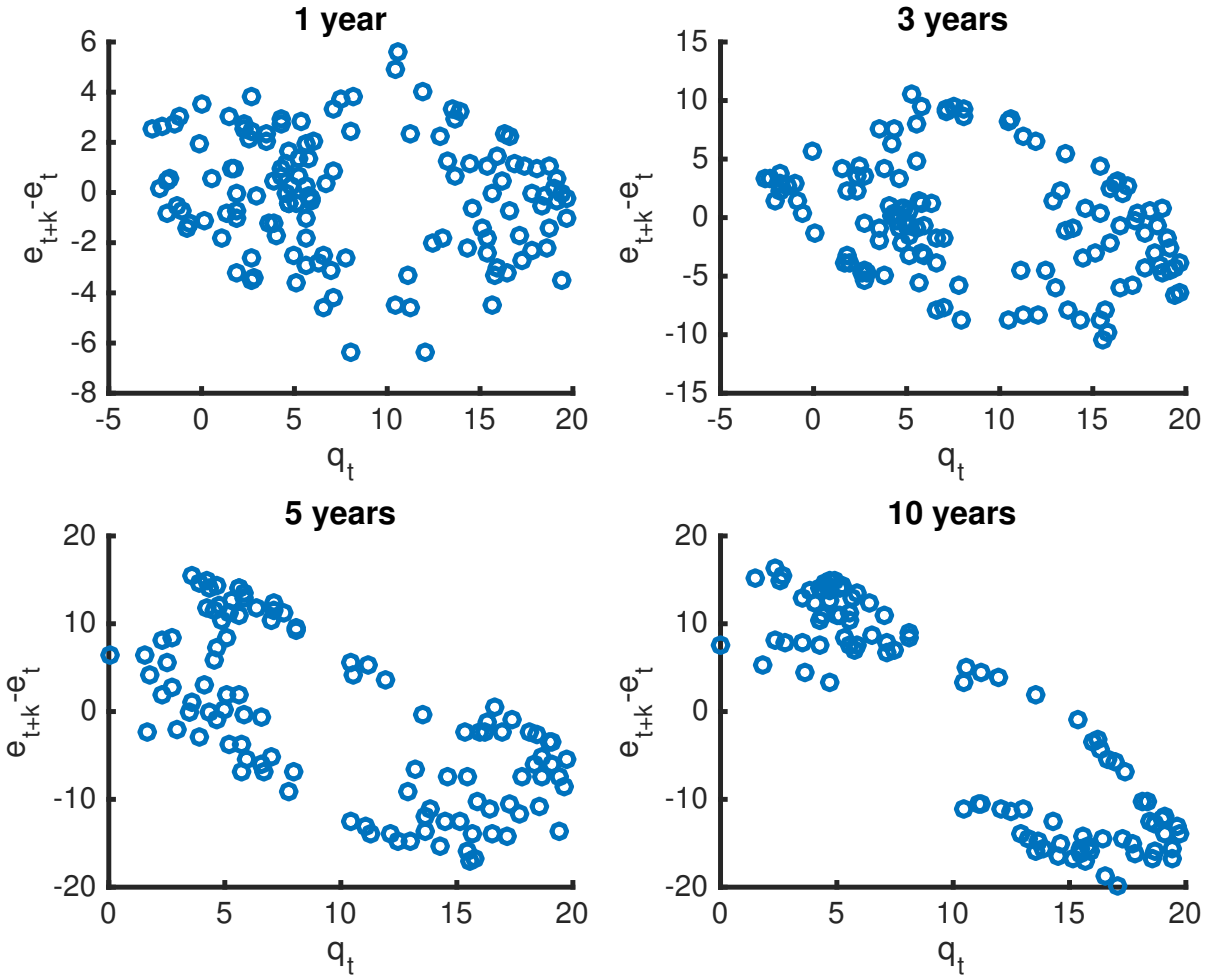
	$k =$	1 year	3 years	5 years	7 years	10 years
MC Simulations	$\widehat{\beta_k}$	-0.14	-0.40	-0.59	-0.74	-0.89
	R^2	0.08	0.22	0.33	0.41	0.49
EJR—for AUD	$\widehat{\beta_k}$	-0.20	-0.70	-1.06	-1.12	-1.60
	R^2	0.10	0.39	0.59	0.60	0.75

- With $T = 34$ years, bias is large ($\simeq$50% of result)
- Paper compares empirical $\widehat{\beta_k}$ with plim from theory
  - (in simplest case, theory says $\mathbb{E}[e_{t+k}] = \rho^k e_t$, so $\mathrm{plim}\widehat{\beta_k} = \rho^k - 1$)
  - **Solution**: run regression in artificially generated model data
  - This nets out the small sample bias

Monte-Carlo simulation: sample path



Monte-Carlo simulations



Conclusion on empirics

- Conclusion: in-sample results suffer from a bias
  - Could try to do direct bias correction to data, or (simpler) compare model and data with identical bias
- Hence, out-of-sample results deserve more emphasis!
  - especially since they do not require ex–post information on Q_t
- Note: the empirical literature on exchange rate forecasting runs

$$e_{t+k} - e_t = \alpha + \beta f_t + \epsilon_t$$

on 'fundamental' (f_t) determinants. Did not seem to focus much on PPP. Why not?

Review of the theory

- New open economy macro model where:
  - Fundamental shocks affect the flexible-price RER in a transitory way
  - Home productivity $\downarrow$ or govtt spending $\uparrow \rightarrow$ ToT $\downarrow \rightarrow$ RER $\downarrow$
  - Monetary policy follows a Taylor rule, so stabilizes inflation
  - Most of the adjustment to shocks happens via NER
- Argument is extremely general. Suggestion:
  - Under flex prices, consider a benchmark Taylor rules where both countries track their natural rate
  - Then, $\pi_t = \pi_t^* = 0$ always $\Rightarrow$ All adjustment is through NER!
  - More generally, there is exchange rate pass through to inflation
  - $\Rightarrow$ more than 100% of adjustment has to go through nominal

Added bells and whistles

- Want the model to be consistent with empirically volatile and persistent exchange rates, and unconditional UIP failure
- Get this from slow-moving real shocks and spread shocks
- Main intuition clearly remains. Why these added bells and whistles?
- What about other targets? Despite incomplete markets, the model is likely inconsistent with consumption-ReR correlation, for example (Backus-Smith puzzle)

Conclusion

- Really nice and thought-provoking paper!
  - Proposes a coherent, intuitive story of RER adjustment, relevant for most floats today
  - Works both in theory and in practice
  - Connection can be made even tighter

Thank you!