“What do financial markets say about the exchange rate?”: Discussion

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Outline

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2. Empirical findings
3. The asset market view of exchange rates
4. Specific comments
   - Segmentation
   - Global shocks
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Summary of paper

- Currencies are not spanned by bond and equity markets
- "FX disconnect"
- Absence of arbitrage imposes very few restrictions on exchange rates
- In circumstances when financial markets are informative about the exchange rate [i.e., I think?, if markets are complete], the constraints they impose yield counterfactual implications
- Intermediary pricing models seem to work

Is the exchange rate spanned?

- No.
  - G10 currencies, 1988–2022, monthly horizon
  - If you regress currency appreciation onto sovereign debt returns and equity indices, you find R^2 between 25% (CHF) and 45% (CAD)
- From one perspective, this is surprising: our models are typically driven by a small number of shocks
- From another, it is not: absence of arbitrage does indeed place very few restrictions
  - At a micro level, absence of arbitrage doesn't place many restrictions on, say, AAPL
  - At a macro level, absence of arbitrage doesn't place many restrictions on what happens to the stock market
  - ... and markets tend to thrive when the risks they hedge are not spanned by other markets

The “asset market view”

- The asset market view of exchange rates: in frictionless complete markets,

$$m^*_{t+1} - m_{t+1} = \Delta s_{t+1}$$

- Implies that

$$\underbrace{\operatorname{var} m^*_{t+1}}_{\text{big}} + \underbrace{\operatorname{var} m_{t+1}}_{\text{big}} - 2\operatorname{cov}(m_{t+1}, m^*_{t+1}) = \underbrace{\operatorname{var} \Delta s_{t+1}}_{\text{small}}$$

- So, $\operatorname{cov}_t(m_{t+1}, m^*_{t+1})$ is big: “international risk sharing is better than you think”

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- Available Sharpe ratios (MSR) and exchange rate vol (σ) imply that correlation between m and m^* (ρ) is

$$\rho = 1 - \frac{1}{2}\frac{\sigma^2}{\text{MSR}^2}$$

  - Brandt, Cochrane and Santa-Clara (2006): max Sharpe ratio of 0.5 and $\sigma = 15\%$ implies $\rho = 0.955$
  - (Connection between var m and Sharpe ratios relies on lognormality, but some conclusion along these lines will I think survive)

- If $m_{t+1} = -\gamma \Delta c_{t+1}$ and $m^*_{t+1} = -\gamma^* \Delta c^*_{t+1}$, this gives the “cyclicality puzzle”: consumption growth is not strongly correlated across countries

What is required for $m^*_{t+1} - m_{t+1} = \Delta s_{t+1}$?

- Let S_{t+1} be the exchange rate (price of a pound, in dollars)
- Given any dollar SDF M_{t+1}, we can make a sterling SDF M^*_{t+1}:

$$M^*_{t+1} = M_{t+1} \frac{S_{t+1}}{S_t}$$

  - Given any sterling return R^*_{t+1}, must check that $\mathbb{E}_t\, M^*_{t+1} R^*_{t+1} = 1$
  - Convert \$1 to £$1/S_t$, invest, collect £R^*_{t+1}/S_t, convert to \$$R^*_{t+1} \frac{S_{t+1}}{S_t}$
  - This is a dollar-denominated trading strategy so

$$\mathbb{E}\, M_{t+1} \underbrace{\frac{S_{t+1}}{S_t} R^*_{t+1}}_{\text{strategy return}} = 1$$

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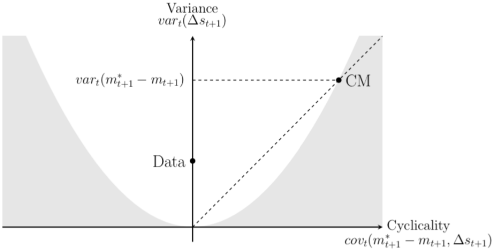
$$\mathbb{E}\,\underbrace{M_{t+1}\frac{S_{t+1}}{S_t}}_{M^*_{t+1}}R^*_{t+1} = 1 \qquad \checkmark$$

Interpretation of $m^*_{t+1} - m_{t+1} = \Delta s_{t+1}$

- This works for any tradable returns and does not require any assumptions about lognormality etc
- In particular, $m^*_{t+1} - m_{t+1} = \Delta s_{t+1}$ does not require any commitment to complete markets per se
- Puzzles only arise if you want to think of m_{t+1} as related to, eg, aggregate consumption data
  - Alternative title / first sentence of abstract: "What do [certain models] teach us about the exchange rate?" "Not very much."

Figure 2: Proposition 1 in complete markets



The figure illustrates implications of the complete market setting, labeled as CM, for the properties of depreciation rates. The point labeled Data is a stylized representation of the evidence regarding the depreciation rates. The grey area represents the infeasible combinations of volatility and criticality of depreciation rates due to the Cauchy-Schwarz inequality.

- "Data" refers to the prediction of a restrictive class of equilibrium models subject to the "cyclicality puzzle", "FX risk premium puzzle", "equity premium puzzle", and so on

An analogy

- The equity premium puzzle is born: Mehra and Prescott (1985) wrote down a model and pointed out that it fails to match the data
  - The model imposes strong assumptions: maybe these are wrong?
- Ross (2005): "*The consumption beta model is marvelous theory but it surprises me that people take it as seriously as they do for empirical work.*"
- Hansen and Jagannathan (1989) recast the EPP as an empirical observation (high Sharpe ratios are attainable) with an inescapable implication for frictionless models (SDFs must be volatile)
- It would be great if this paper could add some more agnostic, HJ-type, results

Segmentation

- Segmentation is a powerful modelling device, so direct evidence is important to discipline models
  - To matter for prices, segmentation must prevent lots of rich people from doing trades they really want to do
  - Strong incentives for market creation—why is it not happening?
  - How are markets segmented, and why are they segmented?
- Paper is vague about the identity of the "intermediaries" / "international arbitrageurs"
  - Who owns them / who are they?
  - Where do they show up in the underlying equilibrium model?

Global shocks

- We have a sense of what these are ex post
- But it's not obvious we can define, ex ante, fixed portfolios that reveal them
- Is the definition of local and global shocks in the paper missing some further assumption?
  - As stated, we can always set all global shocks to zero, so everything is local, and satisfy conditions 1–3 of Definition 1

Do you really need lognormality?

- The paper imposes lognormality throughout
- But currencies experience crashes and jumps (Brunnermeier, Nagel and Pedersen, 2008; Lettau, Maggiori and Weber, 2014; Della Corte, Ramadorai and Sarno, 2016; Chernov, Graveline and Zviadadze, 2018) that are priced into, eg, FX options (Farhi and Gabaix, 2016) and quantos (Kremens and Martin, 2019)
- And these crashes sometimes reflect "systematic" / "global" news
- Occasional scary events help to make $\text{cov}_t(m_{t+1}, m^*_{t+1})$ large
- The message "[lognormality + … + …] $\Longrightarrow$ puzzle" would be more compelling without the lognormality assumption

Disconnect might not be so jarring at longer horizons

- To the extent that the goal is to connect currencies to some notion of fundamentals, it might be worth looking over longer horizons
- Kremens, Martin and Varela, 2023:
    - R^2 using professional forecasts of currency movements rises from $< 1\%$ at 1mo horizon to $\sim 17\%$ at 24mo horizon
    - And forecasts are themselves well explained by macro/finance "fundamental" variables