Lecture 4: Capital Markets and International Risk Sharing

PSE – APE Masters Year 1 (M1) – Macro 3

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Today's Question

Last lecture: does financial globalisation *destabilise*? Sudden stops, sovereign risk, capital-flow surges, ...

Today: does it *deliver* what it promises? The promise has two parts:

1. **Arbitrage** – capital flows equalise returns across countries; price gaps close $\Longrightarrow$ allocative efficiency
2. **Risk sharing** – consumption tracks world income, not domestic income

In this lecture we review each promise in turn.

Capital Market Integration

Investing Across Currencies: The Problem

Suppose you live in Europe and care about payoffs in euros.

Two strategies for investing 1 € over one period:

Domestic strategy:

- Invest at domestic rate i_t; certain payoff $1 + i_t$ €

Foreign strategy:

- Convert to foreign currency at spot rate $\mathcal{E}_t$ (e.g. USD/EUR)
- Invest at foreign rate i_t^*
- Convert back at future spot $\mathcal{E}_{t+1}$
- Payoff: $(1 + i_t^*)\dfrac{\mathcal{E}_{t+1}}{\mathcal{E}_t}$ € – **risky** since $\mathcal{E}_{t+1}$ is unknown at t

Problem: the two payoffs cannot be directly compared because $\mathcal{E}_{t+1}$ is unknown at t. How you evaluate risk matters for whether you prefer the domestic or foreign strategy.

Notation: $\mathcal{E}_t$ = nominal (spot) exchange rate; $\varepsilon_t \equiv \ln \mathcal{E}_t$ = its log

Uncovered interest rate parity (UIP)

UIP assumes risk-neutral investors equate expected returns across currencies:

$$1 + i_t = (1 + i_t^*) \frac{\mathbb{E}_t[\mathcal{E}_{t+1}]}{\mathcal{E}_t}$$

Taking logs and using $\ln(1 + x) \approx x$:

$$i_t - i_t^* \approx \mathbb{E}_t[\Delta \varepsilon_{t+1}]$$

where $\Delta \varepsilon_{t+1} \equiv \varepsilon_{t+1} - \varepsilon_t$ is the (log) depreciation rate.

- **Not an arbitrage condition** — requires risk neutrality
- A high-interest rate currency should be expected to depreciate
- Whether UIP holds empirically is an open question — we return to this

Covered Interest Rate Parity

A **forward contract** agreed at time t locks in exchange rate F_t for delivery at $t+1$.

If you buy a forward contract, the foreign payoff becomes *certain*: $(1+i_t^*)\dfrac{F_t}{\mathcal{E}_t}$.

No-arbitrage then requires:

$$1 + i_t = (1 + i_t^*)\,\frac{F_t}{\mathcal{E}_t}$$

- Under free capital mobility: CIP must hold — any deviation is a riskless profit opportunity
- CIP holds *regardless* of risk aversion; it requires only free capital mobility (and default-risk-free bonds)
- CIP is the “easy” parity condition: it should hold even when UIP does not

CIP: The Arbitrage in Action

Suppose: $i = 7\%$, $i^* = 3\%$, $\mathcal{E}_t = \$0.50/\text{EUR}$, $F_t = \$0.51/\text{EUR}$.

CIP differential: $1.07 - 1.03 \times 1.02 = 0.019 > 0$ – CIP is violated.

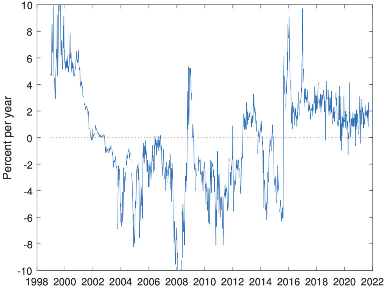
Arbitrage strategy:

1. Borrow EUR 1 at $i^* = 3\%$
2. Convert to \$0.50 at spot $\mathcal{E}_t$
3. Invest at $i = 7\% \rightarrow \$0.535$
4. Sell \$0.5253 forward (at $F_t = 0.51$) for EUR 1.03; repay loan
5. **Riskless profit: \$0.0097** with no initial capital

Competition among arbitrageurs immediately eliminates such gaps under free capital mobility.

CIP Deviations: Dollar-Renminbi

Dollar-Renminbi Covered Interest Rate Differentials, 1998–2021



Notes. The figure plots weekly observations of the dollar-renminbi covered interest rate differential for the period December 11, 1998 to September 24, 2021, in percent per year. Own calculations based on data from Bloomberg.

Source: Schmitt-Grohé et al. (2022), Chapter 11.

- Average CIP deviation: **3.1 pp** — large and persistent
- Sign flipped **twice**: positive pre-2002 and post-2015, negative in between
- **Negative** differential ⇒ impediments to capital *outflows* (Chinese investors can't invest abroad)
- **Positive** differential ⇒ impediments to capital *inflows* (foreigners can't invest in China)
- Not just capital controls: transaction costs and regulatory changes can cause CIP to fail Post-GFC CIP deviations

Should UIP hold in theory?

CIP uses a forward contract: the exchange rate is locked in at t.

What if you hold the foreign bond **uncovered** — taking on exchange rate risk?

Household first-order conditions, where $M_{t+1} = \beta \frac{U'(C_{t+1})}{U'(C_t)}$ is the SDF:

$$\underbrace{1 = (1+i_t)\ \mathrm{E}_t[M_{t+1}]}_{\text{domestic bond}} \qquad \underbrace{1 = (1+i_t^*)\ \mathrm{E}_t\left[\frac{\mathcal{E}_{t+1}}{\mathcal{E}_t} M_{t+1}\right]}_{\text{uncovered foreign bond}}$$

Both equal 1, so equating them gives

$$(1+i_t)\ \mathrm{E}_t[M_{t+1}] = (1+i_t^*)\ \mathrm{E}_t\left[\frac{\mathcal{E}_{t+1}}{\mathcal{E}_t} M_{t+1}\right]$$

UIP requires: $(1+i_t) = (1+i_t^*)\ \mathrm{E}_t\left[\frac{\mathcal{E}_{t+1}}{\mathcal{E}_t}\right]$, but M_{t+1} is inside the RHS expectation

Why UIP Fails: The Covariance Condition

Expand the RHS using $\text{E}[XY] = \text{E}[X]\ \text{E}[Y] + \text{Cov}(X, Y)$:

$$(1 + i_t)\ \text{E}_t[M_{t+1}] = (1 + i_t^*)\left[\text{E}_t\left[\frac{\mathcal{E}_{t+1}}{\mathcal{E}_t}\right] \text{E}_t[M_{t+1}] + \text{Cov}_t\left(\frac{\mathcal{E}_{t+1}}{\mathcal{E}_t},\ M_{t+1}\right)\right]$$

This shows that **UIP holds if and only if**:

$$\text{Cov}_t\left(\frac{\mathcal{E}_{t+1}}{\mathcal{E}_t},\ M_{t+1}\right) = 0$$

- With risk-averse agents, M_{t+1} is stochastic – this covariance is *generically non-zero*
- UIP holds only under **risk neutrality** (linear utility $\Rightarrow$ constant M_{t+1})
- *UIP failure is a feature of GE models – not evidence of capital market segmentation*

The Carry Trade: Evidence and Crash Risk

Strategy: borrow in low-interest currency (e.g. yen), lend in high-interest currency (e.g. USD).

Payoff per unit invested:

$$\text{Payoff} = (1 + i_{\text{USD}}) - (1 + i_{\text{JPY}})\frac{\mathcal{E}_{t+1}}{\mathcal{E}_t}$$

Under UIP: expected payoff $= 0$. Empirically: **positive average returns, severe crash risk.**

- Sterling carry trade (vs. 10 currencies, 1976–2005): average monthly payoff $\approx 0.25\%$ per pound. $+ve$ average return violates UIP (Burnside et al., 2006)
- **October 1998:** yen appreciated 14% in 2 days; $1B short-yen position lost $140M overnight. High risk! "Picking up nickels in front of steamrollers" (*The Economist*, 2007)
- Carry-trade profits exist because the covariance term is non-zero — the risk premium compensates for crash exposure

The Fama Regression

Test UIP by regressing ex-post depreciation on interest differentials:

$$\varepsilon_{t+1} - \varepsilon_t = \alpha + \beta \left(i_t - i_t^* \right) + u_{t+1}$$

Under UIP: $\alpha = 0$, $\beta = 1$ – high-interest currencies depreciate to offset the differential.

The data strongly reject this (Engel et al., 2022):

- Most currency pairs have $\hat{\beta} < 0$ – often significantly so
- **Interpretation:** high-interest currencies *appreciate* rather than depreciate – the opposite of UIP

This is the **forward premium puzzle** (also called *Fama puzzle*): the carry trade is profitable in expectation precisely because UIP fails

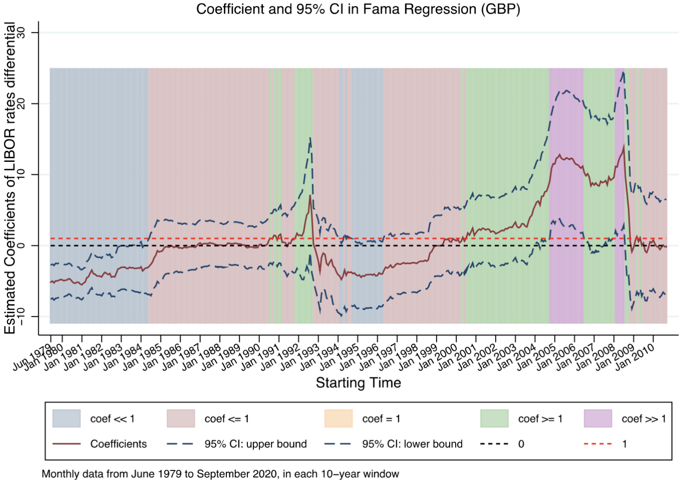
For the maths of why risk aversion can generate $\hat{\beta} < 1$, see ▸ Appendix.

Fama Regression: Estimates Across Currency Pairs

Currency	Sample	Obs.	$\hat{\beta}$	95% CI
AUD	1989/01–2020/09	381	-0.546	$(-2.34,\ 1.24)$
CAD	1979/06–2020/09	496	-1.031	$(-2.18,\ 0.11)$
CHF	1979/06–2020/09	496	-1.467	$(-2.90,\ -0.04)$
DEM	1979/06–2020/09	496	-0.919	$(-2.51,\ 0.67)$
FRF	1979/06–2020/09	496	-0.167	$(-1.54,\ 1.20)$
GBP	1979/06–2020/09	496	-1.759	$(-3.42,\ -0.10)$
ITL	1979/06–2020/09	496	0.467	$(-0.43,\ 1.37)$
JPY	1979/06–2020/09	496	-1.607	$(-3.03,\ -0.18)$
NOK	1986/01–2020/09	417	0.280	$(-1.18,\ 1.74)$
NZD	1997/04–2020/09	282	-0.110	$(-3.10,\ 2.88)$
SEK	1987/01–2020/09	405	0.658	$(-1.06,\ 2.37)$

Source: Engel et al. (2022), Table 1. All pairs vs. USD. p-values for $H_0: \beta = 1$: CAD, CHF, GBP, JPY all < 0.01.

Rolling Fama Regression Estimate: USD-GBP



Source: Engel et al. (2022);

Key pattern: $\hat{\beta}$ shifts from strongly negative before the GFC to strongly positive after. Why?

The Forward Premium Puzzle

An alternative – and essentially equivalent – test uses **forward exchange rates** instead of interest differentials on the right-hand side:

$$\varepsilon_{t+1} - \varepsilon_t = a + b\left(f_t - \varepsilon_t\right) + \mu_{t+1}$$

where $f_t \equiv \ln F_t$ is the log forward rate and $f_t - \varepsilon_t$ is the **forward premium**.

Why equivalent? CIP holds well empirically:

$$\frac{F_t}{\mathcal{E}_t} = \frac{1 + i_t}{1 + i_t^*} \quad \Longrightarrow \quad f_t - \varepsilon_t \approx i_t - i_t^*$$

So replacing $i_t - i_t^*$ with $f_t - \varepsilon_t$ gives an almost identical test of UIP.

Under UIP (given CIP): $a = 0$, $b = 1$ – the currency depreciates one-for-one with the forward premium. Burnside (2018): $\hat{b} \approx -0.75$.

When $F_t > \mathcal{E}_t$ (foreign currency trades at a *forward premium*), UIP predicts domestic depreciation of exactly that magnitude.

The Feldstein-Horioka Puzzle

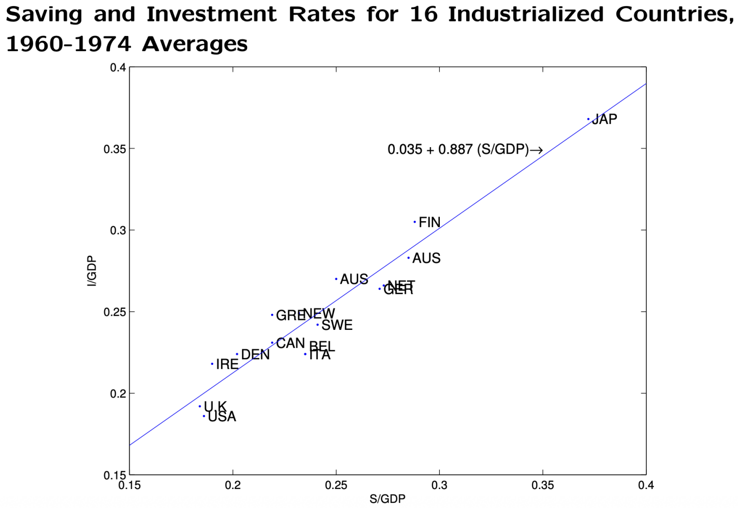
The Feldstein-Horioka Finding

Feldstein and Horioka (1980) ran a cross-country regression for 16 OECD countries, 1960–1974:

$$\left(\frac{I}{\text{GDP}}\right)_i = 0.035 + 0.887\left(\frac{S}{\text{GDP}}\right)_i + \nu_i; \quad R^2 = 0.91$$

- The coefficient is almost exactly 1: 91% of cross-country investment variation is explained by saving
- Remains true in more recent data, and even *higher* since the GFC
- If capital markets were integrated, investment should be financed by the world — domestic saving should be irrelevant

Feldstein-Horioka: Scatter Plot



Source: Feldstein and Horioka (1980); Schmitt-Grohé et al. (2022), Chapter 11.

Why Is This a Puzzle?

Start from the current account identity: $CA = S - I$.

Under autarky (no capital flows): $CA = 0$ always, so $S \equiv I$ – correlation $= 1$ by construction.

Under perfect capital mobility: $CA \neq 0$; investment should be financed by the world – domestic saving should be irrelevant to domestic investment.

- Feldstein and Horioka's interpretation: high S-I correlation $\Rightarrow$ low capital mobility

Note: Blanchard and Giavazzi (2002): "The End of the Feldstein-Horioka Puzzle?" EU integration reduced S-I correlation in the EU

A counterexample: Common Shocks

Here is an example where high S-I correlation does not $\Rightarrow$ low capital mobility

Consider a persistent productivity shock that raises A today and tomorrow.

Effect on saving: higher future output $\Rightarrow$ households are richer $\Rightarrow$ save more today (consumption smoothing).

Effect on investment: higher marginal product of capital $\Rightarrow$ firms invest more.

Both S and I shift **rightward simultaneously** in the Metzler diagram.

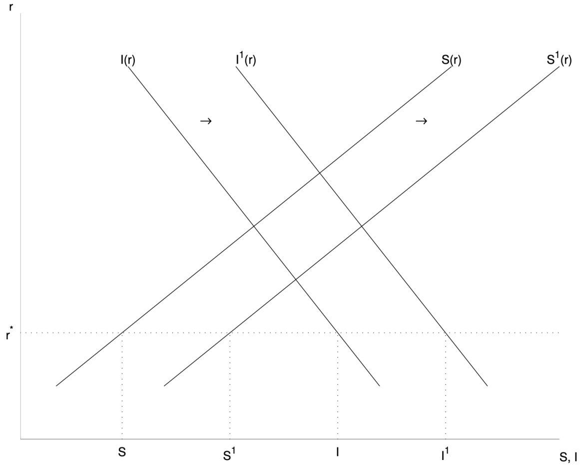
In a **small open economy**, the world interest rate r^* is fixed — neither schedule shifts *along* r^*.

$CA = S - I$ need not change at all — even with perfectly open capital markets.

But, if there are other kinds of shocks, then FH puzzle still suggests low capital mobility

A counterexample: Common Shocks

Response of S and I to a persistent productivity shock



Source: Schmitt-Grohé et al. (2022), Chapter 11.

International Risk Sharing

The Promise: Consumption Insurance

Open capital markets allow countries to trade claims on each other's output streams.

- A country with a bad harvest can draw on savings held abroad
- A booming country shares its windfall with the world
- Welfare gain: domestic consumption becomes smooth even when domestic income is volatile

Theory (complete-markets models): domestic consumption should track **world** consumption, not **domestic** output.

But how much of this insurance do we actually observe?

What is International Risk Sharing?

Definition: The ability of countries to **insulate consumption** from **idiosyncratic output shocks** by trading **state-contingent claims** or borrowing/lending internationally.

Idea goes back to at least Obstfeld (1986)

Some simple implications for the data:

- Under **perfect risk sharing**: domestic consumption is tied to **global** consumption, not to domestic output:

$$\Delta \log c_{i,t} = \Delta \log c_{world,t}$$

- Under **autarky**: consumption tracks domestic output:

$$\Delta \log c_{i,t} = \Delta \log y_{i,t}$$

Neat empirical question: How close are we to perfect consumption risk sharing?

Benchmark: What Complete Markets Predict

Under complete international asset markets, the Pareto-optimal allocation implies:

$$\Delta \log c_{it} = \Delta \log C_t + \text{const}_i$$

Every country's consumption growth equals world consumption growth plus a country-fixed constant.

Country-specific income shocks are **fully insured away** — they do not appear in consumption.

Two testable predictions:

1. Cross-country consumption correlations close to 1, and *well above* output correlations
2. Regressing idiosyncratic consumption growth on idiosyncratic output growth: $\beta = 0$

Both predictions are badly violated in the data.

For the derivation from the complete-markets FOC, see ▸ Appendix.

The BKK Puzzle

Backus et al. (1992): the ordering of international correlations is **backwards**.

$$\underbrace{\rho(\Delta c_i,\ \Delta c_j)}_{\approx 0.46\text{ (data)}} < \underbrace{\rho(\Delta y_i,\ \Delta y_j)}_{\approx 0.7\text{ (data)}}$$

Theory predicts: left side ≈ 1, and *much larger* than the right side.

- Consumption should be highly correlated (we insure each other); output need not be
- In the data: consumption correlations are *lower* than output correlations
- Not just wrong magnitude – **wrong ordering**

The BKK Puzzle: Evidence

Cross-country correlations with the **same U.S. variable** (HP-filtered, quarterly):

Country	Output	Consumption
Australia	.25	.13
Austria	.31	.07
Canada	.77	.65
Finland	.02	−.01
France	.22	−.18
Germany	.42	.39
Italy	.39	.25
Japan	.39	.30
South Africa	−.15	−.23
Switzerland	.27	.25
United Kingdom	.48	.43
Europe	.70	.46

Source: Backus et al. (1992), Table 2. Correlations with the corresponding U.S. series, 1960s–1990.

Project paper:
Kose et al. (2009)

Measuring Risk Sharing: The KPT Regression

Kose et al. (2009) derive a testable regression directly from the complete-markets benchmark:

$$\Delta \log c_{it} - \Delta \log C_t = \text{const} + \beta \left(\Delta \log y_{it} - \Delta \log Y_t \right) + \varepsilon_{it}$$

Both sides are expressed as deviations from world aggregates to remove common shocks.

β	Interpretation
$\beta = 0$	Perfect risk sharing — idiosyncratic income shocks fully insured
$\beta = 1$	Zero risk sharing — consumption tracks output one-for-one

Metric reported: $(1 - \beta)$, running from 0 (no sharing) to 1 (perfect).

Data and Estimation Strategy

Sample: 69 countries, 1960–2004: 21 industrial, 21 emerging market economies (EMEs), 27 other developing.

Data:

- Penn World Tables, World Bank WDI
- De jure openness: IMF AREAER and other sources
- De facto openness: external assets and liabilities (External Wealth of Nations Database)

Three estimation approaches (all using 9-year rolling windows):

- **Cross-section:** estimate year by year, track rolling $(1-\hat{\beta})$
- **Time-series:** estimate country by country, take median
- **Panel:** combine both dimensions

Three consistent pictures from three methods: the conclusion is robust. Focus period for globalisation effects: 1987–2004.

Baseline Results: How Much Risk Sharing?

All groups are far from the benchmark $\beta = 0$ (perfect insurance):

Country group	$\hat{\beta}$	$(1 - \hat{\beta})$	Interpretation
Industrial	≈ 0.66	≈ 0.34	Some, but limited
Developing	≈ 0.87	≈ 0.13	Very limited
Emerging markets	≈ 0.97	≈ 0.03	Essentially none

Source: Kose et al. (2009), Table 1a (panel regression, full sample period).

- EMEs are the worst group – consumption tracks output almost one-for-one
- Emerging markets liberalised capital accounts rapidly in the 1990s – yet risk sharing is minimal

Risk Sharing Over Time

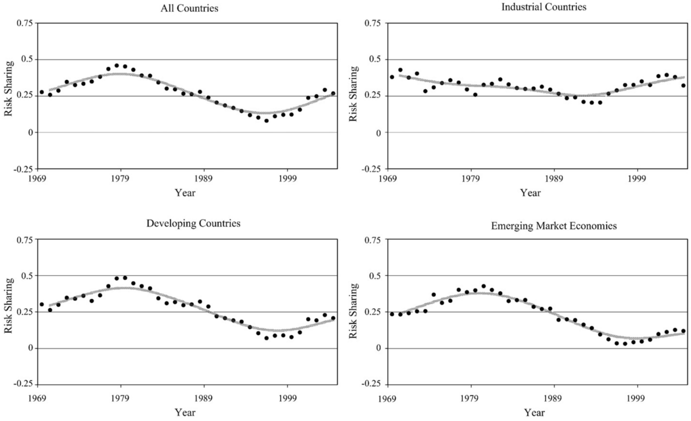


Fig. 1. Risk sharing-cross-section regressions.

Source: Kose et al. (2009). Rolling $(1 - \hat{\beta}_t)$ from time-series regressions.

- **Industrial countries:** modest improvement during the globalisation period (1987–2004)
- **Emerging and developing:** flat or slight *decline* — liberalisation did not deliver risk sharing

Did Financial Integration Help Improve Risk Sharing?

Augmented regression: interact idiosyncratic output growth with financial openness FO_{it}:

$$\Delta \log c_{it} - \Delta \log C_t = \text{const} + [\mu + \gamma\, FO_{it}]\,(\Delta \log y_{it} - \Delta \log Y_t) + \varepsilon_{it}$$

If $\gamma < 0$: more integrated countries achieve lower pass-through (β smaller) $\Longrightarrow$ integration helps risk sharing.

Results (globalisation period, de facto external liabilities):

- **Industrial countries:** $\hat{\gamma} \approx -0.037$ to -0.041 (significant at 1%) — integration improves risk sharing
- **Emerging markets:** $\hat{\gamma}$ not significantly negative — no benefit from financial openness
- De jure measures (capital account restrictions): rarely significant for any group

Note: These results are not significant over the full sample period. Robust?

The Type of Flow Matters: Debt vs. Equity

Not all financial integration is equal — the *composition* of external liabilities matters.

Flow type	Industrial $\hat{\gamma}$	EME $\hat{\gamma}$
Equity	negative***	not significant
FDI + equity	negative***	not significant
Portfolio debt	not significant	$+0.17^{***}$

Source: Kose et al. (2009), Table 2. Globalisation period. *** significant at 1%.

Why did financial integration not help risk sharing in emerging markets?

- **Portfolio debt** is a fixed claim: repayment is independent of the debtor's output $\Longrightarrow$ the borrower bears all income risk
- **Equity and FDI** are contingent claims: foreign investors' returns fall when the host has a bad year $\Longrightarrow$ risk is transferred abroad
- Portfolio debt dominated EME liabilities: $\sim$78% in 1980–84, declining to $\sim$47% by 2000–04 — the liberalisation created the *wrong kind* of integration

Replication and Extensions

Replication targets:

- Table 1a/1b: baseline $\hat{\beta}$ by country group
- Figures 1–3 (rolling $(1 - \hat{\beta})$ by group)
- Table 1a/1b: interaction with financial openness
- Table 2 (composition mechanism: debt vs. equity)

Data needed: Basic macro aggregates (consumption, output) are easy from PWT etc. Getting all financial openness measures is more work.

Extension ideas:

1. Extend to 2005–2023 – effect of the financial crisis?
2. Investigate the Euro area – did EMU improve risk sharing for members?
3. Within-EME heterogeneity, e.g. Asia vs. Latin America vs. ...

Summary

Part 1: Capital Market Integration

- CIP holds under free capital mobility (no arbitrage)
- UIP only holds if agents are risk neutral
- Carry trade, Fama regression, Forward premium regression all reject UIP

Part 2: The Feldstein-Horioka Puzzle

- High saving-investment correlations in the data suggest low capital mobility (although this is not necessarily the case)

Part 3: International Risk Sharing

- Complete markets predict consumption growth tracks world growth; data reject this
- Empirical investigation in KPT suggests risk sharing is limited

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Appendix

Appendix: Why Does the Fama Slope Fail? A Risk-Premium Example

One leading explanation: UIP fails because high-interest currencies carry a **time-varying risk premium**.

Suppose the true DGP is:

$$\varepsilon_{t+1} - \varepsilon_t = (i_t - i_t^*) - \rho_t + u_{t+1}$$

where ρ_t is a risk premium and u_{t+1} is a rational forecast error uncorrelated with $i_t - i_t^*$.

The estimated OLS slope in the Fama regression (which omits ρ: OVB) then converges to:

$$\hat{\beta} \;\to\; 1 - \frac{\text{Cov}[i_t - i_t^*,\ \rho_t]}{\text{Var}[i_t - i_t^*]}$$

If high interest rates reflect higher crash risk, investors demand a larger premium ρ_t – so $\text{Cov}[i_t - i_t^*, \rho_t] > 0$ and $\hat{\beta} < 1$.

The carry trade is profitable not because of irrational expectations, but because it earns a risk premium.

Appendix: UIP at Long Horizons

The Fama puzzle is primarily a **short-horizon** phenomenon.

- At 1-year frequency: $\hat{\beta} \approx -0.75$ across developed economies
- At 5-year horizons: many currency pairs no longer reject UIP; $\hat{\beta}$ moves toward 1
- Interpretation: time-varying risk premia and systematic forecast errors matter at business-cycle frequencies but *mean-revert* over longer periods — in the long run, the interest differential does predict depreciation
- Implication: UIP failure should not be interpreted as permanent market segmentation; it reflects short-run pricing anomalies that partially unwind

Appendix: Survey Expectations and UIP

If the Fama anomaly reflects **systematic forecast errors**, using survey-based expectations should produce slopes closer to 1.

- Regressions using Consensus Forecasts (professional forecasters' expected depreciation) instead of realised depreciation yield less negative — sometimes positive — slopes
- Supports the forecast-error channel in the Fama decomposition
- **Peso problem:** rare but large depreciation events under-weighted in rational expectations; realised depreciation over any finite sample is systematically lower than what was ex ante expected, biasing $\hat{\beta}$ downward

Implication: the puzzle is partly structural (genuine risk premium) and partly measurement; survey evidence helps separate the two.

Post Global Financial Crisis CIP Deviations

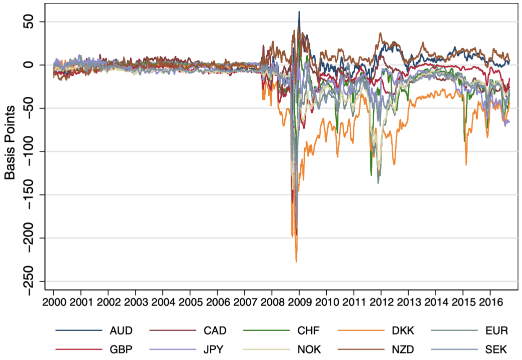

Figure 2. Short-term Libor-based deviations from covered interest rate parity. This figure plots the 10-day moving averages of the three-month Libor cross-currency basis, measured in bps for G10 currencies. Covered interest rate parity implies that the basis should be zero. The Libor basis is equal to $y^{\$,Libor}_{t,t+n} - (y^{Libor}_{t,t+n} - \rho_{t,t+n})$, where $n =$ three months, $y^{\$,Libor}_{t,t+n}$ and $y^{Libor}_{t,t+n}$ denote the U.S. and foreign three-month Libor rates, and $\rho_{t,t+n} \equiv \frac{1}{n}(f_{t,t+n} - s_t)$ denotes the forward premium obtained from the forward $f_{t,t+n}$ and spot s_t exchange rates. (Color figure can be viewed at wileyonlinelibrary.com)

Source: Du et al. (2018). CIP fails due to regulatory changes post-GFC (Basel III, ...) making arbitrage costly.

← Back

Appendix: Benchmark Risk Sharing — The Complete Markets FOC

A Pareto-optimal planner maximises $\sum_i \lambda_i \sum_t \beta^t U(c_{it})$ subject to world resource constraints.

First-order condition in each state s and period t:

$$\lambda_i \, U'(c_{it}(s)) = \mu_t(s) \quad \forall \, i$$

where $\mu_t(s)$ is the shadow value of world resources — **the same for all countries**.

Therefore the ratio of marginal utilities between any two countries is constant across all states:

$$\frac{U'(c_{it})}{U'(c_{jt})} = \frac{\lambda_j}{\lambda_i} = \text{const}$$

With isoelastic utility $U'(c) = c^{-\sigma}$: consumption *shares* are fixed in every state.
Taking logs and differencing: $\Delta \log c_{it} = \Delta \log c_{jt}$, which implies $\Delta \log c_{it} = \Delta \log C_t + \text{const}_i$.

Intuition: complete markets let countries offload all idiosyncratic risk onto the world; only aggregate shocks — which cannot be diversified — affect individual consumption.