Production-Based Asset Pricing

$$Er_{t+1} = r_f - \frac{Cov(u'(C_{t+1}), r_{t+1})}{E_t(u'(C_{t+1}))} \qquad (1)$$

Endogenize everything in terms of fundamental shocks

RBC model

Tobin's Q and Investment: falls in risk premia during a boom make it a good time to issue equity and invest.

Risk Sharing/Complete Markets

State A: you get 10, I get 0

State B: you get 0, I get 10

Ex post State A: you consume 5, I consume 5.

Ex post State A: your output 10, mine 5.

Consumption growth correlations exceed output correlations

The value

$$\frac{u'(C_1)}{u'(C)}$$

is equated across people/countries.

Global imbalances are often an implication of risk sharing.

Complete markets: approximate by equities and bonds.

Portfolio diversification (Equity premium puzzle suggests risk aversion is high, so international diversification should also be high.)

Home bias puzzle – French and Poterba (1991)

If US is 40 percent of world market, should invest 60 percent abroad.

Baxter and Jermann (AER, 1997)

$$Y = AK^{\alpha}L^{1-\alpha}$$

$wL = \alpha Y$, $rK = (1-\alpha)Y$.

Bottazzi, Pesenti, and Van Wincoop (EER, 1996) argue that the stock market indeed provides a hedge against labour income fluctuations. They find that income and stock returns are negatively correlated in data, not positively correlated as predicted by Baxter and Jermann.

Explanations (Asset markets and goods markets, but latter key; ultimately risk sharing must show up in consumption data.

Tesar and Werner (not transaction costs, since gross turnovers are large; net positions still relatively low.)

Nontraded Goods (if only value these, little point in having shipments of tradables from overseas in a downturn.)

Tesar and complementarity.

Transactions costs. Iceberg costs; political risk, taxes. Nontraded represent infinite costs.

Cole and Obstfeld: terms of trade provide hedge; when output rises, terms of trade fall, so foreigners get a rise in real income. In their setting, there is no need for sophisticated financial assets; risk is shared via terms of trade fluctuations.

Kollman/Baxter and Crucini: Incomplete markets (trade in non-state contingent asset such as a bond)

Can borrow and drive up interest rates on world market. As a result, other countries reduce consumption; so we get positive consumption correlations across countries.

Persistence is important in these models: if shock is permanent, no need to borrow

Permanent shocks.

For a persistence of $\rho = .95$ consumption correlation falls from .72 to .38.

Backus-Smith Condition

$$\log \frac{\epsilon_{t+1}}{\epsilon_t} = \log M_t^* - \log M_t. \qquad (2)$$

International Business Cycles

RBC model with complete markets (Backus, Kehoe, and Kydland)

Foreigners own half domestic firms; symmetry; they get half extra output.

Any increases in output shared.

Country with positive TFP shock has negative net exports (due to investment). MPK rises in that country.

Consumption correlations too high compared to data

Correlated shocks etc.

Risk and Exchange Rates

$e_t = 10$: 10 euros equals 1 dollar

UIP Prediction

$$1 + i = \frac{1}{e_t}(1 + i^*)Ee_{t+1}$$

CIP (this holds, since there is no uncertainty involved)

$$1 + i = \frac{1}{e_t}(1 + i^*)f_t$$

Therefore, according to UIP

$$Ee_{t+1} = f_t$$

Application (ignore price variation).

$e_t = 10$: 10 euros equals 1 dollar

$e_{t+1} - f_t$: expected monetary gain from buying forward contract. For example, I buy forward at $f_t = 10$, but domestic currency depreciates to $e_{t+1} = 30$, so I make profit of $e_{t+1} - f_t = 30$. Strategy pays off well if e_{t+1} is high. But in utility terms (what *really* matters) the equilibrium condition is

$$E(e_{t+1} - f_t)u'(C_{t+1}) = 0$$

Call $\gamma = s_{t+1} - f_t$

$$E(XY) = EXEY + Cov(X, Y)$$

$$E(\gamma u') = E\gamma Eu' + Cov(\gamma, u')$$

$$E\gamma = \frac{E(\gamma u')}{Eu'} - \frac{Cov(\gamma, u')}{Eu'}$$

$$E\gamma = -\frac{Cov(\gamma, u')}{Eu'}$$

$$E(e_{t+1} - f_t) = -\frac{Cov(\gamma, u')}{Eu'}$$

Putting in the standard utility function for u' and linearizing gives

$$E(e_{t+1} - f_t) = \theta Cov(e_{t+1}, c_{t+1})$$

Intuition: If strategy pays off well when consumption is high (and so pays off poorly when consumption is low) the strategy is a bad hedge and so expected returns are high on average.

$$E(e_{t+1} - f_t) = \theta Cov(e_{t+1}, c_{t+1})$$

$$\Rightarrow E(e_{t+1}) = f_t + \theta Cov(e_{t+1}, c_{t+1})$$

$$\Rightarrow E(e_{t+1}) = f_t + RP$$

where RP denotes risk premium (which could be time-varying.) Most importantly (and in contrast to UIP), with a non-zero risk premium

$$E(e_{t+1}) \neq f_t$$

The model is one way to rationalize persistent deviations of e_{t+1} from f_t (the *forward premium puzzle*) and failure of UIP.

But like with equity premium puzzle, to rationalize high expected returns, we need a high $\theta Cov(e_{t+1}, c_{t+1})$. But since $Cov(e_{t+1}, c_{t+1})$ is low, we need a counterfactually high θ. So, need a utility function that works!

Empirical Motivation for Above Theory

According to UIP, on average,

$$e_{t+1} = f_t$$

Hence

$$e_{t+1} - e_t = f_t - e_t$$

To test theory consider

$$e_{t+1} - e_t = \alpha + \beta(f_t - e_t)$$

and see if $\alpha = 0$ and $\beta = 1$. Large failure of these predictions. (Note that the tests are often in this form since e_{t+1} and f_t are typically *nonstationary*.)