Handout 3: International Capital Markets

1 Asset pricing and international portfolio diversification: A Review of basic portfolio theory

Key observation: Investors seem to strongly favor domestic (local) assets in selecting their portfolios (home bias)

Americans favor American assets (stocks and bonds), Germans favor German assets …..

US equity portfolios: 94% US stocks, 3.5% Japanese, 0.5% German

Question: What are the reasons for home bias? Can international portfolio theory explain it? That is, do these the best possible menu portfolios represent of investments?

Objective: How to get the best return at the lowest possible risk

1.1 Construction of the set of efficient portfolios

Portfolio choice with 2 risky assets

Asset A: $\{Er_A , \sigma_A\}$ Asset B: $\{Er_B , \sigma_B\}$

- Case 1: $cor(r_A, r_B) = 1$

$$Er_p = Er_B + (\sigma_p - \sigma_B)\frac{Er_A - Er_B}{\sigma_A - \sigma_B}$$

- Case 2: $cor(r_A, r_B) = -1$ (Perfect hedging)

$$Er_p = Er_B + (\sigma_p + \sigma_B)\frac{Er_A - Er_B}{\sigma_A - \sigma_B} \qquad s_A > \frac{\sigma_B}{\sigma_A - \sigma_B}$$

$$Er_p = Er_B - (\sigma_p - \sigma_B)\frac{Er_A - Er_B}{\sigma_A - \sigma_B} \qquad s_A < \frac{\sigma_B}{\sigma_A - \sigma_B}$$

$$Er_p = Er_B + \sigma_B \frac{Er_A - Er_B}{\sigma_A - \sigma_B} \qquad s_A = \frac{\sigma_B}{\sigma_A - \sigma_B}$$

- Case 3: $-1 < \text{cor}(r_A, r_B) < 1$

Portfolio choice with one risky and one riskless asset

"A" is the risk free asset, with return $r_A = r_f$

$$Er_p = Er_B - \frac{(\sigma_p - \sigma_B)}{\sigma_B}(Er_B - r_f)$$

Short position in the risk free asset (borrowing money)

Portfolio choice with two risky and one riskless asset

- *Step 1*. Construct the opportunity set $\{Er_p, \sigma_p\}$ for the risky assets
- *Step 2*. Find the portfolio shares for the risk free asset and the portfolio of the risky assets that gives the steepest CAL line

Slope of CAL: $z = (Erp - rf)/\sigma p$

Max{z}

st

$\Sigma s_i = 1$

- *Step 3*. Use the objective (utility) function of the investor to select a point from the CAL

Portfolio choice with many risky and one riskless asset

Minimum variance frontier

Efficient frontier

Global minimum variance portfolio

How do we select the optimal portfolio?

- Need expected returns and the their covariances
- Construct efficient frontier

$$Er_p = \sum_{i=1}^{n} s_i Er_i \qquad st \qquad \sigma_p^2 = \sum_{i=1}^{n} s_i^2 \sigma_i^2 + \sum_{i=1, i\neq j}^{n} \sum_{j=1}^{n} s_i s_i \operatorname{cov}(r_i, r_j)$$

- Combine with risk free asset

Important point: All investors hold the same portfolio of risky assets, independent of their risk attitudes. Investors differing in risk aversion chose different combinations of the risk free asset with the (common) portfolio of the risky assets (**separation property or theorem**)

1.2 The CAPM

Covariance of rates of return and asset riskiness

Assumptions: Single period planning, mean variance optimization

$$Er_i - r_f = \frac{\operatorname{cov}(r_i, r_M)}{\sigma_M^2}(Er_M - r_f)$$

$$\beta_i = \frac{\operatorname{cov}(r_i, r_M)}{\sigma_M^2}$$

$$Er_i - r_f = \beta_i (Er_M - r_f)$$

Market price of risk: $Er_i - r_f = \dfrac{(Er_M - r_f)}{\sigma_M^2}$

Risk premium: $\beta_i (Er_M - r_f)$

1.3 The consumption CAPM

Use consumption in place of the market portfolio to determine risk premia (to price assets)

Price a one-period nominal bond

$$(1+R_t)^{-1} = \beta E_t \frac{u_{ct+1} p_t}{u_{ct1} p_{t+1}} = \beta E_t \frac{u_{ct+1}}{u_{ct1}} E_t \frac{p_t}{p_{t+1}} + \beta COV_t(\frac{u_{ct+1}}{u_{ct1}}, \frac{p_t}{p_{t+1}})$$

Real interest rate on a nominal bond

$$(1+r_t)^{-1} = (1+R_t)^{-1}(E_t \frac{p_t}{p_{t+1}})^{-1} = \beta E_t \frac{u_{ct+1}}{u_{ct1}} + \beta COV_t(\frac{u_{ct+1}}{u_{ct1}}, \frac{p_t}{p_{t+1}}) / E_t \frac{p_t}{p_{t+1}} = \bar{r}_t + RP_t$$

$$\bar{r}_t = risk\ \ free\, rate$$

Problems with the use of the CAPM to price international assets

Modifications to the CAPM to account for international elements

- Exchange rate risk
- Investor heterogeneity (differences in consumption baskets)
- Restrictions (actual or expected) on capital flows
- Political risk

Findings:

- Investors can achieve more favorable risk-return combinations by diversifying internationally
- Differences in consumption baskets across countries can justify some home bias. However, the theory predicts too much international diversification relative to what we observe in the real world

1.4 Possible explanations for the lack of diversification (home bias)

Explantions of the international portfolio non-diversification puzzle:

1. It is not worth doing it:

- Small aggregate *gains* (an estimate: 0.2 of 1% of GNP per year)
- Small improvement in *return-risk* trade offs

  High *covariance* of rates of return across countries (synchronization of national business cycles, similar economic structure…)

  Testing for *common factors* in international returns:

  Idiosyncratic, industry specific, national, international

  Finding: There exists a *significant national component* (which could presumably be diversified away internationally)

But: it seems that investors can achieve more favorable risk-return combinations by diversifying internationally

- Higher cost for international asset transactions

  But turnover is higher for international equity

2. Informational asymmetries: The local guys know better

3. International capital restrictions, differences in taxation…

Compare degree of diversification of within country regional portfolios and international portfolios

4. Dellas and Stockman (non-traded goods)

Differences in consumption baskets across countries can justify some home bias. However, the theory still predicts too much international diversification relative to what we observe in the real world.

5. Human capital

How does the presence of a non traded asset affects optimal portfolios? Does it make the home bias puzzle worse or not. It depends on the correlation between return to human capital (wages) and domestic stock returns.

2 International capital mobility

Is there enough capital mobility? Does international capital do its job?

2.1 Reasons for international asset trade: Consumption smoothing

- Over time (borrowing-lending)
- Across states of nature (risk sharing)

2.2 Implications of global markets

The Law of one price (people in different countries face the same asset prices)

Key question: which international assets to compare?

- *An informative comparison*: On shore-off shore differentials: Nominal interest rate on identical assets in different financial markets (pound CDs in Paris and London)

  Result: The rates are almost identical, a fact that indicates perfect capital mobility
- *A non informative comparison*: Uncovered returns on different currencies (uncovered IRP)

Consumption smoothing or insurance (people in different countries can pool national consumption risks)

Under complete asset markets, risk is perfectly diversifiable internationally

Consumption should be perfectly correlated across countries

and highly correlated even under incomplete markets (say, bonds only)

Empirical Fact: Consumption is less correlated across countries than output

Possible explanations:

- Non traded goods
- Incomplete asset markets (for instance, moral hazard)

A comparison to regional patterns (e.g. US states). Regional correlations of consumption are greater than cross country correlations.

Caution in interpreting result due to:

- Common (national) shocks affecting all regions
- Government transfers (fiscal insurance)
- Non tradeables

The efficient international allocation of investment (new savings, regardless of where it originates, is allocated to the country with the most productive investment opportunities)

- Free capital mobility implies that the size of domestic savings does not impose any constraint on domestic investment. No correlation between domestic savings and domestic investment.

  The **Feldstein-Horioka (H-F) result**: Domestic savings and investment are too highly correlated

$$I/Y = 0.04 + 0.89(S/Y) \quad R^2 = 0.91 \qquad 1960\text{-}74$$

$$0.02 \quad 0.07$$

$$I/Y = 0.09 + 0.62(S/Y) \quad R^2 = 0.69 \qquad 1982\text{-}91$$

$$0.02 \quad 0.09$$

Possible explanations of the H-F result

- Government policy (adjustment of fiscal/monetary policy to avoid large CA imbalances)
- Developed countries may be close to their steady state
- Demographic-productivity changes

- Comparison of -ex ante- rates of return on capital investment

  According to standard theory, the rate of return on capital must be much higher in less developed countries. Yet, we do not observe massive capital inflows into those countries. Why?

$$Y(t) = AK(t)^{a} L(t)^{1-a} \rightarrow MP_k = r(t) = aA\frac{Y(t)}{K(t)}$$

  - Political risk
  - The role of human capital in enhancing the productivity of physical capital

3 The LDC debt problem

Large capital inflows into the LDCs in the seventies.

Reason:

- Demand side (borrow to finance growth)

- Supply side (petrodollars)

Result: Inability to pay. Partial default (forgiveness). Bail outs

What went wrong?

- Bad shocks (domestic and world)
- Bad use of the funds
- Type of foreign investment (loans vs equity)

What have we learned concerning investment in LDCs?

What is the optimal size of international investment? How are funds priced?

- Full insurance.
- Insurance when contracts are not enforceable Partial insurance

  The greater the possible sanction the better off the borrower!
- Debt and investment under default
- Debt overhang

  Partial forgiveness may increase debt repayments (debt Laffer curve)
- Debt buyback
- Foreign investment and moral hazard

  Moral hazard and implicit guarantees. Example: Banks lending