

INTERNATIONAL FINANCE



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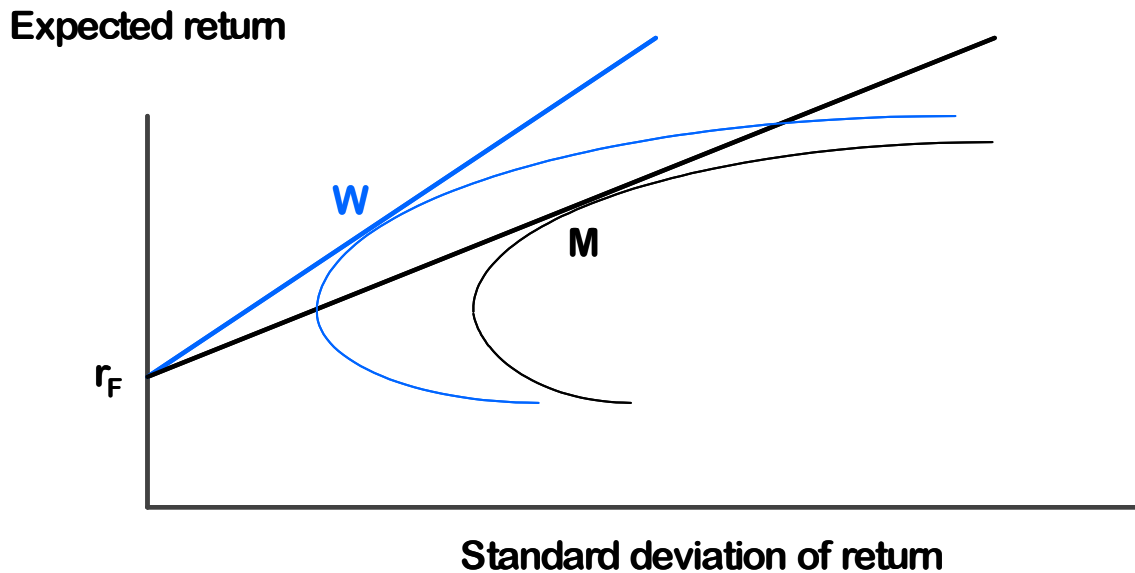
**INTERNATIONAL RISK AND RETURN:
EMPIRICAL EVIDENCE**

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INTERNATIONAL RISK AND RETURN

INTERNATIONAL DIVERSIFICATION

- A globally diversified stock/bond portfolio can offer **higher expected return** at **lower portfolio risk** than a purely domestic portfolio.
 - ◆ Higher expected return - **Developing economies** are much more likely to experience **above-average economic growth**.
 - ◆ Lower portfolio risk - National economies **do not move in unison** and stock and bond returns vary widely across national markets.

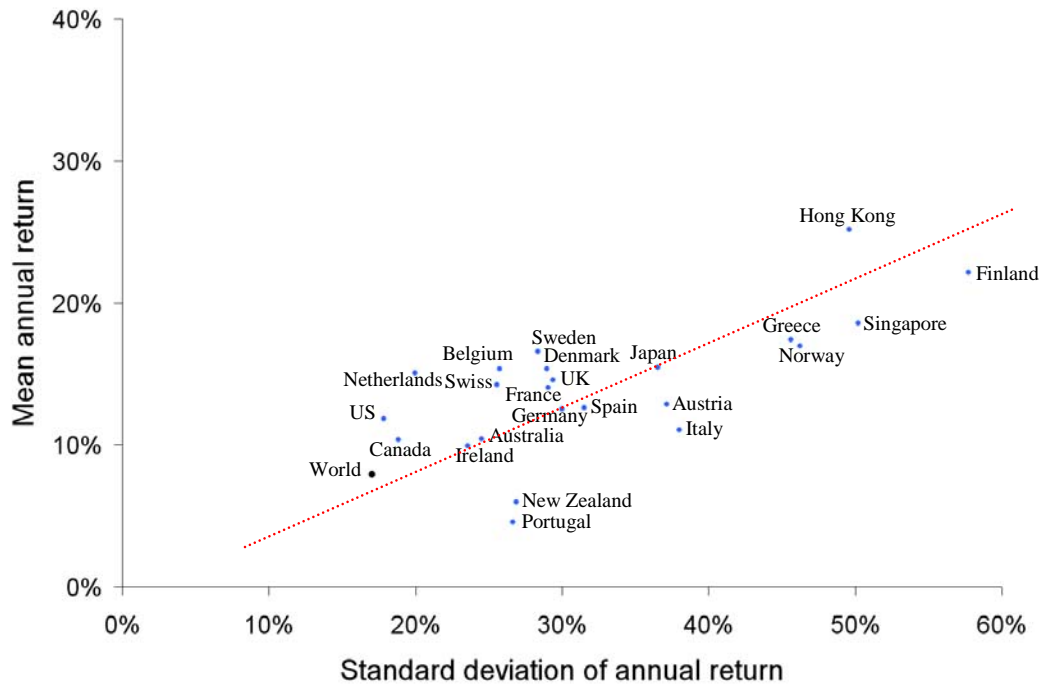


From Kirt Butler, 2004, *Multinational Finance*, Thomson South-Western, 3rd. ed.

INTERNATIONAL RISK AND RETURN

Historical Stock Market Performance (1970-2002)

(MSCI index, dollar returns to U.S. investors)



From Kirt Butler, 2004, *Multinational Finance*, Thomson South-Western, 3rd. ed.

Observation:

- Countries with **higher volatility** tend to have **higher returns**.
- Countries with **high risk and return** tend to be **small** ones.

INTERNATIONAL RISK AND RETURN

In numbers:

	Mean (%)	Stdev (%)	$\beta_{i,W}$	Sharpe Ratio
Canada	10.4	18.8	0.79	0.17
France	14.0	29.1	1.09	0.23
Germany	12.5	30.0	1.05	0.18
Japan	15.4	36.5	1.39	0.23
Switzerland	14.2	25.5	0.98	0.28
U.K.	14.6	29.4	1.14	0.25
U.S.	11.8	17.8	0.87	0.26
World	11.2	17.6	1.00	0.23

- $\beta_{i,W}$ is the CAPM **beta** of country i with respect to the MSCI World stock market index.
- ❖ **Q1.** Which country return is the riskiest? Is the risk rewarded?
- Sharpe ratio is a **risk-return** measure.
- $(r_i - r_f)/\beta_{i,W}$ is called **Treynor's measure**. This is also a risk-return measure.

INTERNATIONAL RISK AND RETURN

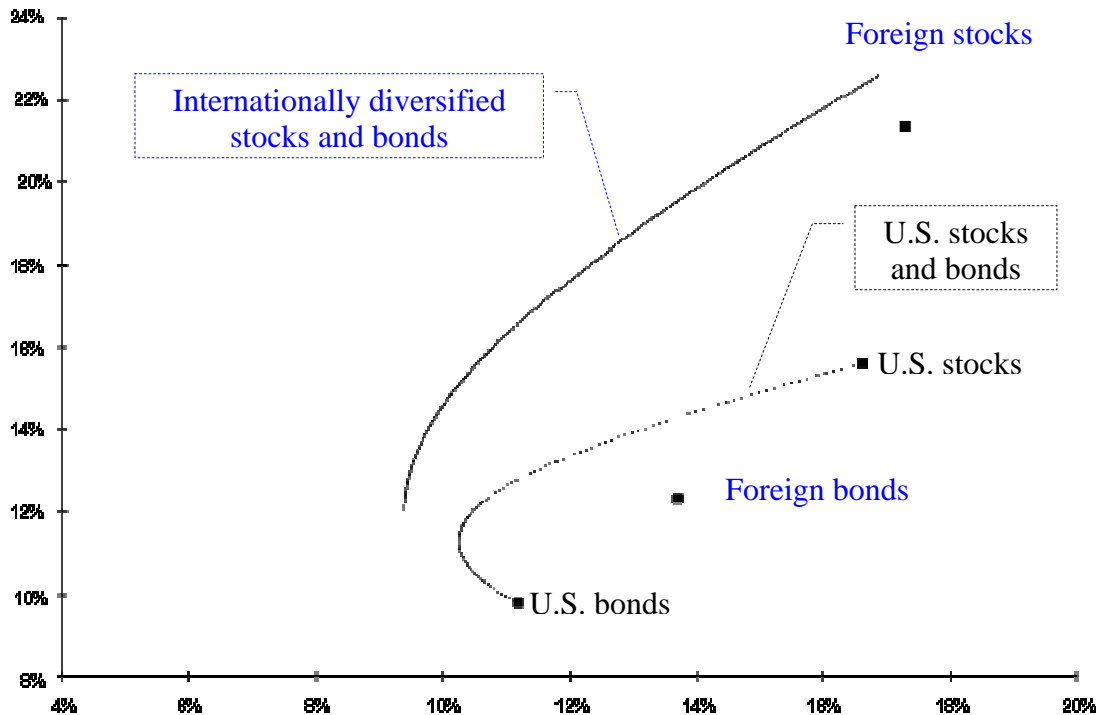
INTERNATIONAL EQUITY CORRELATIONS

	Can	Fra	Ger	Jp	Swi	UK	US
France	0.472						
Germany	0.388	0.645					
Japan	0.320	0.399	0.364				
Swiss	0.464	0.618	0.670	0.430			
U.K.	0.513	0.559	0.451	0.369	0.569		
U.S.	0.727	0.482	0.443	0.304	0.504	0.522	
World	0.735	0.657	0.618	0.671	0.674	0.685	0.855

Countries are likely to have **highly correlated** stock markets if:

- ♦ They are in **geographically** close proximity
- ♦ They have substantial **cross-border trade** such as within the countries of the European Union (EU) or the North American Free Trade Agreement (NAFTA).
- ♦ They are members of a **common monetary system**, such as the European Exchange Rate Mechanism (ERM).

INTERNATIONAL RISK AND RETURN

International Asset Allocation

“Asset Allocation.” Jorion, *Journal of Portfolio Management*, Summer 1989.
 As adapted in Kirt Butler, 2004, *Multinational Finance*, Thomson South-Western, 3rd. ed.

Here, we ask the following question:

- How much variance of foreign stock or bond returns comes from **asset return variability** and how much comes from **exchange rate variability**?

“When U.S. funds invest in securities denominated in foreign currencies, there are **two** distinct components to investors’ returns: the **changing value of the portfolio securities in their local currencies** and the impact of **fluctuating exchange rates**.”

“Is Your Foreign Fund Hedged or Unhedged?” *WSJ* 11/19/2004, Page C1

Let’s address this question.

INTERNATIONAL RISK AND RETURN

RISKS IN INTERNATIONAL INVESTMENT

- Let P_t^f be the price of a **foreign asset** in the foreign currency.
- Dollar price of a foreign asset is $P_t^d = P_t^f S_t^{d/f}$
- Thus, dollar return on a foreign asset, r_t^d , is given by

$$\begin{aligned} r_t^d &= P_t^d/P_{t-1}^d - 1 = P_t^f S_t^{d/f}/P_{t-1}^f S_{t-1}^{d/f} - 1 \\ &= (P_t^f/P_{t-1}^f)(S_t^{d/f}/S_{t-1}^{d/f}) - 1 \\ &= (1 + r_t^f)(1 + \Delta S_t^{d/f}) - 1 \\ &= r_t^f + \Delta S_t^{d/f} + r_t^f \Delta S_t^{d/f} \end{aligned}$$

where $\Delta S_t^{d/f} = S_t^{d/f}/S_{t-1}^{d/f} - 1$ is the percentage change in the exchange rate.

- That is, dollar return on a foreign asset has **three** components:
 - ◆ **Asset return** in the foreign currency, r_t^f
 - ◆ **Spot-rate return**, $\Delta S_t^{d/f}$
 - ◆ An interaction term, $r_t^f \Delta S_t^{d/f}$

- From the above calculation, **expected dollar return** on a foreign asset is

$$E[r_t^d] = E[r_t^f] + E[\Delta S_t^{d/f}] + E[r_t^f \Delta S_t^{d/f}]$$

Dollar variance is

$$\begin{aligned} \text{Var}(r_t^d) &= \text{Var}(r_t^f + \Delta S_t^{d/f} + r_t^f \Delta S_t^{d/f}) \\ &= \text{Var}(r_t^f) + \text{Var}(\Delta S_t^{d/f}) + \text{Var}(r_t^f \Delta S_t^{d/f}) \\ &\quad + 2\text{Cov}(r_t^f, \Delta S_t^{d/f}) + 2\text{Cov}(r_t^f, r_t^f \Delta S_t^{d/f}) + 2\text{Cov}(\Delta S_t^{d/f}, r_t^f \Delta S_t^{d/f}) \\ &= \text{Var}(r_t^f) + \text{Var}(\Delta S_t^{d/f}) + \text{Interaction terms} \end{aligned}$$

The magnitude of each term is an **empirical question**. We now examine this point.

INTERNATIONAL RISK AND RETURN

Table A: Variance decomposition of dollar return on foreign **stocks**

	$\text{Var}(r_t^f)$ +	$\text{Var}(\Delta s_t^{S/f})$ +	Interaction terms	=	$\text{Var}(r_t^S)$
Canada	0.915 +	0.033 +	0.053	=	1.000
France	0.937 +	0.149 +	-0.086	=	1.000
Germany	0.973 +	0.194 +	-0.167	=	1.000
Japan	0.813 +	0.182 +	0.005	=	1.000
Switzerland	0.928 +	0.298 +	-0.225	=	1.000
U.K.	0.902 +	0.127 +	-0.029	=	1.000
Average	0.911 +	0.164 +	-0.075	=	1.000

(Each variance is normalized at 1)

- The dominant risk in foreign **stock** markets is the **local asset return** (r^f)
- Exchange rate variability is less important
- The **interaction terms are close to zero** for most of the international equity investments

INTERNATIONAL RISK AND RETURN

Table B: Variance decomposition of dollar return on foreign bonds

	$\text{Var}(r_t^f) +$	$\text{Var}(\Delta s_t^{d/f}) +$	Interaction terms	=	$\text{Var}(r_t^d)$
Canada	0.601 +	0.184 +	0.215	=	1.000
France	0.242 +	0.823 +	-0.065	=	1.000
Germany	0.124 +	0.818 +	0.058	=	1.000
Japan	0.172 +	0.701 +	0.126	=	1.000
Switzerland	0.090 +	0.936 +	-0.026	=	1.000
U.K.	0.287 +	0.599 +	0.114	=	1.000
Average	0.253 +	0.677 +	0.070	=	1.000

(Each variance is normalized at 1)

➤ The dominant risk in foreign **bond** markets is **exchange rate variability**

❖ **Q2.** Does this make sense?

➤ Bond return variability in the local currency is less important

➤ Again, the interaction terms are close to zero.

Since the effect of **interaction** terms is **small**, we may write

$$r_t^d \approx r_t^f + \Delta s_t^{d/f} \quad (*)$$

INTERNATIONAL RISK AND RETURN

FX RISK HEDGING AND FOREIGN STOCK INVESTMENT

What happens to the risk-return characteristics of international investment when we hedge the FX risk?

Consider a simple hedging strategy in which the investor sells the expected foreign currency payoff from the stock $E[P_t^f]$ **forward** at $F^{d/f}$. We can write

$$P_t^f = \underbrace{E[P_t^f]}_{\text{Forward}} + \underbrace{(P_t^f - E[P_t^f])}_{\text{Spot}}$$

The amount in the parenthesis represents the unexpected foreign currency payoff, and this must be sold at the future spot rate, $S_t^{d/f}$. Thus, the hedged dollar proceeds are (using superscript “H” for “hedged”)

$$P_t^{dH} = E[P_t^f] F^{d/f} + (P_t^f - E[P_t^f]) S_t^{d/f}$$

Then,

$$\begin{aligned} r_t^{dH} &= P_t^{dH}/P_{t-1}^d - 1 \\ &= \{E[P_t^f] F^{d/f} + (P_t^f - E[P_t^f]) S_t^{d/f}\} / P_{t-1}^f S_{t-1}^{d/f} - 1 \\ &= (E[P_t^f]/P_{t-1}^f)(F^{d/f}/S_{t-1}^{d/f}) + \{(P_t^f - E[P_t^f])/P_{t-1}^f\}(S_t^{d/f}/S_{t-1}^{d/f}) - 1 \\ &= (1 + E[r_t^f])(1 + FP^{d/f}) + (r_t^f - E[r_t^f])(1 + \Delta S_t^{d/f}) - 1 \\ &= r_t^f + FP^{d/f} + r_t^f \Delta S_t^{d/f} + E[r_t^f](FP^{d/f} - \Delta S_t^{d/f}) \end{aligned}$$

where $FP^{d/f}$ is the **forward premium**. Since the third and fourth terms are likely to be small, we may write

$r_t^{dH} \approx r_t^f + FP^{d/f}$

Compare with (*) above. The implication is that:

<p>You can hedge the exchange rate component by a forward contract.</p>

INTERNATIONAL RISK AND RETURN

➤ Expected return

$$\text{Unhedged: } E[r_t^d] = E[r_t^f] + E[\Delta s_t^{d/f}]$$

$$\text{Hedged: } E[r_t^{dH}] = E[r_t^f] + FP^{d/f}$$

❖ **Q3.** Under **what parity condition** are these the same?➤ Variance: since $FP^{d/f}$ is constant, clearly,

Hedged $\text{Var}(r_t^{dH}) < \text{Unhedged } \text{Var}(r_t^d)$
--

The difference is the variance of the spot rate (intuitive). This is why **FX risk hedging can enhance the risk-return efficiency** of international stock market investment.

❖ **Q4.** Compare Tables A and B above. Is the benefit of hedging relatively larger for international stock investment, or bond investment?

- An internationally diversified portfolio will hold both foreign stocks **and** bonds. Thus, the benefit of currency hedging can be substantial.
- Later in the financial engineering sessions, we will see a contract **that hedges the whole risk** (i.e., FX risk AND foreign stock price variability) of foreign stock investment. (These are called quanto options.)

INTERNATIONAL RISK AND RETURN

- Here is **another view**: according to Eun and Resnick, the benefit of currency hedging is **substantial** for foreign **stock** investment, too.

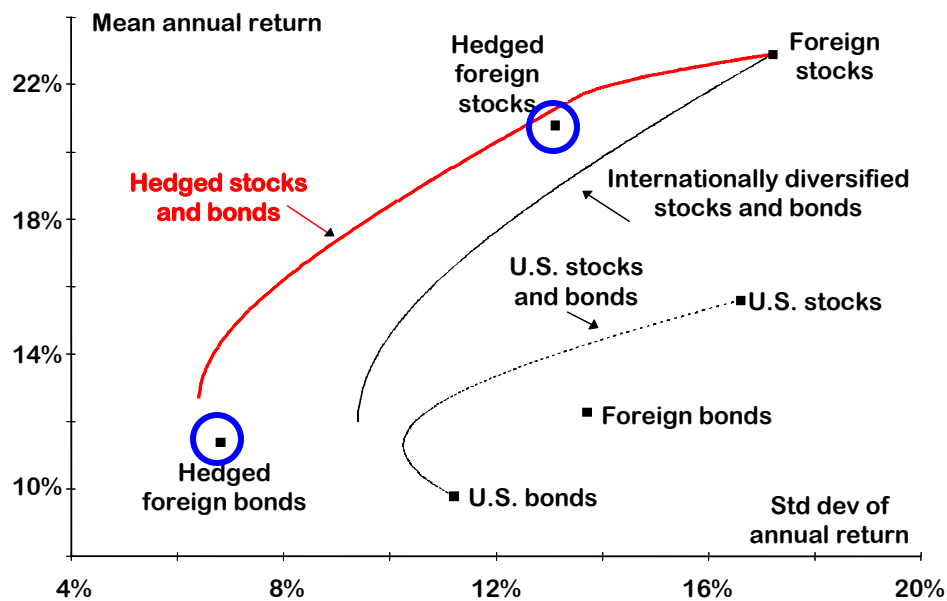
	Components of $\text{Var}(R_{i\$})$				
	$\text{Var}(R_{i\$})$	$\text{Var}(R_i)$	$\text{Var}(e_i)$	$2 \text{Cov}(R_i, e_i)$	ΔVar
	\$ return	Asset return	FX rate return		
Bonds					
Canada	15.29	10.82	1.72	2.67	0.08
France	16.48	2.82	12.74	0.60	0.32
Germany	21.53	2.59	13.84	4.91	0.19
Japan	24.70	3.03	15.13	6.09	0.45
Switzer.	21.16	1.14	17.64	2.34	0.04
U.K.	27.67	8.88	12.39	6.08	0.32
U.S.	10.24	10.24	0.00	0.00	0.00
Stocks					
Canada	37.70	30.58	1.72	5.37	0.03
France	59.75	43.03	12.74	3.75	0.23
Germany	43.82	29.27	13.84	0.00	0.71
Japan	41.47	19.45	15.13	5.83	1.06
Switzer	34.81	20.07	17.64	-3.76	0.86
U.K.	40.96	29.27	12.39	-1.52	0.82
U.S.	21.16	21.16	0.00	0.00	0.00

From C. Eun and B. Resnick, 1994, "International Diversification of Investment Portfolios: U.S. and Japanese Perspective," *Management Science*, 40 (1), 140-161.

INTERNATIONAL RISK AND RETURN

- The picture below shows Jorion's estimate of the additional benefit in **hedging 100% of the currency risk** in the world market portfolio (compare with the previous picture).
- ◆ Jorion uses a rolling one-month forward hedge of the full amount of the investment in each foreign currency.
 - ◆ With a one-month rolling foreign currency hedge, the amount invested in each foreign market is sold forward at the start of each month with a one-month forward contract.

Message: **Hedging can improve the efficient frontier.**



INTERNATIONAL RISK AND RETURN

HOME BIAS

- Despite the potential benefits of international portfolio diversification, most investors tilt their portfolios **toward domestic** securities.

	Portfolio weights	
	Predicted Market cap as percent of total	Actual Percentage in domestic equities
France	2.6%	64.4%
Germany	3.2%	75.4%
Italy	1.9%	91.0%
Japan	43.7%	86.7%
Spain	1.1%	94.2%
Sweden	0.8%	100.0%*
U.K.	10.3%	78.5%
U.S.	36.4%	98.0%

Source: Cooper & Kaplanis, "Home Bias in Equity Portfolios, Inflation Hedging, and International Capital Market Equilibrium," *Review of Financial Studies*, Spring 1994.

Note *: Cooper and Kaplanis used data from the late 1980s, at which time Sweden did not allow cross-border investments. Swedish investors were consequently 100% invested in Swedish assets. This constraint was removed in the early 1990s.

- ◆ "Predicted portfolio weight" is the percentage of the world's total market capitalization. These are the weights investors would hold if all investors were diversified on a value-weighted basis across international assets—the **world market portfolio**.
- ◆ Investors in **all** countries have a significant **home bias**.

Beyond the Mean-Variance Analysis—Why is there home bias?

- Factors that tend to tilt investor holding toward **more** domestic assets
 - ◆ Domestic stock portfolios can **hedge domestic inflation** risk
 - ◆ Banks and insurance companies with **domestic liabilities** have an incentive to hedge with domestic assets
- Factors that tend to tilt investor holding toward **fewer** domestic assets
 - ◆ **Labor income** is highly correlated with other **domestic** assets, so investors' portfolios of tradable assets should be tilted **away** from domestic assets
- ❖ **Q5.** What is the underlying idea behind the labor income argument?

INTERNATIONAL RISK AND RETURN

FINANCIAL MARKET IMPERFECTIONS

➤ Market frictions

- ◆ Government controls
 - **Currency boards** or **limitations on foreign ownership** of domestic assets are often intended to **keep capital at home**.
 - Even a **developed country like Sweden** restricted foreign investment of domestic investors (see the table above).
- ◆ Taxes
 - **Taxes on cross-border transactions** include share purchases (stamp taxes) and withholding taxes on dividends or interest
- ◆ **Transactions costs**

These reflect the market's operating efficiency and **influence informational** and **allocational efficiency**.

 - United States: transactions costs can be less than 0.1 percent for large transactions in actively traded stocks.
 - Developing markets: direct trading costs often exceed 1 percent.

INTERNATIONAL RISK AND RETURN

➤ **Investor irrationality**

These are the recent fruitful results of **behavioral finance**, which borrows much from **psychology**.

- ◆ Hueristics (decision rules)
 - **Rules-of-thumb** can save time and **simplify** decisions, but lead to **cognitive biases** or **systematic errors** in individuals' decision-making processes
 - In particular, people seem to place too much weight on **recent** and **negative** information
- ◆ Frame dependence

The form in which a problem is presented can influence decisions

- **Overconfidence** about knowledge, abilities, and future prospects can lead investors to **trade more** than rational investors with unbiased forecasts.
 - According to Barber and Odean, **men trade nearly 50% more than women. Excessive trading reduces** men's returns by 2.65% per year, and women's by 1.72% per year, relative to buy-and-hold investors.
Barber and Odean, "Boys Will Be Boys: Gender, Overconfidence, and Common Stock Investment," *Quarterly Journal of Economics*, 2001.
- **Regret avoidance** causes tendency to hold losers (**loss aversion, disposition effect**) & sell winners

➤ **Unequal access** to market prices

- ◆ Only a **fraction** of total market capitalization is available for trade in many countries.
- ◆ The percentage of total market cap that is **closely held** varies across countries:

	% of cap closely held		% of cap closely held
Australia	24.85	Japan	38.38
Brazil	67.13	Mexico	26.15
Canada	48.82	Netherlands	33.74
France	37.98	Sweden	20.99
Germany	44.74	Switzerland	25.73
Hong Kong	42.73	U.K.	9.93
Italy	37.54	U.S.A.	7.64

INTERNATIONAL RISK AND RETURN

- ◆ Dahlquist, et. al. (2003) make the point that actual portfolio holdings should be compared to **available market capitalization** rather than total market capitalization.

	<u>Weight in a U.S. investor's portfolio</u>		
	<u>Actual</u>	<u>Predicted (% of cap)</u>	<u>Adjusted prediction (% of available cap)</u>
Australia	0.24	1.30	1.25
Brazil	0.24	1.12	0.47
Canada	0.54	2.49	1.63
France	0.65	2.96	2.34
Germany	0.49	3.62	2.55
Hong Kong	0.21	1.81	1.32
Italy	0.32	1.51	1.21
Japan	1.04	9.72	7.65
Mexico	0.27	0.69	0.65
Netherlands	0.81	2.05	1.74
Sweden	0.30	1.20	1.21
Switzerland	0.47	2.53	2.39
U.K.	1.66	8.76	10.07
U.S.A.	91.29	49.60	58.32

Source: Dahlquist, Pinkowitz, Stulz, and Williamson, "Corporate Governance and the Home Bias," *Journal of Financial and Quantitative Analysis*, March 2003.

- ◆ Adjusting total market cap for available shares brings the portfolio holdings of U.S. investors **closer** to the prediction from portfolio theory. **Nevertheless**, this adjustment is unable to explain all of the observed home bias.

INTERNATIONAL RISK AND RETURN

➤ Unequal access to information

- ◆ It is difficult to get and interpret information from **distant markets**
- ◆ Once invested, it is difficult to monitor the actions of **distant managers**

Empirical evidence

- ◆ Individuals prefer investments that are **culturally similar** and **geographically nearby**
- ◆ Grinblatt and Keloharju find that investors in Finland are more likely to own firms that are **located nearby**, communicate in their **native tongue** (Swedish vs Finnish), or have CEOs of the **same cultural background**.

Grinblatt and Keloharju, "How Distance, Language, and Culture Influence Stockholdings and Trades," *Journal of Finance* (2001)

- ◆ According to Coval and Moskowitz, U.S. fund managers prefer **local firms**, especially **small** and **highly levered** firms that produce nontraded goods. Information and monitoring costs are particularly high for these firms.

Coval and Moskowitz, "Home Bias at Home: Local Equity Preference in Domestic Portfolios," *Journal of Finance* (1999)

- ◆ Investors in MNCs

Japanese MNCs with a greater international presence (i.e., ADRs or large export volume) have **greater foreign ownership**. Local firms are more likely to be owned by Japanese investors.

Kang and Stulz, "Why Is There a Home Bias? An Analysis of Foreign Portfolio Equity Ownership in Japan," *Journal of Financial Economics* (1997)

INTERNATIONAL RISK AND RETURN

Suggested solutions to questions

- Q1.** Clearly, Japan has the highest beta. The risk seems to be somewhat rewarded as it has the highest realized return.
- Q2.** Yes. Volatility of bond return is smaller than stock return, since the main variability of bond price is interest rate changes.
- Q3.** When the Forward Parity holds. So, to the extent that the Forward Parity predicts future spot rate, hedged and unhedged expected returns are close.
- Q4.** We have seen that exchange rate risk plays a relatively lesser role in foreign stock investment than in bond investment (see the proportion of FX rate variance in the tables). Thus, according to these tables, the benefit of hedging is relatively larger for bond investment. (But also see the Eun & Resnick Table, which provides another view.)
- Q5.** The ordinary diversification argument. Labor income is not traded, so investors have an incentive to diversify their portfolios into assets that have low correlations with their labor income.