Currency markets: Section 7

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Pset 4 review

1. Yes, there is an arbitrage opportunity.
2.
   a. Yes, there is a violation of CIP.
   b. See "Investing in forward markets" example in Section 5 slides.
   c. Net profit = 1.067 - 1.065 = 0.002 USD per unit of USD invested.
   d. $\frac{F_t - S_t}{S_t} = \frac{1.45-1.42}{1.42} \approx 0.021127$ (forward premium) $> 0.02 = i_t^{\$} - i_t^{€}$.
   e. $F_t = S_t \frac{1+i_t^{\$}}{1+i_t^{€}} = 1.42 \cdot \frac{1.065}{1.045} = 1.447$.

Pset 4 review

3. e) *i* and *iv*

Domestic currency to foreign currency strategy profits if

$$Profit = \frac{F_b}{S_a}(1 + i_b^*) - (1 + i_a) > 0$$

To prevent this,

$$\frac{F_b}{S_a}(1 + i_b^*) - (1 + i_a) \leq 0 \Rightarrow \frac{F_b}{S_a}(1 + i_b^*) \leq +i_a.$$

Similarly, foreign currency to domestic currency strategy profits if

$$Profit = \frac{S_b}{F_a}(1 + i_b) - (1 + i_a^*) > 0$$

To prevent this,

$$\frac{S_b}{F_a}(1 + i_b) - (1 + i_a^*) \leq 0 \Rightarrow \frac{S_b}{F_a}(1 + i_b) \leq 1 + i_a^*.$$

Pset 4 review

4.

a. Net cashflows

US Company A: (-4.1% in €), €–2.05 mil ×5 = € – 10.25 mil

German Company X: (-6.15% in $), $ – 3.6285 mil ×5 = $ – 18.1425 mil

Swap bank: (0.15% in $, 0.10% in €),

$(\$88,500 + €50,000) \times 5 = \$737,500$

b. Savings/earnings

US Company A saved (0.9% per year) €2.25 mil

German Company X saved (0.85% per year) $2.5075 mil

Swap bank earned (0.15% in $, 0.10% in €) $737,500

Reasons for currency hedging

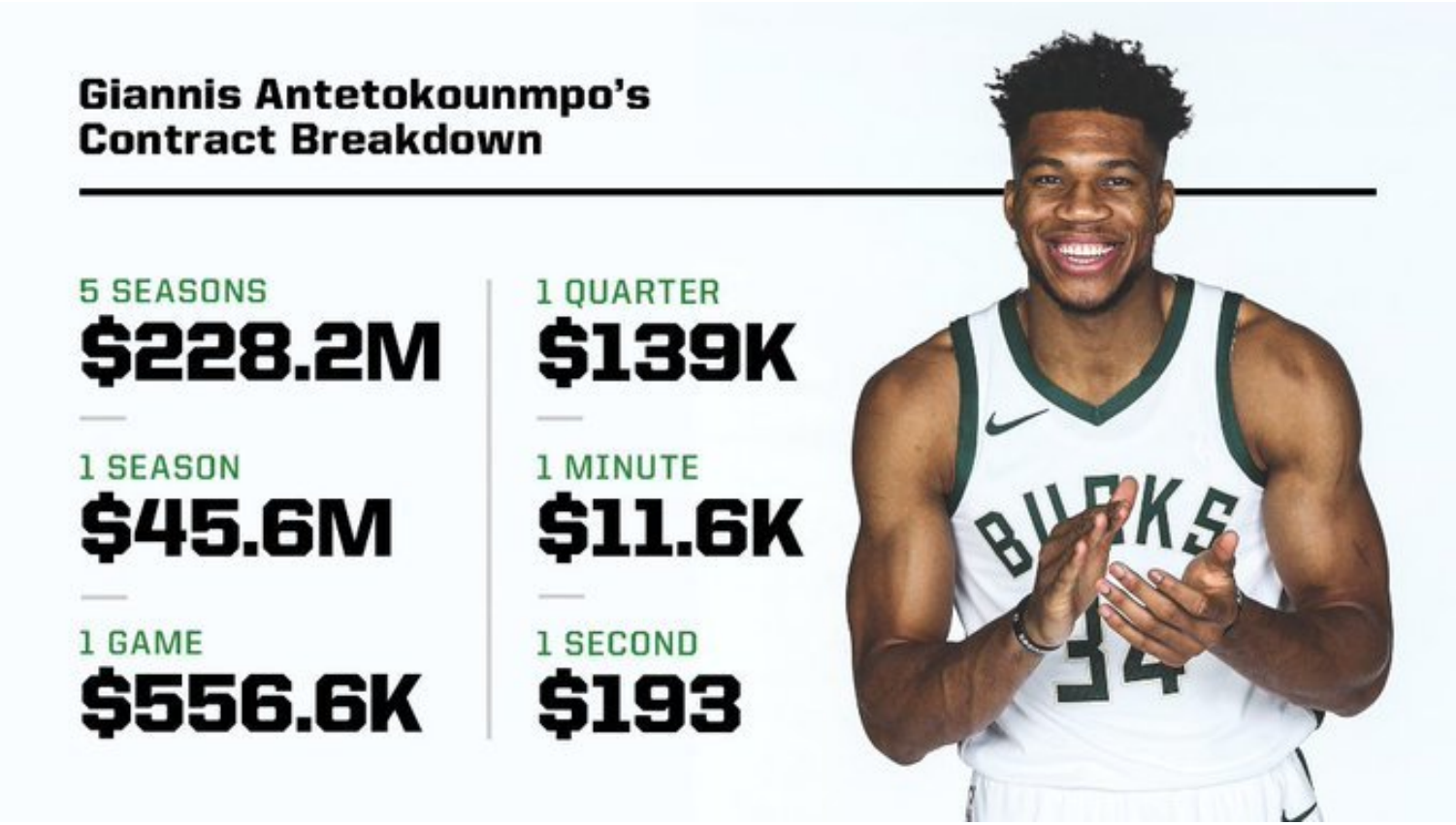
- Information asymmetry: firm vs. shareholders
- Differential transaction costs: firm vs. shareholders
- Default costs: currency hedging decreases probability of bankruptcy.
- Progressive corporate taxes: stable pre-tax earnings → lower corporate taxes relative to volatile pre-tax earnings.[1]

[1] Mackay and Moeller (2007), "The Value of Corporate Risk Management", The Journal of Finance, 62, pg. 1379-1419. https://doi.org/10.1111/j.1540-6261.2007.01239.x

Different way to hedge currencies

We'll start with forward contracts.

Forward contracts



Currency hedging with forward contracts

Suppose that EuroLeague Basketball wants to form a team in the UK. NBA built a new basketball facility to develop athletes in UK and billed EuroLeague £10 million payable in one year.

The NBA could wait a year to receive its payment and exchange £10 million at the future spot rate, but it is worried about exchange rate risk.

Instead, the NBA sets up a forward contract with a bank and sells its pounds forward for a £10 million delivery in one year at the one-year forward rate of \$1.3639/£. In one year, the NBA receives £10 million from EuroLeague, hands the £10 million to the bank, and receives \$13.639 million independent of the spot rate. The NBA's net pound exposure is zero.

Currency hedging in money markets

Now re-consider our first example, and suppose that $i^{\$} = 1.25\%$ and $i^{£} = 1\%$ with the current spot rate $S_0 = \$1.3646/£$.

The one year discounted £10,000,000 payment is £9,990,990.10. An example of money market hedging would be:

- Borrow £9,990,990.10 for one year.
- Convert £9,990,990.10 to \$13,510,891.09 at S_0.
- Invest \$13,510,891.09 at $i^{\$}$ in the US.
- After a year, collect £10 million from EuroLeague Basketball and repay borrowed £9,990,990.10.
- Receive $\$13,510,891.09 \cdot 1.0125 = 13,679,777.23$.

Notice all actions were done at $t = 0$. No exchange rate exposure.

Hedging through invoice currency

- The NBA could also invoice the EuroLeague in \$ which would eliminate (shift) exchange rate risk for the NBA.
- The NBA and EuroLeague could share the exchange rate risk by invoicing half in \$ and half in £.

Currency swaps as a sequence of forwards

Now suppose the UK and NBA want to form a basketball team in UK to compete in the EuroLeague. UK willing to give NBA £100 million loan with interest rate subsidized in pounds (10%).

NBA accepts but does not want £s liability because NBA does not want exchange rate risk.

NBA goes to bank with one-to-one spot and exchanges £s for $s.

NBA needs to buy £s forward.

Currency swaps as a sequence of forwards

If $S_0 = \$1/£, F_1 = \$1.1/£, F_2 = \$1.2/£, F_3 = \$1.3/£$

	$t=0$			$t=1$			$t=2$			$t=3$		
UK government	-£100					+£10			+£10			+£110
NBA	+£100	-£100	+$100	-$11	+£10	-£10	-$12	+£10	-£10	-$143	+ £110	-£110
Bank		+£100	-$100	+$11	- £10		+$12	-£10		+$143	-£110	

Currency hedging with recurrent exposures

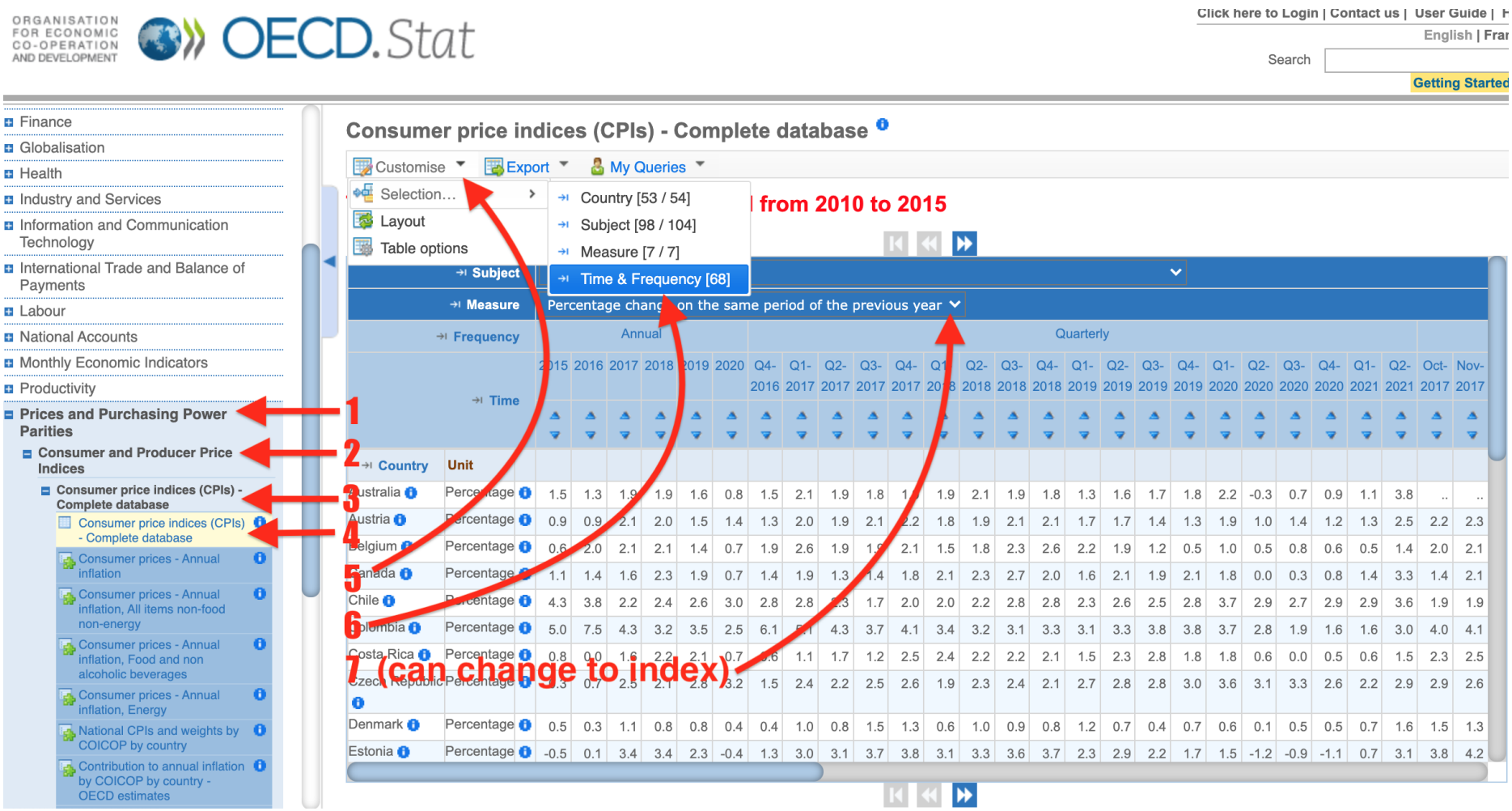
Suppose the NBA now has a EuroLeague Basketball team in UK. The NBA now has a recurrent revenue stream in £. It plans to recoup 1% of the UK team's annual profits and re-invest the rest of the profits back into the UK team. The NBA's analysts predict profits of £10 million annually for the next five years.

The NBA can eliminate exchange rate risk today by (once again) setting up a sequence of forward contracts at F_1, F_2, F_3, F_4, F_5.

Pset 5 hints

1. Assume parity conditions hold (don't use approximations).
2.
   b. Demonstrate the relationship with a regression.
3. Recall Section 6 discussion of real exchange rates.

Pset 5 hints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Consumer price indices (CPIs) - Complete database
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Consumer prices - Annual inflation
Consumer prices - Annual inflation, All items non-food non-energy
Consumer prices - Annual inflation, Food and non alcoholic beverages
Consumer prices - Annual inflation, Energy
National CPIs and weights by COICOP by country
Contribution to annual inflation by COICOP by country - OECD estimates
Consumer price indices (CPIs) - Complete database
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Export
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Country [53 / 54]
Subject [98 / 104]
Measure [7 / 7]
Time & Frequency [68]
from 2010 to 2015
Subject
Measure
Percentage change on the same period of the previous year
Frequency
Annual
Quarterly
Time
Country
Unit
1
2
3
4
5
6
7 (can change to index)

Exam

- 24 hour take-home exam.
- If you've had submission issues before, use this last homework as practice for correctly submitting your work.
- Equity and currency review in next week's section.
- Equity: review materials and homework – make sure you understand the assignments.
- Currency: updates coming soon.