International Economics: Lecture 19

Exchange rates in the Short run: Asset approach

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Interest arbitrage & Risk

Interest on dram / dollar denominated assets, r=10 / r*=5

Investor should decide in which asset to invest taking account exchange rate risk.

Two investment strategies

1) Riskless arbitrage:
Hedge the exposure to exchange rate risk through forward contract.

2) Risky arbitrage:
Wait to use a spot contract when the investment matures.

Riskless arbitrage: Covered interest parity

Interest on dram / dollar deposits, $r=10$ / $r^*=5$

Forward rate, $F_{AMD/\$}=523.8$

Spot rate, $S_{AMD/\$}=500$

Dram return on dram asset: $ROR_{AMD} = r$

Dram return on dollar asset: $ROR_{\$} = 1/S \times (1+r^*) \times F - 1$

To avoid risk we engage in a forward contract today.

Note: The last strategy requires both *spot*, and *forward* contracts. The two are combined in a ***swap*** contract. That is why swaps are so prevalent.

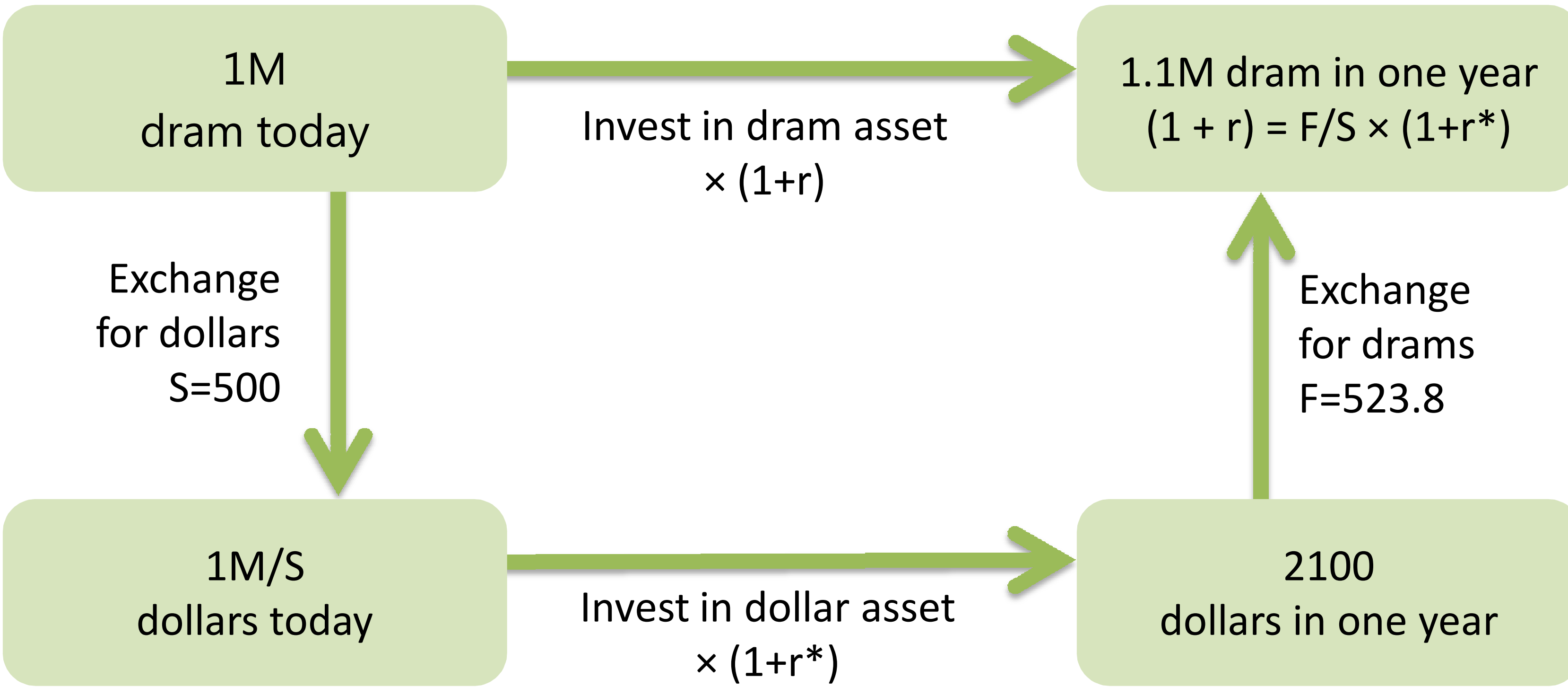
No arbitrage condition $\Leftrightarrow$ *Covered interest parity*

$$r = 1/S \times (1+r^*) \times F - 1$$

$$F/S = (1 + r) / (1+r^*) \quad \text{or} \quad F = S\,(1+r) / (1+r^*)$$

Exchange rate risk has been "covered"

Riskless arbitrage: Covered interest parity



Interest on dram / dollar deposits: r=10 / r*=5. Forward rate: $F_{AMD/\$}$=523.8. Spot rate: $S_{AMD/\$}$=500

Riskless arbitrage opportunities

Invest in dram if $ROR_{AMD} > ROR_{\$}$

$$r > 1/S \times (1+r^*) \times F - 1$$

$$F/S < (1+r)/(1+r^*)$$

$$(F - S)/S < (r-r^*)/(1+r^*)$$

Invest in dram if forward premium/discount is *less* than interest rate differential.

Otherwise invest in dollar.

Risky arbitrage: Uncovered interest parity

Interest on dram / dollar deposits, r=10 / r*=5
Expected exchange rate, $S^e_{AMD/\$}=523.8$
Spot rate, $S_{AMD/\$}=500$

Dram return on dram asset: $ROR_{AMD} = r$

Expected dram return on dollar asset: $ROR_{\$} = 1/S \times (1+r^*) \times S^e - 1$
We take the risk and don't hedge.

No arbitrage condition ⇔ *Uncovered interest parity*

$$r = 1/S \times (1+r^*) \times S^e - 1$$

$$S^e/S = (1 + r) / (1+r^*)$$

Exchange rate risk hasn't been "covered", they were left "uncovered"

Risky arbitrage: Uncovered interest parity

UIP can be seen as a theory of spot rate determination.

$$S^e/S = (1 + r) / (1+r^*)$$

$$S = S^e (1 + r^*) / (1+r)$$

$$(S^e - S)/S = (r-r^*)/(1+r^*)$$

Higher interest rate currency is expected to depreciate

Test of UIP

CIP: $(1 + r) = F/S \times (1+r^*)$

UIP: $(1 + r) = S^e/S \times (1+r^*)$

$\Rightarrow \quad F = S^e$

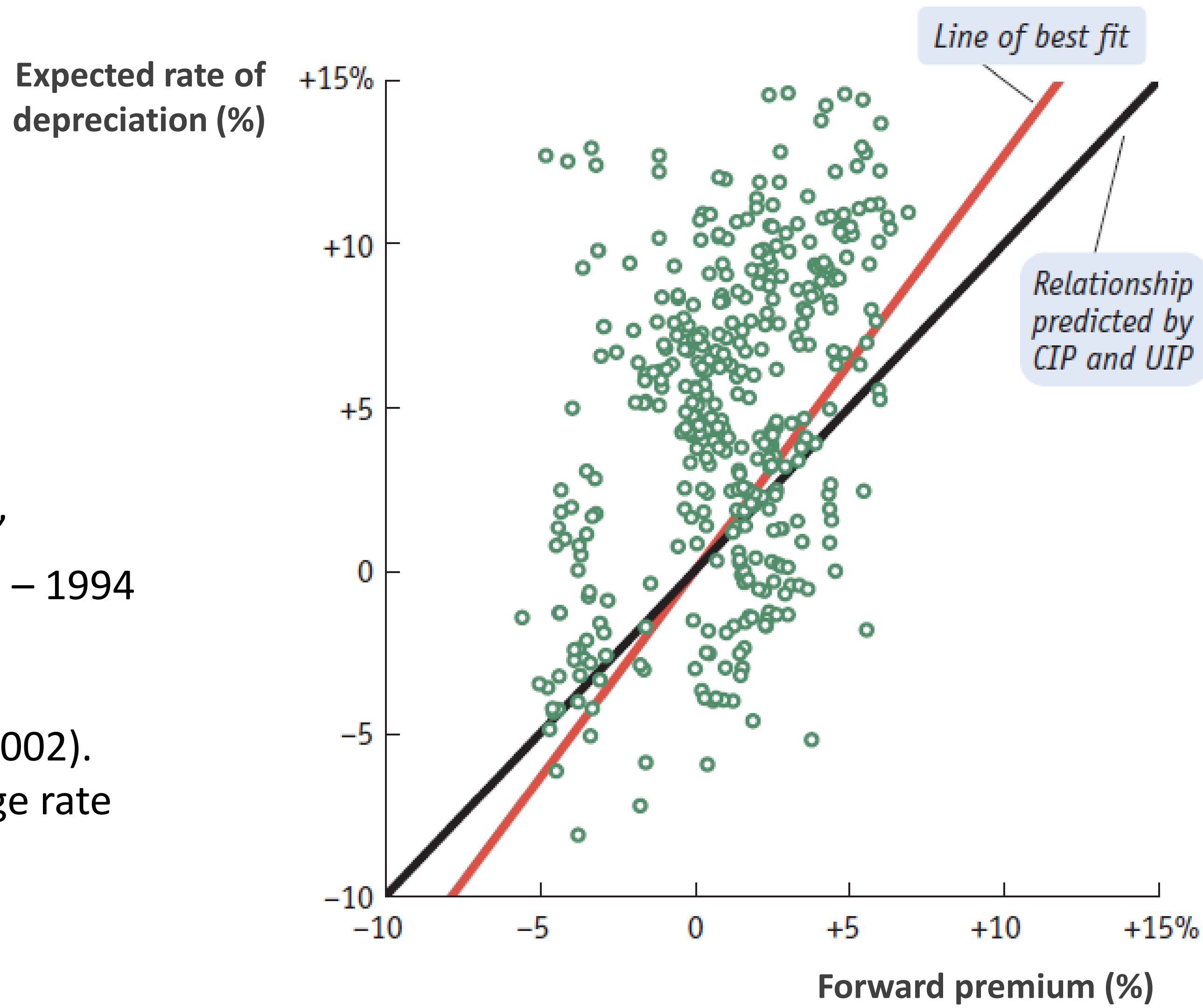
Forward rate = expected spot rate
if both CIP and UIP hold

Although
S^e employed in risky arbitrage,
F employed in riskless arbitrage,
they should be equal.

CIP assumed to hold, as there is a strong evidence in favor or CIP.

And if $F = S^e$, $\Rightarrow$ Forward premium = Expected rate of depreciation

Test of UIP



Survey of Forex traders' expectations over 1988 – 1994 on 24 currencies.

Chinn, M., Frankel, J. (2002). Survey data on exchange rate expectations.

UIP & Term structure of interest rates

UIP: $(S^e-S)/S = (r-r^*) / (1+r^*)$

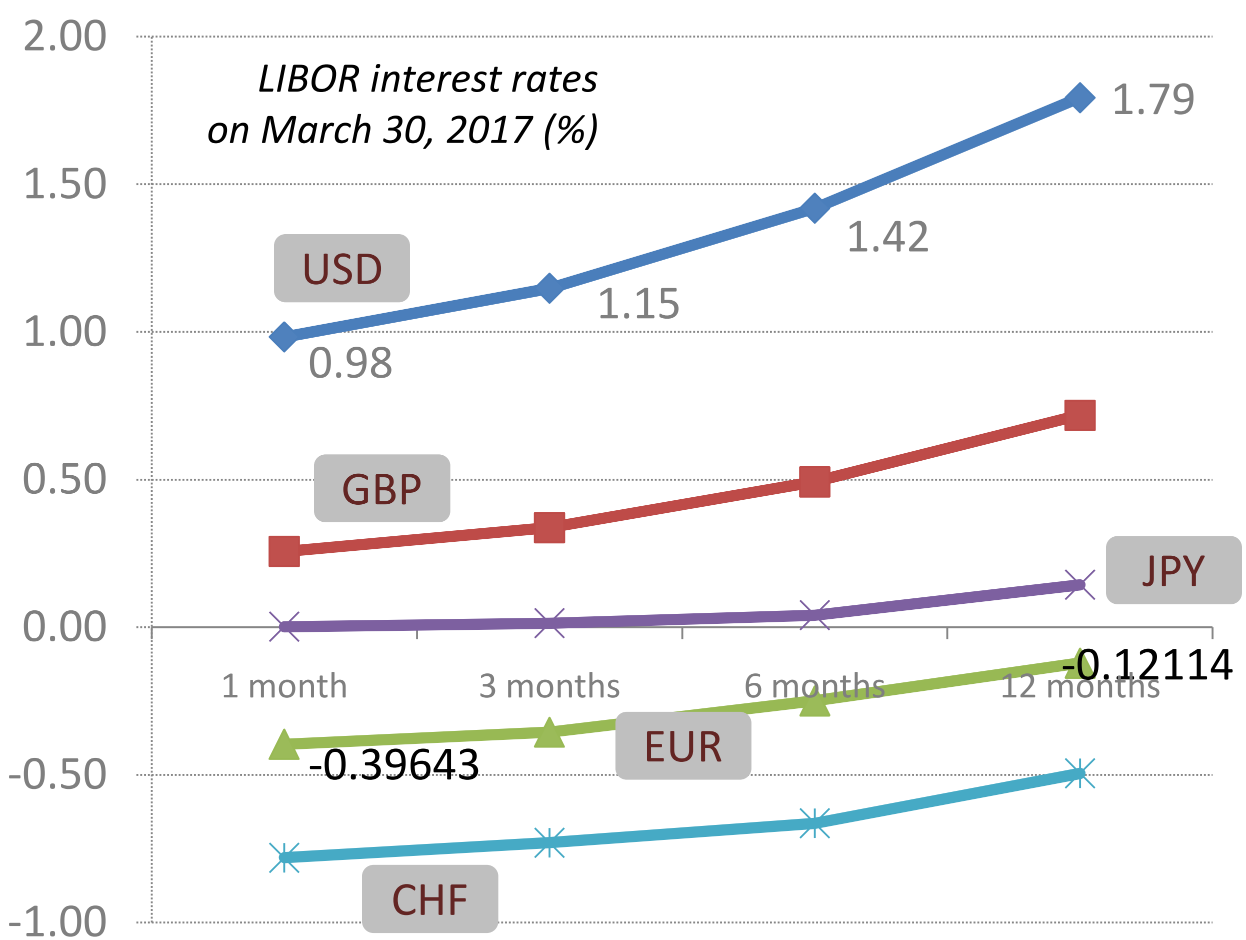
Lower interest rate currency expected to appreciate.

Term structure of interest rates – the relation between security
- maturity dates and
- the rates of return

Usually, longer dated securities have higher rates of return

Therefore, the term structure reveals *how exchange rate expectations are changing* through time

UIP & Term structure of interest rates



LIBOR - average interbank interest rates in London money market at which large banks are lending each another unsecured loans.

__Parallel lines__ –
Exchange rate changes expected to be constant *(appreciate/depreciate against each other at a constant rate).*

__Diverging lines__ –
Higher interest rate currency is expected to depreciate at a __increasing__ rate.

__Converging lines__ –
Higher interest rate currency is expected to depreciate at a __declining__ rate.

Interest parities vs. Spot & Forward rates

Expected future spot rate S^e

Interest rates r, r^*

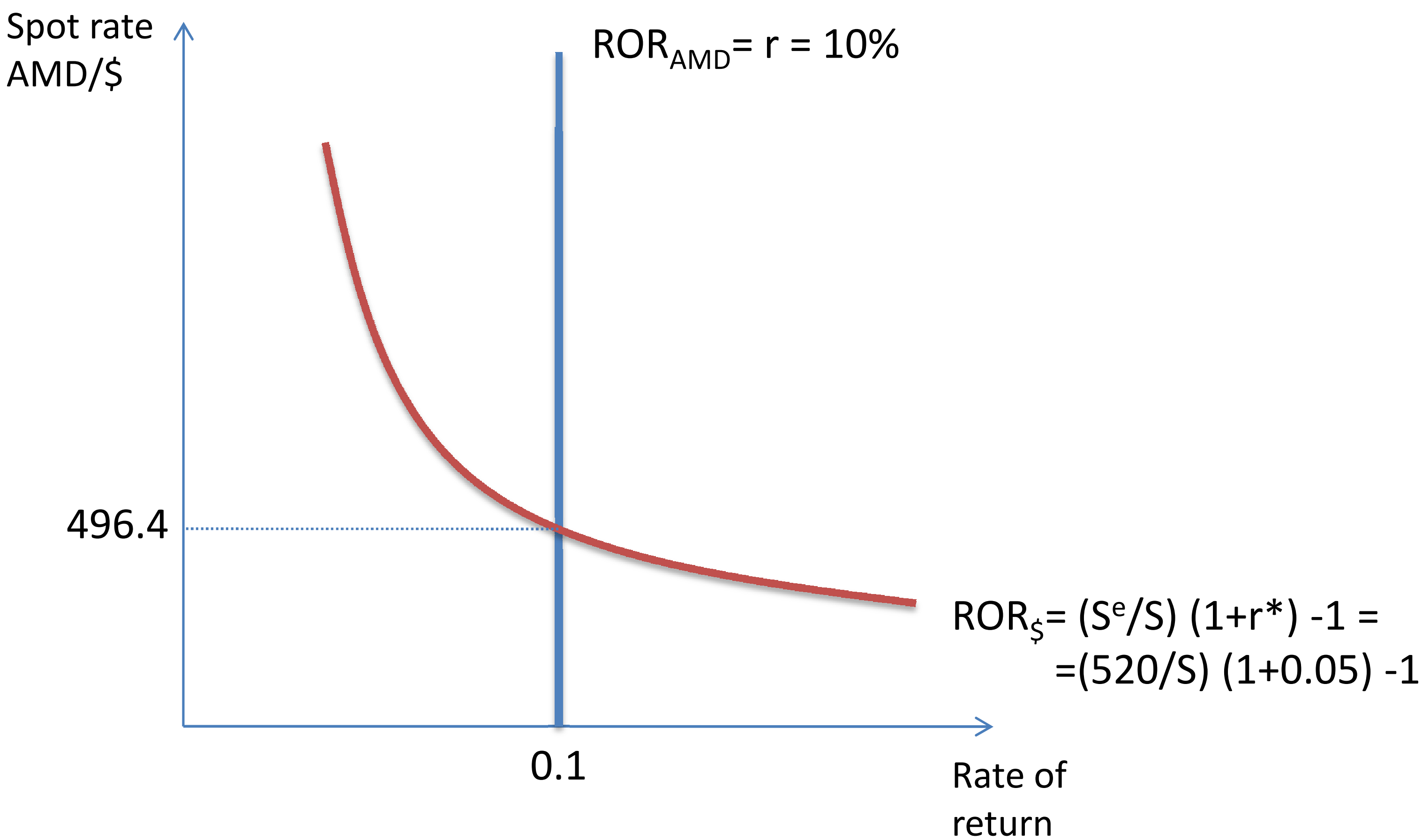
Spot market model:
Uncovered interest parity

$$S = S^e(1+r^*)/(1+r)$$

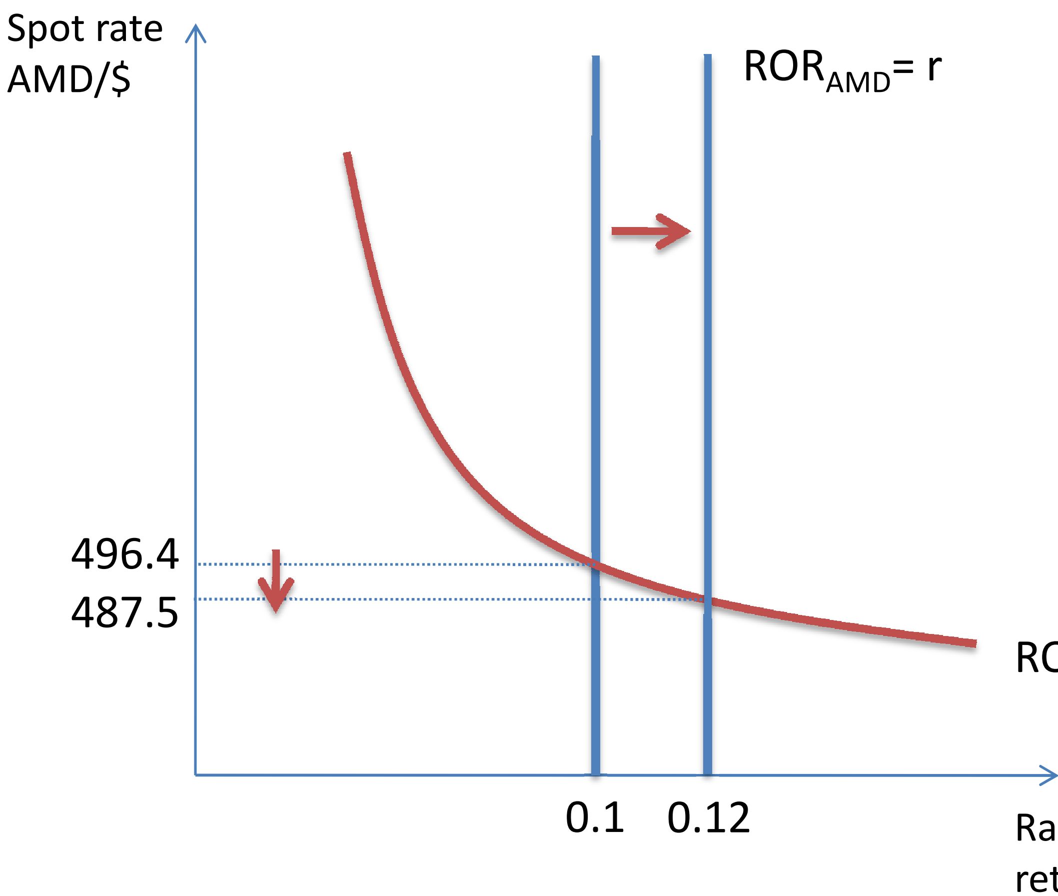
Forward market model:
Covered interest parity

$$F = S(1+r)/(1+r^*)$$

FX market


Spot rate
AMD/$
ROR$_{AMD}$= r = 10%
496.4
0.1
ROR$_{\$}$= (S^e/S) (1+r*) -1 =
=(520/S) (1+0.05) -1
Rate of
return

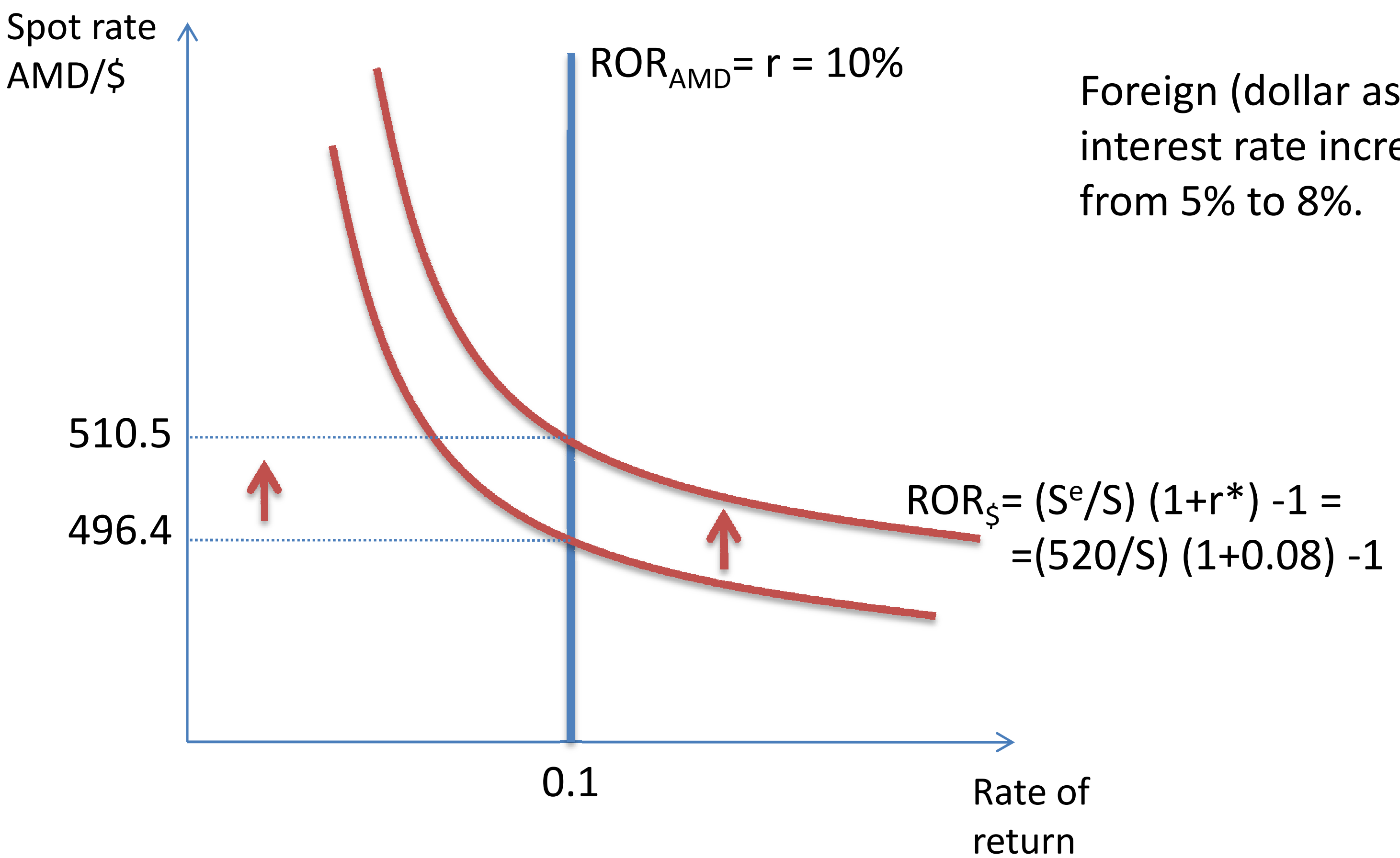
FX market



Domestic interest rate increases from 10% to 12%.

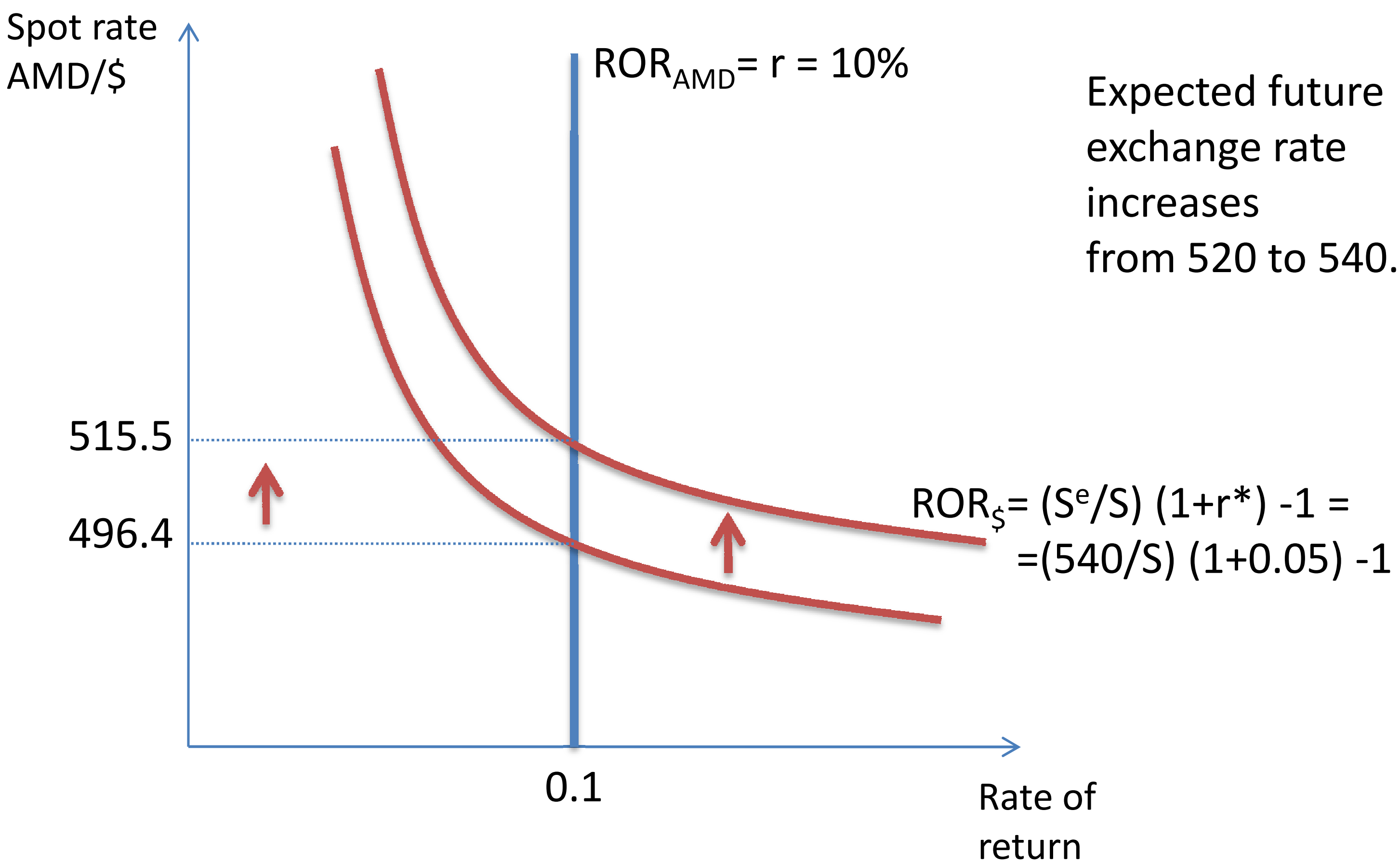
$ROR_{\$} = (S^e/S)\,(1+r^*) - 1 =$
$= (520/S)\,(1+0.05) - 1$

FX market



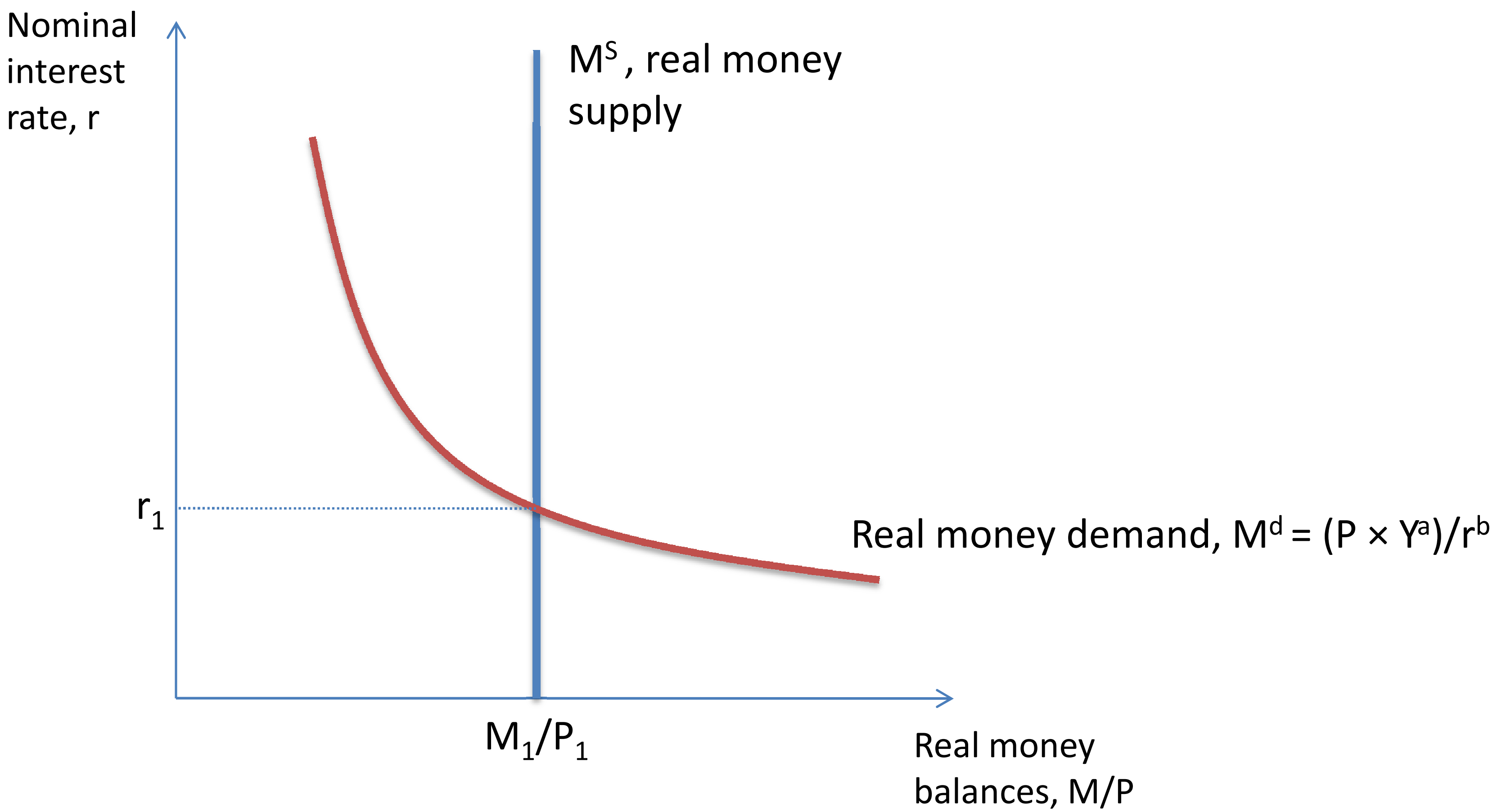
Foreign (dollar asset) interest rate increases from 5% to 8%.

FX market

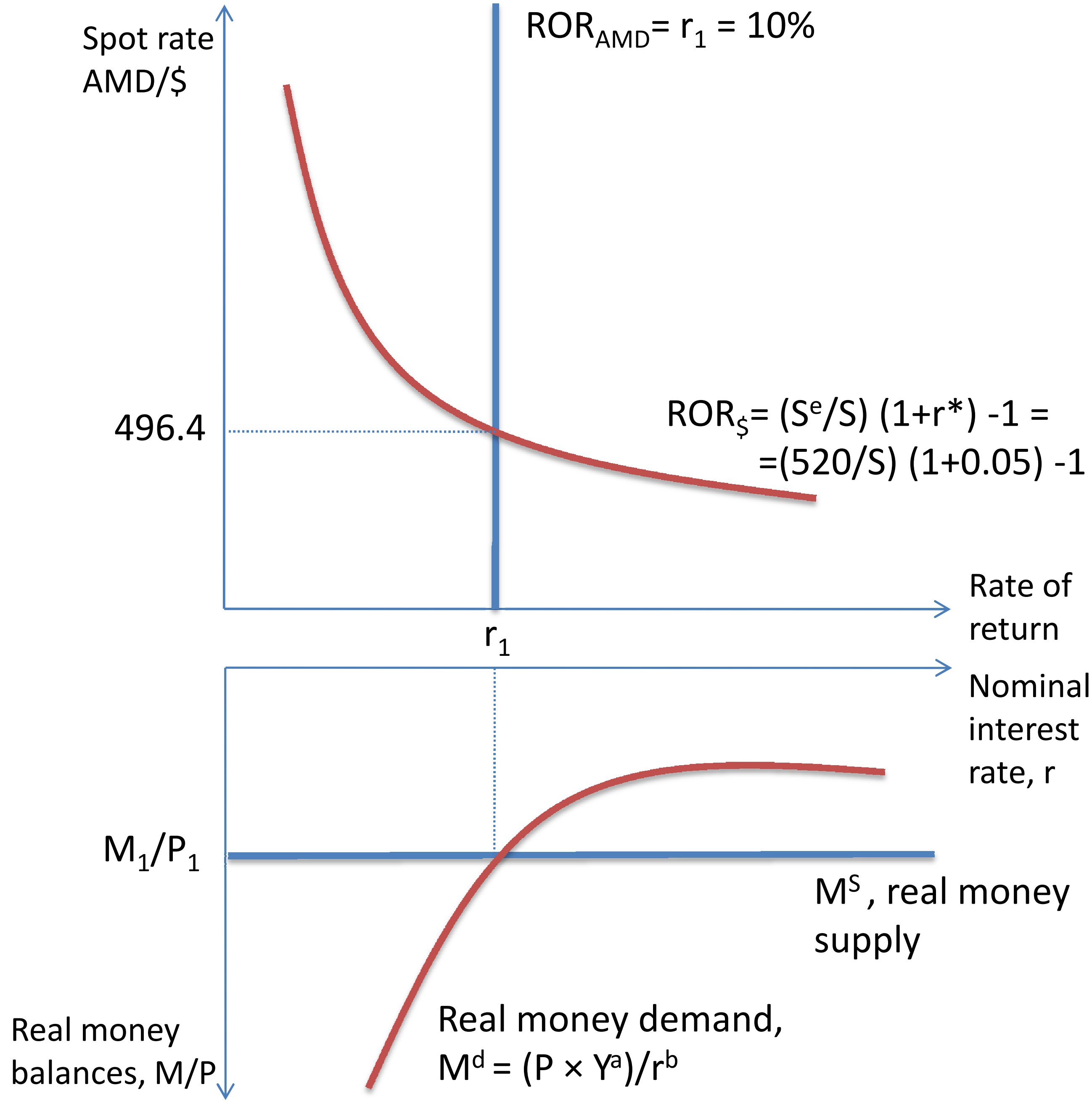


Expected future exchange rate increases from 520 to 540.

Money market

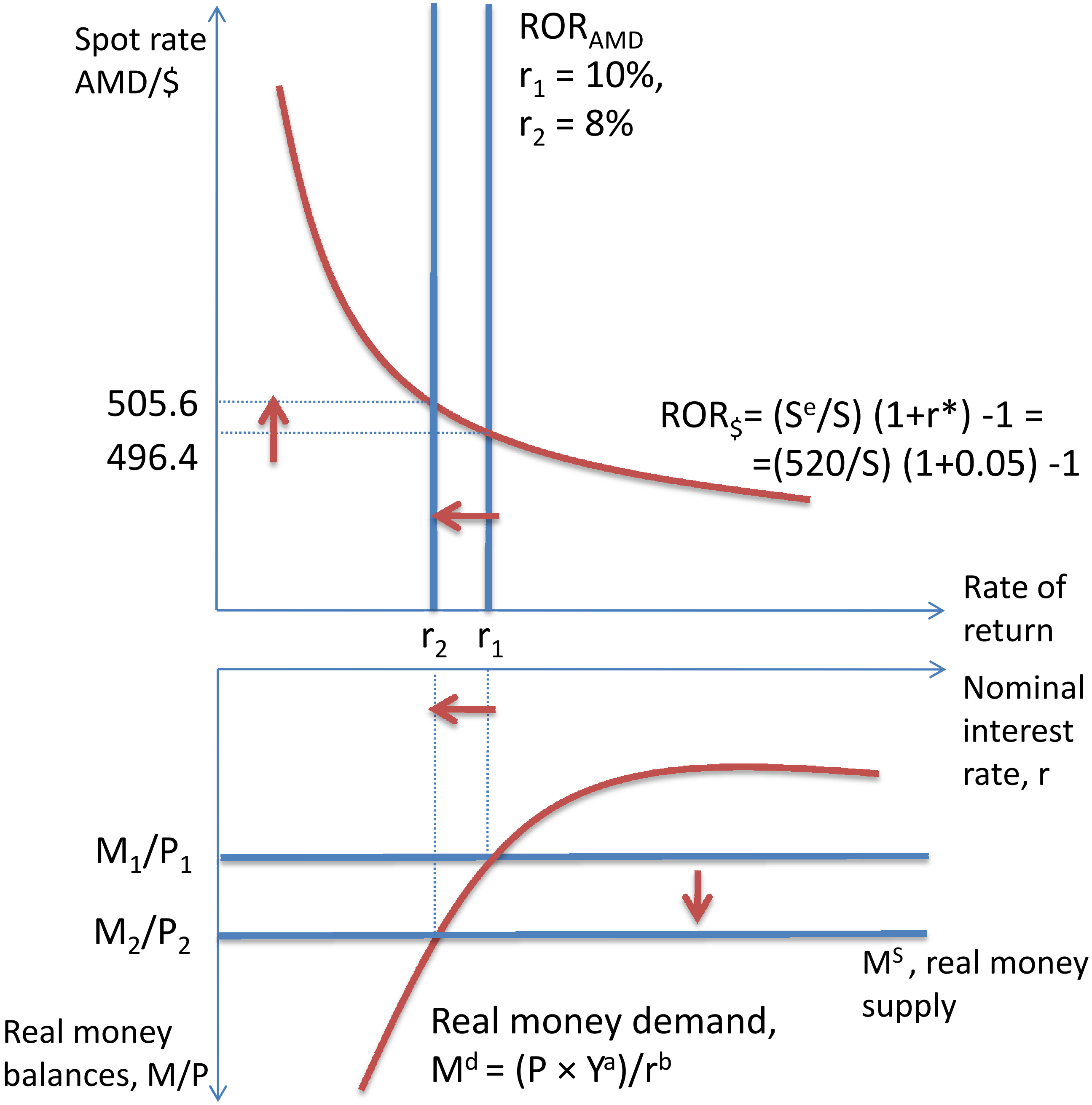


FX & Money markets



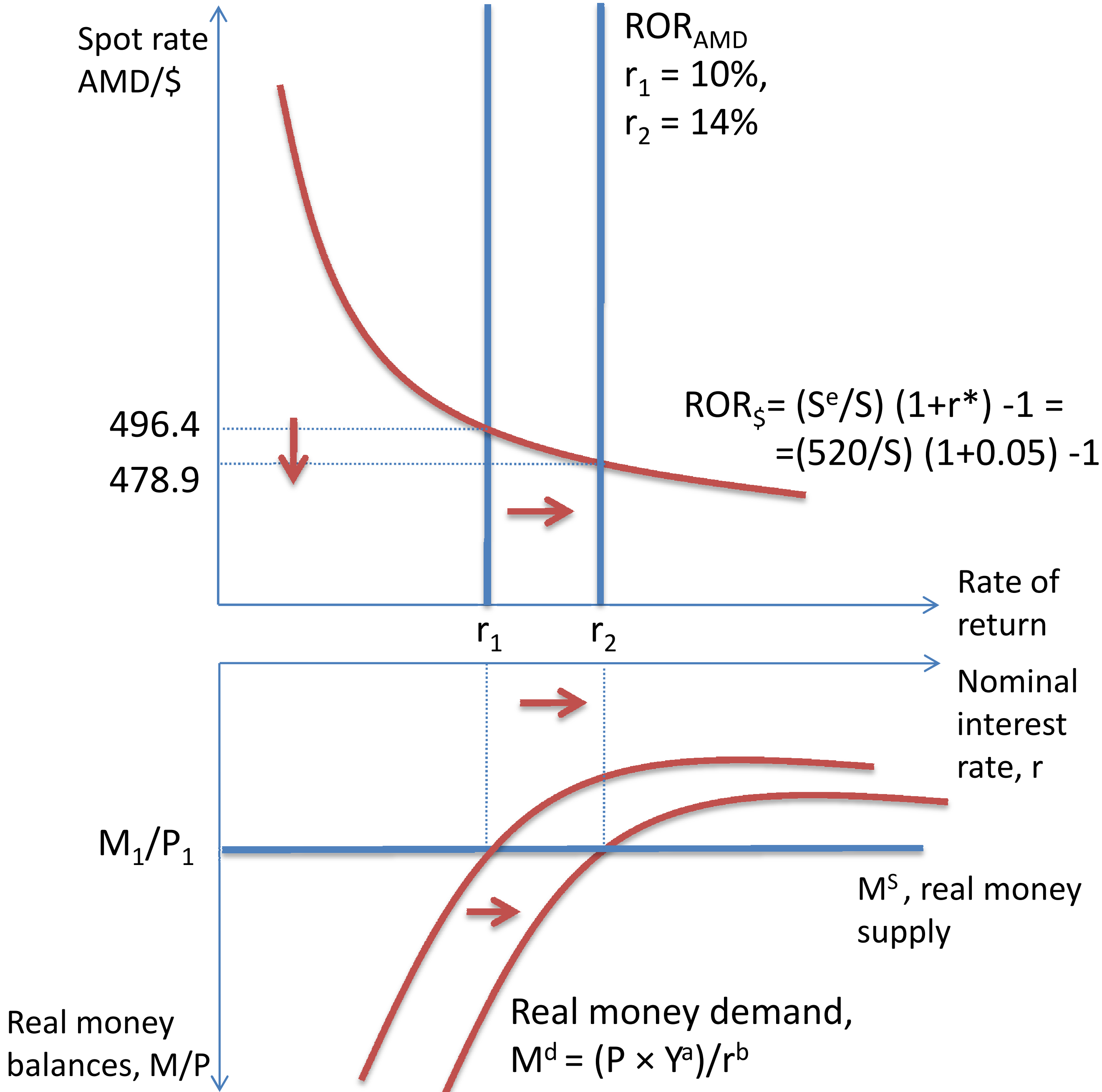
FX & Money markets

1. An increase in Real money supply ….
2. … lowers the nominal interest rate ….
3. … and decreases ROR_{AMD} ….
4. … as a result of which Dram depreciates.



FX & Money markets

1. An increase in Real money demand ….
2. … increases the nominal interest rate ….
3. … and raises ROR_{AMD} ….
4. … as a result of which Dram appreciates.



Thank you and take care,

but remember

Getting an education was a bit like a communicable venereal disease. It made you unsuitable for a lot of jobs and then you had the urge to pass it on.

Terry Pratchett, Hogfather