

International Economics: Lecture 17

Foreign Exchange Market

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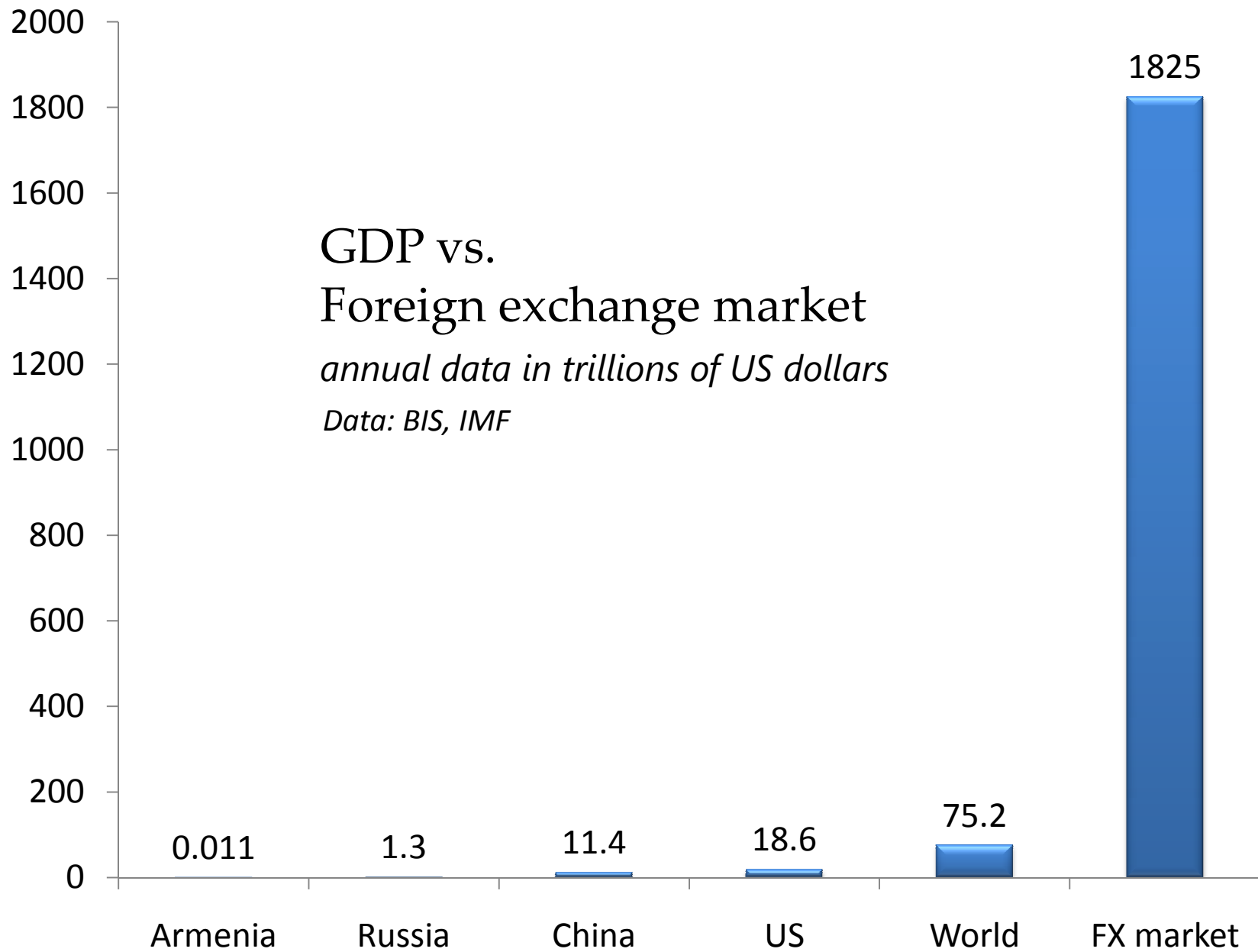
ATC, April 3, 2017

Foreign exchange market turnover

*OTC turnover, daily averages in April,
in billions of US dollars*

Instrument	2001	2004	2007	2010	2013	2016
Foreign exchange instruments	1,239	1,934	3,324	3,973	5,357	5,067
Spot transactions	386	631	1,005	1,489	2,047	1,652
Outright forwards	130	209	362	475	679	700
Foreign exchange swaps	656	954	1,714	1,759	2,240	2,378
Currency swaps	7	21	31	43	54	82
Options and other products	60	119	212	207	337	254

Data: BIS



Currency distribution of OTC foreign exchange turnover

percentage shares of average daily turnover in April

Currency	2001		2016	
	Share	Rank	Share	Rank
USD	89.9	1	87.6	1
EUR	37.9	2	31.4	2
JPY	23.5	3	21.6	3
GBP	13.0	4	12.8	4
AUD	4.3	7	6.9	5
CAD	4.5	6	5.1	6
CHF	6.0	5	4.8	7
CNY	0.0	35	4.0	8
SEK	2.5	8	2.2	9
NZD	0.6	16	2.1	10
MXN	0.8	14	1.9	11
SGD	1.1	12	1.8	12
HKD	2.2	9	1.7	13
NOK	1.5	10	1.7	14
KRW	0.8	15	1.7	15
TRY	0.0	30	1.4	16
RUB	0.3	19	1.1	17
....
Total	200		200	

Data: BIS

OTC foreign exchange turnover by currency pair

daily averages in April, in billions of US dollars and percentages

Currency pair	2001		2016	
	Amount	%	Amount	%
USD / EUR	372	30.0	1,172	23.1
USD / JPY	250	20.2	901	17.8
USD / GBP	129	10.4	470	9.3
USD / AUD	51	4.1	262	5.2
USD / CAD	54	4.3	218	4.3
USD / CNY	...	...	192	3.8
USD / CHF	59	4.8	180	3.6
USD / MXN	...	...	90	1.8
USD / SGD	...	...	81	1.6
USD / KRW	...	...	78	1.5
USD / NZD	...	...	78	1.5
USD / HKD	...	...	77	1.5
USD / SEK	...	...	66	1.3
USD / TRY	...	...	64	1.3
USD / INR	...	...	56	1.1
USD / RUB	...	...	53	1.1
...
Total	1,239	100	5,067	100

Data: BIS

Trading Hours

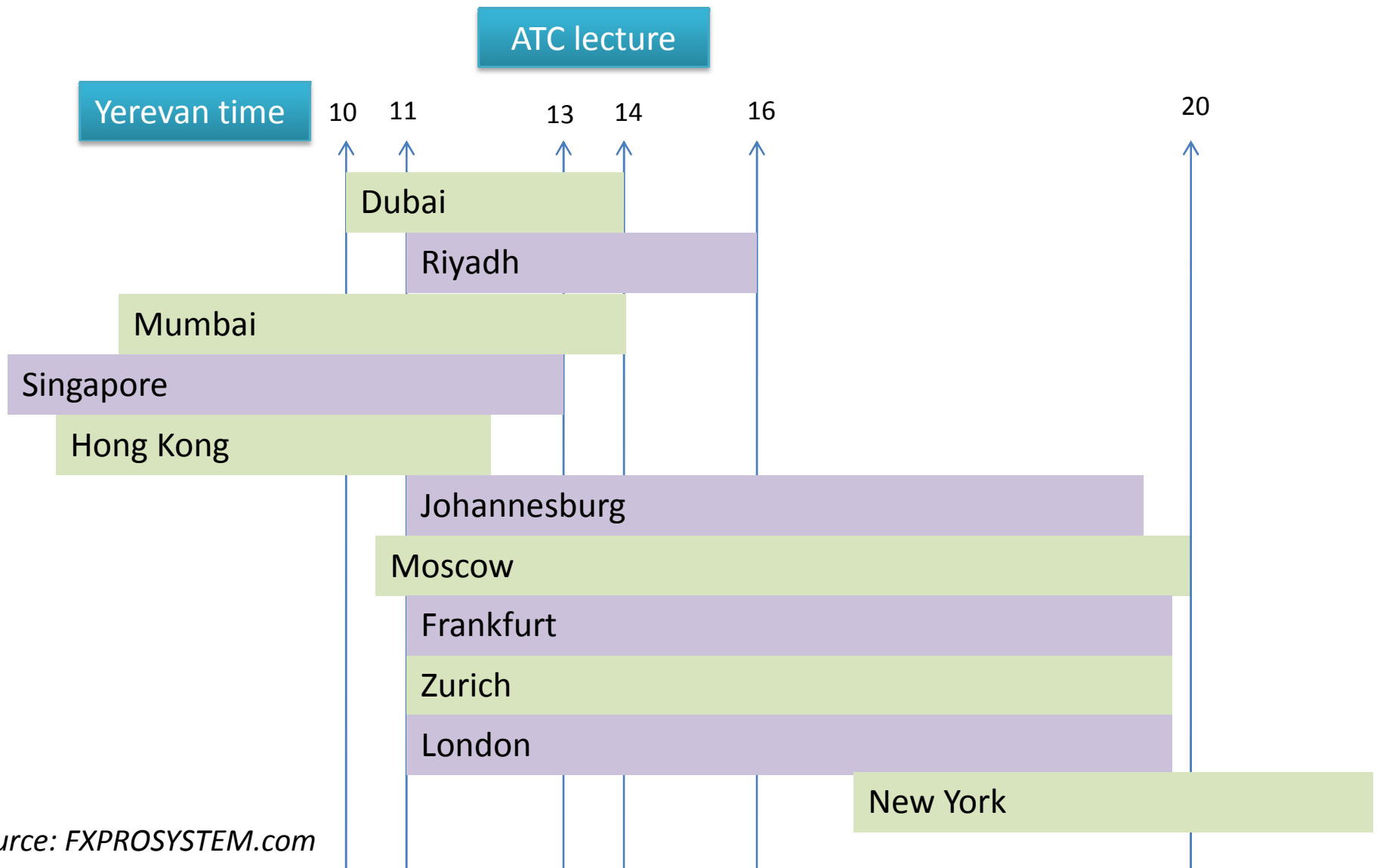
Forex market is open 24 hours 5 days a week.



1. Australia and Oceania (Sydney, Wellington) – GMT 22:00-06:00
2. Asian session (Tokyo, Singapore, Hong Kong) – GMT 00:00-09:00
3. European Session (London, Zurich, Paris, Frankfurt) – GMT 07:00-16:00
4. American session (New York, Chicago, Toronto) – GMT 13:30-20:00

Source: FXPROSYSTEM.com

Exchange Trading Hours



Source: FXPROSYSTEM.com

Geographical distribution of OTC foreign exchange turnover

daily averages in April, in billions of US dollars and percentages

Country	2001		2016	
	Amount	%	Amount	%
Argentina	...	...	1	0.0
Australia	54	3.2	121	1.9
Canada	44	2.6	86	1.3
China	...	...	73	1.1
Chinese Taipei	5	0.3	27	0.4
Denmark	24	1.4	101	1.5
France	50	2.9	181	2.8
Germany	91	5.4	116	1.8
Hong Kong SAR	68	4.0	437	6.7
Japan	153	9.0	399	6.1
Korea	10	0.6	48	0.7
Luxembourg	13	0.8	37	0.6
Netherlands	31	1.8	85	1.3
New Zealand	4	0.2	10	0.2
Norway	13	0.8	40	0.6
Russia	10	0.6	45	0.7
Singapore	104	6.1	517	7.9
Sweden	25	1.5	42	0.6
Switzerland	76	4.5	156	2.4
Turkey	1	0.1	22	0.3
United Kingdom	542	31.8	2,406	36.9
United States	273	16.0	1,272	19.5
....
Total		100.0		100.0

Data: BIS

Spot vs. Forward

Spot transaction: Purchase or sale of currency for immediate delivery and payment on the spot date.

Forward transaction: Purchase or sale of currency with the delivery and payment at a specified future date.

Suppose ArmPhone manufacturer, TSD has an order from Russia of 56mln RUB in three months. TSD worries, that in three months RUB will depreciate.

Current spot:	1 USD=56 RUB	56 mln RUB = \$1 mln
Expected spot in 3 months:	1 USD = 80 RUB	56 mln RUB = \$0.7 mln
3 month Forward rate:	1 USD = 58 RUB	

Therefore, TSD engages in a 3 months currency forward and sells 56 mln RUB in exchange for 0.96 mln USD.

Fair Forward rate

Money may be invested to earn interest, so the future value of money is greater than its present value.

An investor has 1M drams.

Dram/dollar spot rate, $E=500$, expected spot rate in one year, $E^e=520$.

Interest on dram (dollar) denominated asset: $r=10\%$ ($r^=5\%$)*

If 1M drams are invested in dram-asset:

$$\text{AMD } 1\text{M} \times (1+0.1) = \text{AMD } 1.1\text{M} \quad \Leftrightarrow \quad \text{ROR}_{\text{AMD}} = (A \times (1+r) - A) / A = r$$

If in dollar-asset: $\text{AMD } 1\text{M}/500 \times (1+0.05) \times 520 = \text{AMD } 1,092,000$

$$\text{ROR}_{\text{USD}} = \{ A/E \times (1+r^*) \times E^e - A \} / A = 1/E \times (1+r^*) \times E^e - 1$$

$$\text{ROR}_{\text{USD}} = \text{ROR}_{\text{AMD}} \quad \Leftrightarrow \quad 1/E \times (1+r^*) \times E^e - 1 = r$$

$$E^e/E = (1+r)/(1+r^*) \quad \Leftrightarrow \quad (E^e-E)/E \approx r-r^* \quad \text{Uncovered Interest Parity}$$

$$F/E = (1+r)/(1+r^*) \quad \Leftrightarrow \quad (F-E)/E \approx r-r^* \quad \text{Covered Interest Parity}$$

Fair Forward rate

$$F/E = (1+r)/(1+r^*) \quad \Leftrightarrow \quad (F-E)/E \approx r-r^* \quad \text{Covered Interest Parity}$$

$$F = E(1+r)/(1+r^*) = 500(1+0.1)/(1+0.05) = 523.8 \quad \text{Fair Forward Rate}$$

Forward contract

A forward contract is an agreement to buy or to sell an asset at a future settlement date at a forward price specified today.

If Forward Rate is not Fair, then there are ARBITRAGE opportunities.

Arbitrage

Buying a good or asset in one market where price is low, and simultaneously selling in another market where price is higher. It doesn't involve taking any risks.

Currency derivatives (CD)

Options, futures, forwards, swaps

Main purpose: To *hedge against exchange rate risks*

Extensively used for speculation: *Profiting from exchange rate fluctuations*

Main market participants:

- Hedgers, wish to cover their risks.
- Speculators, wish to profit from exchange rate volatilities.
- Arbitragers, wish to realize riskless profit by simultaneously buying and selling the same instrument in two different markets.

In essence, speculators take on what hedgers want to avoid. Therefore speculators are essential for market efficiency.

Over the counter (OTC)

The size of OTC currency market is about 5T daily.

OTC transactions have following characteristics:

- The two counterparties are aware of each other's identity
- The transactions size and price are determined based on negotiations
- The risk of default is borne by the other counterparty

In contrast, organized exchange transactions are characterized by:

- Standardized lot sizes and maturity dates
- Absolute anonymity
- Guaranteed settlement of the trade by the exchange
- Transparent prices

OTC: **Outright forward** (*customized, usually used for hedging*)

Organized exchanges: **Currency futures** (*standardized, usually used for speculation*)

Currency futures

Currency futures are contract to buy or sell a standard quantity of currency assets at a pre-specified future date at a pre-specified price.

- The seller agrees to deliver the currency at a pre-specified delivery date;
- The buyer agrees to take delivery of the currency at a pre-specified delivery date.

The only variable of a futures transaction is the price.

Settlement (delivery) dates of currency futures:

3rd Wednesday of March, June, September, and December

Contract sizes

1. Full: 125,000 Euro, Swiss Franc;
100,000 CAD, AUS;
62,500 GBP;
12,500,000 JPY
2. Mini (1/2 of Full)
3. E-Micro (1/10 of the Full)

Currency futures

Usually speculators offset their original position by taking an exact opposite position at any time before the settlement date.

⇒ In over 90% of cases only the net profit or loss is credited or debited to the traders account.

⇒ In less than 10% of cases contracts are settled through physical delivery of currency.

Currency futures

Suppose the Euro Futures rate for June 2017 is 1.069 Dollars per Euro.

A speculator believes the June spot rate will be higher than 1.069.

⇒ buys a June contract (i.e. agrees to take a delivery of 125,000 Euros for 1.069\$/€).

If in June the spot rate rises to 1.075\$/€, then the speculator will realize a profit, by taking the delivery of 125,000 Euros for 1.069\$/€ and selling it in the spot market for 1.075\$/€.

The profit will be equal to:

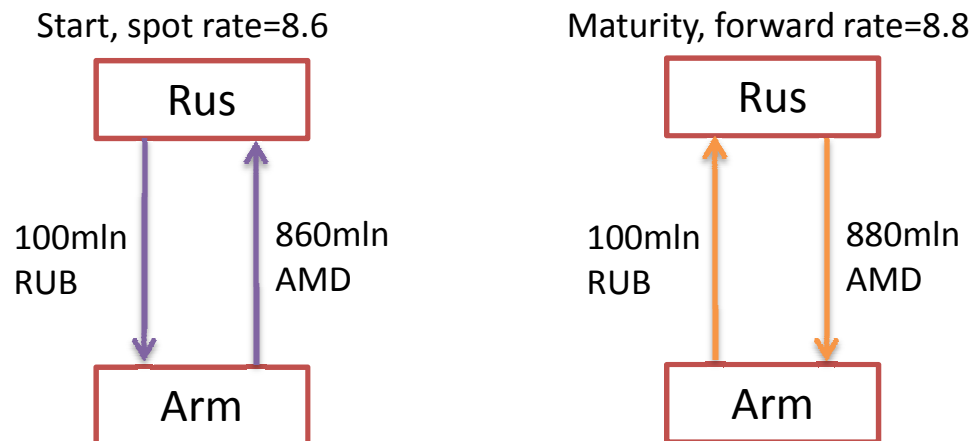
$$125,000\text{€} \times (1.075\text{\$/€} - 1.069\text{\$/€}) = \$750 \quad \textit{A trifle, but nice!}$$

Foreign exchange swap

FX swap is the simultaneous purchase and sale of one currency against another for two different value dates (usually spot/forward, sometimes forward/forward).
FX swap is simply the combination of a spot and a forward transactions.

Spot leg: At the start of the FX swap contract, Rus borrows 100×8.6 mln AMD from Arm, and lends 100 mln RUB to Arm, where 8.6 is the dram/rouble spot rate.

Forward leg: When the FX swap contract expires, Arm returns 100×8.8 mln AMD to Rus, and Arm returns 100 mln RUB to Rus, where 8.8 is the dram/rouble forward rate as of the start.

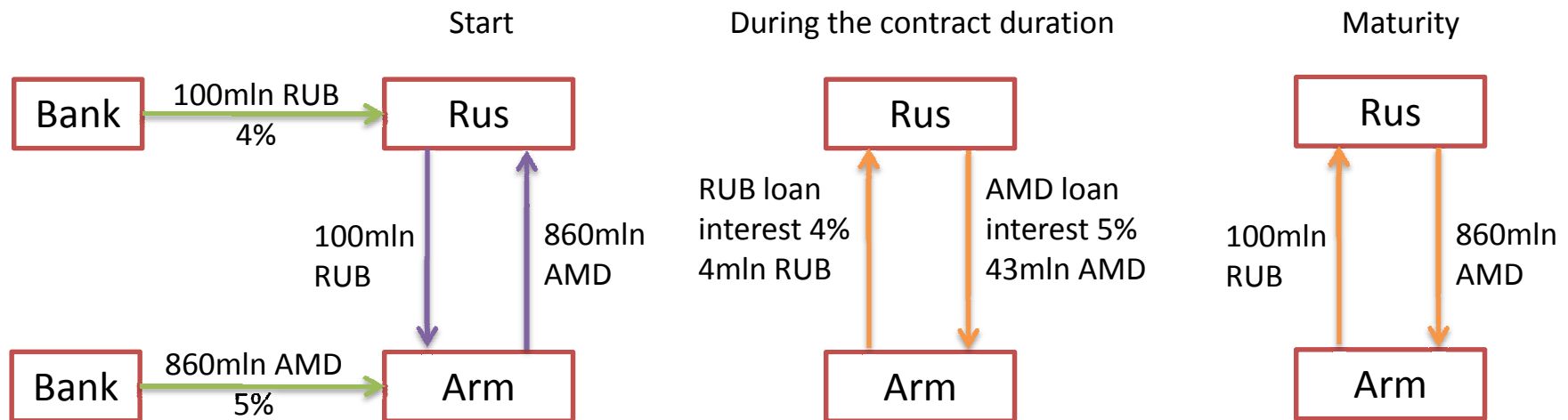


Currency swap

- Russian company Rus wants to increase its operations in Armenia and needs a dram loan.
- Armenian company Arm is seeking an entrance into Russian market and needs a rouble loan.

	Rus	Arm
Rouble loan	4%	9%
Dram loan	10%	5%

Each has competitive advantage of borrowing in their domestic markets.



The loans are swapped

ARM instead of 9% pays 4%
RUS instead of 10% pays 5%

Currency option

Currency option grants the holder the right, but not the obligation to buy or sell a foreign currency at a pre-determined price on or up to a pre-specified date.

- Call option: Right, but not the obligation to buy.
- Put option: Right, but not the obligation to sell.

Currency option: The terminology

- Call option is **in the money**, if the strike price is less than the spot price.
- Put option is **in the money**, if the strike price is higher than the spot price.
- *Otherwise*, the option is **out of the money**.
- If spot rate = strike price, then the option is **at the money**.
- **Strike price**: The price at which the option can be exercised.
- **Time to expiry**: The period of time that the option right is valid.
- **European-type option**: Option, which can be exercised only on the maturity date.
- **American-type option**: Can be exercised any time up to the maturity date.
- **Premium**: Fee, the buyer must pay to the seller (option writer) upfront.

Currency option

right vs. obligation

The buyer (the holder) of the option has a *right, but not an obligation*.

The writer (the seller) of the option has an *absolute obligation*.

FX market & spot rate determination

Who demands U.S. dollars in Armenia?

- Armenian consumers of foreign goods and services
- Armenian buyers of foreign assets

D_{USD} reflects S_{AMD}

Who supplies U.S. dollars in Armenia?

- Foreign consumers of Armenian goods and services
- Foreign buyers of Armenian assets

S_{USD} reflects D_{AMD}

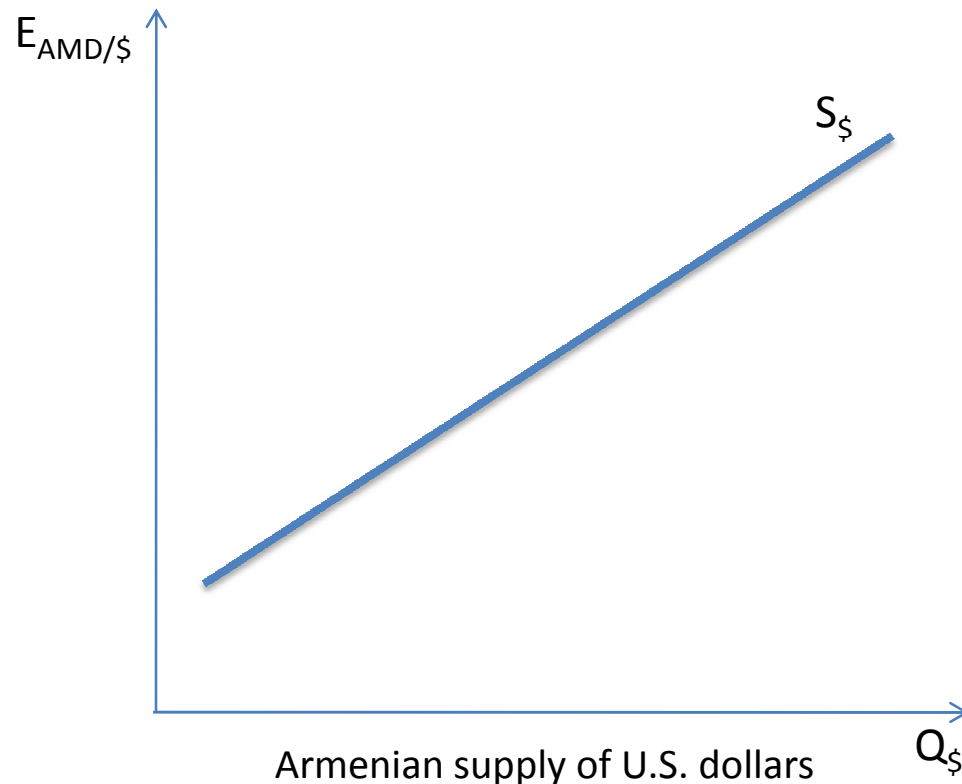
Also a major source of currency supply/demand is the speculation.

Spot rate determination

FX supply curve is upward slopping:

Demand for domestic goods/services/assets (e.g. exports) is the source of FX supply

- As exchange rate \uparrow (domestic currency depreciates)
- Domestic goods/services/assets prices \downarrow
- Exported/acquired quantity of g/s/a $\uparrow \Rightarrow$ volume $\uparrow \Rightarrow$ FX supply \uparrow

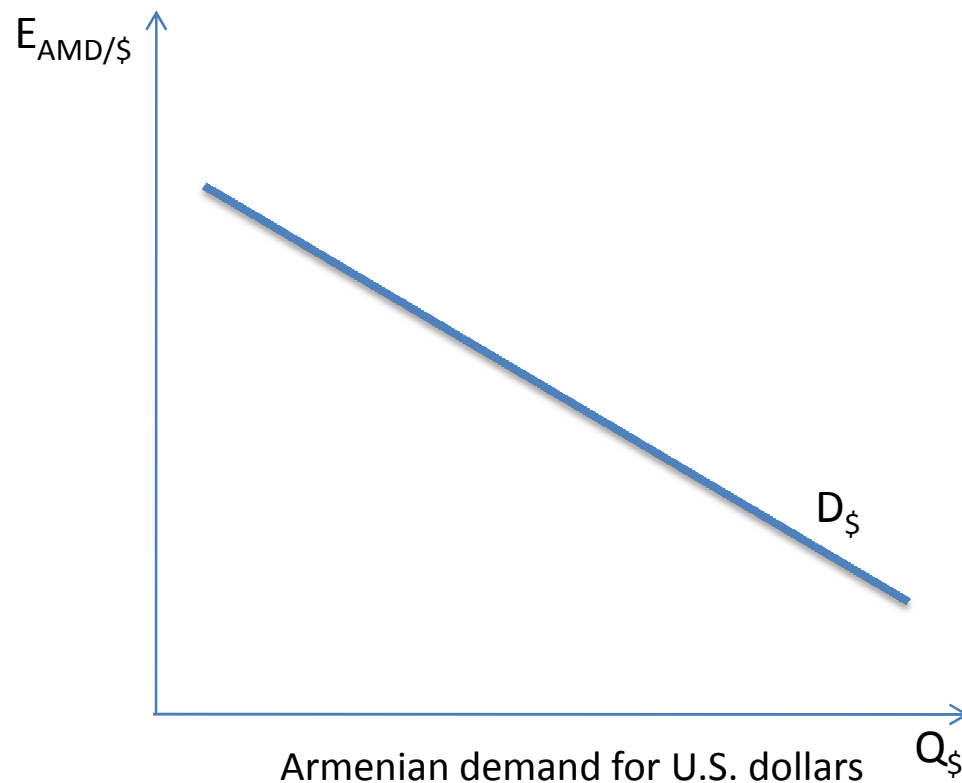


Spot rate determination

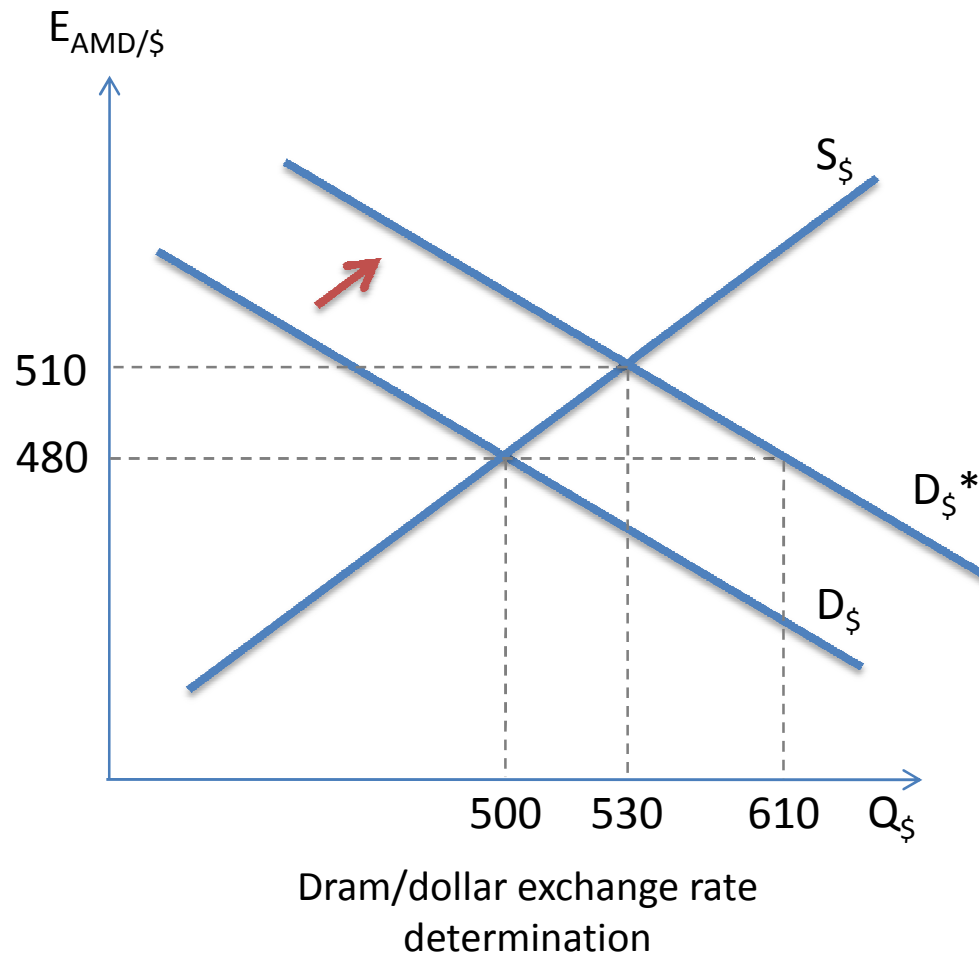
FX demand curve is downward sloping:

Demand for foreign goods/services/assets (e.g. imports) is the source of FX demand

- As exchange rate \uparrow (domestic currency depreciates)
- Foreign goods/services/assets prices \uparrow
- Imported/acquired quantity $\downarrow \Rightarrow$ volume $\downarrow \Rightarrow$ FX demand \downarrow



Spot rate determination



Factors affecting on FX demand

- 1) Income growth
- 2) Change of relative prices of goods, services, and assets
- 3) Change of relative profitability of assets
- 4) Change in tastes
- 5) Changing expectations about future exchange rates, inflation, perceived risks

When demand for USD rises:

Under free floating domestic currency (AMD) will depreciate.

Under fixed exchange rate, the Central bank should defend its peg and satisfy excess demand for dollars by selling its international reserves.

Thank you and take care,

but remember

Right action is better than
knowledge; but in order to
do what is right, we must
know what is right.

Charlemagne