Holiday Effect on Libor and Treasury Rates

By Knights <>

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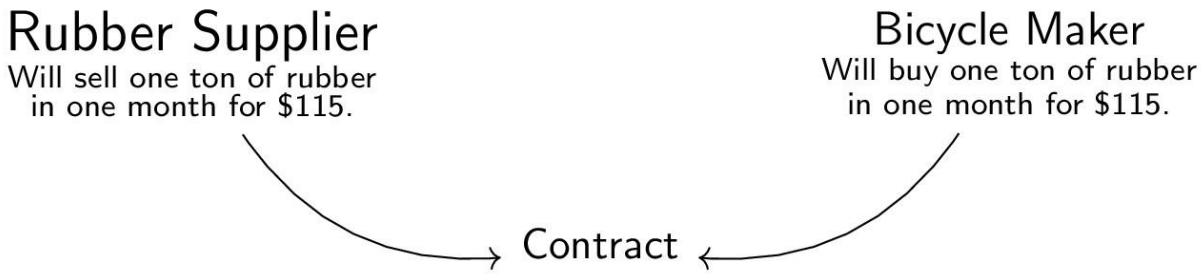
Futures Contract

Current price of rubber: \$115/ton.



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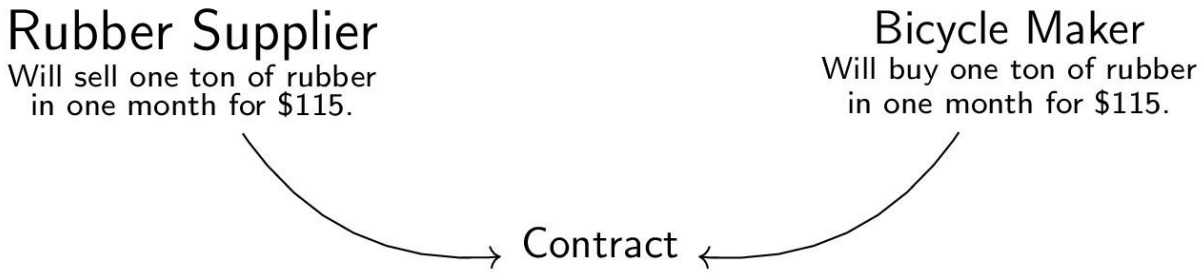

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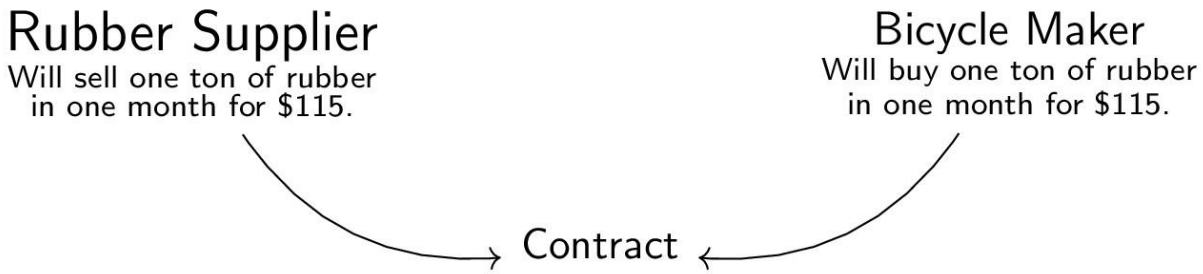

- If rubber prices fall to \$100/ton, the rubber supplier makes \$15 and the bicycle maker loses \$15 from this contract.
- If rubber prices rise to \$120/ton, the rubber supplier loses \$5 and the bicycle maker makes \$5 from this contract.

Contract Market

Person A
Sell: 115
Buy: 110

Person B
Buy: 115
Sell: 120

Person C
Buy: 120
Sell: 110

Contract Market

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Buy: 110

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Buy: 120
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Person B
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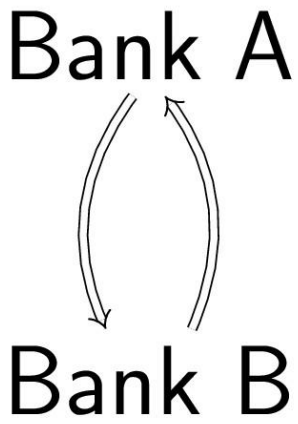
The London Inter Bank Offered Rate

LIBOR Rate	
ON	2.362%
1W	2.369%
1M	2.261%
6M	2.144%
12M	2.158%

Table: Rates from 21 July 2019



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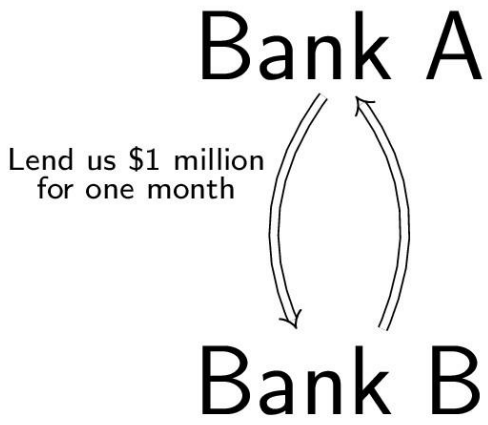

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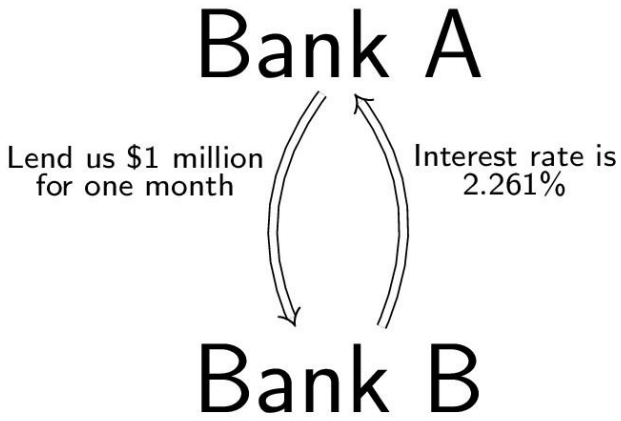

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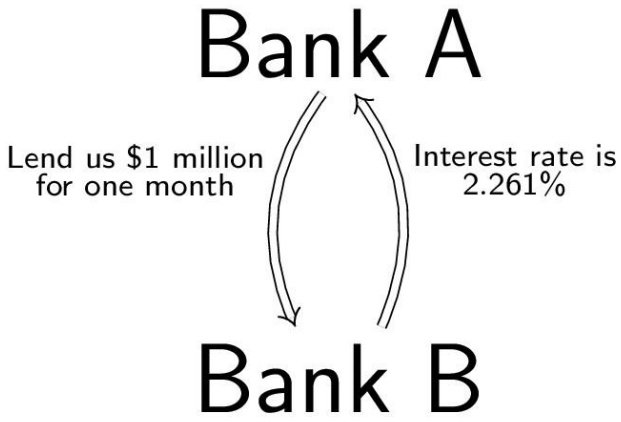
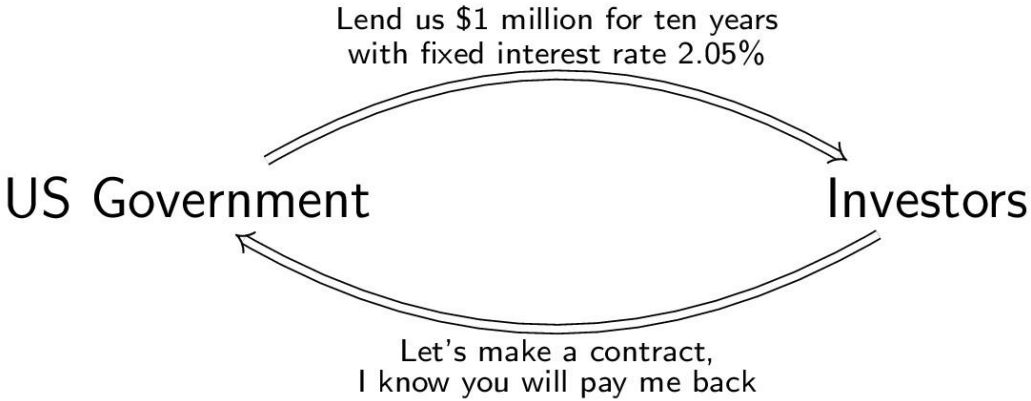


- After one month, Bank A owes Bank B

$$1000000 \times \left(1 + \frac{.0261}{12}\right) = \$1002175$$

.

US Treasury Rate



Interest Rate Swap Market

	Person A
Borrowed	\$1 million
Interest Rate	5%

$\Longleftrightarrow$

Person B
\$1 million
2% + LIBOR

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- Person B cannot afford the risk of the LIBOR rate rising too high.

Interest Rate Swap Market

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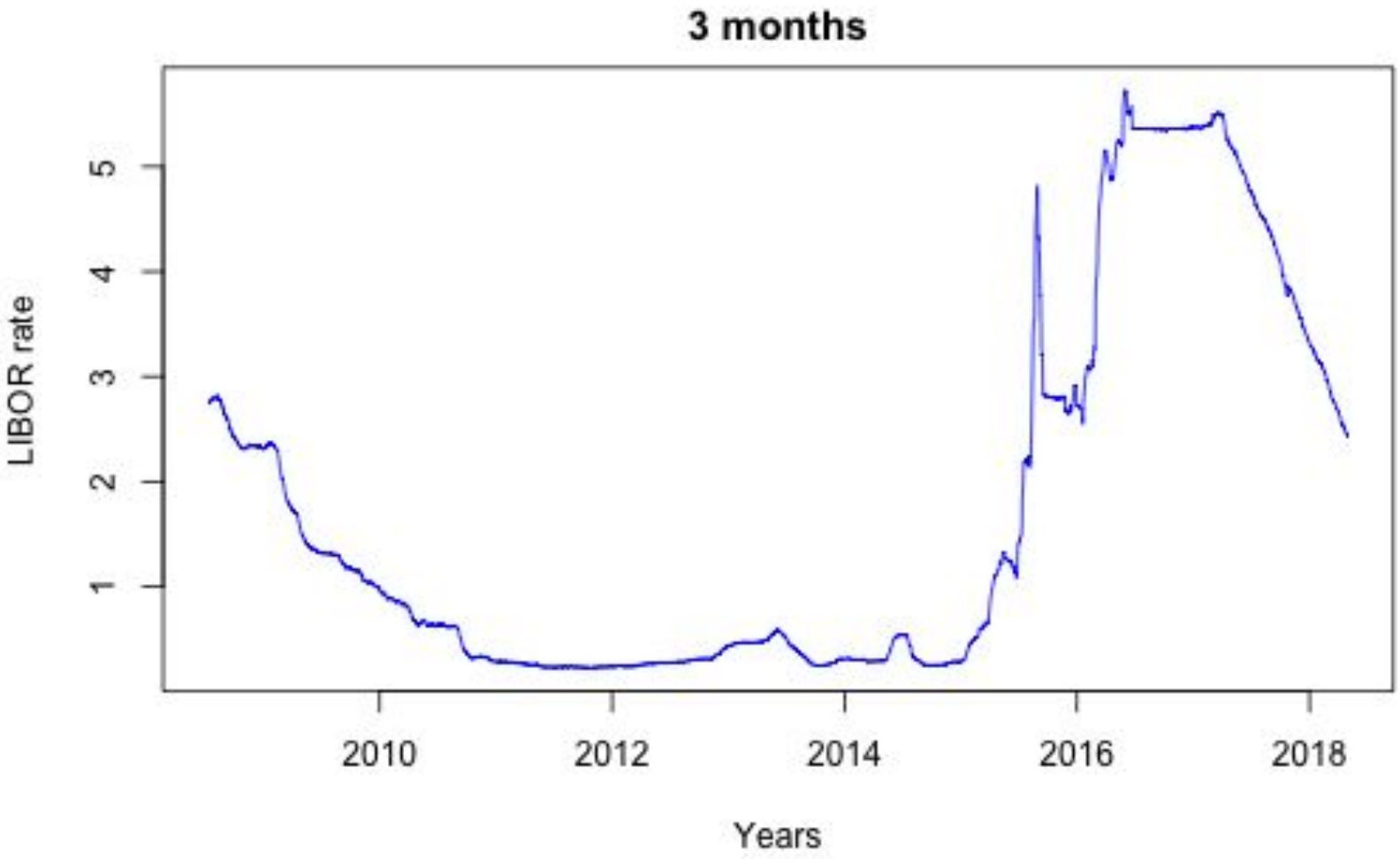
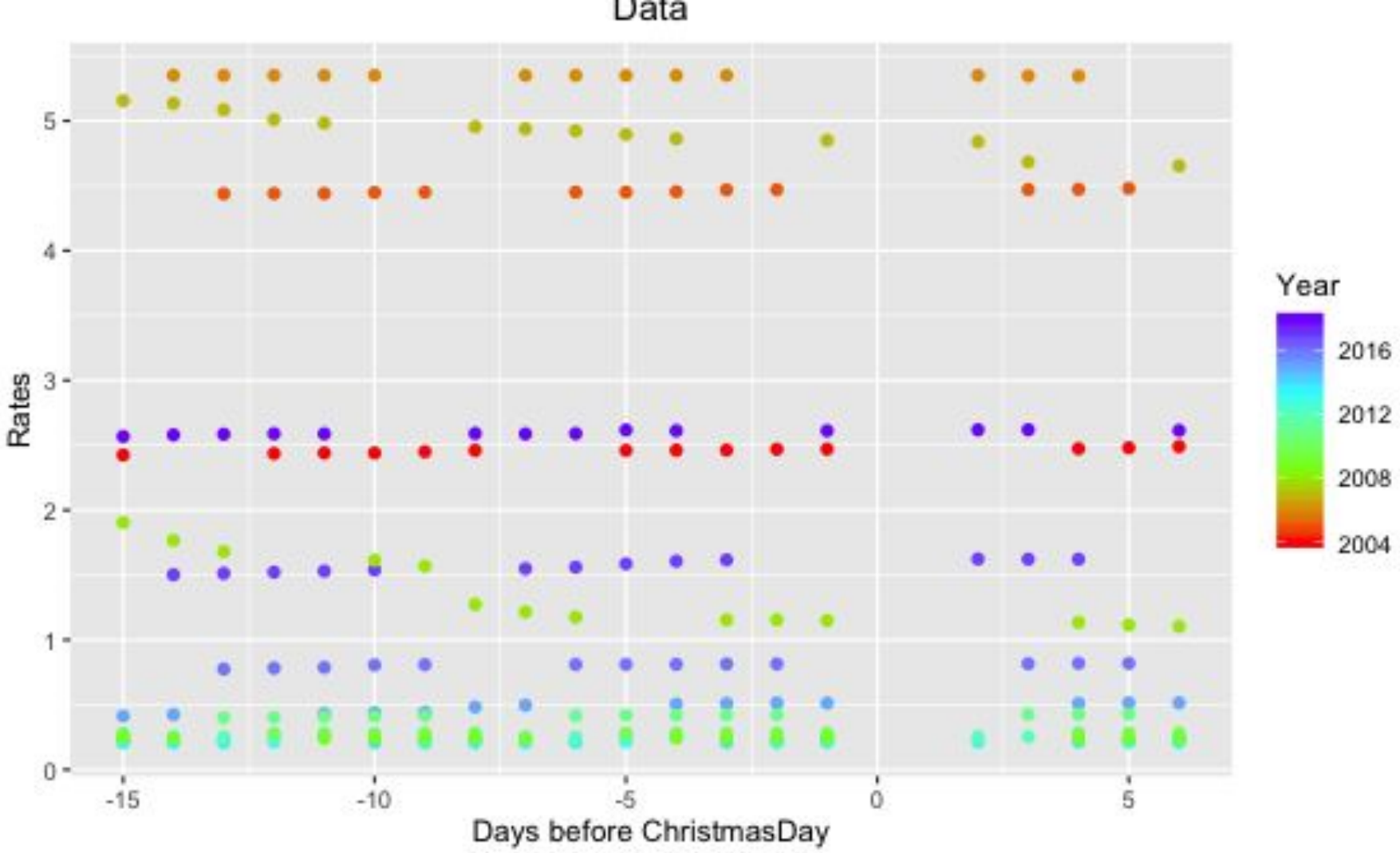
SWAP RATES! ⟺

Person B
\$1 million
2% + LIBOR

- Person A thinks that the LIBOR rate will fall below 3%.
- Person B cannot afford the risk of the LIBOR rate rising too high.
- Frank Fabozzi: *"The swap market is a market to buy and sell LIBOR"*.

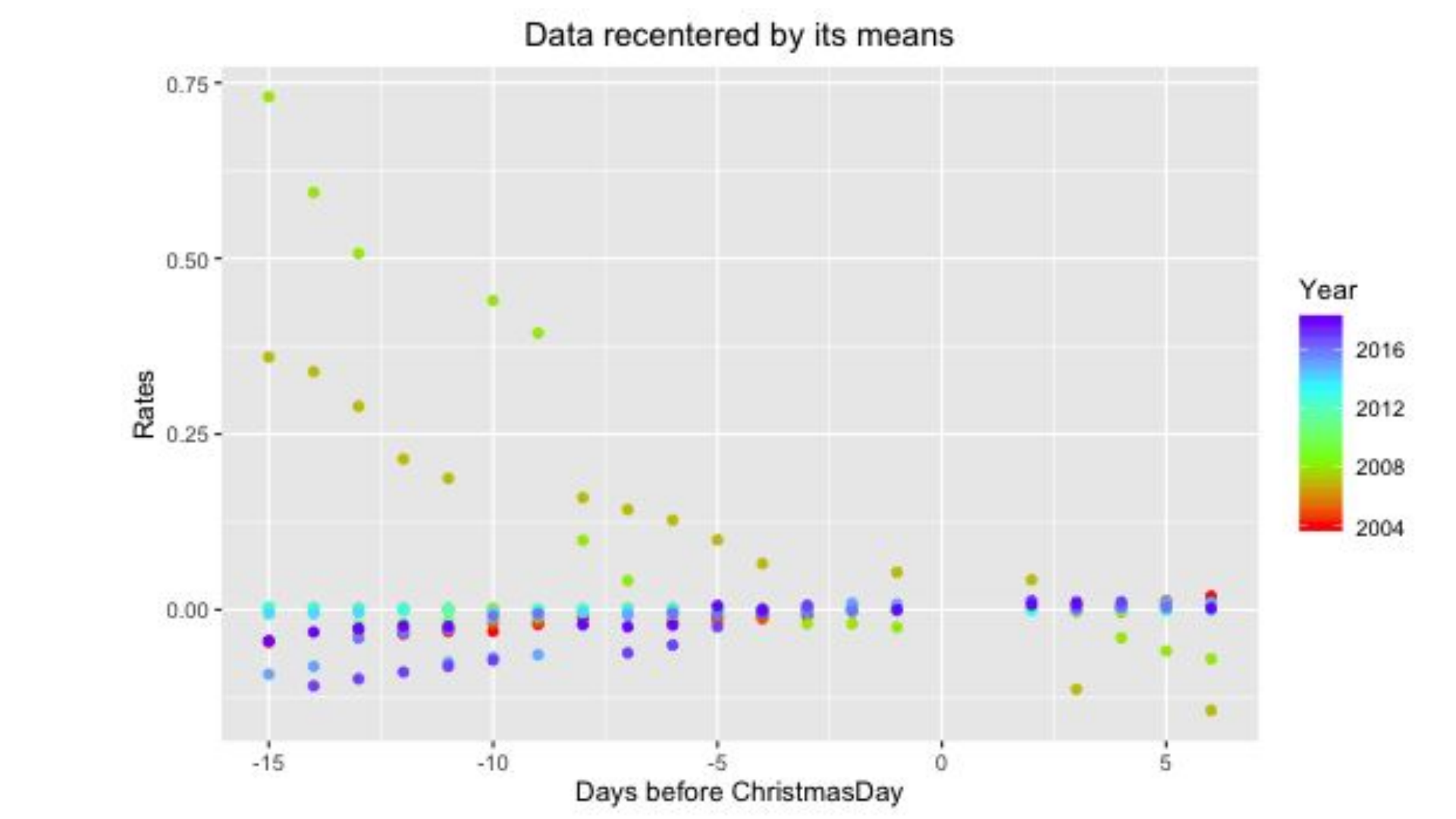

3 months
LIBOR rate
1
2
3
4
5
2010
2012
2014
2016
2018
Years


Data
Rates
0
1
2
3
4
5
-15
-10
-5
0
5
Days before ChristmasDay
Year
2016
2012
2008
2004

Take away changes accumulated over years to localize holiday effect:

Adjusted_Rates_j = Rates_j - mean(Rates_j),

where **j** is a year from 2004 to 2018

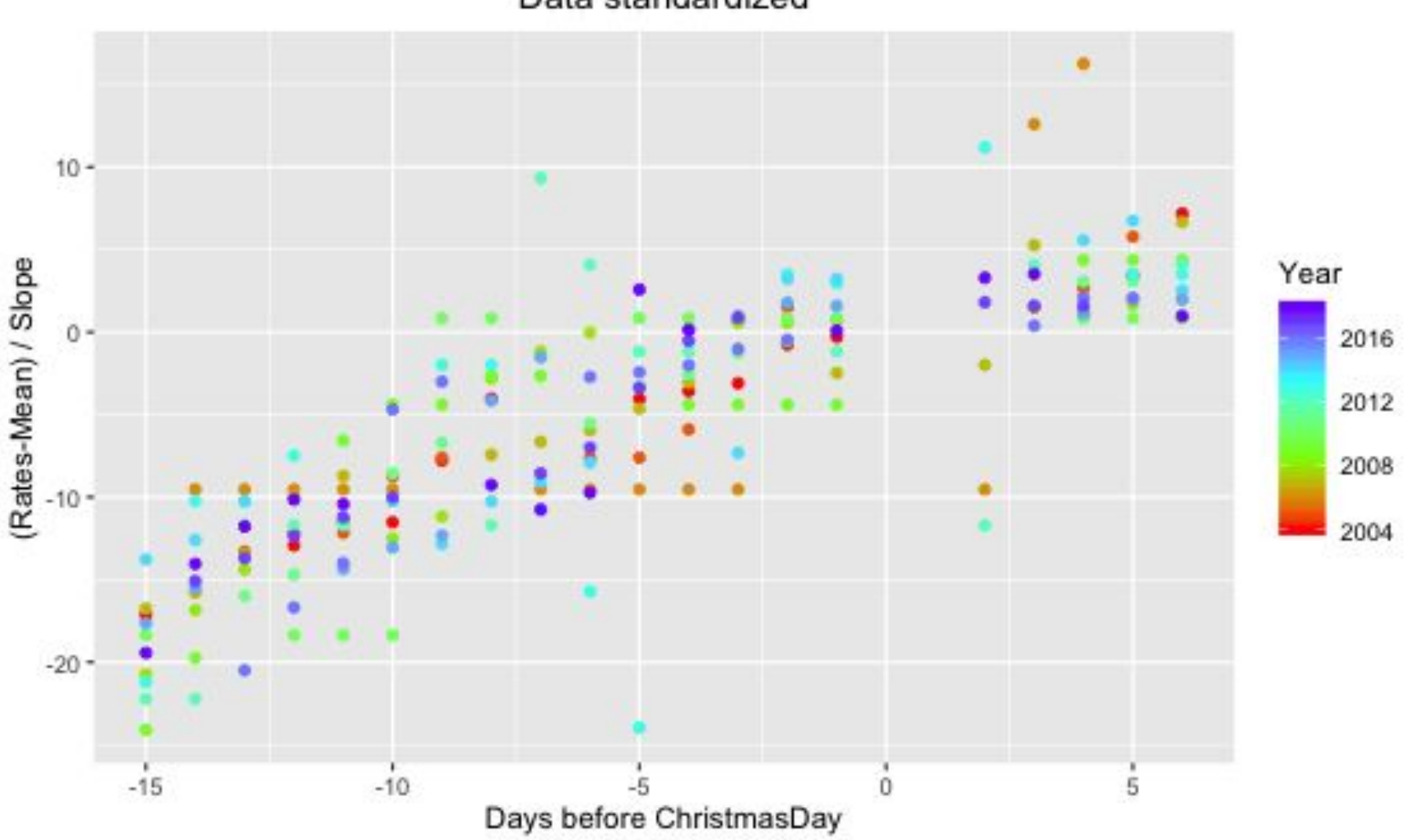

Data recentered by its means
0.75
0.50
0.25
0.00
Rates
-15
-10
-5
0
5
Days before ChristmasDay
Year
2016
2012
2008
2004

Take those slopes away:

Normolized_Rates_j = Adjusted_Rates_j / **slope_j**,

where **slope_j** are obtained thru linear regression with linear functions on each year **j** from 2004 to 2018.

Now we should expect data look like **y = x** with noise and a potentially a jump


Data standardized
(Rates-Mean) / Slope
10
0
-10
-20
-15
-10
-5
0
5
Days before ChristmasDay
Year
2016
2012
2008
2004

Building the model, finally...

Now we can combine data from all years and run linear regression on them to detect jump.

Results of LIBOR 15d before 6d after Christmas

2M Normalized_Rate = \beta_0 + \beta_1 * relative_date + \beta_{2} * X^{Pre}

	β_0 (p-value)	β_1 (p-value)	β_2 (p-value)	R^2Adj	Overall Pval
2004 - 2018	2.28180** (0.00123)	1.23930*** (< 2e-16)	-4.60371*** (0.00012)	0.7022	< 2.2e-16

Before Holiday: Rate = 2.28180 + 1.23930 * Relative_Date

After Holiday: Rate = (2.28180 - 4.60371) + 1.23930 * Relative_Date

Conclusion

Christmas holiday effect does exist.

We suggest expecting a jump computed as

$$\text{Jump} = -4.60371 * \mathbf{s},$$

where **s** is slope on 15 days before Christmas current year.

Now you can give us your money.
Thank you!