Graz Economics Blog

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Intro to Econ: Second Lecture – Arbitrage with Exchange Rates

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I begin the second lecture by reminding the students about the key insights of the first class: that people pursue goals, that this leads to systematic patterns of behavior, and that these patterns are somewhat understandable, perhaps even somewhat predictable to an analyst. The particular goal we talked about in the first class was that people try to avoid wasting time. In the end I talked about queuing behavior that can be understood as a consequence of this goal: for example, we expect roughly equally long queues at supermarket checkout points and roughly equally fast queues in traffic jams.

In the second lecture I then take up another goal most people share: people, "ceteris paribus", tend to prefer more money over less. The expression "ceteris paribus" means "all else equal". I might be reluctant to accept extra money if this means someone is allowed to hit me on the head. But I generally will be happy to receive extra money if this does not come with any extra obligations.

This idea that, ceteris paribus, people prefer more money over less money implies that the world should not contain easy "arbitrage" opportunities. "Arbitrage" is making money without risk. I discuss the consequences of the absence of arbitrage in three contexts. I first consider exchange rates. I then give the students examples of supposed exchange rates of three fictional currencies, A, B, and C. These exchange rates are given in this table:

	A	B	C
A	1	0,75	0,85
B	1,33	1	1,13
C	1,18	0,89	1

The table is to be read as follows. The entry in row A and column B is the amount of money in B-currency that 1 unit of money in the A currency can buy. In other words, 1 A buys you 0,75 B's. I ask the students how they feel about this system of exchange rates. Does it seem plausible or implausible?

After their responses, which are not so important at this point, I give them another system of exchange rates between fictional currencies D, E, and F, given in this table:

	D	E	F
D	1	7,50	5,50
E	0,13	1	0,08
F	0,18	12,40	1

Again, I ask the students how plausible this system of exchange rates seems to them. Again, their answers are not so important at this point (but there are some who seem to see where this is going). I then reveal that the first three currencies are the US-dollar, the british pound, und the euro with exchange rates taken at 8am CET on the 17th of October 2017. These are perfectly fine exchange rates. We will understand why this is so in a moment. The second batch of three currencies, D, E, and F, are currencies taken from the Harry Potter books. In fact I have taken them from a 2017 paper by Daniel Levy and Avichai Snir, entitled "Potterian Economics", who in turn have taken these from the Harry Potter books.

One D is one gold galleon from the Harry Potter world, one E is one US dollar, and one F is 1 gram of gold. Apparently one gold galleon weighs 5,50 grams of gold and can be bought for USD 7,50. There is also a US-dollar price of gold which is USD 12,40 for each gram of gold. Here is the full table again:

	galleons	USD	gold (in g)
galleons	1	7,50	5,50
USD	0,13	1	0,08
gold (in g)	0,18	12,40	1

So what is wrong with these exchange rates? Well, you (or at least the supposedly rather poor Weasley's) could make arbitrage. Take one gold galleon, which constitutes 5,50 grams of gold, sell this gold for US dollars and get 5,50*12,40 = 68,2 US dollars. Then buy yourself 68,2*0,13 = 9 gold galleons. This means without any risk you can turn 1 gold galleon into 9 gold galleons with two simple transactions. The Weasley's and everyone else in the Harry Potter world should be able to lay their hands on as many gold galleons as they desire.

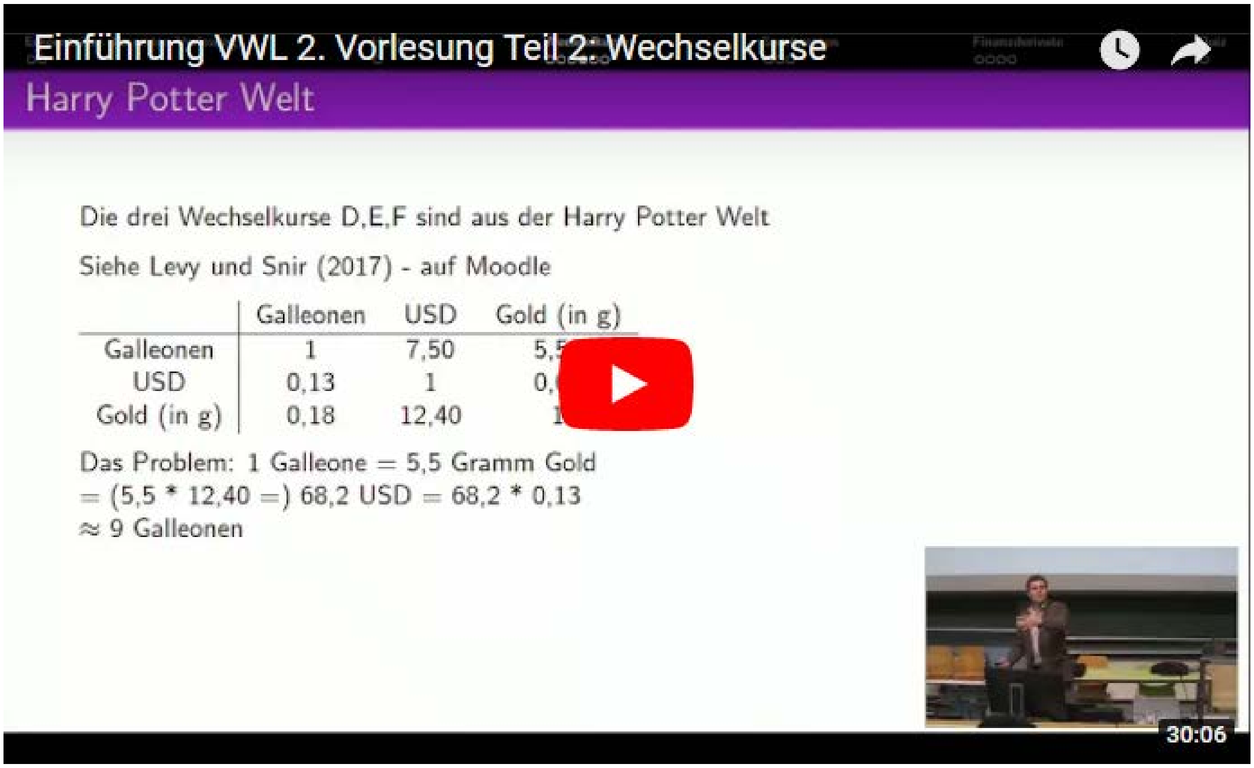
Of course it is possible that such trading is not allowed for some reason in the Harry Potter world or perhaps magically simply impossible. But the fact is that in our world we cannot really observe such a system of exchange rates as it would allow arbitrage. Arbitrage would be exploited pretty quickly and exchange rates would quickly change in such a way that there are no more arbitrage opportunities.

You can check for yourself that the exchange rate system between the three real currencies of our world does not allow arbitrage in any way.

In other words, the idea that people, ceteris paribus, prefer more money over less implies that any visible arbitrage opportunities would be quickly exploited, which in turn implies that for any number n of currencies with $n*(n-1)$ exchange rates only $n-1$ of these are "free". Of course real economic activities determine these "free" exchange rates, but the point is that once $n-1$ exchange rates are given the remaining $(n-1)^2$ exchange rates are completely determined by the absence of arbitrage opportunities.

I then point out that this implies, among other things, that the exchange rate between any two currencies cannot only depend on the economic interactions between the two countries behind the two currencies alone. Why not? Think of three currencies (and respective countries) in a world full of currencies (and respective countries). The economic interaction (such as imports and exports) between any two small countries can be fairly arbitrary. Thus, if it were true that the bilateral economic interaction is the sole determinant of the exchange rate between the two respective currencies, then any system of exchange rates between the three currencies is possible. But we know that the absence of arbitrage poses a severe restriction on these exchange rates. Proof by contradiction.

And here is the Video (in German):



https://youtu.be/dcP42AqYJ6M

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