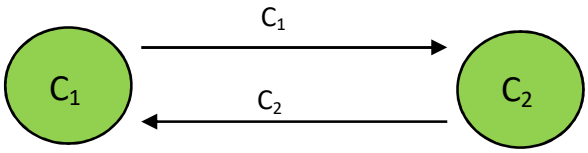
Towards a More Accurate Model of the Economy – A Derivation

After much deliberation, I have devised what I see as a more accurate model of the economy, and believe this has not been demonstrated or derived in this fashion before.

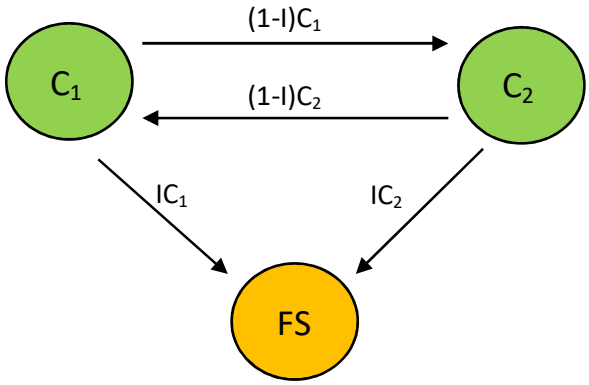
The first important step is to realise that you cannot model an economy well with just a two-commodity market. The next important step to note is that you must model the financial services sector as well as the market, since it interacts with the market, but is not part of the market. The third step is that we will not be dealing with money here for simplification purposes, just the exchange of one commodity for another (like in the old days).

To illustrate the first two points; if you consider a two-commodity market without a financial middle-man, you have the following:



Where two people could be exchanging commodity C_1 for C_2, which is how a market should work. The owner of commodity C_1 is happy to lose his goods in exchange for the gain of commodity C_2. Similarly, the owner of commodity C_2 is happy to lose his goods in exchange for the gain of commodity C_1.

If you then introduce a middle-man who changes commission (I) on this exchange, the market now looks something like this:



This is all well and good because the middle-man (FS) has gained a percentage (set by 'I') of commodities C_1 and C_2 through his service of exchange, and can go away and consume these at his own leisure. However, this is not the case in real-life. The middle man could go and use what he gained from this transaction, and perform another transaction himself in the same market. You

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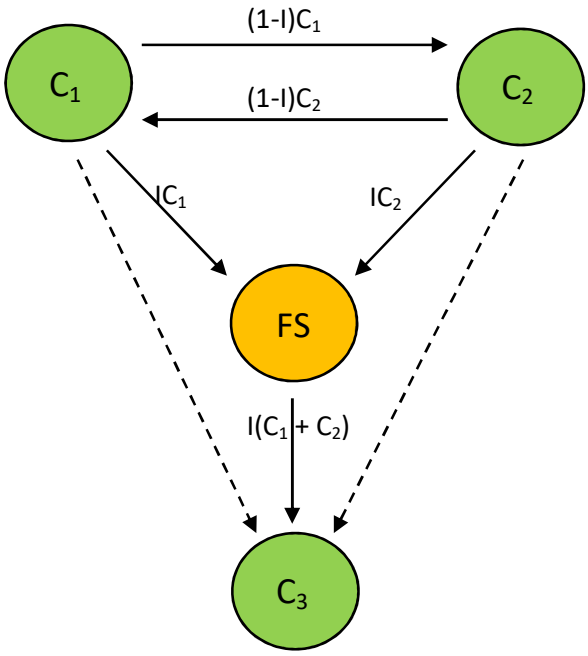
might think this is ok, but it's not. Let me illustrate with a three-commodity market model, and you'll hopefully see why:



As you can see, a third commodity C_3 has entered the market, and the middle-man can use what he gained from his transactional service for the exchange of C_1 and C_2, and use it to exchange this with some of commodity C_3. However, this now puts the owners of commodities C_1 and C_2 at a disadvantage because rather than competing with each other, they now have the middle-man to compete within the market too. The dotted lines show this competition.

So to cover the first transaction (ignoring C_3), and working with the quantities of each transaction, we have:

$$Q = (1 - I)QC_1 + (1 - I)QC_2$$

But then for the next transaction involving C_3, we have:

$$Q = (1 - I)(1 - I)QC_1 + (1 - I)(1 - I)QC_2$$

Note, we have to ignore the gain by the middle-man for the current transaction between C_1 and C_3, and C_2 and C_3 because he hasn't gained it by the time he competed for C_3.

But because we are working with the three-commodity market model, we also need to take into consideration the effects of competing for C_1 and C_2 by the middle man and the other commodities. Therefore, the total quantity transacted is:

$$Q_1 = QC_1 + QC_2 + QC_3$$

Adding each equation after the transaction into this, we have:

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$$Q_2 = (1-I)(1-I)QC_1 + (1-I)(1-I)QC_2 + (1-I)(1-I)QC_1 + (1-I)(1-I)QC_3 + (1-I)(1-I)QC_3 + (1-I)(1-I)QC_2$$

Simplifying we get:

$$Q_2 = (1-I)^2(QC_1 + QC_2 + QC_3)$$

Or the factor we get from the transactions in the economy is:

$$F_{economy} = (1-I)^2$$

This is after two transactions. After the third we get:

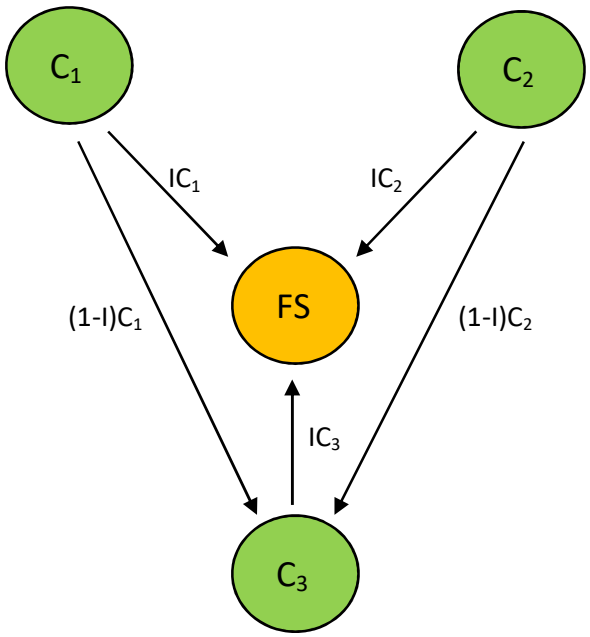
$$F_{economy} = (1-I)^3$$

And after n transactions we get:

$$F_{economy} = (1-I)^n$$

You can see that for each transaction, the economy is losing money because of the extra competition introduced by the middle-man, or the Financial Services (FS), as I have called it in my diagram.

However, this is only looking from the perspective of the economy. What is getting accumulated by the middle-men? We can calculate this by following a new diagram:



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From the first transaction between C_1 and C_2, we get the following:

$$Q_1 = I(QC_1 + QC_2 + QC_3)$$

Since:

$$QC_3 = I((1 - I)QC_1 + (1 - I)QC_2)$$

We get:

$$Q_2 = I(QC_1 + QC_2) + I(1 - I)QC_1 + I(1 - I)QC_2$$

Making this generic for all three commodities:

$$Q_2 = I(QC_1 + QC_2 + QC_3) + I(1 - I)(QC_1 + QC_2 + QC_3)$$

Then after the third transaction, we get:

$$Q_2 = I(QC_1 + QC_2 + QC_3) + I(1 - I)(QC_1 + QC_2 + QC_3) + I(1 - I)^2(QC_1 + QC_2 + QC_3)$$

Resulting in the equation for all n transactions as:

$$Q_n = (QC_1 + QC_2 + QC_3)\sum_{1}^{n} I(1 - I)^{n-1}$$

Or the factor we get is:

$$F_{FS} = \sum_{1}^{n} I(1 - I)^{n-1}$$

This final equation shows that for a three-commodity market model, the middle-man will always accumulate commodities after each transaction.

Thus the conclusion of these two equations:

$$F_{economy} = (1 - I)^n$$

$$F_{FS} = \sum_{1}^{n} I(1 - I)^{n-1}$$

States that if the middle-man charges a commission, he can become infinitely richer, while the economy itself becomes infinitely poorer as $n \to \infty$.

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