The Missing Exchange Rate of Banking

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Abstract

A bank accepts deposits and grants credits [1][2]. Both activities can be fully separated by separation into two competing currencies [3]: one for deposits and one for credits. In contemporary banking, this exchange rate is fixed to 1:1. The market could demand two price levels for deposits and credits, allowing the real time judgement of bank assets versus bank liabilities, even at zero interest.

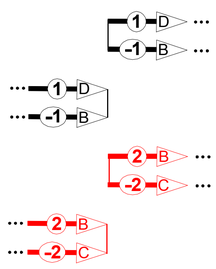
The major result is that charging interest or bank fees is now a differential inflation in both currencies which can be counteracted by the exchange rate, leading to zero bank profits. Without profit, interest might very well be abolished.

Banks will be reverted to their major purpose: use the exchange rate to judge investments from the past (deposits) against investments into the future (credits).

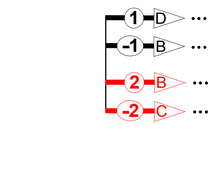
Bank Bookkeeping

Bank-Nonbank Transfer		C Liabil.	Bank Assets	Bank Liabil.	D Assets
Deposit Creation	Bank ⟶ D			+1$D	+1$D
Deposit Termination	D ⟶ Bank			−1$D	−1$D
Credit Creation	C ⟶ Bank	+2$C	+2$C		
Credit Termination	Bank ⟶ C	−2$C	−2$C		

Feynman Graphs



Nonbank Transfers at 1$D = 2$C		c Liabil.	C Liabil.	Bank Assets	Bank Liabil.	D Assets	d Assets
Deposit Transfer	d ⟶ D					+1$D	−1$D
Credit Transfer	c ⟶ C	+2$C	−2$C				
Transfer by Termination	D ⟶ C		−2$C	−2$C	−1$D	−1$D	
Transfer by Creation	C ⟶ D		+2$C	+2$C	+1$D	+1$D	
Interest	C,c ⟶ D,d	+4$C	+4$C	+8$C	+2$D	+1$D	+1$D
		Credit Currency			Deposit Currency		



Generalized bank bookkeeping with deposit dollars $\$_D$ and credit dollars $\$_C$, assuming $1\$_D=2\$_C$. Transfers between bank and non-banks increase or decrease deposits (black), increase or decrease credits (red). Transfers between nonbanks fully separate into creation or annihilation of deposits or credits, best seen in the Feynman-graph representation of bookkeeping [4],[5].

Conclusion

We show that banking bookkeeping establishes (but hides) two competing currencies of deposits and credits at an artificially fixed exchange rate 1:1. If allowed to float, interest will probably be abolished. This is shown by a three-fold analysis using Feynman-graph bookkeeping, extended quantity theory and statistical money mechanics.

1. Schultz, Arthur, "*Bank bookkeeping and Accounting*", American Institute of Banking, New York, 1943
2. W.H. Kniffin, "*The practical work of a bank*" (9th edition, The bankers publishing company, Wassen Publication Press, Cambridge Mass. USA, 1948)
3. Dieter Braun, "*The Missing Exchange Rate of Banking*", submitted to Quantitative Finance
4. Dieter Braun, "*Assets and liabilities are the momentum of particles and anti-particles displayed in Feynman-graphs*", Physica A 290:491-500 (2001)
5. Robert Fischer and Dieter Braun, 2003, "*Nontrivial Bookkeeping: a mechanical Perspective*", Physica A 324:266-271 (2003)
6. Robert Fischer and Dieter Braun, 2003, "*Transfer Potentials shape and equilibrate Monetary Systems*", Physica A 321:605-618 (2003).
7. Dieter Braun, "*Nonequilibrium Thermodynamics of Wealth Condensation*", Physica A, accepted (2006)

Quantity Theory

		Circulation State	Credit Currency M_C	P_C	Q_C	V_C	Deposit Currency M_D	P_D	Q_D	V_D
α	Baseline Circulation		1	1	1	1	1	1	1	1
β	High Goods-Velocity		1	1	2	2	1	1	2	2
γ	High Quantity-Goods		2	1	2	1	2	1	2	1
δ	High Quantity-Price		2	2	1	1	2	2	1	1
ε	High M,P,Q,V		2	2	2	2	2	2	2	2

		Change in State	Credit Currency M_C	P_C	Q_C	V_C	W_B	Deposit Currency M_D	P_D	Q_D	V_D	W_B
α,β	Goods-Velocity Inflation		1	1	1/2	1/2	0	1	1	1/2	1/2	0
α,δ	Quantity-Price Inflation		1/2	1/2	1	1	0	1/2	1/2	1	1	0
α,γ	Quantity-Goods Inflation		1/2	1	1/2	1	+	1/2	1	1/2	1	−
δ,γ	Price-Deflation, Goods Inflation		2	2\1	1/2	1	+	2	2\1	1/2	1	−
ε,γ	Price-Velocity Deflation		2	2\1	2	2\1	+	2	2\1	2	2\1	−
β,γ	Quantity-Inflation, Velocity Deflation		1/2	1	2	2\1	+	1/2	1	2	2\1	−

Quantity theory now separates into quantity of deposits M_D and credits M_C with velocities V_D and V_C, price levels P_D and P_C, number of transferred goods per time with deposits Q_D and with credits Q_C:

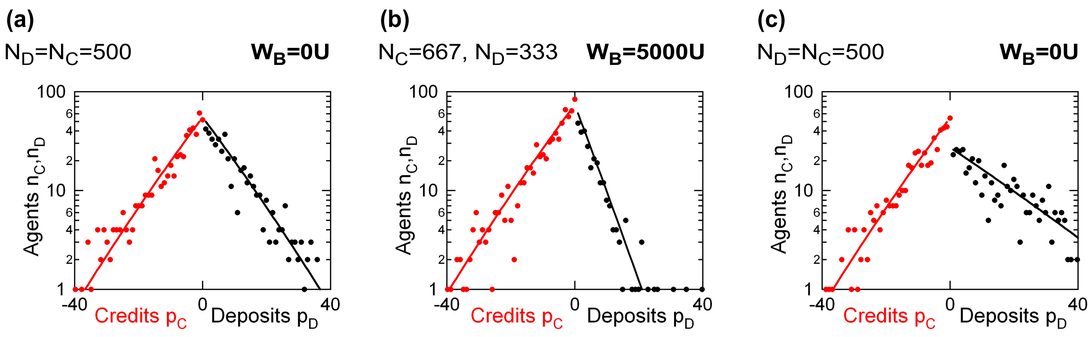
$$\frac{M_D}{P_D} = \frac{Q_D}{V_D} \qquad \frac{M_C}{P_C} = \frac{Q_C}{V_C}$$

Bank wealth W_B directly relates to the extended quantity theory:

$$W_B = -W_{NB} = \frac{M_C}{P_C} - \frac{M_D}{P_D} = \frac{Q_C}{V_C} - \frac{Q_D}{V_D}$$

Upon charging interest or bank fees, markets will change the price level pair P_C,P_D to reflect the quantity-price inflation (α,β) in either or both deposit and credit currency. As result, the bank does not profit from simply charging interest or rising bank fees.

Statistical Money Mechanics



We simulate a random economy [6],[7] that is equilibrated with a deposit and credit fee F_D, F_C. Increasing the deposit fee F_D allows banks to make profit if they only run classically with one currency. However with a free floating exchange rate, the price levels can adapt, pushing the bank back to zero wealth W_B. We limit our discussion to linear, transfer potentials U_D and U_C

$$U_D = F_D p_D \qquad U_C = -F_C p_C$$

and find the bank profit to be

$$W_B = \frac{P_C}{F_C \Delta t} \frac{N_C^2 - N_D^2}{N_C}$$

We wee that the bank profit mainly depends on the difference between number of credit users N_C versus the number of depositors N_D.