The Optimal Benchmark “Lollar” Rate

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By Invitation:

This spotlight was prepared by the late Professor Samih Azar (1956-2023), who passed away on 20/2/2023. Professor Azar was a distinguished economist and a remarkable human being. He was also an excellent contributor to the Blog. He will always be remembered and deeply missed.

The spotlight is slightly on the technical side.

According to circular # 151 of the central bank, Banque du Liban, monthly dollar withdrawals are authorized from dollar deposits and are convertible to Lebanese pounds at the pre-specified rate of LBP 8,000 per US dollar. The figure of LBP 8,000 is known as the “lollar” benchmark rate. It is due to be readjusted to LBP 15,000 per US dollar starting on the first day of February 2023, with a maximum monthly withdrawal of USD 1,600. The purpose of this note is to find out whether there is an optimal lollar benchmark rate, and if yes how much it is, and on what does it depend. This will serve to understand and eventually to rationalize the underlying policy.

The adopted approach can be described as being marginalist. In economics, marginalism stems, refers, and derives from optimization, like for example profit maximization. For the latter, the required optimum is attained by equalizing marginal revenue to marginal cost. In this note a variant of maximization is implemented, and hence it is under the same banner of marginalism.

The amount $\mathbb{Q}$ in Lebanese pounds that will be exchanged at the lollar rate depends on the behavior and preferences of bank depositors who hold the dollar bank deposits. If the lollar rate is expressed as $\mathcal{B}$, and if the parallel black market rate is designated as $\mathcal{H}$, then this $\mathbb{Q}$ amount will be determined by a function $f(.)$ of two explanatory factors or arguments $\mathcal{B}$ and $\mathcal{H}$, with a constant and fixed scale coefficient A

$$\mathbb{Q} = A * \mathcal{B} * f(\mathcal{B}, \mathcal{H}) \text{ with } f_{\mathcal{B}} > 0 \text{ and } f_{\mathcal{H}} < 0$$

where $f_{\mathcal{B}}$ is the first partial of $f(.)$ with respect to $\mathcal{B}$, and $f_{\mathcal{H}}$ is the first partial of $f(.)$ with respect to $\mathcal{H}$. The two inequalities mean that an increase in the lollar $\mathcal{B}$ rate will incentivize the depositor to sell more $\mathbb{Q}/\mathcal{B}$ dollars, and an increase in the market black market dollar rate $\mathcal{H}$ will do just the opposite, as the potential loss of value is greater with a higher $\mathcal{H}$. Of course one has the pre-condition that $\mathcal{H} > \mathcal{B}$. There is a possibility that a higher $\mathcal{H}$ will impact $\mathbb{Q}$ positively instead of negatively, i.e. $f_{\mathcal{H}} > 0$. This may be true if a depreciation of the foreign exchange rate will require agents to hold a higher amount of cash money for the same transaction.

Let it be assumed that $f(.)$ takes the following functional form which features conveniently constant price elasticity

$f(.) = (\mathcal{B}/\mathcal{H})^{\theta} \Rightarrow \mathbb{Q} = A * \mathcal{B} * (\mathcal{B}/\mathcal{H})^{\theta}$ where $\theta > 0$ is the price elasticity

When the bank depositor sells $\mathbb{Q}/\mathcal{B}$ dollars the bank receives directly this amount and sells it at the parallel rate $\mathcal{H}$. In other terms the bank is long a call option at a strike price $\mathcal{B}$, as the pay-off in both cases is the same. Since an option has a positive economic value, the opportunity of holding such a call produces a material gain to the bank, a gain which is levied on and is at the expense of depositors. Moreover and since a call option varies theoretically, directly, and positively with $\mathcal{H}$, the underlying asset, and also varies directly and positively with the variance of $\mathcal{H}$, then banks have more economic profits when the foreign exchange rate $\mathcal{H}$ depreciates (i.e., $\mathcal{H}$ is higher) and when it is highly volatile or highly dispersed and variable. This means that banks benefit from a deterioration and highly variable foreign exchange rate. In still other terms, banks benefit from the economic turmoil, which is an astounding event. The question that is begged: is this deliberate and intended?

The riskless arbitrage profit π to the bank is therefore

$$\pi = \left(\frac{\mathbb{Q}}{\mathcal{B}}\right) * A * (\mathcal{H} - \mathcal{B}) = \left(\frac{\mathcal{B}}{\mathcal{H}}\right)^{\theta} * A * (\mathcal{H} - \mathcal{B})$$

which is positive as long as $\mathcal{H} > \mathcal{B}$, which is satisfied. If the bank delays the sale of the dollars then it is undertaking a speculative activity on $\mathcal{H}$, and the realized profits must be adjusted for incremental risk, and hence can no longer be considered as riskless arbitrage funds.

If there is a representative bank, or a benevolent dictator, who maximizes this profit π relative to the rate $\mathcal{B}$ then the first-order condition implies that[1]

$$(\mathcal{H} - \mathcal{B}) * \theta * \left(\frac{\mathcal{B}}{\mathcal{H}}\right)^{\theta - 1} * \left(\frac{1}{\mathcal{H}}\right) - \left(\frac{\mathcal{B}}{\mathcal{H}}\right)^{\theta} = 0$$

Given that $\left(\frac{\mathcal{B}}{\mathcal{H}}\right)^{\theta} \neq 0, \text{and } A \neq 0$, the marginal condition simplifies to

$$\mathcal{B}_{optimal} = \frac{\theta * \mathcal{H}}{(1 + \theta)}$$

[1] The second-order condition of negativity for the presence of a maximum is satisfied.

This equation identifies the lollar rate as a parsimonious function of two parameters: θ and $\mathcal{H}$. As an example, and if $\theta = 1$, then the optimal lollar rate is half the parallel price $\mathcal{H}$. In this situation and assuming a value of LBP 60,000 for $\mathcal{H}$ the optimal lollar rate is LBP 30,000. However, if $\theta = 2$ then the optimal lollar rate for the same $\mathcal{H}$ is LBP 40,000. Finally, if $\theta = 1.5295$ then the optimal lollar rate is LBP 36,279.90.

However the actual practice imposes constraints. The new circular of the Banque du Liban includes a cap of USD 1,200 on individual transactions. Without this restriction the optimal individual will choose to sell USD 4,632.62.[2] Repeating the optimization with the addition of a USD 1,200 maximum transaction amount, produces an optimal lollar rate of 15,000.72. This figure is exactly the actual lollar rate imposed. Hence, if one assumes that policy-makers behave as if they are theoretical optimizers then an actual lollar rate of LBP 15,000 corresponds to an assumed internal value of $\theta = 1.5295$, which is a highly plausible figure. Using the envelope theorem a one unit increase in θ decreases optimal profits by $LOG[\theta/(1+\theta)]\%$, where LOG is the natural logarithm.

If $\mathcal{H}$ is higher than LBP 60,000 then the optimal lollar rate will also be higher. A 1% depreciation of the foreign exchange rate will impact the lollar rate by exactly 1%. However, since the base levels are not the same, a one LBP depreciation of the foreign exchange rate will result in an increase of the optimal lollar rate by less than one pound. This is evident since $(1+\theta) > \theta > 0$. Hence the optimal $\mathcal{B}$ will optimally rise by less than the rise in $\mathcal{H}$. This should be respected by policy-makers if a change in the lollar rate $\mathcal{B}$ becomes warranted.

If the restriction on individual transactions is relaxed and removed the optimal lollar rate will be much higher than 15,000 at around 36,279.90 (vide supra). This also shows that imposing the cap on transactions lowers $\mathcal{B}$ and raises $(\mathcal{H} - \mathcal{B})$, and this impacts significantly and positively on the value of the call option to banks. Hence capital controls benefit even more banks. The presence of the call opportunity seems to favor banks at the expense of depositors. The result, whether intended or not, is to reinstall and redistribute the burden of the financial and monetary debacle from banks to depositors. Depositors are already witnessing and adapting to the blunt and any additional capital constraints required by the International Monetary Fund and other external donors will adversely and incrementally affect their fortunes.

As a general conclusion the policy-makers are actually and surprisingly behaving efficiently, rationally and optimally given the financial constraints in place. It is as if actual policy on the choice of the lollar rate is strongly master-minded. Another conclusion is that depositors are indirectly being sanctioned by the circular # 151 before being sanctioned more formally by other controls.

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[2] The parameter $\mathcal{A}$ is calibrated and set equal to 10,000.

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