The Lebanese Treasury Auction

An Evaluation of the Treasury's Choice of the Auction Design

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───── ملخص ─────

دراسة حول تصميم مناقصة سندات الخزينة اللبنانية تبين إمكانية

تحسين إيرادات الخزينة باعتماد تصميم مختلف

تعتمد الخزينة اللبنانية على نظام التسعير التمييزى (Discriminatory pricing) فى مناقصات السندات التى تصدرها أسبوعيا، بينما يبين هذا البحث إمكانية تحسين إيرادات الخزينة، وذك باعتماد نظام التسعير الواحد (Uniform) .

هذه الدراسة التحليلية لمناقصة سندات الخزينة اللبنانية تظهر، بناء على الدراسات النظرية والتجارب العملية لعدد من الدول، أن نظام التسعير الواحد أكثر فعالية من نظام التسعير التمييزى وذلك لسببين : التسعير الواحد يؤدى إلى عروض أقل حذرا ويضعف التكتل بين المصارف التجارية فى لبنان. ميل المصارف التجارية فى لبنان للحذر والتكتل عند دخول مناقصات سندات الخزينة اللبنانية ينتج عن كون الجو الاقتصادى والسياسى العام غير مستقر.

توصى هذه الدراسة إلى المسؤولين فى مصرف لبنان الاستفادة من المعلومات السرية التى بحوزتهم لتحديد ضخامة مشاكل العرض الحذر والتكتل بين المصارف وعدم التكافئ فى الحصول على المعلومات المهمة للمشاركة فى مناقصة سندات الخزينة اللبنانية. كما أن هذه الدراسة تشرح بالتفصيل المقاييس والطرق الاحصائية الواجب الاعتماد عليها من أجل ذلك.

يخلص البحث بتوصية إضافية حول إنشاء سوق مستقبلية لسندات الخزينة اللبنانية، مما يؤدى لمنافع اقتصادية مهمة بما فيها تفعيل عملية اكتشاف السعر لهذه السندات.

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1. Introduction

The Lebanese government issued an average of 388 billion in Lebanese-lire-denominated Treasury securities to the public in its weekly auction between January 1996 and May 1997[1]. These issues help the Lebanese government finance its budget deficits, roll over maturing Treasury securities, and implement monetary policy.

Whether the auction design maximizes government revenue (i.e., minimizes the Lebanese government's borrowing cost) is an important issue, especially since Lebanon has continuing budget deficits. Thus, it is surprising that there is no debate on this issue among financial economists and policy makers in Beirut.

The design of the Lebanese Treasury auction can be described as discriminatory pricing, since winning bidders pay the prices that they bid for the treasury securities being sold. In orher words, the Lebanese Tresury awards the securities to the highest competitive bidder and works down through the competitive bids until the entire issue is sold, thereby acting as a perfectly discriminating monopolist. In contrast, with uniform pricing, winning bidders pay the same price, which is equal to the lowest winning bid (or the highest losing bid), rather than their bid prices.

The ability to price-discriminate is often believed to increase the auctioneer's revenue, because the lowest winning bid price is applicable to only a portion of the issue. However, common-value auction theory indicates that uniform pricing should be revenue-superior to discriminatory pricing (e.g., Milgrom and Weber, 1982; and Bikhchandani and Huang, 1989), and the empirical evidence provided in the studies of Tenorio (1993), Umlauf (1993) and Nyborg and Sundaresan (1996) supports this theory[2].

This study argues that it is worthwhile to experiment with the uniform priceing mechanism in the Lebanese Treasury securities auctions. The uniform pricing mechanism is likely to be welfare-superior to the discriminatory pricing mechanism currently in use, for at least two reasons. First, it alleviates the "winner's curse." Second, it combats collusion in the auction.

This paper is organized as follows. Section 2 describes the Lebanese Treasury auction and illustrates how the bidding environment is characterized by great uncertainty. Section 3 reviews the published theoretical and empirical studies on auction design, and conludes that uniform pricing auctions are welfare-superior to discriminatory ones. Section 4 shows the fallacy of some possible counterarguments to the recommendations in this study. Section 5 explains how Banque du Liban can analyze its confidential data to determine the performance of uniform versus discriminatory pricing auctions. Section 6 concludes this study with a final recommendation addressed to the public officials at the Lebanese Treasury and Banque du Liban.

2. Description of the Lebanese Treasury Auction

The Lebanese Treasury currently auctions three-month, six-month, one-year, and two-year securities every week, using a discriminatory pricing mechanism. The three-mongh, six month, and one-year securities are pure discount bills. The two-year note pays coupon semi-annually. All four security types have a par value of Lebanese lire 10,.000 (i.e., around U.S. $6.36 as of end of June 1996).

The Lebanese Treasury usually announces the ceiling of each security issue on Friday at noon. The auctions for the three-and six month bills take place on Saturday, and on Monday for the one-and two-year securities. Before 10:00 a.m. on the day of the auction, bidders submit multiple competitive sealed bids that are discount-quantity pairs. Bid discount rates are specified in basis points. The auction results are announced at noon on the same day of the auction. The settlement date for all four types of securities is the following Thursday at 10:00 a.m.

All commercial banks operating in Lebanon can submit competititve bids in the auction[3]. There were 79 commercial banks operating in Lebanon during the year 1995. Noncompetitive bidding (in which bids specify a quantity, but no discount) is not avilable to the commercial banks. It is available, however, to individual investors and non-bank financial institutions[4]. Noncompetitive bidders are guaranteed to receive the

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quantities specified in their bids at the quanitity-weighted average discount rate of the winning competitive bids. The noncompetitive bid quantities are not included in the ceilings announced on the Friday.

The settlement prices of the pure-discount three-month, six-month, and one-year bills for the noncompetititve and the winning competitive bidders are computed as follows: Settlement price = L.L. 10.000 X {1 - [Winning bid rate X (Maturity / 365)]}. Therefore, the effective yields on these Lebanese Treasury bills are higher than the bid discount rates. Maturities of all four type of securities are 91, 182, 364, and 728 days, respectively. Bidders who submit multiple winning bids pay several different settlement prices for the same security.

All winning bidders in the auction for the two-year Lebanese Treasury note receive a set coupon rate, which is the quantity - weighted average discount rate of the winning bids for that security. However, winning bidders on the two-year note at rates that are higher (lower) than the average pay less (more) than the par value of Lebanese lire 10.000 on the settlement date. In other words, winning bidders pay at settlement the present value of the two-year note with the set coupon, using their own winning bid rates.

Banque du Liban discloses the results of the auction by publishing the quantity weighted average winning discount rate for each security, the highest winning bid discount rate, and the actual issue size, as a percentage of aggregate bids. No data are provided on the distribution of the losing bid rates or quantities. In addition, from Janury 1996 to May 1997, the ceilings that were announced before the auction were never adhered to. In fact, the actual weekly issue size exceeded the announced ceiling by an average of 92%, with a range spanning from -44% to 292.2%.[5]

However, since Februay 1997, the Lebanese Treasury has been keeping the actual issue size closer to its announced ceiling for competitve bids. Since the quantity of securities demanded far exceeds the quantity supplied, the Treasury currently allocates the issues to the winning bidders on a pro rata basis. Even the bidder with the lowest discount rate (i.e., with the highest bid price for the auctioned securities) receives the same percentage of his corresponding bid quantity as the bidder with the highest

winning discount rate (i.e., with the lowest bid price for the auctioned securities)[6].

This fact makes asset allocation and liquidity management much more difficult at a commercial bank in Lebanon. For example, a strategy of bidding at very competitive rares does not always help the bank obtain the bid quantity it needs to balance its mix of assets. In addition, bidding for higher quantities in the hope of obtaining the needed quantity is not a good solution to this problem. This strategy entails sigrificant liquidity risk, because Banque du Liban can accept the exaggerated bid quantity. From February 1997 through May 1997, winning bidders received an unpredictable percentage of their bid quantities that varied between 5% and 100%[7].

Therefore, the auction for the Lebanese Treasury securities is a one-sided (i.e., fixed supply), multiple-unit, multiple-price, multilateral, scaled-bid, call auction. It does not generate real-time feedback of information on the acceptance status of individual bids, and the bidding environment is characterized by great uncertainty. In addition to the uncertainties pertaining to other bidders' strategies, the demand for, and the actual supply of the auctioned securities, Lebanon's foreign debt has been rising dramatically, Israel invaded Lebanon in March 1994 and again in April 1996, and there have been several additional destabilizing political events in recent years. These factors greatly exacerbate the risks of bidding in the Treasury auctions and encourage collusion.

3. Literature Review on Auction Design

The theoretical and empirical studies which demonstrate that uniform pricing is revenue-superior to discriminatory pricing mention two important attributes of the former. First, the uniform pricing mechanism alleviates the winner's cure. Second, it combats collusive bidding strategies in the auction.

The "winner's curse" refers to the concept that winning bidders in auctions are those with the highest ex ante estimates (Wilson, 1969). Therefore, winning means that all other bidders estimated a lower value for

the issue, which is bad news for the winner. In attempting to avoid regretting their bids ex post, bidders bid cautiously, which reduces the auctioneer's revenue. Bikhchandani and Huang (1993) and Milgrom (1989) make the theoretical argument that the uniform pricing auction would result in a higher expected selling price than the discriminatory pricing auction, since uniform pricing reduces the winner's curse, because the auction price is linked to the lowest winning bid price (or the highest losing bid price).

Friedman (1991) argues that a uniform pricing auction would lessen collusion. His argument is based on the notion that a bidder's influence on his own marginal price is much smaller in uniform pricing than in discriminatory pricing mechanisms. Therefore, there are stronger incentives to deviate from cartel equilibria in uniform pricing auctions. For instance, with a perfectly collusive cartel in a single-bid uniform auction in which all bidders submit identical bid prices, a bidder can significantly increase his expected share of the issue and profits by raising his bid price and quantiy. As long as he left some of the auctioned quantity for the cartel members who adhered to the collusive agreement, the price he would pay would not rise. However, in a discriminatory pricing auction, such a strategy would increase the deviator's marginal price.

Empirical studies by Cammack (1991) and Spindt and Stolz (1992) examine markups at three-month U.S. Treasury bill auctions over when-issued rates on the same bills.[8] These authors give estimates of the markups that exceed one basis point above bid when-issued rates. Similarly, Simon (1994) shows that the average of the markups over bid when-issued rates in a sample of U.S. Treasury coupon auctions is 0.37 basis points. More importantly, all these studies document that average auction rates rise in relation to when-issued rates when uncertainty increases, indicating that the winner's curse indeed exists. Simon (1994) reports that a one-basis-point increase in the standard deviation of when-issued rates during the half-hour before auction is associated with a 0.83 basis-point markup increase at auctions.

Direct empirical evidence on the revenue-superiority of uniform pricing auctions is provided by Tenorio (1993), Umlauf (1993) and Nyborg

and Sundaresan (1996), Tenorio uses data from the Zambian foreign exchange auctions, which were held weekly from October 1985 to January 1987, to analyze revenue-equivalence of uniform and discriminatory pricing mechanisms. The auctioned foreign funds came primarily from export proceeds and foreign aid. Bank of Zambia used the uniform pricing mechanism in the beginnig. However, after the Zambian authorities became alarmed about what they considered to be an excessive depreciation of the Zambian currency (Kwacha), they switched to discriminatory pricing beginning with the 43 rd auction until they suspended the auction on January 28, 1987. The results of Tenorio's tests indicate that the uniform pricing auctions yielded a higher average revenue than the discriminatory pricing auctions, and that the difference is explained by a higher effective bidder participation under the uniform pricing mechanism.

Umlauf (1993)analyzes bidding behavior in Mexican Treasury bill auctions over the period 1986-1991. In July 1990, in an effort to combat collusion and increase auction revenue, the Mexican Treasury began using uniform pricing instead of discriminatory pricing. Umlauf finds that bidders take into account the winner's curse, curse, and that auction revenues increase as infomtion dispersion increases. He laso concludes that uniform pricing auctions appear to raise more revenue than discriminatory pricing auctions.

Nyborg and Sundaresan (1996) use when-issued transactions data in the U.S. to provide an empirical comparison of the performance of discriminatory versus uniform U.S. Treasury auctions. They find that when-issued volume is higher under uniform, compared to discriminatory, auctions. This finding suggests a higher information release, which should reduce pre-auction uncertainty and the winner's curse. In addition, they report that when-issued volatility falls after uniform auctions and again after the outcome announcement; whereas, it rises in discriminatory auctions, which represents further evidence that uniform auctions increase precaution information and lower the short squeeze.[9]

Overall, the conclusion, based on this review of theoretical and international empirical studies on auction design, is that uniform pricing

auctions seem to be revenue-superior to discriminatory pricing auctions for two reasons : Uniform pricing alleviates the winner's curse and makes collusion more difficult ot sustain. Therefore, experimenting with the uniform pricing mechanism in the auction for the Lebanese Treasury Securities seems worth while.

4. Fallacy of Some Possible Arguments for Not Experimenting with the Uniform Pricing Mechanism in the Auction for the Lebanese Treasury Securities

There are three arguments that may be raised against experimenting with the uniform pricing mechanism for the Lebanese securities acutions. The first argument is that an   increasing number of bidders might eliminate the downward bias in bids due to the winner's curse. In fact, the theoretical models of Milgrom (1979) and Wilson (1977) show that when the number of competitive bidders is finite, there are two effects for the entry of additional bidders. Their entry exacerbates winner's curse, which increases profits, but it also increases competition and reduces the probability of winning, which decreases profits. The net effect depends on the nature of bidding strategies and the distribution of private information.

However, Engelbrecht-Wiggans, Milgrom, and Weber (1983) develop a model for a common-value auction in which some of the bidders have superior ex ante information (i.e., ex ante information is distributed asymmetrically). They demonstrate that adding uniformed bidders to the auction does not alter the profitability of either incumbent informed or uninformed bidders. Hendricks and Porter (1988) provide empirical support for this latter consclusion.

Therefore, if there is collusion among some of the major commercial banks in Lebanon and there is a serious winner's curse, it is unrealistic to expect that increased participation of small individual or institutional investors will compete away profits to incumbent banks. Anyway, these bidders are better off submitting noncompetitive bids. Such bids enable them to purchase the Lebanese Treasury securities at the quantity-weighted average discount rate of the winning competitive bids without incurring any information collection costs or assuming the risk of non-execution.

The second argument is that the theoretical studies cited earlier are equilibrium models of single-bid, single-unit, common-value auctions. In contrast, the Lebanese Treasury auction is characterized by multiple bids and multiple units, and there is no published model of equilibrium bidding behavior in multiple-bid, multiple-unit auctions to refer to. In addition, the winner's curse can be diversified through bidding at different rates (Scott and Wolf, 1979). and this is what the commercial banks in Lebanon do.

However, bidders in the auctions for the Mexican and the U.S. Treasury securities also submit multiple competitive bids (i.e., similar to the commercial banks in Lebanon). Yet, the empirical evidence provided in the studies of Cammack (1991), Spindt and Stolz (1992), Umlauf (1993), Simon (1994), and Nyborg and Sundaresan (1996) clearly indicates that the winner's curse still exists, and that uniform pricing auctions are revenue-superior to discriminatory pricing auctions.

The third argument is that none of the theoretical or empirical studies from the international capital markets can be used to appraise auctions of Lebanese Treasury securities, since these auctions are unique and the experiences of other markets are not applicable to Lebanon. Further, this study does not provide any empirical evidence on the severity of the winner's curse, the existence of collusive bidding or information asymmetries, or the expected saving from switching to uniform pricing.

It is very difficult to see what is so unique about the auction for the Lebanese Treasury securities, which makes all the above theoretical and empirical studies irrelevant when evaluating the choice of the auction design in Lebananon. Admittedly, however, this study does not provide any empirical evidence about the severity of the winner's curse, the existence of collusive bidding, the existence of information asymmetries, or the expected savings from switching to uniform pricing in the auction for the Lebanese securities. Regrettably, this needed evidence cannot be provided in this study because it requires having access to the complete set of participant-identifiable competitive bids in each auction, the detailed list of participant-identifiable allocated quantities with their corresponding prices in each auction, and the complete data on all resale transactions that have

occurred on the Lebanese Treasury securities for at least the past two years. These data are considered confidential by Banque du Liban, and thus are not available.

Clearly, however, given the huge amount of securities that the Lebanese Treasury sells every week, even a few basis points' reduction in borrowing costs implies substantial savings for the Lebanese Treasury and the Lebanese taxpayers. The officials at Banque du Liban have the data they need to examine the severity of the winner's curse, the existence of collusive bidding, and the existence of information asymmetries in the auctions, and they can easily determine, at minimal cost, the potential savings to the Lebanese Treasury from switching to the uniform pricing mechanism.

5. How to Appraise the Performance of the Lebanese Treasury Auction and the Welfare-Superiority of Uniform Pricing Auctions

As noted, the public officials at Banque du Liban can use the data they possess to examine the severity of the winner's curse, the existence of collusive bidding, and the existence of informing asymmetries in the auction for each of the four types of Lebanese Treasury securities[10]. They can also examine whether switching to a uniform pricing format alleviates these problems. This section explains the recommended measures and statistical procedures to use in such an examination.

5.1 Measure for cautions bidding

A good measure for the extent of cautious bidding attributable to the winner's curse(i.e downward bias in bids) is the ratio of the quantity-weighted average resale price to te quantity-weighted average price of winning competitive bids minus one :

$$\{[\sum_{i=1}^{M} \overline{s_i} * Q_i / \sum_{i=1}^{M} Q_i] / [\sum_{i=1}^{N} \overline{b_i} * V_i / \sum_{i=1}^{N} V_i]\} - 1$$

Where :

$$\sum_{j=1}^{M} \overline{s_j} * Q_j / \sum_{j=1}^{M} Q_j = \text{quantity-weighted average resale price}$$

S_j = price of the jth resale transaction

M = number of resale transactions

Q_j = quantity of the jth resale transaction

$$\sum_{i=1}^{N} b_i * V_i / \sum_{i=1}^{N} V_i \quad = \text{quantity-weighted average of winning bid prices}$$

b_i = prices of the ith winning bid

N = number of winning bids

V_i = quantity of the ith winning bid

The higher this measure is, the greater would be the auction profits to the bidders, and the greater would be the downward-biased estimates of common values due to winner's curse. To determine the statistical significance of this figure, compute the t-statistic by dividing its average across auctions by the standard error.

In addition to examining this meaure under the existing pricing mechanism, it should be compared in both uniform and discriminatory pricing formats. A t-test for mean differences can determine which format best alleviates winner's curse. Moreover, this measure should be examined cross-sectionally to determine if there is a long-term convergence towards zero profits. [11]

5.2 Measure for collusive bidding

A good measure for the level of collusion is the quantity-weighted variance of the prices of winning bids :

Quantity-weighted variance of winning bid prices =

$$\sum_{i=1}^{N} (b_i - b_w) * V_i / \sum_{i=1}^{N} V_j$$

$$\text{Where } b_w = \sum_{i=1}^{N} b_i * V_i / \sum_{i=1}^{N} V_j$$

= quantity-weighted average of winning bid prices.

The higher this measure is, the lower would be the level of collusion. To test whether this measure of collusion is different in uniform versus discriminatory pricing auctions, use the *F*-test for equality of variances (assuming paired auctions).

5.3 *Measure for asymmetrically informed bidding*

Information asymmetries are likely to arise if certain bidders enjoy more contact with government officials and thus acquire valuable political and economic information that is relevant to the Lebanese Treasury auctions. A good indicator that information asymmetries exist would be a finding that some competitive bidders consistently win bids at prices that are lower than the quantity-weighted average winning bid price (or at prices that are very close to the lowest winning price)[12]. The following measure should be computed for each commercial bank :

$$(1-T)\sum_{t=1}^{T} [\sum_{e=1}^{E} V_{e.t} / \sum_{h=1}^{P} V_{h.t}] * (1/T)\sum_{t=1}^{T} [\sum_{e=1}^{E} b_{w.t} - b_{e.t}) V_{e.t} / \sum_{e=1}^{E} b_{e.t} V_{e.t}]$$

Where

T   = number of auctions entered by the bank

V_e = quantity of the eth winning bids made by the bank at a price lower than b_w

E   = number of winning bids made by the bank at prices lower than b_w

$V_{h.t}$ = quantity of the hth winning or losing bid made y the bank in the auction of week t

p = number of winning or losing bids made by the bank

b_e = price of the eth winning bid made by the bank at a price lower than b_w

The first part of this measure is the total quantity of successful bids at prices lower than the quantity-weighted average price of winning bid to total quantity of successful and unsuccessful bids made by the particular

bank, averaged over the period of T weeks. The greater this average ratio is, the more likely it is that the bidding bank has access to superior information. The second part of this measure captures the extent to which the bidding bank does better than the average bidder, in terms of price paid for the auctioned securities, averaged over the period of T weeks. The greater this average ratio is, the more likely it is that the bidding bank has superior information. The product of these two parts, forming the measure of information asymmetries, is interpreted in a similar fashion.[13]

5.4. Analysis of the downward bias in bids

The following regression model of bidders' profitability (i.e. downward bias in bids) in the Lebanese Treasury auctions should be applied to the data available at Banque du Liban for each of the four Lebanese Treasury securities:[14]

$$BIAS_t = \phi_0 + \phi_1 \, RISK + \phi_2 \, NUMBID_t + \phi_3 \, COLLUSION_t + \phi_4 FORMAT_t$$

BIAS, is the downward bias in bids, proxied by the ratio of the quantity-weighted average resale price to the quantity-weighted average price of winning competitive bids, minus one, in the auction of week t. This measure is a weak upper-bound estimate of the downward bias in bids, assuming that the change in the auction design does not change the expected resale prices of the Lebanese Treasury securities.

RISK, is the resale risk and information dispersion, proxied by the variance of overnight interbank rates over the five-day period ending with the day of auction execution. One would expect a positive correlation between the variance of overnight rates and bidder profitability assuming bidders are risk--averse.

NUMBID, is the number of participating competitive bidders. If the variation in this nubmer is due to the entry and exit of small uninformed bidders, and if the implications of the model of Engelbrecht-Wiggans, Milgrom, and Weber (1983) extend to the Lebanese auction, one should find a coefficient of zero for this variable. Alternatively, finding a significant negative coefficient implies that winner's curse can be reduced by increasing

competition in the auctions for the Lebanese Treasury securities.

COLLUSION, is the level of collusion in the auction proxied by the quantity-weighted variance of winning bid prices. One would expect a positive correlation between bidders' profits and the quantity-weighted variance of winning bid prices if the auction is noncompetitive.

FORMAT, is a binary variable that represents the auction format. It takes a value of zero for uniform pricing auctions, and one for discriminatory pricing auctions. A statistically significant positive coefficient for this variable would indicate that uniform pricing auctions are revenue-superior to discriminatory pricing auctions.

6. Conclusion and Final Recommendations

This study recommends experimenting with the uniform pricing mechanism in the auction for the Lebanese Treasury securities. The bidding environment for these securities is characterized by great uncertainty; and the current Treasury auction design in Lebanon does not help reduce this pre-auction uncertainty, which is conducive to collusion and cautious bidding. The theoretical and empirical studies on auction design clearly indicate that switching to the uniform pricing mechanism can alleviate these problems, and hence increase the auctioneer's revenues.

This study also recommends that the Lebanese Treasury implement a complementary meaure, which would further reduce the uncertainty in the auction for its securities. This complementary measure is to create a futures market for the Lebanese Treasury securities, which would be welfare-improving in at least three ways. First, a futures market lead to more efficient price discovery[15] since observing the prices at which trades are being made in the futures market helps potential auction bidders gain information on the demand for the issue (i.e., expected price) and the dispersion of participants' views about the value of the issue (i.e., price variability). As a result, the winner's curse is reduced and the auction participants could bid less cautiously, which would raise the auction revenues for the Lebanese Treasury. Second, a futures market would result

in more efficient allocation and bearing of risk, which could ultimately increase the demand for the Lebanese Treasury securities. Third, a futures market could provide investors with a more efficient way to achieve a certain risk-return trade -off, since futures transactions cost less in terms of portfolio disruption than cash transactions, and they are excellent instruments for duration management. Portfolio insurance, and the design of synthetic instruments.

Creating a futures market for the Lebanese Treasury securities could come at a cost. By aggressively bidding in the auction, well-capitalized Lebanese banks may opportunisticaly attempt to squeeze others when they are net short in the futures market. Such aggressive bidding would raise the Lebanese Treasury's revenue in the short run, but it wuld have the undersirable effect of driving participants away from the market in the long run.

It is notable, however, that probably no single commercial bank in Lebanon has enough liquidity to corner the market. With an average weekly issue size of L.L. 388 billion, even a 35% share, which is far below being a blocking position, represents L.L. 135.8 billion, which is an amount that even the largest, most liquid commercial bank in Lebanon cannot afford to purchase. Any way, as a simple measure to prevent this potential problem, the Lebanese Treasury can impose a ceiling on the amount of any issue that any bidder can win in the auction.[16]

I should be recognized, however, that for futures market for the Lebanese Treasury securities to truly lead to the welfare improvements cited earlier, it should have the proper static and dynamic microstructure properties. The desirable microstructure properties for a securities market are : transparency, liquidity, consolidation of the order flow, accurate price discovery reasonable price stability, fairness, regulatory simplicity, low transaction costs, and immediacy. The empirical research by Amihud and Mendelson (1987 and 1991), Stoll and Whaley (1990), and Amihud, Mendelson and Murgia (1990) clearly indicates that market structure has important effects on the properties of asset prices. The design of trading mechanisms is an important determinant of a security market's liquidity and

performance in facilitating the process of price discovery, which in its turn is the most essential information for an investor (Hayek, 1945; and Grossman, 1989).

This study also recommends using an electronic call market with real-time information feedback on the acceptance status of individual futures bids. The theoretical model of Madhavan (1992) and Schnitzlein (1996) demonstrate that electronic call markets are structurally more liquid than continuous markets, because they bunch orders over time and then execute them simultaneously. The empirical evidence of Amihud and Mendelson (1991) and Amihud, Mendelson, and Murgia (1990) supports this theory. In addition, the study of Pagano and Roell (1990) documents that transactions costs are lower in call auctions than in dealership markets.

With real-time information feedback on the acceptance status of individual bids, an electronic call market can produce timely information of superior quality to continuous trading. Clearly, a trader might want to delay his commitment until the last second before the call, which completely completely defeat the meachanism. For this reason, this study recommends that the Lebanese Treaury should encourage traders to commit early by rewarding early irrevocable commitments (e.g., time-differentiated bid execution). Accordingly, participants would select the time at which they enter their orders by balancing their need to gather more information by waiting with the rewards of early commitment. [17]

Finally, this recommends offering two types of futures contracts for trading. The first type should require the delivery of the actual underlying Lebanese Treasury securities, and the second type should allow the delivery of close substitutes of the underlying securities at maturity. This latter type would satisfy those who do not truly need the actual paper of the Lebanese Treasury securities, and it would ease any short squeeze in the auction for the Lebanese Treasury securities caused by aggressive bidder attempting to corner participants with short positions in the futures market (Sundaresan,1992),

Foot Notes & References

* Foot Notes

1. This statistic was computed by collecting data from the daily newspaper An - Nahar. Using the exchange rate for the U.S. dollar as of end of June 1996, this average weekly issue size is equivalent to U.S. $247 million.

2. Auction theory distinguishes between two auction types : independent private-value auctions and common-value auctions. In the former, bidders' Valuations are independently distributed; in the latter, bidder share a single uncertain valuation. Theasury auctions are more like common-value auctions than independent private-value auctions.

3. Until March 1997, the commercial banks operating in Lebanon were required to maintain an investment in the Lebanese Treasury securities amounting to not less than 40% of their deposits. This legal reserve requirement is now llifted.

4. As of end of June 1996, 71.3% of all outstanding Lebanese Treasury securities were held by the commercial banks, 21.5% by the public, 6% by public institutions, and 1.2% by non-bank finance institutions (Source : Quarterly Report of Banque du Liban.

5. This statistic was computed from data from the daily newspaper An-Nahar.

6. Allocating the securities to winning bidders on a pro rata basis does not prevent a commercial bank with superior information from obtaining a large portion of the issue. All the commercial bank has to do is bid for a very large quantity.

7. Source : Weekly auction results reported by Banque du Liban.

8. Markups are the difference between the average winning auction yield and the when-issued yield around the time of the auction. In the when-issued market, dealers and investors may either take long or short forward positions in the Treasury security to be auctioned. When-issued trading occurs during the period between the auction announcement date and the actual issue date of the security, and settlement takes place on the issue date.

9. "Squeeze" is a term used to describe situations in which a few market participants bid aggressively at auctions in order to reduce the supply of an issue to short

sellers in the when-issued market (see Jordan and Jordan, 1996).

10. The commercial banks in Lebanon may have different bidding strategies for the different Lebanese Treasury securities. It is important, therefore, to perform the above analyses on all four securities.

11. Due to insufficient resale transactions of the auctioned securities, resale transactions pertaining to previously auctioned securities may have to be used instead, after controlling for maturity differences and accrued interest, and adjusting for changes in the term structure of interest rates and the differential liquidity of the issues. Newly issued securities would be on-the-run, which may make them more liquid than the outstanding isues (Warga, 1992).

12. Alternatively, one can use the product of : (1) the average of the quantity of successful bids as a percent of total bids made by the bank, and (2) the inverse of the average of the excess price (paid by the bank) over the lowest winning price multiplied by the bid quantity as a percent of toal volume of the bank's successful bids multiplied by the lowest winning price.

13. Note that this measure is unaffected by the size of the bidding bank.

14. It is very important to conduct the usual diagnostic tests before interpreting the results of the regression analyses. In addition, it is important that Banque du Liban experiment with the uniform pricing mechanism over several months in the auction for each of the four Lebanese Treasury securities in order to enable the commercial bansk in Lebanon to learn and adjust to the new auction design.

15. Price discovery is the process of finding market clearing prices that are resonably aligned with the theoretically desirable equilibrium values.

16. For instance, the U.S. Treasury does not permit any single bidder to win more than 35% of an issue competitive, and the Mexican Treasury rules dictate that no single bidder can purchase more thatn 60% of the quantity offered to competitive bidders.

17. The Arizona (U.S.) Exchange's electronic market utilizes differential fees to encourage early commitment to trade in the call.

* References

Amihud, Y. and H. Mendelsonn, 1987, Trading mechanisms and stock returns : An empirical investigation, Journal of Finance 42, 533-553.

Amihud, Y. and H. Mendelson, 1991, Volatility, efficiency and trading:Evidence from the Japanese stock market, Journal of Finance 46,1765-1790.

Amihud, Y., H.Mendelson and M. Murgia, 1990, Stock market microstructure and return volatility : Evidence from Italy, Journal of Banking and Fanance 14, 423-440.

Bickchandani, S. and C. Huang, 1989, Auctions with resale markets : A model of Treasury bill auctions, Review of Financial Studies 2, 311-340.

Bickchandani, S. and C. Huang, 1993, The economics of Treasury securities markets, Journal of Economic Perspectives 7, 117-134.

Cammack, E., 1991, Evidence on bidding strategiess and the information in Treasury bill auctions, Journal of Political Economy 99, 100-130,

Engerlbrecht-Wiggans, R., P. Milgrom, and R. Weber, 1993, Competitive bidding and proprietary information, Journal of Mathematical Economics 11, 161-169.

Friedman, M., 1991, How to sell government securities, Wall Street Journal, August 28th, A8.

Grossman, S., 19989, The Informational Role of Prices (MIT Press, Cambridge, Mass).

Hayek, F., 1945, The use of Knowledge in society, American Economic Review 35, 519-530.

Hendricks, K. and R. Porter, 1988, An empirical study of an auction with asymmetric information, American Economic Review 78,865-883.

Jordan, B. and S. Jordan, 1996, Salomon brothers and the May 1991 Treasury auction : Analysis of a market corner, Journal of Banking and Fianance 20, 25-40.

Madhavan, A., 1992, Trading mechanisms in securities markets, Journal of Finance 47, 607-641.

Milgrom, P., 1979, A convergence theorem for competitive bidding, with differential information, Econometrica 47, 679-688, Milgrom, P., and R.Weber, 1982, A theory of auctions and competitive bidding, Econometrica 50, 1089-1122.

Milgrom, P., 1989, Auctions and bidding : A primer, Journal of Economic Perspectives 3, 3-22.

Nyborg, K. and S. Sundaresan, 1996, Discriminatory versus uniform Treasury auctions : Evidence from when-issued transactions, Journal of Financial Economics 42, 63-104.

Pagano, M. and A. Roell, 1990, Stock markets, Economic Policy 10, 65-106.

Schnitzlein, C., 1996, Call and continuous trading mechanisms under asymmetric information : An experimental investigation, Journal of Finance 51, 613-636.

Scott, J. and C. Wolf, 1979, The efficient diversification of bids in Treasury bill auctions, Review of Economics and Statistics 61,280-287.

Simon, D., 1994, Markups, quantity risk, and bidding strategies at Treasury coupon auctions, Journal of Financial Economics 35,43-62.

Spindt, P. and R. Stolz, 1992, Are U.S. Treasury bills udnerpriced in the primary market ? Journal of Banking and Fianance 16, 891-908.

Stoll, H. and Whaley, 1990, Stock market structure and volatility, Review of Fianancial Studies 3,37-71.

Sundaresan, S., 1992, Pre-auction markets and post-auction efficiency : The case for cash settled futures on On-the-run Treasuries," working paper, Columbia University.

Tenorio, R., 1993, Revenue equivalence and bidding behavior in a multi-unit auction market : An empirical analysis, Review of Economics and Statistics 75, 302-314.

Umlauf, S., 1993, An empirical study of the Mexican Treasury bill auction, Journal of Fianancial Economics 33, 313-340.

Warga, A., 1992, Bond returns, liquidity, and missing data, Journal of Financial and Quantitative Analysis 27, 605-617.

Wilson, R., 1969 , Competitive bidding with disparate information, Management Science 15, 446-448.

Wilson, R., 1977, A bidding model of perfect competition, Review of Economic Studies 44,511-518.