No. 2002/02

Price Discrimination on Syndicated Loans and the Number of Lenders: Empirical Evidence from the Sovereign Debt Syndication

Issam Hallak

Center for Financial Studies
an der Johann Wolfgang Goethe-Universität ▪ Taunusanlage 6 ▪ D-60329 Frankfurt am Main
Tel: (+49)069/242941-0 ▪ Fax: (+49)069/242941-77 ▪ E-Mail: ifk@ifk-cfs.de ▪ Internet: http://www.ifk-cfs.de

CFS Working Paper No. 2002/02

Price Discrimination on Syndicated Loans and the Number of Lenders: Empirical Evidence from the Sovereign Debt Syndication

Issam Hallak*

June, 2002

Abstract:
Syndicated loans and the number of lending relationships have raised growing attention. All other terms being equal (e.g. seniority), syndicated loans provide larger payments (in basis points) to lenders funding larger amounts. The paper explores empirically the motivation for such a price discrimination on sovereign syndicated loans in the period 1990-1997. First evidence suggests larger premia are associated with renegotiation prospects. This is consistent with the hypothesis that price discrimination is aimed at reducing the number of lenders and thus the expected renegotiation costs. However, larger payment discrimination is also associated with more targeted market segments and with larger loans, thus minimising borrowing costs and/or attempting to widen the circle of lending relationships in order to successfully raise the requested amount.

JEL Classification: F34, G21, G33

Keywords: Syndicated loans, Price discrimination, Number of lenders, Sovereign debt.

* Issam Hallak, Center for Financial Studies at J.W. Goethe-University, Taunusanlage 6, 60329 Frankfurt/Main, Germany, Email: hallak@ifk-cfs.de

1. Introduction

Loan syndication and the number of lending relationships have raised a growing attention in the recent literature. Costs of borrowing are found to be consistent with agency and renegotiation issues. The paper suggests an innovative empirical investigation of the price discrimination on sovereign private debts. The sovereign borrower is different from the corporate agent as no collaterals and enforcement means are available. Therefore, the latter is subject to three main borrowing constraints, i.e. minimising agency costs, increasing the finance raising capacity, and reducing the renegotiation costs. The literature have found these three issues are interrelated with the number of lenders.

The syndicated loan is a single facility financed by a group of bank under the same conditions. Nevertheless, all other terms being equal (e.g. seniority), lenders' returns increase in *basis points* in function of the committed amount. Terms are predefined by the borrower together with his arrangers before the syndication is launched. The amount related premium is reflected in the up-front fees (the up-front fee is a fee paid at the signature of the contract and before any tranche of the loan is yet drawn down). The empirical study explores the motivation for the presence of such a price discrimination. It is based on a sample of 100 loans issued or guaranteed by sovereign agents between 1990 and 1997.

I find expected costs associated with renegotiations and information asymmetries have a positive impact on the price gap, thus being likely to reduce the number of joining lenders. This is consistent with the hypothesis that renegotiation costs are an increasing function of the number of lenders (Bolton and Sharfstein (1996), Preece and Mullineaux (1996), Brunner and Krahnen (2001)) as well as the "common pool" issue (Morris and Shin (2002)). However, I actually find little evidence of price discrimination having a negative impact on the number of financial institutions joining the syndicate. Instead, price discrimination is to a large extent motivated by the size of the loan. Results also show that the larger up-front payment gap is actually designed to

target a larger number of lenders. This is consistent with Petersen and Rajan (1994) and Machauer and Weber (2000) which show that the number of bank relationships is foremost determined by the borrower size. Therefore, I find loan size implies larger costs. The latter are not reflected in the spread, as unsuccessfully investigated in the past, but in the front-end payments.

The paper is organised as follows. In the next section I describe more in details the theory behind the empirical investigation. Section 3 contains the description of the empirical models. In section 4 the sampling procedure, the actuarial methodology, and the data set are described. The results and their interpretation are reported in section 5. Section 6 presents the estimate robustness analysis. The last section provides concluding remarks.

2. Theoretical background

2.1. Syndicated loans and the optimal number of lenders

A syndicated loan is a single credit facility financed by a group of banks under the same contracting terms. All other terms being equal, increasing payment in percentage points is, however, usually provided to lenders as a function of their committed amounts. The increasing scale is reflected in the so-called up-front fee.[1]

The main motivation for the spread on up-front fees is traditionally related to the compensation for the individual lender's higher exposure and risk-aversion. However, it clearly has an impact on the number of lenders as well as on the cost of borrowing. Indeed, provided a larger spread incurs higher borrowing costs, the borrower is likely to be attempting to reduce other costs related to the larger set of creditors, in particular renegotiation costs.

The impact of the number of lenders on contracting costs has been well investigated. It is mainly associated with information collection and renegotiation costs. The asymmetric information approach (Sharpe (1990), Diamond (1991) and Rajan (1992)) argues a close and repeated lending relationship, reflected by the reduced number of lenders, decreases information asymmetries and the relative costs. This affects the smaller and less public borrower. On the other hand, the smaller

[1] Rhodes (2001) provides a valuable description of the syndication process.

number of lenders also increases every lender's own voting rights in the event of a financial distress. The lending 'monopoly' also may result in a sort of 'hold-up' increasing borrowing costs.

Bolton and Scharfstein (1996) demonstrates there is an optimal debt structure that balances these effects. The higher number of lenders will deter the manager to default strategically that is to divert cash. However, facing a liquidity shortage beyond the manager's control, the inevitable distress will incur higher renegotiation cost due to the lack of coordination among lenders.

A recent line of research (Morris and Shin (2002)) highlighted the 'common pool' problem due to the coordination failure, i.e. even if the project is feasible, a creditor may be tempted to seize some assets and lead the borrower to financial distress. Therefore reducing the number of banks will reduce the probability that such an event occurs.

First empirical studies pointed out the positive impact of bank loan issues on the value of the firm contrasting with the insignificant impact of public debt issues (James (1987)), and more specifically loan renewals (Lummer and McConnel (1989)). Further analyses validated that the borrower has a larger set of lenders as the amount of asymmetric information declines (Petersen and Rajan (1994) and Dennis and Mullineaux (2000)) while coordination is welfare improving (Brunner and Krahnen (2001)). The value of the syndicated loan is also found to be a negative function of the number of syndicated lenders believed to be increasing renegotiations costs (Preece and Mullineaux (1996)) and the credit rating of the lending institution (Billett *et al.* (1995)). This provides evidence of the renegotiation costs affecting the asset value. The weak creditor rights and poor legal enforcement are associated with more scattered ownership structure on project finance loan (Esty and Megginson (2001)) providing evidence of international syndication is aimed to deter strategic default rather than to enhance monitoring or facilitate renegotiations. My study belongs to this line of research.

2.3. What is different about a sovereign?

The sovereign agent is the state or national entities which act on behalf of the state (usually government entities and the central bank). State representative individuals and property goods are

not subject to foreign national legislation. In this context, although a threat on the sovereign's assets (e.g. trade) somewhat exists (Bulow and Rogoff (1989), Rose (2002)), debt repayment is reputation motivated because the lenders would presumably deny the defaulter future access to foreign-currency debt and prevent from consumption smoothing (Eaton and Gersovitz (1981), Cole *et. al* (1995), Grossman and Han (1999)).

Therefore, the default is declared no sooner than when the borrower had called for a moratorium on debt repayments. Although there exists the custom-rule London Club, there is no bankruptcy code as such (Eichengreen and Portes (1995)).

The last remarks yield important comments. To the sovereign debtor chiefly matters reducing borrowing and renegotiation costs. Provided the absence of a bankruptcy code that protects the distressed borrower and the lack of coordination among lenders, the fewer the participants in the renegotiations are, the better off is the distressed sovereign. Secondly, costs due to information asymmetries will also be reduced by limiting the number of creditors.

On the other hand, alike firms, the sovereign also looks to prevent any information hold-up likely to happen with too few banks. A larger set of lenders also gives access to larger amounts. Moreover, in the absence of bankruptcy code, more than a firm, the sovereign will pay attention to the "common pool problem" (Morris and Shin (2002)).

The larger is the spread on up-front fees, the higher are borrowing costs. The spread yields higher committing amounts, thus reducing the number of financial institutions participating to the syndicate. The payment is aimed to cover for other costs resulting from the number of creditors. In particular, the larger is the liquidity available to the sovereign borrower, the more likely he will try to extend the number of banks to have access to higher amounts in the future. The fact that available cash is of a lower amount will make the borrower willing to reduce the number of banks to prepare likely renegotiations, and therefore enlarge the spread and make him pay more.

2.4. Quantity-based price discrimination and lending amounts

An alternative explanation for the price discrimination on syndicated loans follows the line of research on quantity based price discrimination. The borrower will compensate lenders differently, penalising the lower committer. The borrower thus taps various lending market segments, thus attempting to minimise borrowing costs and/or increase borrowing capacities.

Although the literature provides a wide range of illustrations, quantity based price discrimination is hardly documented on financial products. However, the non-linear pattern of syndication pricing will let the borrower decrease his borrowing costs the same way the monopolist increases his profits. The intuition is as follows. The monopolist borrower offers a relatively low lending amount to the low-demand lender. The borrower thus captures the low-supply lender surplus and reduces the high-demand costs. The borrower hence enlarges the spectrum of lending patterns and by doing so the number of lenders. The reasoning follows Mirrlees (1971).

Alternatively, the borrower increases the price difference and add several ranks to reach several lending markets attempting to expand the number of lending relationships. The motivation is the size of the loan which is related to the size of the firm (Petersen and Rajan (1994), Machauer and Weber (2000)). Although previous research found little evidence of the number of banking relationship affecting the interest spread, additional cost might be reflected in the front-end payments.

3. Model specifications

3.1. The number of participants in sovereign syndicated loans

The first model explores the impact of the fees spread on the number of banks joining the syndicate. The model of syndicated lenders to be estimated is:

$$\begin{aligned} \textit{Number of joining lenders}_{i,j} \quad &= \quad \textit{Constant} + \Phi_0.\textit{Dummies}_j \\ &+ \ f_1.\textit{Up-front fees spread}_i \\ &+ \ f_2.\ \textit{Loan amount}_i \\ &+ f_3.\ \textit{Number of arrangers}_i \\ &+ \textit{Error}_{i,j} \end{aligned} \qquad (1)$$

where a subscript *i* indicates that the variable refers to the *i*th loan observation. Similarly subscript *j* and *k* respectively indicate a variable regarding the *j*th country. Upper-case coefficients indicate vectors.

The country dummies correct for specific effects of highly represented countries in the data set, namely Turkey and India. The loan amount is reported in constant billions of 1995 US dollars. The spread on the up-front fees is calculated as the difference between the lowest and the highest fees values in percentage points. This provides with the additional cost on the loan.

This model is aimed at verifying that the spread on payments indeed contributes to reducing or increasing the number of lenders. Therefore, f_1 is expected to be negative if the borrower intends to reduce renegotiation costs, and positive if price discrimination is aimed to reduce borrowing costs. By contrast, f_2 is expected to have either a positive sign.

3.2. The determinants of the discrimination on lending compensations

The second model is intended to measure the impact of the determinants of financial distress and volatility on the spread. The model specification for the price discrimination calculated as the difference between top and bottom end fees is:

$$
\begin{aligned}
Fees\ spread_{i,j,k} \quad = \quad & Constant + \Psi_0.Dummies_{i.k} \\
& + y_1.Loan\ amount_i \\
& + y_2.Liquidity_{j,k} \\
& + y_3.Solvency_{j,k} \\
& + y_4.Public\ information_{j,k} \\
& + y_5.Variation\ of\ income_{j,k} \\
& + Error_{i,j,k}
\end{aligned} \qquad (2)
$$

where a subscript *i* indicates that the variable refers to the *i*th loan observation. Coefficients are real terms. Similarly subscripts *j* and *k* respectively indicate a variable regarding the *j*th country and *k*th year.

The up-front fees spread, the loan amount and the dummies are the same as described previously. The proxy for liquidity equals the ratio of the amount of foreign currency reserves available to the sovereign by the public and publicly guaranteed (PPG) short-term debt. This indicator is used in Eichengreen and Mody (2000). The ratios of reserves to imports and short-term debt to exports are two alternative proxies. However, results showed they added no information in the model estimates. The liquidity variable indicates the probability of a temporary foreign-currency shortage. In the sovereign debt perspective, this is assumed to indicate that default and the subsequent credit disruption is not necessarily maximising the country's aggregated utility. Instead, the sovereign will seek to renegotiate the loan arrangements. The liquidity variable, hence, indicates the perspective of renegotiations rather than debt repudiation. Therefore, the borrower will seek to reduce the number of lending relationships so that renegotiations become less costly. Thus, the sign of y_2 is expected to be positive, thus increasing the difference between the lowest and the highest committing bank.

The proxy for solvency is the ratio of the total amount of PPG long-term debt (lifetime more than a year) relative to GNP. Solvency in the sovereign debt literature indicates that the liabilities are of a larger amount than the expected cash-flows. In this case, credit disruption is unlikely to be a credible threat to the sovereign debtor. Unlike the liquidity constraint, solvency is expected to

affect very little the spread since the default risk is already reflected by the interest rate premium itself. Therefore, y_3 is expected to be insignificant.

The last variable is an indicator for the presence of public information about the borrower on the markets. This is proxied by the ratio of the PPG total private creditor debt of the country (bonds plus banking debt) relative to the total amount of PPG LDC debt. Note that an alternative is a dummy variable indicating the presence of a bond market which would reflect all public information in the traded yield. y_4 is expected to be negative.

If instead price discrimination is intended to tap different market segments and minimise the borrowing costs, both the price discrimination scale and the number of offered contracts will have a positive impact on the number of lenders.

3.3 Endogeneity of the number of lenders to price discrimination

Although the pricing is determined beforehand, the price discrimination is likely to be determined endogenously by the targeted number of lenders. In the third model, the number of joining lenders is added in model (2) as a determinant of the fees difference to form model:

$$\begin{aligned} \textit{Fees spread}_{i,j,k} = \; & \textit{Constant} + \Psi_0.\textit{Dummies}_{i.k} \\ & + y_1'.\textit{Number of joining lenders}_i \\ & + y_2'.\textit{Liquidity}_{j,k} \\ & + y_3'.\textit{Solvency}_{j,k} \\ & + y_4'.\textit{Public information}_{j,k} \\ & + y_5'.\textit{Variation of income}_{j,k} \\ & + \textit{Error}_{i,j,k} \end{aligned} \qquad (2')$$

The model defined by equations (1)-(2') cannot however be estimated using ordinary least-squares, for each model includes amongst its explanatory variables the dependent variable of the other model. Consequently, the endogenous variables will be correlated with the error terms. This will be tested. The result is the inconsistency of the estimates using the ordinary least-squares. Two-stage least-squares provides consistent estimates of the coefficients and disturbances. For this

the model needs to be identified. A necessary condition of identification of the equation is that the number of exogenous variables excluded from the equation must not be less than the number of endogenous variables included in that equation. The identification condition is satisfied in each equation of model (1)-(2').

3.4 The number of arranging banks

The study extends to the number of arranging (or "mandated") banks, which I believe is of high relevance to the present study. The arrangers are mainly large banks. Although managing banks are usually part of the pool of lenders, they receive a separate undisclosed payment. The group of arrangers build up the syndicate and their credibility along with their business partnerships constitute an asset for the loan issuer. I investigate the impact of information asymmetries on the number of arrangers. I suspect the larger is the loan and the larger is the asymmetry of information between the loan issuer and the markets, the larger the number of arrangers will be. Thus, the model of the number of arranging banks is:

$$\begin{aligned} \textit{Number of arrangers}_{i,j,k} = \; & \textit{Constant} + \Gamma_0.\textit{Dummies}_{i.k} \\ & + g_1.\textit{Loan amount}_i \\ & + g_2.\textit{Liquidity}_{j,k} \\ & + g_3.\textit{Solvency}_{j,k} \\ & + g_4.\textit{Public information}_{j,k} \\ & + g_5.\textit{Variation of income}_{j,k} \\ & + \textit{Error}_{i,j,k} \end{aligned} \qquad (3)$$

where a subscript *i* indicates that the variable refers to the *i*th loan observation. Similarly subscript *j* and *k* respectively indicate a variable regarding the *j*th country and *k*th year. Upper-case coefficients indicate vectors.

4. Sampling and data description

The sample of contracts is assembled from various issues of the International Financing Review (IFR) which is the benchmark magazine among loan syndication practitioners. The sample

is composed of 130 syndicated loans issued or guaranteed by LDC sovereigns between January 1990 and December 1997[2] which also report up-front payments. The sample includes all types of loans except for Islamic financings, issued by sovereigns located in 28 countries.[3] However, of the 130 observations, 29 are reported with missing fees at the top or bottom ends making the calculation of the difference between the top and bottom fees impossible.[4] Moreover, one observation benefits from a security and is therefore deleted.[5] Therefore, the final sample includes 100 observations representing 23 countries. Of these 100 observations, 85 report the number of banks joining the syndicate that is necessary for estimating Model (1). Exogenous variables report is complete except for three contracts missing the variability of per capita income in the last five years.[6] Descriptive details are presented in Table I and II.

The average bottom and top fees are respectively of 0.390% and 0.550% making the average spread on the up-front payments as large as 15.8 basis points. This represents a substantial premium of 40.3% relative to the lowest commitment fee. This will cost the borrower a maximum amount of 181.9 thousands US dollars for the average 115.1 million US dollars loan. Note however that the average up-front fee is substantially lower than in the sample described by Hallak (2001) in which the weighted up-front fee was found as high as 0.743% in average on the period between 1983 to 1997. The bottom and top participation fees respective means are however similar to the sample described in Esty and Megginson (2001) on international project finance (36.9-53.1bp). Moreover, there are substantial differences among countries without evident patterns.

The number of lenders per loan are rather heterogeneous too. The mean varies between 6 (Malaysia) and 70 (Thailand). However, preliminary data screening lets no correlation appear

[2] The status was verified in the articles of the company, where it should be stated that the national sovereign agent will make sure the company will meet its (foreign) obligations.
[3] Islamic Credit is an equity type of credit that carries no interests. My sample included one Islamic loan only. The facility is the second tranche of a credit signed by Turkish Grained Board (TMO) on 18 September 1997 and guaranteed by the Republic of Turkey. The first tranche is however a regular term loan and therefore has been left in the sample (see for instance IFR No. 1191, 12 July 1997, p. 102-103).
[4] However, the observation remains suitable for the study if only the lead-manager fee is missing. Each arranger usually obtains top management ranking in the syndicate and hardly discloses his own total compensation.
[5] *Zambian copper conundrum* loan guaranteed by Zambian Ministry of Finance, signed on 17 July 1997. "The principal outstanding is at least 150% covered by copper contracts" (IFR No. 1181 May 3 1997, p.58).
[6] Oman 1996, and Slovenia 1993, 1996. Slovenia entered international debt markets early after its creation.

between these three parameters of the loan, namely the total number of lenders, the up-front fees difference and the size of the loan.

5. Empirical results

5.1. The number of banks joining the syndicate and the renegotiation costs

Tables IV and V summarise the ordinary and two-stage least-squares estimates of the model's structural parameters. The *Number of joining* equations yield several insights. Results show that the number of banks joining the syndicate is mainly determined by loan characteristics. The amount of debt sought in markets has a strong positive impact at 0.01 level. Similarly to Esty and Megginson (2001), the loan lifetime also has a significant negative impact on the number of lenders joining the syndicate at standard levels (0.05). However, the impact of the difference between top and bottom fees is insignificant at standard levels, *t*-statistics being equal to 0.13. Surprisingly, the *Number of arrangers* who seek to bring into existence the syndicate has no impact on the *Number of lenders* who commit at the last stage. Last, the price discrimination has no impact on the number of banks joining the syndicate at standard significance levels.

Conversely, the OLS estimate of the model described by equation (2) is reported in the third column of Table IV. *Fees spread* is determined by expected factors with expected signs. The expected renegotiations proxied by the *Liquidity* shortage indicator has a significant positive impact on the payment premium at standard levels (5%). This is consistent with the hypothesis that the borrower will attempt to reduce the number of lenders as the prospect of renegotiations augments in order to increase lenders cohesion and reduce renegotiation costs, e.g. Bolton and Scharfstein (1996), Brunner and Krahnen (2001), Morris and Shin (2002). However, the amount of information already available to bankers has a positive impact on the spread. Probably, this is instead related to financial markets general risk exposure.

Columns 4 and 5 present the results of the two-stage least squares estimate of the simultaneous equations model constituted of equations (1)-(2'). Interestingly, I find similar results

as in the OLS models except that the number of joining lenders has a significant positive impact on the scale of the price discrimination among lenders at the 10% level. Therefore, the fee spread increases as the targeted *number of joining* lenders is larger at standard significance levels.

Therefore, results provide little evidence of price discriminating on syndicated loans being aimed at reducing the number of lenders as related e.g. to Morris and Shin (2002) 'common pool' problem as well as the borrower's attempt to reduce the renegotiation costs (Preece and Mullineaux (1996)).

5.2. The quantity based price discrimination and the size of the loan

The two stage-stage least squares estimates of the simultaneous equation models described by (1)-(2') is presented in columns four and five of Table IV. The *number of joining* equation is unchanged with respect to OLS estimate, though. The size of the loan is found to be the strongest determinant with *t*-statistics equals 6.92. Again, the payment difference has no significant impact (*z*-statistics equals -0.19). As far as the *Fees spread* equation is concerned, I find a significant positive impact of the targeted number of banks joining the syndicate on the price discrimination at the standard 10% level (*z*-statistics equals 2.36). Apart from the *number of joining* determinant, other factors have the same significance as in OLS estimate of equation (2) presented in the third column of Table IV. Results imply that, all other things being equal, loans syndicated with a larger price discrimination is associated with more banks providing additional funds.

Therefore, the quantity based price discrimination and the loan size seem more likely to be the suitable motivations for the presence of a difference in payments to lenders. Specifically, the fact that the pricing spread is aimed at increasing the number of lenders gives evidence of the price differences being aimed at targeting various lending. Additional estimates are presented in Table V. Indeed, adding *number of ranks* in equation (2) as in model (7) in Table V. The larger *Fees spread* is associated with a larger *number of ranks* in the syndicate at the 5% level (*t*-statistics equals 2.40). Therefore, I find evidence of the price discrimination reflecting higher costs incurred by the larger

borrower who attempts to widen his set of lenders for financing ability purpose. This is consistent with Petersen and Rajan (1994) and Machauer and Weber (2000).

5.3. The number of arranging banks

Interestingly the number of institutions arranging the syndicate is instead negatively determined by default indicators (solvency) at the 0.05 level. Information asymmetries also significantly increase the number of arrangers at the 0.05 level. This is consistent with the hypothesis that the borrower will attempt to reduce information asymmetries by 'hiring' several trustworthy banks to improve the information distribution. However non-reported results show that the number of arrangers has no impact on the number of banks joining the syndicate. Therefore, additional borrowing costs the issuer is willing to pay out are function of the information asymmetries costs for a given targeted number of banks. However, the statistical performance of model (3) estimate being poor, I believe this result should be regarded as a descriptive result.

6. Robustness

Sensitivity

I make sensitivity analyses to make sure the results in Table IV were robust to alternative independent variables and regression specifications. With regard to the independent variables, I replaced the *Fees spread* with *Relative spread*, and the *number of joining* lenders with the total *number of lenders*. Moreover, to make my results comparable with Esty and Megginson (2001) study, I also use the *Mean tranche* in the syndicate as a concentration indicator. Unfortunately, the number of observations providing with a complete report of commitments being too low, I was unable to calculate the same concentration ratios.[7] Results are reported in Table V.

I find the *Relative spread* sensitive to most of factors that too determine the *Fees spread* in levels at standard levels, namely *liquidity*, *Loan size*, *Lifetime*. *Relative spread* is however

[7] The number of observations with a detailed report of final commitments for each bank in the sample is of 19 only, thus insufficient for a robust statistical analysis of the Herfindhal concentration ratio.

insignificantly affected by *Public information* and *Variability of income growth*. The *Solvency* indicator is again insignificant. These results are different from those presented in Table IV.

Interestingly, the *mean tranche* is related to the same factors as the total *number of lenders*. Only the *Number of arrangers* has an additional negative impact as compared with the *Number of joining* banks. This is predictable since arrangers usually commit at top levels (highest shares) thus reducing the available share to other joining banks.

I associate the positive impact of the size of the country's international debt contracted from private creditors relative to the total LDCs international debts contracted from private creditors. Indeed other indicators of public information are insignificant at standard levels, namely the presence of bond markets for the particular country as well as GNP size. I also changed the *liquidity* indicator for either the ratio of foreign currencies reserves to the total amounts of shirt-term debt and imports or the ratio of reserves to GNP without affecting the significance of the estimates. The substitution of the *lifetime* of the loan by the *average lifetime* had no impact on the results.

Hence I can conclude my results are apparently robust. The main findings relate price discrimination on sovereign syndicated credits to the size of the loan and the attempt of the borrower to increase the number of lenders to obtain a successful syndication.

7. Concluding remarks

In this paper I analysed the price discrimination on syndicated loans contracted by sovereigns and its motivation. More specifically, the borrower together with his mandated arranger launch the loan syndication providing a higher compensation (in percentage points) if the committing lender finances a larger amount. The amount related premium is reflected in the up-front fee (the up-front fee is a fee paid at the signature of the contract and before any instalment of the loan is yet disbursed). In particular I answer the question whether price discrimination affects the number of banks participating in the credit facility and relate the positive or negative impact to

number of lending relationships issues. Alternatively, the borrower behaves alike the monopolist and exerts price discrimination to tap different lending markets and thus minimise his borrowing costs.

I find a large impact of the size of the loan on the number of financial institutions joining the syndicate and the price gap. Price discrimination is also related to liquidity shortage associated distress and information asymmetries. The evidence of the minimising borrowing costs hypothesis and the size of the loan is the best fitted explanation for such a price gap. This is consistent with the financing ability and the borrowing costs minimisation hypotheses. It is also consistent with the hypothesis that the set of lenders is expanded in a poor legal environment such as sovereign debt markets.

Interestingly, the investigation is extended to the number of arrangers. The arranging banks is the group of banks which collaborate with the issuing borrower to make the loan successful. I find the number of arrangers is significantly positively affected by asymmetries of information and the lifetime of the loan, while negatively related to the probability of repudiation. Nevertheless, their number has insignificant impact on the number of banks joining the syndicate. Therefore, I find evidence of arrangers behaving as a reducer of asymmetries of information for a given targeted number of joining banks. This also provides evidence of the existence of valuable private information in sovereign debt markets.

REFERENCES

Banerjee, S. and O. Cadot, 1996, Syndicated Lending under Asymmetric Creditor Information, Journal of Development Economics, 49 (2), May, 289-306.

Berglöf, E., G. Roland and E.-L. von Thadden, 2000, An Incomplete Contracts Approach to Corporate Bankruptcy, Manuscript, April.

Billett, M. T., M. J. Flannery, and J. A. Garfinkel, 1995, The Effect of Lender Identity on a Borrowing Firm's Equity Return, The Journal of Finance 50(2), 699-718.

Bolton, P. and D.S. Scharfstein, 1996, Optimal Debt Structure and the Number of Creditors, Journal of Political Economy, 104 (1), 1-25.

Brunner, A. and J.P. Krahnen, 2001, Corporate Debt Restructuring: Evidence on Lender Coordination in Financial Distress, Center for Financial Studies WP, No. 2001/04.

Bulow, J. and K. Rogoff, 1989, Sovereign Debt : Is to Forgive to Forget?, American Economic Review 79, March, 43-50.

Cole, H.L., J. Dow and W.B. English, 1995, Default, Settlement, and Signalling: Lending Resumption in a Reputation Model of Sovereign Debt, International Economic Review 36 (2), May, 365-85.

Datta, S., M. Iskandar-Datta and A. Patel, 1999, Bank Monitoring and the Pricing of Corporate Public Debt, Journal of Financial Economics 51, 435-449.

Dennis, S. and D.J. Mullineaux, 2000, Syndicated Loans, Journal of Financial Intermediation 9 (4), October, 404-26.

Diamond, D. W., 1991, Monitoring and Reputation: the Choice between Bank Loans and Direct Placed Debt, Journal of Political Economy, Vol. 99, August, 689-721.

Eaton, J. and R. Fernandez, 1995, Sovereign Debt, NBER WP N0. 5131, May.

Eaton, J. and M. Gersovitz, 1981, Debt with Potential Repudiation: Theoretical and Empirical Analysis, Review of Economic Studies 48, 289-309.

Eichengreen, B. and A. Mody, 2000, Lending Booms, Reserves and the Sustainability of Short-term Debt: Inferences from the Pricing of Syndicated Bank Loans, Journal of Development Economics 63, 5-44.

Eichengreen, B. and R. Portes, eds., Crisis? What crisis? Orderly Workouts for Sovereign Debtors, CEPR, London, 1995

Esty, B. C. and W. L. Megginson, 2001, Legal Risk as a Determinant of Syndicate Structure in the Project Finance Loan Market, Harvard Business School, University of Oklahoma, mimeo.

Grossman, H.I. and T. Han, 1999, Sovereign Debt and Consumption Smoothing, Journal of Monetary Economics 44, 149-158.

Hallak, I., 2001, The Determinants of Up-front Fees on Bank Loans to LDC Sovereigns, University of Oxford Department of Economics Discussion Paper, No 75, July.

Heckman, J., 1979, Sample Selection Bias as a Specification Error, Econometrica 47, 153-161.

James, C., 1987, Some Evidence of the Uniqueness of Bank Loans, Journal of Financial Economics, Vol. 19, 217-35.

Lummer, S.L. and J.J. McConnell, 1989, Further Evidence on the Bank Lending Process and the Capital-Market Response to Bank Loan Agreements, Journal of Financial Economics 25, 99-122.

Machauer, A. and M. Weber, 2000, Number of Bank relationship: An Indicator of Competition, Borrower Quality, or Just Size?, CFS Working Paper, No 2000/06, March.

Megginson, W.L., A.B. Poulsen, and J.F. Sinkey, Jr., 1995, Syndicated loan Announcements and the Market Value of the Banking Firms, Journal of Money, Credit, and Banking 27(2), 457-475.

Mirrlees, J., 1971, An Exploration in the Theory of Optimum income Taxation, Review of Economic Studies 38, 659-670.

Morris, S. and H.S. Shin, 2002, Coordination Risk and the Price of Debt, Cowles Foundation Discussion Paper No. 1241R, February.

Ongena, S. and D.C. Smith, 2000, What determines the Number of Bank Relationships? Cross Country Evidence, Journal of Financial Intermediation 9, 26-56.

Petersen, M.A. and R.G. Rajan, 1994, The Benefit of Lending Relationships: Evidence from Small Business Data, The Journal of Finance 49 (1), 3-37.

Pichler, P. and W. Wilhelm, 2001, A Theory of the Syndicate: Form Follows Function, The Journal of Finance 61(6), 2237-2264.

Preece, D. and D.J. Mullineaux, 1996, Monitoring, Loan Renegotiability, and Firm Value: the Role of Lending Syndicates, Journal of Banking and Finance 20, 577-593.

Rajan, R.G., 1992, Insiders and Outsiders: The Choice between Informed and Arm's-Length Debt, The Journal of Finance 47 (4), 1367-1400.

Rose, A., 2002, One Reason Countries pay their Debts: Renegotiation and International Trade, CEPR Discussion Paper No. 3157, January.

Sharpe, S.A., 1990, Asymmetric Information, Bank Lending and Implicit Contracts: A Stylized Model of Customer Relationship, The Journal of Finance 45(4), 1069-1087.

Tirole, J., The Theory of Industrial Organisation, MIT Press, London, 1988.

Table I

Price Discrimination and Number of Lenders by Countries

For each country, the table reports the number of loans contracted or guaranteed by sovereigns with the following information being required: the difference between the lowest and the highest fee paid up-front in percentage points (Fees spread) and the loan amount in constant 1995 US$ (Amount). The total number of lending institutions (Nb. lenders) and the number of banks joining the syndicate (Nb. joining) are also reported. The difference between Nb. lenders and Nb. joining is the number of arranging institutions participating in the facility. The sample of individual loans stems from the *International Financing Review* for the period 1990 to 1997. The reported values are mean values calculated over the sample period.

Country	Nber of obs. reporting:		Fees spread	Amount	Nb. lenders	Nb. joining
	Fees spread	Nb. lenders				
Algeria	1	0	0.1000	90.72	.	.
China	5	4	0.2760	198.03	19.25	16.75
Colombia	2	2	0.1875	261.77	23.50	21.50
Czech Rep.	2	2	0.0375	140.39	13.50	12.50
Ghana	2	1	0.1250	58.28	14.00	12.00
Hungary	5	5	0.1520	46.36	11.00	8.00
India	12	11	0.1229	88.94	13.73	10.27
Kazakhstan	1	1	0.1250	47.06	15.00	14.00
Lithuania	2	2	0.1375	82.30	16.50	7.00
Malaysia	2	2	0.0000	120.22	6.00	5.00
Oman	2	2	0.0112	342.22	45.00	36.50
Philippines	3	2	0.1667	73.40	8.50	7.50
Pakistan	3	1	0.0417	97.81	28.00	20.00
Russian Fed.	1	1	0.2000	187.65	29.00	26.00
South-Africa	5	5	0.0850	108.91	15.20	10.60
Seychelles	1	1	0.3000	27.89	5.00	4.00
South-Korea	4	4	0.2650	101.16	17.25	11.25
Slovakia	1	1	0.0500	111.75	13.00	8.00
Slovenia	2	2	0.1250	80.90	10.00	6.50
Thailand	5	1	0.0790	78.82	70.00	64.00
Turkey	29	26	0.2045	140.29	20.50	18.19
Tunisia	3	3	0.0833	122.71	21.67	18.67
Zimbabwe	7	6	0.1678	48.74	13.50	11.17
Total	100	85	0.1570	115.61	17.96	14.76

Table II

Descriptive Statistics of the Sample

Highest and lowest fees are respectively the highest and the lowest fee in the syndicate in percentage points. Fees spread is the difference between Max and Min. Number of lenders is the number of financial institutions committing to lending for each loan contract after syndication. Number of joining lenders is the number of banks joining the syndicate. This equals the total number of lenders minus the number of committing arrangers. Joint-arrangers are however counted among the 'joining banks.' Loan size is the credit amount in constant 1995 US dollars. Liquidity is the ratio of foreign currency reserves relative to public and publicly guaranteed short-term debt (less than a year maturity). The ratio proxies for the sovereign's ability to repay in the short-run. Solvency is the ratio of long-term debt (more than a year maturity) relative to GNP. This proxies for the long-run ability to repay. In the sovereign context, this variable provides a proxy for the motivation for repudiating debt. Public information is the ratio of the country's private creditors debt relative to the total less-developed countries private creditors debt.

Variable	Num. of Obs.	Mean	Std. Dev.
Fees spread	100	0.157	0.135
Highest fee	100	0.550	0.543
Lowest fee	100	0.390	0.484
Number of lenders	85	17.96	11.248
Number of joining lenders	85	14.76	10.681
Loan size (millions 1995 USD)	100	115.61	119.06
Liquidity *Reserves to Short-term Debt*	100	2.211	4.154
Solvency *Long-term Debt to GNP*	100	0.260	0.135
Public Information *Country's Bond and Bank Debt to all LDCs Bond and Bank Debt*	100	0.031	0.025
Potential for information asymmetries *Variability of income per capita growth in the last five years*	97	0.137	0.160

Table III

Definition of variables

Variable name	Definition
Endogenous variables	
Fees spread	equals ($Fee_{max} - Fee_{min}$) where Fee_{max} is the top up-front fee and Fee_{min} is the bottom up-front fee.
Relative spread	equals $\frac{AMargin_{max} - AMargin_{min}}{AMargin_{min}}$ $AMargin_{min}$ and $AMargin_{max}$ being respectively top and bottom ends all-in margins. The top (bottom) all-in margin equals the sum of the interest spread (annualised interest margin that takes account for pre-designed variations) and the top (bottom) end up-front fee calculated as a yearly margin over the lifetime of the loan.
Number of arrangers	Total number of financial institutions mandated to arrange the loan syndication.
Number of joining	Number of non-arranging banks that participate in the loan syndication and therefore provide funds.
Number of lenders	Total number of financial institutions that participate in the syndicate, including all banks joining the syndicate as well as all arrangers holding a share of the loan after syndication.
Mean tranche	equals $\frac{Loan\ size}{Number\ of\ lenders}$ the average size of the committed tranche for each loan.

Table III

Definition of variables (continued)

Variable name	Definition
Exogenous variables	
Liquidity	Ratio of foreign currencies reserves relative to short-term (lifetime under a year) foreign currency public and publicly guaranteed debts (PPG).
Solvency	Ratio of public and publicly guaranteed (PPG) long-term debts relative to GNP.
Public information	Ratio of the country's total amount of PPG international debts contracted from private creditors (banking and bond debts) relative to all LDCs PPG long-term debts contracted from private creditors debts.
Variability of income growth	Five years variability of GNP per capita growth in the issuing economy. For country i, year $j = 0$, $V(dIncome)_{i,j} = \sum_{j=-4}^{0} \frac{\left(\text{GNP per Capita growth}_{i,j} - \textit{Average}\ \text{GNP per capita growth over the last 5 years}_{0}\right)^2}{5}$
Loan size	Loan amount in billions of constant 1995 US dollars (indexed on US consumer prices).
Lifetime	Loan time duration in number of years
Number of ranks	Number of management rankings in the syndicate
India	dummy=1 if India is the loan country of risk, 0 otherwise
Turkey	dummy=1 if Turkey is the loan country of risk, 0 otherwise

Table IV

Models estimates

The models described by (1), (2) and (3) are estimated separately. Models (1) and (2) are estimated using OLS while (3) is estimated using the Tobit censured model. The system described by (1)-(2') is estimated separately using two-stage least squares. Country dummies for India and Turkey were included. All variables are defined in Table III. Below the coefficient estimates *t*-statistics are given in brackets for the OLS, *z*-statistics for the 2SL. Number of observations: 100 reporting fees spread, 86 reporting both fees spread and the number of banks joining the syndicate, 96 both the fees difference and the number of financial institutions arranging the loan. The effective number of observations used for the model estimate is however reduced because of the absence of three observations on the variability of income growth (see Table II). ***, **, * indicates respective significance at 1%, 5%, 10% levels.

Eq.	(1)	(2)	(1)	(2')	(3)
Dependent var.	*Number of joining*	*Fees spread*	*Number of joining*	*Fees spread*	*Number of arrangers*
Fees Spread	1.066	.	-4.947	.	.
	[0.13]	.	[-0.25]	.	.
Number of	.	.	.	0.003*	.
joining	.	.	.	[1.80]	.
Number of	0.140	.	0.199	.	.
arrangers	[0.43]	.	[0.57]	.	.
Liquidity	.	-0.020**	.	-0.017**	-0.026
	.	[-2.45]	.	[-2.10]	[-0.10]
Solvency	.	0.115	.	0.970	-5.375*
	.	[1.18]	.	[1.03]	[-1.65]
Public Info	.	1.635***	.	1.170**	-10.019
	.	[3.13]	.	[2.38]	[-0.59]
Variability of	.	0.202**	.	0.223***	5.447**
income growth	.	[2.44]	.	[3.00]	[2.10]
Loan size	0.562***	0.190*	0.572***	.	-0106
	[7.61]	[1.82]	[7.03]	.	[-0.03]
Lifetime	-0.706**	0.019***	-0.619*	0.023***	0.032**
	[-2.45]	[4.57]	[-1.70]	[5.85]	[2.26]
Constant	7.870	-0.015	10.251***	-0.047	2.010
	[3.89]	[-0.30]	[4.61]	[-0.87]	[1.26]
R-squared	44.2	29.1	42.6	31.3	3.20
All coeff.=0?	15.6	6.14	61.3	41.0	12.2
N	85	97	82	82	94

Table V

Further results

All variables are defined in Table III. The *Number of lenders*, *Number of joining*, *Fees spread*, *Relative spread* are treated as endogenous. All other regressors are treated as exogenous. Model (4) substitutes the *Mean tranche* as the endogenous variable in model (1). Model (5) is the same as model (1), *Number of lenders* substituting the new endogenous variable. (6) is the same as (2), *relative spread* being the new endogenous variable. (1) and (2) are now modelled using the Instrumental variable statistical model (*Fees spread* being the instrument). *t*-statistics are given in italics below the coefficient estimates. Number of observations: 100 reporting fees spread, 86 reporting both fees spread and the number of banks joining the syndicate, 96 both the fees difference and the number of financial institutions arranging the loan. The effective number of observations used for the model estimate is however reduced because of the absence of three observations on the variability of income growth (see Table II). ***, **, * indicates respective significance at 1%, 5%, 10% levels.

Eq.	(4)	(5)	(6)	(7)
Dependent var.	*Mean tranche*	*Number of lenders*	*Relative spread*	*Fees spread*
Fees Spread	-2.420	1.895	.	.
	[-0.62]	[0.23]	.	.
Number of joining	.	.	.	.
	.	.	.	.
Number of arrangers	-0.325**	1.131***	.	.
	[-2.07]	[3.48]	.	.
Number of ranks	.	.	.	0.034**
	.	.	.	[2.40]
Liquidity	0.186	.	-0.009**	-0.018**
	[0.68]	.	[-1.86]	[-2.17]
Solvency	-2.944	.	0.094	0.120
	[-0.89]	.	[1.63]	[1.26]
Public Info	-6.648	.	0.155	1.364***
	[-0.38]	.	[0.51]	[2.61]
Variability of income growth	0.580	.	0.070	0.196**
	[0.22]	.	[1.42]	[2.43]
Loan size	0.260***	0.563***	0.126**	0.074
	[8.25]	[7.59]	[2.07]	[0.65]
Lifetime	0.200	-0.714**	-0.007***	0.020***
	[1.17]	[-2.47]	[-3.08]	[4.96]
Constant	4.900***	9.624***	0.075**	-0.101
	[3.00]	[5.27]	[2.63]	[-1.70]
R-squared	54.6	49.1	29.0	33.4
All coeff.=0?	10.7	19.0	6.1	6.37
N	83	85	97	97

CFS Working Paper Series:

No.	Author(s)	Title
2001/04	**Antje Brunner** **Jan Pieter Krahnen**	Multiple Lenders and Corporate Distress: Evidence on Debt Restructuring
2001/05	**Ralf Ewert** **Andrea Szczesny**	Countdown for the New Basle Capital Accord. Are German Banks Ready for the Internal Ratings-Based Approach?
2001/06	**Bernd Kaltenhäuser**	Explaining the Dollar-Euro Rate: Do Stock Market Returns Matter?
2001/07	**Guenter Beck** **Axel A. Weber**	How wide are European borders? – New Evidence on the Integration Effects of Monetary Unions –
2001/08	**Yunus Aksoy** **Tomasz Piskorski**	Domestic Money and US Output and Inflation
2001/09	**Elke Hahn**	Core Inflation in the Euro Area: Evidence from the Structural VAR Approach
2001/10	**Olaf Ehrhardt** **Eric Nowak**	Private Benefits and Minority Shareholder Expropriation – Empirical Evidence from IPOs of German Family-Owned Firms
2001/11	**Daniel Gross**	Country-Specific and Global Shocks in the Business Cycle
2001/12	**Daniel Gross**	Trade Flows and the International Business Cycle
2002/01	**Stefan Feinendegen** **Daniel Schmidt** **Mark Wahrenburg**	Die Vertragsbeziehung zwischen Investoren und Venture Capital-Fonds: Eine empirische Untersuchung des europäischen Venture Capital-Marktes
2002/02	**Issam Hallak**	Price Discrimination on Syndicated Loans and the Number of Lenders: Empirical Evidence from the Sovereign Debt Syndication

Copies of working papers are available at the Center for Financial Studies or can be downloaded (http://www.ifk-cfs.de).