Defaults and Interest Rates in International Lending

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Abstract

Since lenders cannot observe the riskiness of the projects borrowers could choose, interest rates alone cannot be used as an instrument to discipline the borrowers. A credible threat to exclude borrowers who default more than a certain number of times from participating in the capital markets makes international debt contracts incentive compatible. Larger borrowers, since they get fewer chances to default, choose safer projects and are therefore charged smaller interest rates. Also, borrowers, after each successive default, switch to safer and safer projects which may result in smaller and smaller interest rates. This paper provides empirical evidence supporting these two predictions.

1. INTRODUCTION

It has been argued in the literature on International Lending that borrowers who default on their loans should be charged higher interest rates on the subsequent loans they contract [for instance, see Feder and Just (1977), Lindert and Morton (1987) and Ozler (1988)]. The intuitive reasoning behind this argument is that lenders can only imperfectly observe borrowers' risk characteristics and each instance of default conveys negative information about the borrower causing the lenders to revise upwards their estimates of the riskiness of the borrower [see Diamond (1989) and Spatt (1975)].

However, the riskiness of a borrower is also dependent on the actions that the borrower could take which the lenders may be unable to observe or on which the lenders may be unable to write enforceable contracts [see Diamond (1984), Gale and Hellwig (1985), Harris and Raviv (1979), Holmstrom (1979) and Townsend (1979)]. Stiglitz and Weiss (1983) demonstrates that interest rates alone cannot be used as an instrument to discipline the borrowers. A credible threat to exclude a borrower who defaults from participating in the capital markets may provide the appropriate incentives for borrowers [Eaton and Gersovitz (1981) and Stiglitz and Weiss (1983)]. Chowdhry (1991) shows that it may be incentive compatible to allow a borrower to default a certain number of times before excluding him from participating in the capital markets. Since each instance of default reduces the borrower's accessibility to the capital markets, until he is completely excluded from the capital markets, the borrower switches to safer and safer projects after each successful default. Competitive lenders, rationally anticipating this, would reduce the interest rates they charge on loans to defaulters.

A default by a borrower then may have two opposing effects on interest rates he is charged on subsequent loans. The negative effect of defaulting on the borrower's reputation may cause an increase in the interest rates. The received view seems to consider this to be the obvious conclusion. But since the borrower, anticipating an impending exclusion from the capital markets, becomes more cautious in project selection, this has an effect of reducing interest rates. The net result of these two opposite effects is ambiguous.

Empirical evidence by Lindert and Morton (1987) does seem to suggest that the effect

causing the interest rates to fall may be strong enough to dominate the opposite effect on the interest rates. Notice that even though a borrower may face smaller interest rates after default, he is not better off since his access to the private capital markets is reduced as a result of the default. The point we are trying to make here is that we cannot simply look at the level of interest rates faced by the borrowers to judge their creditworthiness.

Lindert and Morton, however, find this evidence puzzling. They argue (pp. 22-23):

".....creditors.....have taken little note of history in the 1970's. ..... one would expect major banks to charge higher premia, or lend at shorter term, or lend less, to governments with a default history. They did slightly the opposite in 1976-1979..... Governments with histories of default and rescheduling paid about 0.04 percent less *in interest, on slightly longer term loans, than governments with unblemished repayments records. Repayments history, which helps predict subsequent repayments crisis in the international cross-section, was ignored."*

In this paper, I control for various risk characteristics, regional effects and other systematic effects and find evidence consistent with the Lindert and Morton (1987) observation that countries with a history of default faced smaller spreads than the ones with no history of default.[1]

It has also been argued in Chowdhry (1991) that larger international borrowers, precisely because of their borrowing needs are large, have fewer alternatives and would be able to default and reenter the capital markets fewer number of times than would the smaller borrowers. Consequently, they choose economic policies such that they are less likely to be in a situation in which they must default on their loans. Evidence in this paper also supports this prediction that larger borrowers are perceived to be less risky and face smaller interest rates.

Section 2 describes the data. Section 3 contains empirical evidence. Section 4 concludes.

[1]Ozler (1988) reports an opposite result. However, in my opinion, there are some methodological problems with Ozler's analysis. She treats each loan to a given country as an independent observation. Not only does that bias the estimates, the results are heavily driven by countries that had a large number of loans such as Brazil with 289 observations, Mexico with 192 observations and Spain with 305 observations (the median number of loans in her sample is only 35).

2. THE DATA

We collected data for 88 countries listed in the World Debt Tables, 1983-84 edition, as developing countries. These countries are grouped into six different geographical areas in the *World Debt Tables*. A list of these countries is in Table 1. We compiled the size of the outstanding level of debt owed to private creditors in the financial markets for each of these countries for the years 1976 through 1981. Also data on variables listed as Principal Ratios in the *World Debt Tables*, considered to be important variables in determining creditworthiness of the borrower, was compiled. A list of all these variables is as follows:

- Debt Outstanding Disbursed - Financial Markets (*Size*)
- Principal Ratios
  - Debt Outstanding Disbursed/Exports of Goods and Services (*DOD/XGS*)
  - Debt Outstanding Disbursed/Gross National Product (*DOD/GNP*)
  - Total Debt Service/Exports of Goods and Services (*TDS/XGS*)
  - Total Debt Service/Gross National Product (*TDS/GNP*)
  - Interest Payments/Exports of Goods and Services (*INT/XGS*)
  - Interest Payments/Gross National Product (*INT/GNP*)
  - International Reserves/Debt Outstanding Disbursed (*RES/DOD*)

Data on Interest Rates was obtained from *Borrowing in International Capital Markets* for the years 1976 through 1981. This period was chosen for two reasons. *Borrowing in International Capital Markets* started publishing quarterly data starting 1976. Although some data was available for the period 1973-75 it was much more sparse and incomplete. They stopped publishing after 1981. This was also a good year for us to stop since the onset of the debt crisis right around this time would make interpretation of the data much less clear.

Data on Interest Rate is on the Publicized Eurocurrency Credits. This is expressed as a spread over the London Interbank Offered Rate (LIBOR). The spread over LIBOR for

each loan was weighted by the size of the loan to obtain an average for the year. Only loans denominated in the US dollar were included in the calculation. There are other fees such as the commitment fee and various participation fees. We ignored the effect of these fees assuming that the error caused by the ommision is small and unsystematic.

We also compiled data on *Institutional Investor*'s Country Credit Rating. This rating is based on a survey of nearly one hundred internationally operating banks. Banks are asked to rate each country on a scale of zero to 100, with zero representing the least creditworthy country with the greatest chances of default and 100 representing the most creditworthy with the least chances of default. This data, however, was only available beginning year 1979. So, we only had three years of data, from 1979 to 1981, for country ratings by *Institutional Investor*. This variable is denoted *Rating*.

The data on the history of defaults by various countries was obtained from an appendix in Lindert and Morton (1987). The paper lists countries that defaulted on privately held bonds in the period 1820-1929 and in the 1930's. Table 1 is produced using this data in Lindert and Morton (1987).

3. THE EVIDENCE

Chowdhry (1991) predicts a negative relatioship between the interest rates faced by the borrowing country and the size of the country. A negative relationship is also predicted between the interest rates and default history. However, these are *ceteris paribus* relationships. We need to control for other factors that might be important in determining these relationships. Since we do not have a theory that provides much direction as to what these other factors might be, the choice of the variables would be somewhat *ad hoc*.

First, we consider all the Principal Ratios of the *World Debt Tables* mentioned in the previous subsection. Since the distribution of all these variables is highly skewed, a *log* transformation of all these variables is taken.

Second, we introduce dummy variables for each of the six geographical regions the countries are divided into in the *World Debt Tables*. Presumably, these dummy variables

might control for different political risk associated with each of these geographical region.

Finally, we include a dummy variable for each year to control for any systematic movements in interest rates that might have occured over the period 1976-1981.[2]

Default history is accounted for by introducing dummy variables. Three dummy variables are considered. The variable *Default(1930s or before)* equals 1 if the country defaulted either in the period 1820-1929 or in the 1930s. The variable *Default(1820-1929)* equals 1 if the country defaulted in the period 1820-1929. The variable *Default(1930s)* equals 1 if the country defaulted in the 1930s.

The interest rates are measured as percent spreads over the LIBOR, denoted *Spread.*

The size is measured by the variable *Size.* Since this variable is also skewed, a *log* transformation of this variable is taken.

We run multiple regressions to test our propositions. Let us first look at the correlation matrix in Table 2.

A number of the principal ratios are highly correlated. The inferences about the standard errors for these variables, therefore, may not be correct. We rerun the regressions by dropping some of the highly correlated variables. Results are reported for both set of regressions.

All the regressions we run include the following as independent variables.

- Dummy variables for different geographical regions.
- Dummy variables for different years.
- One of the following subset of Principal Ratios:
  - All seven ratios.
  - The following three ratios:
    - *log DOD/XGS*

[2]Several non academic accounts have documented such movements.

    * *log INT/XGS*
    * *log RES/DOD*

- One of the following for default dummies:
    - *Default(1930s or before)* or
    - *Default(1820-1929)* and *Default(1930s)*
- *log Size*

The first set of regression results we report has *Spread* as the dependent variable. Table 3 reports the results from OLS regressions. We analyzed the residuals to ensure that the regression assumptions are not violated.

The results are consistent with the predictions. First, notice that the relationship between *Spread* and *log Size* is negative and significant in all four regressions. This is consistent with the proposition that large borrowers face smaller interest rates. The evidence is also consistent with our other hypothesis that borrowers with a history of default face smaller interest rates. The coefficient for the dummy variable *Default(1930s or before)* in Regressions 1 and 3 is negative as predicted, and the t-statistics associated are marginally significant. When we look at the regressions with two dummy variables for default in the two periods, *Default(1820-1929)* and *Default(1930s)*, the coefficients are still negative but t-statistics are small.

Let us now interpret the results for other variables. First, we do observe that there are cross sectional variations associated with different geographic regions. Countries from South and East Asia seem to enjoy the lowest spreads whereas countries from Africa and Latin America face the highest spreads. Different political and economic factors may account for this variation in spreads.

Second, the evidence does seem to capture a trend of falling spreads over the period 1976-1981. This trend has been documented by the followers of the Eurobank Syndicated Loan Market.[3]

[3]See various issues of *Euromoney* and McDonald (1982).

Finally, let us look at the coefficients for various principal ratios. Notice that since many of these ratios are highly correlated, the t-statistics in Regression 1 and 2 are small. The signs of the coefficients in Regression 3 and 4, however, seem plausible. The evidence indicates that countries with high ratios of total debt to export earnings were perceived as having higher default risks and consequently faced higher spreads. On the other hand, countries with higher ratios of international reserves to total debt were seen more capable of meeting their debt repayments and therefore faced smaller spreads.

We now look some regressions with the same set of independent variables but now with *Rating* as the dependent variable. Recall that these are country ratings compiled by the *Institutional Investor* in which banks are asked to score each country on a scale of zero to 100 with higher score representing smaller probability of default. The results are presented in Table 4.

The evidence for the relationship between *Rating* and *log Size* is positive and significant in all four regressions. This is consistent with the proposition that larger borrowers are seen as less likely to default resulting in higher ratings. The evidence for relationship between rating and default history, however, is much weaker. Most of the coefficients are positive, albeit with t-statistics not very large, consistent with our proposition that countries with default history are seen as less likely to default. Notice though that the sample size in these regressions is much smaller since we only had three years of data or *Rating* whereas we had six years of data for *Spread*. Two of the coefficients are negative but with extremely low t-statistics. Overall, the evidence is not very strong in favor of our hypothesis but it is certainly not consistent with the competing hypothesis predicting an opposite relationship.

The results for cross sectional variation based on geographic regions are somewhat different from previous regressions with *Spread* as the dependent variable but generally similar. The evidence on trend in worsening perception over the years about default probabilities is confirmed again. Finally, the evidence on the principal ratios is also consistent with our previous results.

4. CONCLUSION

We have presented some evidence that indicates that countries with history of defaults in the 1930's and prior periods were charged smaller interest rates in the period 1976-81 by commercial banks. Notice that many of the countries in Table 1 that are classified as non-defaulting in our sample perhaps had no history of borrowing at all in the 1930's and prior periods. As a matter of fact, many of these countries were not even independent sovereign nations during those periods. One might wonder if our results are being driven by the fact that a large number of non-defaulting countries are either small – such as those from Sub-Sahara Africa – or from high risk regions such as Africa or Latin America. But notice that this result is obtained even though we do control for size, different geographical regions and other risk characteristics as measured by the principal ratios. Our results do confirm the suspicion that Sub-Sahara African and Latin American countries were charged the largest interest rates and suffered the lowest credit ratings. South East Asian countries, on the other hand, had the highest credit ratings and faced the smallest interest rates. We also find strong evidence that larger countries were perceived to be less risky and faced smaller interest rates.

TABLE 1

SOVEREIGN DEFAULT HISTORY

No.	Country	Default History 1820-1929	1930s
	Africa, South of the Sahara		
1	Benin		
2	Botswana		
3	Burundi		
4	Cameroon		
5	Central African Republic		
6	Chad		
7	Congo, People's Republic of		
8	Ethiopia		
9	Gabon		
10	Ghana		
11	Guinea		
12	Guinea Bissau		
13	Ivory Coast		
14	Kenya		
15	Lesotho		
16	Liberia		d
17	Madagascar		
18	Malawi		
19	Mali		
20	Mauritiana		
21	Mauritius		
22	Niger		
23	Nigeria		
24	Rwanda		
25	Senegal		
26	Sierra Leone		
27	Sudan		
28	Tanzania		
29	Togo		
30	Uganda		
31	Upper Volta		
32	Zaire		
33	Zambia		
34	Zimbabwe		

TABLE 1 (continued)

No.	Country	Default History 1820-1929	1930s
	East Asia and the Pacific		
35	Fiji		
36	Hong Kong		
37	Indonesia		
38	Korea, Republic of		
39	Malaysia		
40	Papua New Guinea		
41	Philippines		
42	Singapore		
43	Thailand		
44	Western Somoa		
	Latin America and the Caribbean		
45	Argentina	d	d
46	Bahamas		
47	Barbados		
48	Bolivia	d	d
49	Brazil	d	d
50	Chile	d	d
51	Colombia	d	d
52	Costa Rica	d	d
53	Dominican Republic	d	
54	Ecuador	d	d
55	El Salvador	d	d
56	Guatemala	d	d
57	Guyana		
58	Haiti		
59	Honduras	d	
60	Jamaica		
61	Mexico	d	
62	Nicaragua	d	
63	Panama		d
64	Paraguay	d	d
65	Peru	d	d
66	Trinidad and Tobago		
67	Uruguay	d	d
68	Venezuela	d	

TABLE 1 (continued)

No.	Country	Default History 1820-1929	1930s
	North Africa and the Middle East		
69	Algeria		
70	Egypt	d	
71	Jordan		
72	Lebanon		
73	Morocco		
74	Oman		
75	Syrian Arab Republic		
76	Tunisia		
77	Yemen Arab Republic		
	South Asia		
78	Bangladesh		
79	Burma		
80	India		
81	Pakistan		
82	Sri Lanka		
	Europe and the Mediterranean		
83	Cyprus		
84	Greece	d	d
85	Israel		
86	Portugal		
87	Turkey	d	d
88	Yugoslavia		

d denotes an incidence of default

Source : Lindert and Morton (1987)

TABLE 2

CORRELATION MATRIX

	log DOD/XGS	*log DOD/GNP*	*log TDS/XGS*	*log TDS/GNP*	*log INT/XGS*	*log INT/GNP*	*log RES/DOD*	*log Size*
log DOD/XGS	1.0000							
log DOD/GNP	-0.9963	1.0000						
log TDS/XGS	-0.8670	0.8679	1.0000					
log TDS/GNP	0.8712	-0.8733	-0.9971	1.0000				
log INT/XGS	-0.2514	0.2425	-0.2620	0.2497	1.0000			
log INT/GNP	0.2607	-0.2594	0.2450	-0.2415	-0.9825	1.0000		
log RES/DOD	-0.0591	0.0929	0.0518	-0.0464	0.0462	-0.0481	1.0000	
log Size	-0.2948	0.3219	0.1861	-0.2025	0.1638	-0.2125	0.0951	1.0000

TABLE 3

OLS REGRESSIONS ON SPREAD

Spread	*Regression 1*	*Regression 2*	*Regression 3*	*Regression 4*
Constant	1.128	0.843	0.939	0.747
	(3.157)	(2.160)	(3.134)	(2.336)
Dummy(Africa)	0.185	0.286	0.172	0.282
	(1.947)	(2.710)	(1.816)	(2.726)
Dummy(East Asia)	-0.131	-0.052	-0.150	-0.051
	(-1.589)	(-0.576)	(-1.844)	(-0.567)
Dummy(Latin America)	0.109	0.152	0.101	0.146
	(1.378)	(1.796)	(1.288)	(1.740)
Dummy(Middle East)	-0.108	-0.042	-0.160	-0.073
	(-1.082)	(-0.410)	(-1.704)	(-0.728)
Dummy(South Asia)	-0.267	-0.191	-0.256	-0.164
	(-2.005)	(-1.348)	(-1.929)	(-1.194)
Dummy(1976)	0.814	0.823	0.846	0.855
	(9.274)	(9.157)	(9.963)	(9.836)
Dummy(1977)	0.618	0.617	0.648	0.655
	(7.475)	(7.298)	(8.100)	(8.008)
Dummy(1978)	0.296	0.291	0.334	0.336
	(3.599)	(3.455)	(4.232)	(4.173)
Dummy(1979)	0.139	0.144	0.158	0.165
	(1.917)	(1.933)	(2.215)	(2.276)
Dummy(1980)	0.103	0.102	0.112	0.116
	(1.420)	(1.379)	(1.568)	(1.590)
log DOD/XGS	-0.399	-0.630	0.170	0.180
	(-0.395)	(-0.595)	(2.307)	(2.370)
log DOD/GNP	0.492	0.753		
	(0.483)	(0.704)		
log TDS/XGS	0.463	0.593		
	(0.461)	(0.565)		
log TDS/GNP	-0.338	-0.454		
	(-0.338)	(-0.433)		
log INT/XGS	0.117	0.236	-0.022	-0.012
	(0.230)	(0.439)	(-0.299)	(-0.164)
log INT/GNP	-0.228	-0.357		
	(-0.453)	(-0.674)		
log RES/DOD	-0.111	-0.091	-0.099	-0.086
	(-4.119)	(-3.143)	(-4.193)	(-3.429)
Default(1930s or before)	-0.136		-0.110	
	(-1.943)		(-1.594)	
Default(1820-1929)		-0.104		-0.057
		(-1.424)		(-0.828)
Default(1930s)		-0.001		-0.001
		(-0.013)		(-0.022)
log Size	-0.055	-0.054	-0.047	-0.049
	(-3.151)	(-3.048)	(-3.056)	(-3.155)
R^2	0.67	0.67	0.66	0.67
Adjusted R^2	0.64	0.64	0.64	0.64
N	224	218	224	218

The estimates in parentheses are t-statistics.

TABLE 4

OLS REGRESSIONS ON RATING

Rating	*Regression 5*	*Regression 6*	*Regression 7*	*Regression 8*
Constant	10.784	4.245	10.688	10.313
	(0.870)	(0.301)	(0.996)	(0.882)
Dummy(Africa)	6.985	9.021	7.089	8.692
	(2.158)	(2.482)	(2.193)	(2.552)
Dummy(East Asia)	10.894	12.263	10.266	11.835
	(3.698)	(3.824)	(3.423)	(3.696)
Dummy(Latin America)	6.656	6.138	6.101	5.204
	(2.267)	(2.022)	(2.115)	(1.766)
Dummy(Middle East)	10.053	11.714	11.325	13.000
	(3.500)	(3.811)	(4.058)	(4.410)
Dummy(South Asia)	12.820	15.311	14.232	16.295
	(2.725)	(3.035)	(3.055)	(3.444)
Dummy(1979)	5.315	4.782	6.708	6.418
	(2.825)	(2.484)	(3.655)	(3.469)
Dummy(1980)	3.025	2.806	3.131	2.931
	(1.729)	(1.594)	(1.769)	(1.648)
log DOD/XGS	-6.306	5.563	-9.777	-10.108
	(-0.155)	(0.131)	(-4.540)	(-4.463)
log DOD/GNP	-5.425	-16.301		
	(-0.133)	(-0.384)		
log TDS/XGS	-12.873	-33.000		
	(-0.288)	(-0.695)		
log TDS/GNP	20.075	39.814		
	(0.448)	(0.838)		
log INT/XGS	11.482	19.236	0.670	0.779
	(0.465)	(0.717)	(0.281)	(0.319)
log INT/GNP	-16.795	-24.470		
	(-0.680)	(-0.917)		
log RES/DOD	3.799	4.121	3.917	3.799
	(3.963)	(3.865)	(4.538)	(4.098)
Default(1930s or before)	-0.301		1.342	
	(-0.114)		(0.519)	
Default(1820-1929)		-0.017		1.986
		(-0.006)		(0.747)
Default(1930s)		3.188		3.121
		(1.314)		(1.270)
log Size	6.909	7.150	6.993	7.068
	(10.114)	(10.379)	(10.646)	(10.663)
R^2	0.79	0.79	0.77	0.78
Adjusted R^2	0.76	0.76	0.75	0.76
N	131	128	131	128

The estimates in parentheses are t-statistics.

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