1-1-1996

International Lending by US Banks

Neven Tomov Valev
Georgia State University

International Lending by U. S. Banks

Neven Valev
Purdue University

96-010

Center for International Business Education and Research
Purdue University
Krannert Graduate School of Management
1310 Krannert Building
West Lafayette, IN 47907-1310
Phone: (317) 494-4463
FAX: (317) 494-9658

International Lending By US Banks

by Neven Valev

Abstract

In 1984, the claims of US regional banks represented 44% of the claims of US money-center banks in Mexico, 4% in Indonesia, 101% in Sweden and 15% in Germany. In 1989, these numbers changed to 25%, 7%, 38% and 51%. What are the reasons for and implications of such differences? In this paper, we offer an answer to these and some other related questions.

We offer a model in which lenders differ in wealth endowments and choose the quality of information which they use in the process of foreign lending. We trace the effects of foreign and domestic interest rates, quality of information, quality of the pool of lending opportunities, etc. on the decision to acquire information. In an intertemporal framework, less-informed lenders have the option to observe, at no cost, the behavior of better-informed lenders with a lag of one period and infer information about the current conditions in a lending market or they may purchase current information at a cost. The choice between the two options depends on the persistence of economic conditions over time. In an extension, we derive lenders' choice of maturity structure.

To test these and other hypothesis we employ data on international lending by US banks for the 1982-1992 period. Our empirical results confirm the validity of the main predictions of the model.

JEL Classification: F 34

Address all correspondence to:

Neven Valev
Department of Economics
Purdue University
West Lafayette, IN 47906

Tel: 317-743-7574
E-mail: neven_valev@mgmt.purdue.edu

I would like to thank Prof. Jack Barron and Prof. John Carlson for their valuable help and unending encouragement. All mistakes in the paper are mine.

Introduction

In "The Global Debt Crisis", John Makin [1984] writes: " There was another potentially very dangerous aspect of the run-up in short-term lending during 1981-1982. Many of the loans were put together by the large money-center banks with heavy participation of smaller, regional banks in the United States. The regional banks were, understandably in view of their normal specialization in domestic lending, not very well informed on the economic conditions in the developing countries to which they started lending"[1]. Gwyne, "Selling Money" [1986], writes: "In the absence of their own systems, the regionals paid close attention to what the big banks said. They had no other resource, except to spend a lot of money to achieve what presumably be the same end"[2]. In the professional literature, "Some general explanations have focused on, for instance, error of judgment by banks and the 'herd effect', i.e. ignorant followers rushing in while the more knowledgeable have already gotten out". How much validity should one attribute to such statements? If they contain truth, how could one put structure on the differences in lending patterns of money-center and regional banks? What are the implications for the size and volatility of international capital flows? In this paper, we attempt to answer, in a theoretical and empirical framework, these and some other related questions.

Economics and Finance literature are abundant with explanations for why lenders lend to countries. US banks lend to countries which are politically close to the US (Thapa and Mehta

[1] Pp. 216.
[2] Pp. 69.

Table 1
Outstanding Claims of Regional US Banks as a Percent of the
Outstanding Claims of US Money-Center Banks

	1984	1989	1994		1984	1989	1994
Mexico	44	25	18	Japan	25	59	30
Brazil	21	9	13	UK	75	30	34
Argentina	21	10	11	France	27	31	36
Chile	39	13	19	Sweden	101	38	10
Korea	33	26	20	Canada	41	27	33
Taiwan	21	43	26	Germany	15	51	34
Indonesia	4	7	10	Italy	38	36	24
Venezuela	19	14	24	Spain	27	12	10
Colombia	20	30	16	Yugoslavia	26	16	5
Philippines	12	8	11	Australia	19	28	11

Notes: Loan amounts are weighted by the capital size of money center bans and, respectively, regional banks. Source: "Country Exposure Lending Survey" published by the Federal Reserve Bank.

[1991]) because they believe that they will be bailed out if necessary, banks may lend to protect outstanding claims (Krugman [1989]), private lending follows the direction of official lending (Sachs [1989]). Lenders may lack information of the current indebtedness of a country and are not able to assess the risk of default correctly (Kletzer [1984]). Managers of lending institutions may be evaluated on the basis of their behavior relative to that of other managers and not necessarily on the basis of ex post performance which leads to herd behavior (Sharfstein and Stein [1990]). Lending exhibits different behavior for credit constrained and not-credit-constrained countries (Nunnenkamp [1992]). The dimension which we want to add is probably best summarized by the data presented in Table 1. These indicate the relative involvement of US money-center and US regional banks in lending to a number of countries. There are substantial differences in the mix of lenders across countries and over time. In 1984, the claims of US regional banks represented 44% of the claims of US money-center banks in Mexico, 4% in Indonesia, 101% in Sweden and 15% in Germany. In 1989, these numbers change to 25%, 7%,

38% and 51% and, in 1994, to 18%, 10%, 10% and 34%. What are the reasons for and implications of such differences?

We offer a model in which investors are differentiated on the basis of their wealth level, we endogenously derive their choices of information sources and characterize their lending behavior in terms of a number of model parameters such as foreign and domestic interest rates, quality of information, quality of the pool of lending opportunities. Small banks may costlessly observe large bank lending with a lag of one period and infer information about the current conditions in a lending market or they may incur a cost and purchase current information. The choice of small banks depends on the persistence of economic conditions in different countries. If economic conditions are not persistent, the informational content of last period's behavior of the informed lenders (large banks) is diminished and less informed lenders (small banks) may opt for current information even if that involves a certain cost. In an extension, we derive the choice of maturity structure. Longer maturities, along with costs associated with the sale of foreign assets in secondary markets, implies portfolio adjustments which are not instantaneous.

To test these and some other hypothesis we employ data on international lending by US banks for the 1982-1992 period. The data in our sample is semiannual and contain the outstanding claims of US money-center, medium-sized and smaller regional banks in the largest nine industrialized and nine developing borrowers from US banks in that period. The data are also divided by type of borrower -- government, banks and nonfinancial institutions as well as by maturity – less that one year, one to five years and more than five years. The source of the data is

the "Country Exposure Lending Survey" published by the Financial Institutions Examination Council with the Board of Governors of the Federal reserve System.

Our empirical results confirm the validity of the main predictions of the model. Small banks follow the lagged behavior of large banks in developed countries while, in developing countries, small banks follow the current patterns of large bank behavior. The degree of development of the domestic financial system has a strong effect on the term structure of asset portfolios and adjustment costs. Small bank lending is more volatile than large bank lending in developed countries while, in developing countries, the opposite appears to be true.

In the next section we present our model. Then, we offer an interpretation of the model and discuss its empirical implications. In the last two sections, we discuss the data and show our empirical observations.

Static Model

There are two types of investment projects with respective returns r_H and r_L. Each investor can also earn a return r_0 on a riskless asset. We assume that $r_H > r_0 > r_L$ and we say that the state H has occurred when the return is r_H and that the state L has occurred when the return is r_L. The prior probability that an H state will occur is α. Each investor receives a signal s = {H, L} such that:

$$\Pr(s = H \mid V = H) = \Pr(s = L \mid V = L) = p_i, \quad p_i \in [1/2, \bar{p}], \quad \bar{p} < 1$$

An investor's type is defined by her wealth and the informativeness of her signal: (w_i, p_i). Wealth and investment are denominated in equal units and the price of a unit of investment is 1. Let m denote the number of investment units purchased by an investor. In what follows we assume that investors invest only if their signals indicate a favorable state. Given that s = H, investor i's problem is:

$$\max_{m_i \geq 0} E(u|s=H) =$$

$$= \frac{1}{\alpha p_i + (1-\alpha)(1-p_i)} \left[\alpha p_i u\left(w_i(1+r_0) + m_i(r_H - r_0) \right) + (1-\alpha)(1-p_i) u\left(w_i(1+r_0) - m_i(r_0 - r_L) \right) \right]$$

With a logarithmic utility function the optimal investment level of an individual investor is characterized by the following expression:

$$(1) \qquad m_i^* = w_i(1+r_0) \frac{\alpha p_i (r_H - r_0) - (1-\alpha)(1-p_i)(r_0 - r_L)}{\left[\alpha p_i + (1-\alpha)(1-p_i) \right](r_H - r_0)(r_0 - r_L)}$$

Expression (1) gives us intuitively appealing and standard comparative statics:

$$(2) \qquad \frac{dm_i^*}{dw_i} \geq 0 \quad \frac{dm_i^*}{dp_i} \geq 0 \quad \frac{dm_i^*}{d\alpha} \geq 0 \quad \frac{dm_i^*}{dr_H} \geq 0 \quad \frac{dm_i^*}{dr_L} \geq 0 \quad \frac{dm_i^*}{dr_0} \leq 0$$

Optimal investment level increases in wealth , the quality of information, the prior probability of a good state, the returns in the good and in the bad state and decreases in the return of the riskless asset. An interesting (and, also, empirically testable) question for us is the response of investment flows to changes in the interest rates. In particular what type of investors are more/less likely to move funds in larger amounts when rates change and, also, which countries are likely to experience larger foreign inflows and outflows in response to changes in interest rate differentials? Equation (3) is the cross partial of the return in the good state and quality of information:

$$(3) \qquad m''_{r_H p_i} = -\frac{\alpha(1-\alpha)w_i(1+r_0)}{(r_H - r_0)^2\left[\alpha p_i + (1-\alpha)(1-p_i)\right]^2} \leq 0$$

An investor who has information of a better quality is less responsive to changes in interest rates. The intuition is relatively straightforward: there are three ways by which expected returns are enhanced: if interest rates are higher, if investors are able to distinguish between good and bad projects or if the pool of projects contains a greater proportion of good projects. These three alternatives substitute for each other and an improvement in any one of them makes the other two less important: higher interest rates are less important if the pool of projects or the quality of information is improved, better information is less important if most projects are good, the quality of the pool of projects is not as important if investors can correctly distinguish between good and bad projects. Equation (4) is the cross-partial of r_H and the quality of the pool of investments, α:

$$(4) \qquad m''_{r_H \alpha} = -\frac{p_i(1-p_i)w_i(1+r_0)}{(r_H - r_0)^2\left[\alpha p_i + (1-\alpha)(1-p_i)\right]^2} \leq 0$$

and suggests that investment funds are less responsive to changes in interest rates in countries with better investment pools. Equations (3) and (4) indicate that the response to an exogenous change in interest rates differential is greatest in the case of an investor with low-quality information who invests in a country with a low-quality project pool. However, greater wealth implies a larger, in magnitude, response to changes in interest rates:

$$(5) \qquad m''_{r_H w_i} = \frac{(1-\alpha)(1-p_i)(1+r_0)}{(r_H - r_0)^2\left[\alpha p_i + (1-\alpha)(1-p_i)\right]} \geq 0$$

Assume that each investor has the option to purchase an additional signal s' = {H, L} such that:

$$(6) \qquad \Pr(s' = H \mid V = H) = \Pr(s' = L \mid V = L) = q, \quad 1 > q > \bar{p} \geq 1/2$$

at cost K. Only after an investor has received his own free information s, he decides whether or not to purchase an additional signal. We also assume that an investor will not invest either if his first signal indicates a bad state and he decides not to purchase the second signal or if he decides to purchase the second signal and it indicates a bad state. In his decision to purchase the second signal, the investor compares his expected utility with and without the additional information. We look at the case when the first signal indicates a good state:

$$(7) \qquad \begin{aligned} & E(u \mid s' = H)\Pr(s' = H \mid s = H) + E(u \mid s' = L)\Pr(s' = L \mid s = H) - E(u \mid s = H) = \\ & = g\left(p_i, q, K, \alpha, r_H, r_B, r_0\right) \geq 0 \end{aligned}$$

How does the decision of a given investor to purchase or not additional information depend on the parameters of the model? Unfortunately, equation (6), written in an extended form, is an unwieldy expression[3] and we had to resort to numerical simulations in order to characterize some of the effects. First, we look at the effects of the quality of information and wealth on the purchase decision:

$$(8) \qquad \frac{\partial g(.)}{\partial q} > 0 \quad \frac{\partial g(.)}{\partial p_i} < 0 \quad \frac{\partial g(.)}{\partial w_i} > 0 \quad \frac{\partial g(.)}{\partial K} < 0$$

The likelihood that an investor will purchase information increases in the quality of that information and the investor's wealth and decreases in the cost of information as well as in the quality the investor's own information.

Perhaps a more interesting question is how do changes in interest rates as well as the average quality of investment projects affect the decision of investors to obtain better information:

[3] See Appendix 1

$$(9) \qquad \frac{\partial g(.)}{\partial r_H} < 0 \quad \frac{\partial g(.)}{\partial r_L} < 0 \quad \frac{\partial g(.)}{\partial r_0} > 0 \quad \frac{\partial g(.)}{\partial \alpha} < 0$$

The signs in (9) indicate that fewer investors will purchase additional information if interest rates are higher or if the pool of projects is of a better quality. This results are consistent with equations (3) and (4) -- the importance of better information is smaller if the returns or the pool of projects are better. So, the proportion of less-informed investors in more developed countries (which we associate with higher α) is greater. An increase in interest rates should, according to the model, not only increase the total amount invested by all investors but will also change the mix of investors toward a higher proportion of less informed agents. An increase in the riskfree interest rate will decrease overall investment but will induce more investors to purchase additional information.

Intertemporal set-up

In this section we eliminate the decision taken by investors to purchase or not additional information -- there is a group of n investors who have sufficient wealth to find it optimal to buy information in each period and a group of l investors for whom it is never optimal to buy information because their wealth level is not high enough. By w_q we denote the wealth of each informed investor and by w_p the wealth of an uninformed. We also assume that $p_i = p = 1/2$ and we say, respectively, that the group who purchases signals is the group of the informed and the rest are the uninformed. Equations (10) represent the transitional probabilities between states in different periods:

$$
\begin{aligned}
&\Pr(V_t = H \mid V_{t-1} = H) = \beta \\
&\Pr(V_t = L \mid V_{t-1} = H) = 1-\beta \\
&\Pr(V_t = L \mid V_{t-1} = L) = \varphi \\
&\Pr(V_t = H \mid V_{t-1} = L) = 1-\varphi
\end{aligned}
\qquad (10)
$$

Both types of investors observe total investment and can differentiate between the total investment of the informed and the total investment of the uninformed. Investors do not, however, observe the true realization of the state in any of the previous periods[4]. In the beginning of each period, each investor updates his subjective prior probability on the current state conditional on investment amounts in previous periods and the transitional probabilities (10). Information about the true state in the previous period is contained only in the investment of the informed group because they alone have private information of any value. The informed receive independent signals of the same quality and the probability that n_t of all n informed investors invest is equal to the probability that n_t of them receive a signal which indicates a good state:

$$
\begin{aligned}
&\Pr(n_t \text{ invest in period } t \mid V_t = H) = q^{n_t}(1-q)^{n-n_t} \\
&\Pr(n_t \text{ invest in period } t \mid V_t = L) = (1-q)^{n_t} q^{n-n_t}
\end{aligned}
\qquad (11)
$$

In the beginning of each period, each investor observes last period's investment by the informed group and infers probabilities about the state last period :

$$
\Pr(V_{t-1} = H \mid N_{t-1}) = \frac{q^{n_{t-1}}(1-q)^{n-n_{t-1}} \Pr(V_{t-1} = H)}{q^{n_{t-1}}(1-q)^{n-n_{t-1}} \Pr(V_{t-1} = H) + q^{n_{t-1}-n}(1-q)^{n_{t-1}} \Pr(V_{t-1} = L)} = \gamma_t
$$

$$
\Pr(V_{t-1} = L \mid N_{t-1}) = 1-\gamma_t \qquad (12)
$$

[4] We can think of that assumption in the following terms: each investor knows what his individual project paid in th end of last period but this does not help him locate a good project this period. There is a "fresh" supply of new projects each period and the only way in which they are correlated between periods is through their average quality.

Note that the number of informed who invested last period is known with certainty because each investor knows the total informed investment as well as the optimal investment level of each informed investor. Given the transitional probabilities (10), each investor infers the prior probabilities on the state this period:

$$
\begin{aligned}
&\Pr(V_t = H \mid n_{t-1}, \beta, \varphi) = \beta\gamma_t + (1-\gamma_t)(1-\varphi) = \theta_t \\
&\Pr(V_t = L \mid n_{t-1}, \beta, \varphi) = \varphi(1-\gamma_t) + \gamma_t(1-\beta) = 1-\theta_t
\end{aligned}
\qquad (13)
$$

Similarly to equation (1), the investment level of an individual informed and, respectively, an individual uninformed agent are:

$$
\begin{aligned}
m_t{}^{**} &= \left(w_q - K\right)\left(1+r_0\right)\frac{\theta_t p_i\left(r_H - r_0\right) - \left(1-\theta_t\right)\left(1-p_i\right)\left(r_0 - r_L\right)}{\left[\theta_t p_i + \left(1-\theta_t\right)\left(1-p_i\right)\right]\left(r_H - r_0\right)\left(r_0 - r_L\right)} \\
m_t{}^{*} &= w_p\left(1+r_0\right)\frac{\theta_t\left(r_H - r_0\right) - \left(1-\theta_t\right)\left(r_0 - r_L\right)}{\left(r_H - r_0\right)\left(r_0 - r_L\right)}
\end{aligned}
\qquad (14)
$$

The only new element in (14) as compared to (1) is that the prior probability of a good state is not constant but changes over time in response to changes in investment behavior. In particular:

$$
\begin{aligned}
\theta'_{t,n_{t-1}} &= \gamma'_{t-1,n_{t-1}}\left[\beta - (1-\varphi)\right] \geq 0 \quad if \quad \beta - (1-\varphi) \geq 0 \\
\theta'_{t,n} &= \gamma'_{t-1,n}\left[\beta - (1-\varphi)\right] \geq 0 \quad if \quad \beta - (1-\varphi) \geq 0
\end{aligned}
\qquad (15)
$$

The greater the proportion of informed investors who invested last period, the greater the probability that the state this period will also be good given that $\beta - (1-\varphi) \geq 0$. The condition guarantees that the likelihood of a good state in the current period, given a good state in the previous period, is sufficiently large. We associate larger β with developed countries because, there, a sudden turn for the worse seems less likely than in a developing country. The main result

of the above set-up is that larger informed investment last period implies an increase in both informed and uninformed investment in the current period:

$$(16)\quad \frac{\partial m_t^{**}}{\partial n_{t-1}} \geq 0 \quad \frac{\partial m_t^{*}}{\partial n_{t-1}} \geq 0 \quad if \quad \beta - (1-\varphi) \geq 0$$

If we accept the association of a higher β with more developed countries, we should expect that the increase in investment this period for a given increase in informed investment last period will be greater for more developed countries. In the less developed countries, uninformed investment loses its informative value because good conditions last period do not necessarily imply good conditions in the current period.

Extension: Two-Period Maturity. Adjustment cost

In the previous two sections of the model we talked of the response of investment to changes in a number of parameters and we assumed throughout that these responses were costless. In this section we introduce two-period maturity and adjustment costs. In the beginning of each period, each investor has the option to invest only for the next period only or for two periods. In the end of the first period, if the investor who opted for a two-period maturity wants to sell the second-period portion of his asset he may do so at a cost Z. To simplify the exposition, we assume that each investor knows the state of the world in the end of each period. In what follows, we also assume that, in the beginning of period t, investors observed $s_t = H$ and $V_{t-1} = H$, i.e. last period's state was good and his signal for the current state also indicates a good state. Expected utility for the next two periods, given a one-period maturity is:

$$E(u|\alpha,\beta,\varphi,V_{t-1}=H,s_t=H,one-period\ maturity)=$$

$$=P(V_t=H|s_t=H,V_{t-1}=H)\left\{\begin{bmatrix}u(H_1)+P(s_{t+1}=H|V_t=H)\\ \left[P(V_{t+1}=H|s_{t+1}=H)u(H_1)+P(V_{t+1}=L|s_{t+1}=H)u(L_1)\right]+\\ P(s_{t+1}=L|V_t=H)u(W)\end{bmatrix}\right\}+$$

$$+P(V_t=L|s_t=H,V_{t-1}=H)\left\{\begin{bmatrix}u(L_1)+P(s_{t+1}=H|V_t=H)\\ \left[P(V_{t+1}=H|s_{t+1}=H)u(H_1)+P(V_{t+1}=L|s_{t+1}=H)u(L_1)\right]+\\ P(s_{t+1}=L|V_t=H)u(W)\end{bmatrix}\right\}$$

Where, $H_1=w_i\left(1+r_0\right)+m_i*\left(r_{H1}-r_0\right)$ and $L_1=w_i\left(1+r_0\right)+m_i*\left(r_{L1}-r_0\right)$. The agent's expected utility for the next two periods with a two-period maturity is:

$$E(u|\alpha,\beta,\varphi,V_{t-1}=H,s_t=H,two-period\ maturity)=$$

$$=P(V_t=H|s_t=H,V_{t-1}=H)\left\{\begin{bmatrix}u(H_2)+P(s_{t+1}=H|V_t=H)\\ \left[P(V_{t+1}=H|s_{t+1}=H)u(H_2)+P(V_{t+1}=L|s_{t+1}=H)u(L_2)\right]+\\ P(s_{t+1}=L|V_t=H)u(W-Z)\end{bmatrix}\right\}+$$

$$+P(V_t=L|s_t=H,V_{t-1}=H)\left\{\begin{bmatrix}u(L_2)+P(s_{t+1}=H|V_t=H)\\ \left[P(V_{t+1}=H|s_{t+1}=H)u(H_2)+P(V_{t+1}=L|s_{t+1}=H)u(L_2)\right]+\\ P(s_{t+1}=L|V_t=H)u(W-Z)\end{bmatrix}\right\}$$

Where, $H_2=w_i\left(1+r_0\right)+m_i*\left(r_{H2}-r_0\right)$ and $L_2=w_i\left(1+r_0\right)+m_i*\left(r_{L2}-r_0\right)$. We denote the expected utility with one-period maturity by Eu(1) and, with two-period maturity, by Eu(2). The investor chooses a two-period maturity investment if:

$$(17)\quad \rho\left(r_{H1},r_{H2},r_{L1},r_{L2},r_0,q,\beta,\varphi,w_i,Z\right)\equiv Eu(2)-Eu(1)\geq 0$$

Appendix 3 provides the explicit expressions for equation (17). We used numerical simulations to characterize the effects of the parameters on the decision to invest in a two-period

maturity project. Not surprisingly, given a positive cost of adjustment Z, agents invest in a two-period project only if the returns with a two-period maturity are sufficiently greater. The proportion of two-period maturities is larger for countries where the wedge between short and long-term rates is greater.

Greater wealth makes it more likely that an investor will choose a two-period maturity because the cost of adjustment is proportionately smaller. Investors with better quality information are more likely to invest in longer maturities because, given $s_t = H$, the likelihood that the state will turn to the worse in the second period is smaller. There are fewer long-term maturities in countries where the adjustment cost is higher. An increase in r_0 lowers the optimal investment level with both types of maturities, increases the expected utilities but its effect on the decision to invest in a long-term project is ambiguous.

Interpretation and Empirical Implications of the Model

The model suggests that large banks possess information of a better quality and that small banks infer signals about the conditions in a country from the lending behavior of large banks. Small banks may costlessly observe last period's large bank investment or they may participate, at a certain cost, in syndicated loans which are originated by the large banks. The relative attractiveness of the two alternatives for small banks depends on the persistence of conditions in individual countries. An increase in large banks investment last period increases the likelihood that the state was favorable last period and it will also increase the likelihood that the state is favorable

this period if the conditions in the country are stable over time, i.e. if the likelihood of a sudden downturn is small. For such countries, the behavior of large banks in the previous period has an informative value. If the conditions are not stable over time, small banks become willing to incur a certain cost in order to use the current information of large banks, i.e. participate in syndicated loans. So, to the extent that conditions are more stable over time in industrialized countries as compared to developing countries, we should expect that, in developed countries, small bank behavior is correlated with large bank behavior in the previous period and, in developing countries, it is correlated with large bank behavior in the current period. In addition, there should be no correlation between the behavior of small banks last period and large banks' behavior this period in any country.

If large banks possess better or, at least, more timely information, then they should respond to certain changes in the conditions of a country in a more timely manner than small banks. Based on that, we should expect that adjustments in the portfolio of large banks are easier to explain given some current or recent characteristics of a country.

The model also suggests that less informed agents are more responsive to exogenous changes in the interest rates differentials because it is primarily the interest rate, and not better information, that makes less-informed investors adjust their asset portfolios.

Given loan maturity, over the span of which exogenous conditions may change substantially, and costs associated with cashing a foreign asset we should expect that banks cannot attain their desired portfolios instantaneously, i.e. we expect that bank lending is

Table 2
Outstanding Claims and New Lending by US Banks

Description	*Mean*		*SD*	
	D-ed	D-ing	D-ed	D-ing
Large bank inflows (six months period)	-151.8	104.9	1027.6	488.9
Small bank inflows (six months period)	-88.5	-71	725.8	186.2
Total Large bank loans	6376	5664	5838	4343
Large bank loans to banks	3144	937	3619	984
Large bank loans to governments	651	3299	447	3081
Large bank loans to nonfinancial institutions	2593	1444	2582	1236
Large bank loans with maturity of less than 1 year	4633	2533	4826	1836
Large bank loans with maturity of 1 - 5 years	1029	1418	691	1568
Large bank loans with maturity of over 5 years	659	1711	568	1957
Total Medium bank loans	2053	1443	2023	1346
Medium bank loans to banks	1459	482	1716	516
Medium bank loans to governments	121	580	123	628
Medium bank loans to nonfinancial institutions	467	379	420	502
Medium bank loans with maturity of less than 1 year	1671	745	1822	642
Medium bank loans with maturity of 1 - 5 years	245	344	228	455
Medium bank loans with maturity of over 5 years	131	353	107	445
Total Small bank loans	2755	1270	3575	1539
Small bank loans to banks	2385	439	3415	487
Small bank loans to governments	129	532	146	757
Small bank loans to nonfinancial institutions	232	299	213	535
Small bank loans with maturity of less than 1 year	2390	622	3419	692
Small bank loans with maturity of 1 - 5 years	234	350	199	531
Small bank loans with maturity of over 5 years	114	298	90	523

Note: 198 observations for each sample statistic. All numbers are in $mill. Source: "Country Exposure Lending Survey" semiannual data for the period 1982-1992.

autocorrelated and we also expect to find the sources for that in the term structure of their loan portfolios.

Data

We employ semiannual data on US bank lending to 18 countries for the period 1982 - 1992. The data represent outstanding claims of US banks by country, by type of borrower, by

Table 3
Country characteristics employed as explanatory variables in the Results Section

Description		*Mean*		*SD*	
		D-ed	D-ing	D-ed	D-ing
Country risk rating from a semiannual poll of. bankers	(a)	83	38.5	8.53	12.9
GNP per capita (current dollars) - in thousands	(b)	14.2	2.03	5.56	1.25
Domestic investment as a percent of GDP	(b)	22.5	21	5.01	7
Exports as a percent of GDP	(b)	23.4	22	6.61	9.22
US exports to that country (in $bill)	(e)	16.9	5.06	19.6	6.9
Total foreign debt as a percent of GNP	(d)		57		24
Service on foreign debt as a percent of exports	(d)		15		8.6
Interest (Return in USD) on newly contracted debt	(d)		9.26		2.1
Average maturity on newly contracted foreign debt	(d)		9.59		2.75

Note: 198 observations. Developed countries: Japan, UK, France, Sweden, Canada, Germany, Italy, Spain, Australia, Yugoslavia. Developing countries: Mexico, Brazil, Korea, Taiwan, Colombia, Philippines, Indonesia, Chile, Argentina, Venezuela.
(a) Compiled from semiannual polls conducted and reported by "Institutional Investor". Leading International bankers are asked to rate each country on a credit risk scale of 1 to 100 with 100 being lowest risk.
(b) Compiled from "World Development Report" various years.
(e) Compiled from "World Debt Tables" various years

maturity structure and by the type of US banks: money center banks, medium size banks and small regionals. Appendix 1 presents a list of the money center and medium sized banks as of June1992. The data set includes all US banks which, in the current period, have either a foreign branch or have at least $20 mill. in outstanding foreign loans. The source of the data is "Country Exposure Lending Survey" which is published quarterly by the Financial Institutions Examination Council at the Board of Governors of the Federal Reserve. The survey was originated in 1975 as an annual, then, in 1977, semiannual publication but the division into large, medium and small banks was first introduced in 1982. The data cover around 100 countries and our sample of nine industrialized and nine developing countries includes the largest foreign borrowers during the period 1982-1992. A list of the countries in the sample is available in the notes to Table 3 and Table 2 contains definitions and sample statistics on the loan amount variables which we employ.

The choice of country characteristics, which are presented in Table 3, is discussed in the subsequent sections. The data were compiled from various years of the "World Development Report", the "World Debt Tables" both of which are published by the World Bank as well as from the "Institutional Investor".

Results

Table 4 shows the results from four regressions in which we tried to capture in a simple form the basic structure of relationships between large and small bank investment. The independent variables are the yearly adjustments in the stock of outstanding debt by large and small banks in developed and developing countries and the independent variables are the current year and the previous year net inflows from both large and small banks[5]. In developed countries, an increase in large bank investment leads to an increase in small bank investment during the next year but an increase in small bank investment does not lead to an increase in large bank investment in the subsequent period. In developing countries, large and small bank investment are correlated in the current year but not across time and small banks do not seem to follow the pattern of large bank behavior from the previous period. The autocorrelation of both small and large bank investment is discussed later in the paper.

The literature on foreign lending by US banks has identified and, in some cases, tested a number of hypothesis about the determinants of bank lending (Nunnenkemp [1992], Thapa *et al* [1991]) to foreign countries. The results of these studies are intuitively appealing –

[5] We also included investment with lags of more than one year but the basic results were unaltered.

Table 4
Dependent Variable: Net Inflow/Outflow of US Bank Funds

	Developed		*Developing*	
	Large bank inflow	Small bank inflow	Large bank inflow	Small bank inflow
Large bank inflow this period		0.11 (1.50)		0.09 (2.11)
Large bank inflow last period	0.53 (5.34)	0.17 (2.07)	0.77 (9.92)	-0.04 (-0.92)
Small bank inflow this period	0.22 (1.50)		0.66 (2.11)	
Small bank inflow last period	-0.19 (-1.50)	0.61 (9.17)	-0.36 (-1.21)	0.68 (8.37)
Constant	-148 (-1.41)	-2.05 (-0.26)	-22.4 (-0.32)	-34.8 (-1.27)
R^2 / Number of obs.	0.33 / 90	0.55 / 90	0.66 / 80	0.59 / 80

Notes: OLS estimates. T statistics are in brackets. One period is one year beginning in January.

macroeconomic stability; a better capacity to service foreign debt; FDI investment, low US interest rates, etc. all contribute to larger US bank lending. It is not the purpose of the present analysis to identify the determinants of foreign lending in general; we want, however, to provide indications that large banks do, indeed, possess better or, at least, more current information. In a literature survey paper, Aliber [1984] summarizes that one of the main reasons that banks open foreign branches is to provide service to their domestic clients or at least, not to lose them to foreign bank competitors. Gwyne [1984], on the other hand, suggests that US exporters represent an important source of information about foreign borrowers and that smaller US regional banks who work closely with the exporters at home are the main beneficiaries of this information. Even though opinions differ as to which banks benefit and in what way, it seems to be a common view that US exports are a source of information for US banks. We included the last year's increase (decrease) in US exports to each country to account for improvements in the information base of US banks with the implicit hypothesis that large banks are better positioned, through their existing foreign branch network, to take immediate advantage of an increase in exports[6].

[6] Lagged changes in exports improves the fit of the model compared to current changes without changing the rest of the results. It seems that the benefit of information has a delayed effect, if any.

Kletzer [1984] offers an explanation of the US bank overlending to developing countries in the 70's and early 80's which is based on the assumption that all information about the indebtedness of these countries was not current and this lead to a miscalculation of the risks involved in international lending. It is likely that banks which have offices in a country should have a better and more timely information about the build-up of foreign debt than banks which rely on delayed international statistics. So, we formed the hypothesis that large banks can recognize a build-up of foreign debt sooner and scale down their holdings of foreign assets in a more timely manner. There are a number of problems with such a hypothesis. First, the build-up of foreign loans which lead to the debt crisis of the early 1980's was associated mainly with large banks which does not indicate a possession or a use of superior information on their part. Gwyne [1984] writes: " Even Citicorp which held $3 bill. In Mexican debt did not know until Silva told him the next evening"[7]. Second, as Krugnan [1989] suggests, debt build-up may induce lenders to extend further credit in order to protect outstanding claims.

Equation (3) suggests that less informed agents are more responsive to changes in interest differentials. The World Bank publishes an annual weighted average of contractual interest rates[8] on newly extended credit for all developing countries[9] but these are most likely endogenous and, further, they are not available under the same definition for developed countries so, to test the hypothesis, we included the change in US Treasury bill rate over the current year.

[7] The event in question is 1982 insolvency of Mexico. Gwyne [1984], pp. 25.
[8] Nominal return in dollars.
[9] Source: World Debt Tables.

Table 5
Dependent Variable: Net Inflow/Outflow of US Bank Funds

	Developed		*Developing*	
	Large bank inflow	Small bank inflow	Large bank inflow	Small bank inflow
Large bank inflow this period		0.11 (1.37)		0.08 (1.76)
Large bank inflow last period	0.52 (4.81)	0.14 (1.65)	0.75 (9.46)	-0.02 (-0.39)
Small bank inflow this period	0.22 (1.37)		0.55 (1.76)	
Small bank inflow last period	-0.18 (-1.09)	0.72 (8.84)	-0.17 (-0.52)	0.66 (7.32)
Change in US exports last per	20.8 (0.48)	-3.15 (-0.11)	55.01 (1.11)	21.8 (1.16)
Change in US T-bill rate	20.2 (0.22)	-136 (-2.26)	-19.6 (-0.40)	-38.6 (-2.14)
Change in foreign debt/GDP			-398 (-1.30)	144 (1.28)
Constant	-169 (-1.14)	-23.5 (-0.23)	-48.3 (-0.60)	-66.9 (-2.29)
R^2 / Number of obs.	0.30 / 81	0.60 / 81	0.68 / 73	0.64 / 73

Notes: OLS estimates. T statistics are in brackets. One period is one year beginning in January.

Table 5 presents the results from the estimation of the same equations as in Table 4 with the inclusion of the change in foreign debt/GDP, the change in US exports last year and the change in the US T-bill rate. Changes in US exports appear to have no significant effect on the lending behavior of either large or small banks and this result persists when the sample includes all banks and all countries. Later, in Table 7, we report results which suggest that developing countries which import more from the US are also more likely to receive a larger proportion of loans from small US banks but this effect seems cumulative over time and indistinguishable on a year-by- basis. As predicted by the model, small banks are more responsive than large banks to exogenous changes in interest rate differentials in both developed and developing countries. Again, small banks follow large banks in developed countries and participate in syndicated loans in developing countries.

The effect of changes in the debt/GDP ratio have the predicted signs but the coefficients are not statistically significant. An increase in indebtedness, for potentially problem borrowers,

Table 6
Dependent Variable: Net Inflow/Outflow of US Bank Funds

	Developed		*Developing*	
	Large bank inflow	Small bank inflow	Large bank inflow	Small bank inflow
Large bank inflow this period		0.09 (1.08)		0.09 (1.84)
Large bank inflow last period	0.52 (4.65)	0.15 (1.68)	0.75 (9.21)	-0.23 (-0.48)
Small bank inflow this period	0.18 (1.08)		0.61 (1.84)	
Small bank inflow last period	-0.16 (-0.94)	0.72 (8.29)	-0.15 (-0.47)	0.64 (6.98)
Change in US exports last per	11.6 (0.26)	-8.08 (-0.25)	75.7 (1.29)	12.6 (0.56)
Change in US T-bill rate	-31.3 (-0.32)	-156 (-2.29)	-54.7 (-0.98)	-33.8 (-1.62)
Change in Credit Rating	-8450 (-1.27)	-1383 (-0.28)	-2055 (-1.79)	513 (1.16)
Ch. in Investment/GDP last p	682 (0.46)	383 (0.36)	-155 (-0.56)	25.4 (0.24)
Ch. in GDP per capita last p.	1208 (0.91)	519 (0.57)	292 (0.52)	-37.9 (-0.18)
Ch. in Exports/GDP last per.	-2094 (-1.46)	-235 (-0.22)	63.2 (0.23)	113 (1.14)
Ch. in foreign debt/GDP			-604 (-1.68)	226 (1.65)
Ch. in Service/Exports			-9.34 (-0.05)	-50.3 (-0.76)
Constant	-296 (-1.63)	-78.3 (-0.59)	-74.6 (-0.88)	-62.5 (-2.01)
R^2 / Number of obs.	0.36 / 81	0.60 / 81	0.70 / 73	0.66 / 73

Notes: OLS estimates. T statistics are in brackets. One period is one year beginning in January.

should induce large banks to scale down their foreign asset holdings because they, presumably, recognize the build-up. Small banks should be either unaffected or they may interpret the increase in debt as a signal of improved conditions. Indeed the sign of the debt/GDP coefficient is negative for large banks and positive for small banks but both are insignificant. US bank lending represents a certain percent of the change in total debt of a country and, in view of that, a negative coefficient for large banks would be particularly interesting.

Next, we added last year's changes in the investment/GDP and exports/GDP ratios, GDP per capita and, for developing countries, foreign debt service as a percent of exports. These should proxy for changes in the overall economic conditions of a country as well as its debt service and repayment capabilities. We also added the change in the credit rating of each country which was obtained from semiannual surveys reported in the "Institutional Investor". These ratings are readily available to all lenders and supposedly proxy for the level, quality and direction

of public information. The estimates are reported in Table 6. None of the newly included variables, with the exclusion of credit ratings, have a significant individual effect on lending. An improvement in the credit rating of a developing country appears to induce a decrease in large bank lending. Our expectation was that credit rating have a stronger and positive effect on the lending patterns of small banks but this result does not obtain. An interesting result is the negative and significant coefficient of the debt/GDP ratio for large banks, especially in comparison with the positive and significant coefficient for small banks. As we earlier noted, though, this result is not robust.

We estimated a variety of specifications where the dependent variable is large bank inflows as a percent of either small bank inflows or total inflows. Our intention was to capture in a direct way the exogenous determinants of a particular mix of lenders but the results we obtained were generally not significant[10]. It seems that it is difficult to identify a robust set of determinants of

Table 7
Dependent Variable: Large Bank Outstanding Claims/Small Bank Outstanding Claims

	All countries	*Developed*	*Developing*
Credit rating	-0.08 (-5.39)	-0.08 (-3.64)	-0.19 (-2.36)
GDP per capita	-0.04 (-0.74)	-0.08 (-2.80)	0.81 (1.39)
Investment/GDP	0.10 (2.54)	0.14 (3.83)	0.20 (1.57)
Exports/GDP	-0.02 (-0.80)	-0.05 (-2.08)	-0.01 (-0.14)
US exports	-0.02 (-1.18)	-0.003 (-0.37)	-0.28 (-1.64)
Service payments/Exports			-0.06 (-1.64)
Debt/GDP			-0.14 (-1.06)
constant	9.66 (10.6)	9.46 (6.13)	18.3 (3.89)
R^2 / Number of observations	0.25 / 396	0.19 / 198	0.10 / 181

Notes: OLS estimates. T statistics are in brackets. One period is one year beginning in January.

[10] Available upon request.

bank lending and that a variety of factors influence the decisions of each lender with different lags and weighs attached to them. A less precise way of identifying the determinants of the mix of lenders is to look at total outstanding claims rather than at inflows. That may give us a general indication of which countries, on average, tent to receive loans from a certain mix of lenders. We tried to explain the proportion of large bank outstanding claims as proportion of small bank outstanding claims with the help of the country characteristics discussed above. The results are reported in Table 7. The proportion of small bank lending is higher relative to large bank lending for countries with better credit ratings. In developed countries, the ratio of large/small bank lending decreases in credit ratings, GDP per capita and the size of the export sector. In developing countries, the ratio decreases in the credit ratings, size of the export sector but also in the indebtedness of a country. Unlike for inflows, one can find a significant set of determinants of the mix of lenders which indicates that the effect of a number of decision factors is cumulative over time. One of the reasons why these effects do not seem to be immediate is probably the existence of adjustment costs.

In all estimations we find that both small and large bank lending are highly autocorrelated. Table 8 presents correlations of the level of outstanding debt this period with the level of debt

Table 8
Correlation Between the Current Level of Outstanding Debt and the Level of Outstanding Debt Six Months Ago

Country/Bank	*All banks*	*Large banks*	*Small banks*
All countries	.72	.72	.72
Developed countries	.53	.61	.45
Developing countries	.91	.84	.98

Notes: 198 observations for developed countries and 181 observations for developing countries.

Table 9
Dependent Variable: Correlation of Current Level of Outstanding Claims and the Level of Outstanding Claims Six Months Ago

	All countries, all banks
Demand Deposits/M1	0.008 (4.07)
constant	-0.119 (-0.87)
R^2 / Number of observations	0.34 / 34

Notes: Two observations per country – small and large banks. Sweden is excluded because of an incompatible definition of M1. OLS estimates. T statistics are in brackets.

last period. A positive correlation indicates that changes in banks' portfolios are not instantaneous and it takes more than one period (six months) for the banks to make the desired adjustment. The correlation is greater in developing countries for each type of banks, small bank correlation is greater than large bank correlation in developing countries and, in developed countries, large bank correlation is greater.

To identify the source of adjustment costs we followed a generally standardized method (Anderson [1993]). First, we calculated the correlation between the levels of current and lagged debt for large and small banks for each country and then we regressed the correlations on the proportion of demand deposits in the money stock (M1) for each country in the sample. The results from the regression are reported in Table 9. The greater the proportion of demand deposits in M1, the smaller the correlation and, implicitly, the smaller the adjustment cost. What was our motivation to try and explain these correlations by means of the DD/M1 ratio?

Banks extend loans over the maturity of which exogenous conditions change and they incur costs in the secondary markets in order to attain their desired portfolios. Table 10 provides

Table 10
Proportion of Total Outstanding Claims with Maturity of One Year or Less

Country/Bank	*All banks*	*Large banks*	*Small banks*
All countries	.62	.57	.67
Developed countries	.73	.67	.79
Developing countries	.51	.47	.54

Notes: 198 observations for developed and 181 observations for developing countries.

the proportion of US bank debt which has a maturity period of less than one year. Large banks extend loans with longer maturity periods in both developed and developing countries. Both types of banks extend loans with longer maturities in developing countries which may indicate that, in developing countries, the differential in returns on long and short-term credit is substantial enough to outweigh the potential cost of cashing some of the debt on the secondary market. Underdeveloped financial system are characterized by larger spreads between short and long-term rates, low intensity of competition between intermediaries as well as a predominance of short term-credit (Diaz-Alehandro [1985]). So, we suggest that foreign banks are more likely to lend directly and long-term to nonfinancial institutions in countries with less-developed banking systems. In countries with developed financial systems, more US funds are intermediated through the domestic banking system. Indeed the correlation between the proportion of short-term credit in all credit and the proportion of total credit which is extended to domestic banks is positive and strongly significant. Table 11 shows the estimates from two equations in both of which the independent variable is the correlation of the current and last periods' level of debt. The results suggest that banks face adjustment costs because of long-term maturity -- the correlation is greater where most of the debt is not intermediated through domestic banks or, equivalently, where most of the debt is long term.

Table 11
Dependent Variable: Correlation of Current Level of Outstanding Claims and the Level of Outstanding Claims Six Months Ago

	(1)	*(2)*
Proportion of credit to banks in total	-0.59 (-4.36)	
Proportion short-term credit in total		-0.75 (-2.31)
constant	0.93 (13.4)	0.44 (2.08)
R^2 / Number of observations	.37 / 34	.14 / 34

Notes: Two observations per country – small and large banks. Sweden is excluded because of an incompatible definition of M1. OLS estimates. T statistics are in brackets.

We adopted the proportion of demand deposits in M1 to proxy for the degree of development of the domestic financial system where a greater proportion indicates a higher level of development. The hypothesis which we test is that a larger proportion of demand deposits in M1 implies a shorter term structure of US bank credit to the respective country and, respectively, smaller implicit adjustment costs. Table 12 reports the results from testing the former hypothesis and Table 9 earlier reported the results from the test of the latter hypothesis.

Finally, we created a dummy variable which takes the value of one if the observation is of a large bank, we interacted it with the proportion of demand deposits into M1 and included it in regressions where the independent variables were the percent of loans which are extended to banks, the proportion of credit that is short term and the correlation of the levels of debt in the

Table 12
Dependent Variable: Proportion of Outstanding Claims With Maturity of One Year or Less

	All countries, all banks
Demand Deposits/M1	0.006 (4.93)
constant	0.229 (2.86)
R^2 / Number of observations	0.43 / 34

Notes: Two observations per country – small and large banks. Sweden is excluded because of an incompatible definition of M1. OLS estimates. T statistics are in brackets.

Table 13
Dependent Variable: Proportion of Outstanding Claims With Maturity of One Year or Less

	All countries	*Developed*	*Developing*
Demand Deposits/M1	0.006 (5.57)	0.007 (2.42)	0.004 (1.67)
Demand Deposits/M1*Largedum	-0.001 (-2.15)	-0.001 (-2.13)	-0.001 (-1.15)
constant	0.23 (3.02)	0.23 (1.00)	0.36 (3.19)
R^2 / Number of observations	0.51 /34	0.42 / 16	0.18 / 18

Notes: Two observations per country – small and large banks. Sweden is excluded because of an incompatible definition of M1. OLS estimates. T statistics are in brackets.

current and previous periods. Table 13 shows the estimated coefficients from three equations where the dependent variable is the proportion of short-term debt in total debt. The positive sign of the coefficient of demand deposits/M1 ratio indicates that the more developed the domestic financial system, the greater the proportion of foreign lending which is intermediated through domestic banks and is short-term as we noted earlier. A negative sign on the interaction term indicates that this is less true for large banks, i.e. large banks are better positioned, supposedly through foreign branches, to locate and lend to nonfinancial borrowers even in the conditions of greater competition from domestic banks. Indeed, the sign of the interaction term is negative and significant with the exception of developing countries where the coefficient is not statistically significant. The coefficient of the interaction term is negative and significant in regressions where the independent variable is the proportion of credit which is directed to domestic banks. The coefficients lose their significance when the independent variable is the correlation of this period's and last period's levels of debt.

Conclusion

We endogenize lenders' decision to acquire information in international markets. Lenders endowed with less wealth do not purchase additional information. Instead they observe the behavior of larger investors and infer information about economic conditions. Small lenders may costlessly observe last period's investment by large lenders or they may participate in syndicated loans originated by large lenders. In this basic framework, we develop a number of implication about the behavior of the two types of lenders, maturity structure and adjustment costs. Data on international US bank lending is employed to test the main results of the model. Our empirical observations confirm, in general terms, the predictions of the model.

References

Aliber, Robert Z. "International Banking: A Survey" Journal of Money, Credit and Banking, Vol. 16, No.4 (November 1984, Part 2), 661-678.

Anderson, Patricia M. "Linear Adjustment Costs and Linear Demand: Evidence From Retail Trade firms" Quarterly Journal of Economics, November 1993, 1015-1042.

Benabou, R. "Using Privileged Information to Manipulate Markets" Quarterly Journal of Economics, 1992.

Bergsten, C., William Cline and John Williamson "Bank Lending to Developing Countries: The Policy Alternatives" Institute for International Economics, April 1985.

Claessens, S., M. Dooley, and A. Warner "Portfolio Flows: Hot or Cold?" The World Bank Economic Review, 1995, 153-174

Claudon, Michael (edt.) World Debt Crisis: International Lending on Trial, Ballinger, 1986

Delvin, R. Debt and Crisis in Latin America: The Supply Side, 1989.

Diamond, Douglas, "Reputation Acquisition in Debt Markets" Journal of Political Economy, 1989, 828-862.

Diaz-Alejandro, Carlos, "Good Bye Financial Repression, Hello Financial Crisis" Journal of Development economics 19 (1985) 1-24.

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

Edwards, Sebastian, "LDC Foreign Borrowing and Default Risk: An Empirical Investigation, 1976-80" The American Economic Review, September 1984, 727-734.

Eichengreen, B., Tames Tobin and Charles Wyplosz, "Two Cases for Sand in the Wheels of International Finance" The Economic Journal, 1995, 162-172.

Federal Financial Institution Examination Council Country Exposure Lending Survey, 1982 - 1995.

Gwyne, S.C., Selling Money, 1984.

Institutional Investor, March and September editions for 1982 -1995.

Krugman, Paul "Private Capital Flows to Problem Debtors" in Developing Country Debt and Economic Performance, edt. Jeffrey Sachs, 1989

IMF, Determinants and Systematic Consequences of International Capital Flows, 1991.

Kletzer, Kenneth "Asymmetries of Information and LDC Borrowing With Sovereign Risk" Economic Journal, June 1984.

Kyle, Albert "Continuous Auctions and Insider Trading" Econometrica, November 1985.

Makin, John, The Global Debt Crisis, 1986.

Mathieson, Donald "Managing Financial Risk in Indebted Developing Countries" IMF Occasional Papers, 1989.

Nunnenkemp, Peter, "Determinants of Voluntary and Involuntary Bank Lending to Developing Countries in the 1980's" KYKLOS, 1992, 555-576.

Ozler, Sule, " Commercial Bank Lending to Developing Countries: An Expansion of the Market" Contemporary Policy Issues, 1989, 1-10.

Ozler, Sule, "The Evolution of Credit Terms: An Empirical Study of Commercial Bank Lending to Developing Countries" Journal of Development Economics, 1992, 79-97.

Roussakis, E. (edt.) International Lending By US Commercial Banks: A Casebook, 1981.

Sachs, Jeffrey (edt.) Developing Country Debt and Economic Performance, 1989.

Sharfstein, D. and J. Stein "Herd Behavior and Invaestment" American Economic Review, June 1990.

Thapa, S. and D. Mehta, "An Empirical Investigation of the Determinants of the Supply of Bank Loans to Less Developed Countries" Journal of Banking and Finance, 1991. 535-557.

Wang, Ch., On Improving the Structure of International Lending, 1990

Watson, Maxuell "International Capital Markets: Development and Prospects" IMF Occasional Papers, 1988.

World Bank, World Development Report, various years.

World Bank, World Debt Tables, various years.

Table 14
Some Sample Means

Variable	*Developed*	*Developing*
Percent of total from large banks	60	71
Percent of total from medium banks	18	16
Percent of total from small banks	22	13
Percent of total extended to local banks	53	22
Percent of total extended to governments	15	49
Percent of total extended to private nonfinancial institutions	32	29
Percent of large bank loans to banks	42	16
Percent of large bank loans to governments	17	53
Percent of large bank loans to private nonfinancial institutions	41	31
Percent of medium bank loans to banks	64	33
Percent of medium bank loans to governments	9	39
Percent of medium bank loans to private nonfinancial institutions	27	28
Percent of small bank loans to banks	76	38
Percent of small bank loans to governments	9	40
Percent of small bank loans to private nonfinancial institutions	15	22

Note: Number of observations is 198. Data is semiannual for the period 1982 - 1992 and is compiled from "Country Exposure Lending Survey" - various years

Appendix 1

Bank Names, Assets and Capital as of June, 1992

Large Banks	Medium Banks
Bank of America	Wells Fargo
Citibank	Marine Midland
Chase Manhattan Bank	Mellon Bank
Morgan Guaranty	First National of Boston
Chemical Bank	National Bank of Detroit
Continental Illinois	Texas Commerce Bank
Bankers Trust	Bank of New York
First National of Chicago	Nationsbank Texas
	Republic National of New York
	First Interstate of California
	First City National of Houston

Assets: Large Banks: $694.1 billion
Medium Banks: $273.0 billion
Small Banks: $766.0 billion

Capital: Large Banks: $68.0 billion
Medium Banks: $26.4 billion
Small Banks: $71.3 billion

Appendix 2. The decision to purchase additional information.

Investors solve the following problem:

$$\max_{m_i \geq 0} E(u|s=H) = u\left[w_i\left(1+r_0\right)+m\left(r_H-r_o\right)\right]\Pr(V=H|s=H)+$$

$$+u\left[w_i\left(1+r_0\right)+m\left(r_L-r_o\right)\right]\Pr(V=L|s=H)=$$

$$=\frac{1}{\alpha p_i+(1-\alpha)\left(1-p_i\right)}\left[\alpha p_i u\left(w_i+m_i\right)+(1-\alpha)\left(1-p_i\right)u\left(w_i-m_i\right)\right]$$

Note:

$$\Pr(s'=H|s=H)=\Pr(s'=H|V=H)\Pr(V=H|s=H)+\Pr(s'=H|V=L)\Pr(V=L|s=H)=$$

$$=q\frac{\alpha p}{\alpha p+(1-p)(1-\alpha)}+(1-q)\frac{(1-p)(1-\alpha)}{\alpha p+(1-p)(1-\alpha)}=$$

$$=\frac{1}{\alpha p+(1-p)(1-\alpha)}\left[\alpha pq+(1-q)(1-\alpha)(1-p)\right]=A>\Pr(s'=H)$$

Equivalently,

$$\Pr(s'=L|s=H)=\Pr(s'=L|V=H)\Pr(V=H|s=H)+\Pr(s'=L|V=L)\Pr(V=L|s=H)=$$

$$=(1-q)\frac{\alpha p}{\alpha p+(1-p)(1-\alpha)}+q\frac{(1-p)(1-\alpha)}{\alpha p+(1-p)(1-\alpha)}=$$

$$=\frac{1}{\alpha p+(1-p)(1-\alpha)}\left[\alpha p(1-q)+q(1-\alpha)(1-p)\right]=1-A<\Pr(s'=L)$$

In essence, the prior on the good state is updated by the signal s before the signal s' is received. The signals s and s' relate to the same underlying state. Expected utility when both signals indicate a good state:

$$E(u|s=H,s'=H)=u\left[(w-K)\left(1+r_0\right)+m\left(r_H-r_0\right)\right]\Pr(V=H|s=H,s'=H)+$$

$$+u\left[(w-K)\left(1+r_0\right)+m\left(r_L-r_0\right)\right]\Pr(V=L|s=H,s'=H)$$

Denote:

$$\Pr(V=H|s=H)=\frac{\alpha p}{\alpha p+(1-\alpha)(1-p)}=B$$

$$\Pr(V=L|s=H)=\frac{(1-\alpha)(1-p)}{\alpha p+(1-\alpha)(1-p)}=1-B$$

Optimal investment level when both signals indicate a good state:

$$m_i^*=(w-K)\left(1+r_0\right)\frac{Bq\left(r_H-r_0\right)-(1-B)(1-q)\left(r_0-r_L\right)}{\left(r_H-r_0\right)\left(r_0-r_L\right)\left[Bq+(1-B)(1-q)\right]}=$$

$$=(w-K)\left(1+r_0\right)\frac{\alpha pq\left(r_H-r_0\right)-(1-\alpha)(1-p)(1-q)\left(r_0-r_L\right)}{\left(r_H-r_0\right)\left(r_0-r_L\right)\left[\alpha pq+(1-\alpha)(1-p)(1-q)\right]}$$

Expected utility when s = H and s' = L (recall that the investor does not invest if s'=L):

$$E(u|s=H,s'=L)=u\left((w-K)\left(1+r_0\right)\right)$$

Finally, let m** denote optimal investment level with the purchased signal and m* - the optimal investment level without the purchased signal. Then,

$$g(.|s=H) = A\left[u\left(m^{**}, r_H, .\right)\frac{qB}{qB+(1-q)(1-B)} + u\left(m^{**}, r_L, .\right)\frac{(1-q)(1-B)}{qB+(1-q)(1-B)}\right] +$$

$$+ (1-A)u\left[(w-K)\left(1+r_0\right)\right] -$$

$$-\left[u\left(m^{*}, r_H, .\right)\frac{\alpha p}{\alpha p+(1-\alpha)(1-p)} + u\left(m^{*}, r_L, .\right)\frac{(1-\alpha)(1-p)}{\alpha p+(1-\alpha)(1-p)}\right]$$

With a log utility and after some simplifications:

$$g(.|s=H) = \frac{1}{\alpha p+(1-\alpha)(1-p)}$$

$$\left(\begin{array}{l}
\left\{\alpha p q \log\left[(w-K)\left(1+r_0\right)+m^{**}\left(r_H-r_0\right)\right] + (1-\alpha)(1-p)(1-q)\log\left[(w-K)\left(1+r_0\right)+m^{**}\left(r_H-r_0\right)\right]\right\} + \\
+\left[\alpha p(1-q)+q(1-\alpha)(1-p)\right]\log\left[(w-K)\left(1+r_0\right)\right] - \\
-\left\{\alpha p \log\left[(w)\left(1+r_0\right)+m^{*}\left(r_H-r_0\right)\right] + (1-\alpha)(1-p)\log\left[(w)\left(1+r_0\right)+m^{*}\left(r_H-r_0\right)\right]\right\}
\end{array}\right)$$