Chapter 1

Credit Markets and Patterns of International Trade*

1. Introduction

The theoretical literature on the so-called North–South trade models often points attention to a general asymmetry of product specialization in rich and poor countries, with the former concentrating on goods which involve a high degree of processing and the latter on relatively unprocessed primary or intermediate products. The origin and preservation of this asymmetry is usually traced to static differences in factor endowments, in the nature of product and process innovations that take place in rich countries and in the cumulative processes of dynamic economies of scale in manufacturing and generalized learning effects of a larger initial capital stock in rich countries [see, for example, Krugman (1981) and Dutt (1986)]. While not denying the importance of these factors, in this paper we shall abstract from them and focus on the contribution of some aspects of credit market imperfections to inter-country differences in patterns of specialization and trade. In particular we show that even when technology and endowments are identical between countries and economies of scale are absent, (a) moral hazard considerations in the international credit market under sovereign risk and (b) differences between countries in the domestic institutions of credit contract enforcement under incomplete information may lead to one country facing a higher interest rate or rationed credit compared to another. This may lead to differences in comparative advantage[1] in processed goods requiring more working capital, marketing costs, or trade finance. We presume that more sophisticated manufactured finished products require more credit to cover selling and distribution costs than primary or intermediate products.

In general, the impact of financial markets on merchandise trade is a relatively unexplored area of trade theory. In the empirical literature on East Asian success stories the link between dynamic comparative advantage and easier financial access has often been emphasized. In the related literature on trade and industrial policy the use in those countries of selective allocation of credit and loan guarantees to achieve targets of trade and industrial restructuring has been cited as more effective than the more standard practice of trade restrictions and exchange control. We do not intend to take up many of the relevant issues here; our limited goal is to attempt an integration of one part of traditional trade theory with the growing theoretical literature on credit markets under imperfect information.

Sections 2 and 3 have the same basic model of the relationship between differential cost (or availability) of credit and comparative advantage, but they differ with respect to the underlying source of credit market imperfection along the lines of (a) and (b) above: in section 2 we have a model of international borrowing with potential repudiation and sovereign immunity, and in section 3 we have differences in *domestic* credit market institutions (particularly in the manner of contract enforcement and form of bankruptcy laws) in the presence of international borrowing and trade.

2. Sovereign Risk and Comparative Advantage in a Simple Trade Model

The impact of international credit market imperfections on the pattern of production and trade can be demonstrated in a simple two-country, two-sector, two-factor general equilibrium model. We adopt the usual Heckscher–Ohlin–Samuelson assumptions and introduce a simple role for international credit transactions. Technology, factor endowments, and consumer preferences are assumed to be identical across countries. In our simple model, the output of one sector is used only as an intermediate good or raw material in the production of the other output, which is consumable. We further assume that the intermediate good must be committed as an input one period before output is available so that working capital is required. For simplicity, inputs of the two domestic factors, labor and land, are used concurrently with the production of output. A credit market allows the cost of current intermediate input to be paid from the next period's revenues.

Technology in both sectors is described by constant returns to scale production functions which are twice-continuously differentiable and concave. The output of the final good is denoted by y, and output of the intermediate by x. The production functions in intensive form are given by

$$y = lf(k_1, x_1) \quad \text{and} \quad x = (1 - l)g(k_2),$$

where k_1 and k_2 are the land-intensities of production in each sector, x_1 is the intermediate good to labor ratio employed in sector 1, and l is the proportion of the labor force employed in sector 1. The total labor force is normalized to equal unity.

We will assume that perfect competition and free trade prevail throughout, there are no factor-intensity reversals, and equilibrium entails an interior solution. For now, assume that working credit is available at a given rate of interest, r. The first-order conditions for a production-side equilibrium are

$$\frac{\delta f(k_1, x_1)}{\delta k_1} = q \cdot g'(k_2),$$

$$\frac{\delta f(k_1, x_1)}{\delta x_1} = (1 + r)q,$$

$$\left(f - k_1 \frac{\delta f}{\delta k_1} - x_1 \frac{\delta f}{\delta x_1}\right) = q(g - k_2 g')$$

and

$$k = lk_1 + (1 - l)k_2,$$

where q is the relative price of good 2 in terms of good 1 and k is the country's aggregate land–labor ratio.

For this system, we first examine the comparative statics for an increase in the opportunity cost of credit to competitive firms. For fixed q, evaluating at an equilibrium with incomplete specialization, we have

$$\begin{bmatrix} dx_1/dr \\ dk_1/dr \\ dk_2/dr \end{bmatrix} = \frac{q}{f_{xx} f_{kk} - (f_{xk})^2} \begin{bmatrix} f_{kk} + \dfrac{x_1 f_{xk}}{k_1 - k_2} \\ -f_{xk} - \dfrac{x_1 f_{xx}}{k_1 - k_2} \\ \dfrac{-x_1}{(k_1 - k_2) g''(k_2)} \end{bmatrix}. \tag{1}$$

If we accept the additional assumption that the marginal productivity of labor and land in sector 1 rises with additional intermediate input, so that

$$-k_1 f_{xk} - x_1 f_{xx} > 0 \quad \text{and} \quad f_{xk} > 0,$$

then

$$\frac{dk_1}{dr} \quad \text{and} \quad \frac{dk_2}{dr} \gtrless 0 \quad \text{as} \quad k_1 \gtrless k_2.$$

Therefore, with a rise in r the proportion of the labor force employed in sector 2 rises and, consequently, the output of sector 1 falls and output of sector 2 increases. The wage–rentals ratio rises (falls) if sector 2 is relatively land-intensive (labor-intensive).

In this model, with identical factor endowments across borders, the outputs of each country will be identical under free trade if the opportunity costs of credit to firms are the same. Since only one good is consumed, there will be no trade (for a model with many consumables, identical tastes across borders ensures this). If the cost of credit is higher in one country than in the other, then that country will have a comparative advantage in the production of the intermediate good. Therefore, in equilibrium, the country with a credit disadvantage will export the intermediate good and import the final good. In order to explain the differential credit advantage of countries, we now add to the production model a simple moral hazard model of the international credit market under sovereign risk.

Since international borrowing and lending involves different political and legal jurisdictions, there is no external authority to ensure that parties to a contract abide by the terms of that contract ex post. In the presence of sovereign immunity, a debtor country can always elect to repudiate its obligations, so that repayment occurs only if the costs of repudiation exceed the debt-service obligations. Therefore, international loan agreements necessarily and indirectly enforced by penalties which can be credibly imposed in the event of a default. Examples of such penalties often discussed are disruptions of a debtor's commodity trade and moratoria on future foreign lending.[2] In the case of a financial intermediary reneging on foreign obligations, the loss of the discounted stream of future expected profits concurrent with the loss of reputation can comprise an indirect penalty to the owners of the institution.[3] The amount lent is constrained by the extent of the penalties which can be credibly imposed.

We develop an especially tractable model of borrowing with potential repudiation for inclusion in our general equilibrium framework following the non-stochastic model of Eaton and Gersovitz (1981). A debtor country (or, equivalently, intermediary) perceives that it will suffer a loss of size P if it defaults on its obligations. This penalty can be the present discounted value of future income losses. Therefore, an obligation will be repaid whenever

$$(1 + r)b \leqq P, \tag{2}$$

where b is the loan principal and r is the contracted rate of interest. We assume that indifference [i.e., equality in (2)] leads to repayment. Otherwise, the debt is not repaid and a penalty is incurred (which need not actually equal P).

Lenders receive nothing if repudiation takes place, so that they lose the opportunity cost of their loans. Furthermore, they possess incomplete information about the size penalty perceived by borrowers. Their information can be summarized by a distribution over the size penalties which borrowers believe they face. This set-up can be represented directly as an extensive game with incomplete information.[4] We restrict the possible beliefs of creditors to those for which the resulting equilibrium paths always entail repayment. In this model, revising beliefs which give rise to a repayment equilibrium [that is, a loan contract such that $(1 + r)b \leqq P$] can be costly to the lender because a repudiation may result from a movement off the original equilibrium. While learning may occur, asymmetries of information can persist for long periods even though repudiations do not occur.

If a repudiation does result from initial beliefs, then those beliefs will be revised. Furthermore, we could add the assumption that the penalty is a random variable and can change over time. The equilibria which we choose to adopt are characterized by loan contracts satisfying

$$\text{prob}[\tilde{P} \geqq (1 + r)b] \cdot (1 - r)b \geqq (1 + \rho)b$$

and

$$(1 + r)b \leqq P,$$

where $\text{prob}[\tilde{P} \geqq (1 + r)b]$ is the probability according to lenders' beliefs that the penalty perceived by borrowers (a random variable, $\tilde{P}$) is greater than the debt-service obligation, $(1 + r)b$, and ρ is the opportunity cost of lending. In this formalization, we have made the inessential assumption that lenders are risk neutral. Further, we may assume that there is free entry in loan contracts so that the first inequality is an equality, while the second may hold strictly.

Since the probability of repayment implied by lenders' beliefs declines with rising debt-service obligations, the supply curve of funds is upward-sloping after a possible initial flat segment (along which, $r = \rho$) and may be backward-bending, eventually. The entire curve lies inside the corresponding L-shaped supply curve in Eaton and Gersovitz (1981). This type of supply curve is identical in shape to those in Kletzer (1984), which are generated from a model with stochastic technology in a game of complete information, and in which the probability of default is positive in equilibrium. We adopt this alternative approach so that repudiation never occurs and no stochastic element need enter the general equilibrium model. The supply curve is depicted in fig. 1.1.

To place this model of international borrowing with potential repudiation into our trade model, we assume that all consumers are identical and possess a wealth-holding motive. All wealth is held in loans extended to either of the two countries. For simplicity, consumers' utility functions can be inter-temporarily separable with a common constant rate of discount, ρ. Firms obtain credit on the domestic market either from the government or through a set of intermediaries, which in turn borrow in the international market. We assume that there is no risk or imperfect information

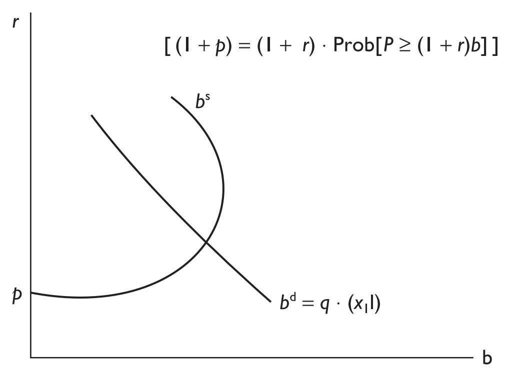

Fig. 1.1

associated with these second-stage loans. Consumers are free to lend to either country, so that their expected return under their beliefs in equilibrium is equal to ρ on assets of either country. Further, we assume that the rate of interest charged to firms on working credit is equal to that paid to creditors.

The demand for working credit is derived from the basic production model. Eqs. (1) imply that the amount of credit demanded, $b = q(x_1 \cdot l)$, is a decreasing function of the interest rate charged ($x_1 \cdot l$ is the total input of good 2 in production of good 1; we also need to assume that the marginal productivity of labor rises with the land employed in sector 1). This curve is depicted in fig. 1, for constant q. The intersection of the supply and demand curves is an equilibrium point for the credit market in the country.

In all respects countries A and B are assumed identical, save for the beliefs of wealth-holders in both countries about the penalty perceived by each country's government or financial intermediaries. For example, the government of B could be believed more likely to possess a shorter horizon, hence greater time rate of discount, than the government of A. While learning by lenders may be possible, it will take time so that reputations can persist. If debtors' perceptions of the penalties they face change over time or the penalty is stochastic, then the supply curves of credit can retain their shapes and relationships, indefinitely. If country B has a worse reputation than A, as represented by a greater probability that each debt-service obligation exceeds the perceived penalty for repayment obligations beyond a certain level, then the supply curve of credit to B will be above that for country A, as depicted in fig. 1.2. Therefore, in the competitive free trade equilibrium, the opportunity cost of working credit in B will exceed that in A, and A will possess a comparative advantage in production of the final good.

In this approach, consumers in both countries are creditors and the government or intermediaries are debtors (firms' obligations are anticipated correctly to be repaid). On net one country will be a borrower and the other a lender; however, consumers face the possibility of a sovereign repudiation by either country. The mechanism which leads to a discrepancy in the opportunity cost of credit is the sovereign immunity of the borrowers. In the next section, we consider an alternative approach in which differences in *domestic* credit market institutions give rise to a pattern of comparative advantage in the presence of sovereign immunity.

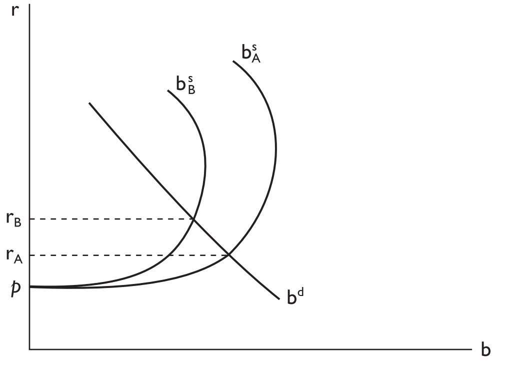

Fig. 1.2

3. Domestic Credit Market Imperfections, Sovereign Immunity, and the Pattern of Trade

International differences between the institutions surrounding domestic contract enforcement with incomplete information can give rise to patterns of comparative advantage in our basic trade model under sovereign immunity. The legal framework of bankruptcy generally differs across countries. In particular, the rights of lenders and of a firm's equity-holders and the manner of dispensing of assets vary internationally. In the presence of sovereign immunity, the best which a foreign lender can expect, in general, is to be treated on an equal footing with domestic lenders in the firm's home legal jurisdiction (in our model, all production by final output producing firms takes place in their home country).

A simple moral hazard model of borrowing by firms is developed in this section, and international differences in the treatment of creditors in the event of bankruptcy are shown to lead to a pattern of comparative advantage.[5] The production model is identical to that of the previous section, except that we assume that each firm in sector 1 faces technological uncertainty. To avoid unnecessary complications, we assume that the random variable in firms' production functions is identically independently distributed and that each country has a (fixed) large number of sector 1 firms, so that invoking the law of large numbers, mean aggregate output and both commodity and factor prices are non-stochastic. We also concentrate on standard debt contracts without explicitly deriving their existence [costly observation of the output realization of firms is an adequate basis for the use of debt contracts with bankruptcy; see Townsend (1978)].

Sector 1 firms produce according to

$$Y = \theta \cdot l \cdot f(k_1, x_1),$$

where θ is a random variable with support [0, 1] and cumulative distribution function $F(\theta)$. The simplifying assumption of multiplicative uncertainty need not be adopted. $F(\theta)$ will be assumed continuously differentiable as necessary. Firm owners declare bankruptcy whenever the current value of the firm is negative, and we assume that the owners lose all their equity in the firm when a bankruptcy is declared. Therefore, under these assumptions, the firm's value is given by

$$V(\theta) = \max\{\pi(\theta) + \beta \mathrm{E} V, 0\},$$

where current profit, $\pi(\theta) = \max_{k_1, l}\{\theta \cdot lf(k_1, x_1) - wl - vk_1 \cdot l - (1 + r)qb\}$, $\mathrm{E}V$ is the expectation of the value of the firm, v is the rental on land, and β is a discount factor. This definition assumes that land and labor inputs are chosen by the firm after the realization of θ is observed. We have also defined the value for any given current loan contract terms, r and $x_1 \cdot l \equiv b$ (the total amount lent, $x_1 \cdot l$, is fixed, the intermediate input to labor ratio varies with l, of course). In an equilibrium, the expectation of $V(\theta)$ will equal $\mathrm{E}V$, which is the price for which the equity of the firm would sell in a competitive market. Since firm owners, consumers, and ultimate debt-holders are all the same people, the discount factor, β, is the same as consumers' constant time discount factor. Therefore,

$$\beta = 1/(1+\rho),$$

in equilibrium. Furthermore, we assume individuals are risk-neutral for expositional simplicity only.

In the event of bankruptcy, creditors can, at most, obtain ownership of the firm, including current output. In other events, creditors simply receive the debt-service obligations specified by the contract. The present value of a loan is given by

$$\bar{V} = \beta\left[\int_{\bar{\theta}}^{1} (1+r)q \cdot b\, dF\right] + \beta\Gamma\int_{0}^{\bar{\theta}} \{(\theta l f(k_1, x_1) - wl - vk_1 \cdot l) + \beta \mathrm{E}V\} dF - qb, \quad (3)$$

where

$$\beta \equiv 1/(1+\rho).$$

The parameter $\bar{\theta}$ is given by

$$\pi(\bar{\theta}) + \beta \mathrm{E}V = 0,$$

so that $\int_{\bar{\theta}}^{1} dF$ is the probability of repayment by our assumptions on technology. The first term in (3) is the expected value of debt-repayments, and the second term is the value of the firm gross of the opportunity cost of the debt. The last term is simply the initial value of the loan. The lender can either sell the firm's equity for EV next period or operate the firm attaining a discounted expected stream of net income EV, beginning the next period. The parameter, Γ, represents the costs to creditors of resolving a bankruptcy. The lender loses some of the current value of the firm in the bankruptcy proceedings if Γ is less than unity. Such costs include provisions for some payment to equity holders, costs of litigation, or uncertainties concerning the creditors' priority, for example. This parameter is a simple expositional way to introduce international differences in domestic credit markets.

In the absence of possible bankruptcy, the first-order conditions for expected profit maximization, under our assumptions, are

$$\theta \cdot \frac{\delta f(k_1, x_1)}{\delta k_1} = v \qquad \text{for all } \theta,$$

$$\theta \cdot \left[f(k_1, x_1) - k_1\frac{\delta f}{\delta k_1} - x_1\frac{\delta f}{\delta x_1}\right] = w \qquad \text{for all } \theta,$$

$$\mathrm{E} \cdot \left[\theta \cdot \frac{\delta f(k_1, x_1)}{\delta x_1}\right] = (1+r)q,$$

where the expectation operator is $\int_0^1 (-)\, dF(\theta)$.

In the presence of possible bankruptcy, the probability of bankruptcy depends upon the interest rate and amount lent. Firms take future expected value as given and maximize

$$\int_{\bar{\theta}}^{1} \pi(\theta) dF,$$

where $\pi(\bar{\theta}) + \beta \mathrm{E} V = 0$.

This implies that

$$\frac{d\bar{\theta}}{dr} = \frac{qb}{f(k_1, x_1)}, \tag{4}$$

$$\frac{d\bar{\theta}}{db} = \frac{-(\bar{\theta}\delta f/\delta x - (1+r)q)}{f(k_1, x_1)}. \tag{5}$$

Since $\mathrm{E}V > 0$, both of these are positive, because constant returns to scale implies that

$$\bar{\theta}\frac{\delta f}{\delta x} - (1+r)q = \pi(\bar{\theta}),$$

which is negative. Furthermore, for constant firm value, the trade-off between r and b is given by

$$\left.\frac{dr}{db}\right|_V = \int_{\bar{\theta}}^{1} \left[\theta \frac{\delta f}{\delta x} - (1+r)q\right] dF / qb \int_{\bar{\theta}}^{1} dF.$$

Because of the presence of moral hazard, we need to specify an equilibrium concept carefully. This model has much in common with those in Kletzer (1984) and Gale and Hellwig (1985); therefore, following these, we consider Nash equilibria in loan contracts, which are equivalent to equilibria with non-linear repayment schedules. Contracts that provide zero net value to lenders satisfy

$$\bar{V} = 0,$$

or, from (3),

$$(r-\rho)qb + \Gamma \int_{0}^{\bar{\theta}} (\pi(\theta) + \beta \mathrm{E} V) dF - (1-\Gamma) \int_{0}^{\bar{\theta}} (1+r) qb\, dF = 0. \tag{6}$$

Recall that $(\pi(\theta) + \beta \mathrm{E}V) < 0$ for $0 \leqq \theta < \bar{\theta}$, so that eq. (6) implies that r is larger than ρ. Eqs. (4), (5), and (6) imply that zero value contracts for the lender display increasing rates of interest with rising principals. An equilibrium loan contract is a contract which provides maximum expected firm value from amongst those contracts

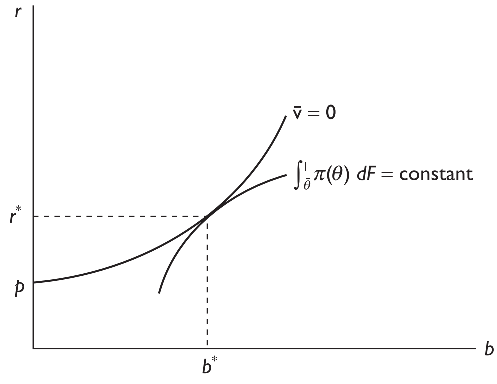

Fig. 1.3

providing zero value to lenders [where the equilibrium expected value of the firm enters into (6)]. A loan market equilibrium is depicted in fig. 1.3.

The amount of intermediate input used per unit of final good output for each realization of θ is lower in this equilibrium with bankruptcy than it would be in the absence of possible bankruptcy in a competitive equilibrium of our model.[6] A reduction in the parameter Γ, representing a different legal framework more adverse for creditors, reduces the value of a previously offered contract to the lender so that the supply curve shifts upwards. Because increasing the interest rate, holding the principal constant, raises the probability of bankruptcy, the slope of the new, lower Γ, supply curve at the same principal amount increases. [This can be readily shown using (6).] At this new possible loan contract, the marginal cost of credit has increased, but the marginal value of credit (since the principal is fixed) is lowered. Therefore, a decrease in Γ will lead to a new equilibrium contract with a lower principal. A reduction in principal, leaving the rate of interest unchanged, leads to an increase in the marginal value of increased credit to the firm. For this model, a reduction in Γ generally leads to a decreasing slope of the shifting supply curve as the interest rate is held constant. Therefore, a reduction in Γ from unity leads to a reduction in the amount lent in equilibrium and, typically, to an increase in the interest rate charged.[7]

The inclusion of this credit market model in our trade model is straightforward because of the assumptions which allow non-random mean relative prices and aggregate outputs and input demands. As in the previous section, we assume that consumers hold assets in either country and that all individuals have the same constant rate of discount, ρ. Either individuals directly lend or hold deposits in intermediaries which lend to firms and honor their obligations with probability one. A foreign loan and a domestic loan receive identical treatment in the home legal jurisdiction of the debtor firm. Sovereign immunity rules out credible contracts subjecting bankruptcies to foreign legal systems.

Equilibrium conditions for the trade model include

$$\mathrm{E}\left[\theta \frac{\delta f}{\delta k_1}\right] = q \cdot g'(k_2)$$

and

$$\mathrm{E}\left[\theta f(k_1, x_1) - k_1\theta\frac{\delta f}{\delta x_1} - x_1\theta\frac{\delta f}{\delta x_1}\right] = q\{g(k_2) - k_2 g'(k_2)\},$$

where $x_1 \cdot l$ is fixed for all θ. It is easy to show that a reduction in the level of good 2 used as an input in each sector 1 firm leads to an increase in the output of sector 2 and a reduction in factor employment in sector 1 by reducing the expected marginal products of factors in sector 1. Therefore, differences in the legal institutions surrounding contract enforcement between country A and country B represented by asymmetries in the value to lenders of the equity of bankruptcy-declaring debtor firms lead to a pattern of comparative advantage comparable to that found in the previous section. In the previous model, individual firms faced perfectly elastic supply curves of credit. Higher interest rates lead to a reduced aggregate output of sector 1. The model of bankruptcy in this section leads to a standard model of credit-rationing under moral hazard, in which each firm obtains less credit than it would demand at the equilibrium interest rate.[8] Larger amounts of credit would be forthcoming to the firm if its personalized rate of interest (not the market rate of interest; aggregate loan demand can remain constant) increases. A reduction in the quantity of working credit available to the firm in equilibrium leads to a reduction in the output of this industry at a fixed relative price of outputs.

4. Conclusion

We have shown that even with identical technology or endowments between countries comparative costs will differ in a world of credit market imperfection when credit for working capital or trade finance is needed to cover the pre-commitment of inputs before the accrual of output revenues. We have explored in some detail two distinct but complementary types of credit market imperfection under considerations of moral hazard. In section 2 we have a model of international lending under sovereign risk, where poorer reputation of a country results in its facing a higher equilibrium interest rate (updating beliefs about reputations being costly). In section 3 we have differences between countries in domestic credit market institutions (including bankruptcy laws) along with the lack of a global contract enforcement mechanism (so that ex ante changes in jurisdictions are not enforceable, i.e., a Brazilian firm cannot credibly commit itself to a New York bankruptcy court should the eventuality arise). In the model of section 2 the higher interest rate faced by firms in the poorer country drives the latter country away from specializing in sophisticated manufactured products requiring more working capital, selling costs and trade finance; in the model of section 3 the country does not face higher interest rates but tighter credit rationing with a similar production and trade result. Both models are examples of how comparative advantage explicitly depends, unlike in standard trade theory, on institutions (in this case, financial institutions).

Notes

* The authors are grateful to J. Eaton and J. A. Ocampo for useful comments. Kletzer also acknowledges support from a grant of the National Science Foundation.

1. Our attention was recently drawn to a paper by Baldwin (1985) which also traces comparative advantage differences to capital market "quality", but in a completely different way. Unlike our model Baldwin's model has no international asset transactions; capital market imperfections take the form of incomplete stock markets, so that it is risk-aversion and differential ability of investors to diversify that lead to differences in trade patterns. We, on the other hand, assume risk-neutrality. In our model it is (a) sovereign immunity and (b) differences in domestic credit contract enforcement institutions with international borrowing and lending that lead to the differential pattern of trade.
2. The points summarized here are made at length by a number of authors, notably, Eaton and Gersovitz (1981) and Eaton, Gersovitz and Stiglitz (1986).
3. This approach implies that intermediaries may require positive profits to make the threat to penalize default credible; see Eaton (1985).
4. This part of the model is identical to the approach taken by Aizenman (1986). The equilibrium is a sequential equilibrium, as defined by Kreps and Wilson (1982).
5. A possible alternative, not taken here, is to portray institutional differences as differences in the information available to lenders about debtors, as in Kletzer (1984). The comparison between Nash equilibria in loan contracts and price-taking equilibria in that paper and in Gale and Hellwig (1985) could give rise to patterns of comparative advantage between otherwise identical economies.
6. The comparative statics of this credit market model are similar to those in Gale and Hellwig (1985).
7. Additional conditions necessary to show that the equilibrium interest rate rises with a drop in Γ are messy and do not provide useful intuition.
8. See, for example, Jaffee and Russell (1976), Kletzer (1984) and Gale and Hellwig (1985). This contrasts with the adverse selection model of Stiglitz and Weiss (1981) in which firms either receive no loan or the project is fully funded.

References

Aizenman, J., 1986, Country risk, asymmetric information and domestic policies, Working paper no. 1880 (NBER, Cambridge, MA).

Baldwin, R., 1985, Exporting the capital markets: Comparative advantage and capital market imperfection, Mimeo. (Economics Department, MIT, Cambridge, MA).

Dutt, A., 1986, Vertical trading and uneven development, Journal of Development Economics 20, no. 2.

Eaton, J., 1985, Lending with costly enforcement of repayment and potential fraud, Working paper no. 1697 (NBER, Cambridge, MA).

Eaton, J. and M. Gersovitz, 1981, Debt with potential repudiation: Theoretical and empirical analysis, Review of Economic Studies 48.

Eaton, J., M. Gersovitz and J. Stiglitz, 1986, The pure theory of country risk, European Economic Review 30, no. 3.

Gale, D. and M. Hellwig, 1985, Incentive-compatible debt contracts: The one-period problem, Review of Economic Studies 52.

Jaffee, D. and T. Russell, 1976, Imperfect information, uncertainty and credit rationing, Quarterly Journal of Economics 90.

Kletzer, K.M., 1984, Asymmetries of information and LDC borrowing with sovereign risk, Economic Journal 94, June.

Kreps, D.M. and R. Wilson, 1982, Sequential equilibria, Econometrica 50, no. 4.

Krugman, P., 1981, Trade, accumulation and uneven development, Journal of Development Economics 8, no. 2.

Stiglitz, J. and A. Weiss, 1981, Credit-rationing in markets with imperfect information, American Economic Review 71, June.

Townsend, R., 1978, Optimal contracts and competitive markets with costly state verifications, Journal of Economic Theory 21.