

The Economics of Credit Information

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Abstract: The credit sale has been a widely used form of transaction. Credit sale can reduce transaction cost but induce credit risk because of default credit. To avoid credit risk a firm needs information about the payment behaviour and solvency situation of his debtor. A credit information agency is a professional supplier of credit information. In this paper an outline of economics of credit information such as market for credit information, production, its cost and welfare effects are discussed.

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Introduction

The credit information industry is not a new branch but has a long history¹. Until recently, somehow or other, the credit information (CI) industry has not been noticed by the economists. In economics literature there is hardly any publication available about this industry. We feel that because of some of its special properties it might be an interesting research area for economists (Chen, 1995 and 1996).

Main product provided by credit information suppliers is the *credit information* or a *credit report* about the solvency and the payment behaviour of business firms and consumers.

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The emergence of the CI industry has professionalised the production of credit information created a market for CI products and has made an important contribution to the development of modern service economy.

The significance of this branch is emphasised by the annual turnover of about US\$ 12 billion of the D & B Company and the total annual turn over on the European market of about DM 2.0 billion.

In response to order a CI about a firm or a person (usually about a new customer or an individual customer) the CI supplier collects and analyses data and provides the information about the payment behaviour and solvency of the firm or person.

These information are used for business decisions. The existence of the CI industry has given firms the possibility either to produce the information themselves or to buy from a professional supplier. Usually the buyers of CI are firms which sell their products or services on credit. Therefore they need information about their customers before making a credit sale decision. Thus a CI is usually concerned about the customer of credit sales.

For better acceptance the credit information product must be provided in the national language, and since the credit information agency belongs to the service sector, which has been protected against international competition, the market of credit information is usually identical to the territory of a country. Credit information product (CIP) is called a domestic credit information product if the object reported by the credit information belongs to the same country as the credit information supplier is registered. Otherwise a credit information product is called a foreign credit information.

Every CIP contains some information about the payment behaviour and solvency situation of a specific firm or a specific private person. The CIP is provided in form of a report which is also called a credit report (CR). A CIP is storable as long as the relevant payment behaviour and solvency situation of the firm or private person concerned is unchanged. During this period a number of CRs about the same CIP can be provided by the supplier without deteriorating the quality of the CIP.

In this paper every CR of a CIP is considered as a unit of the corresponding CIP sold. Every CIP is about a specific firm or person. Therefore the number of CIPs in a country is restricted by the number of firms and persons in the country.

The quality of a CR can be judged according to the following criteria:

- *the information content*; i.e. the items of information,
- *the time between order and delivery of the information*, since credit information is used for credit sale decision, an information must be delivered *on time*. Therefore the delivery time should be as short as possible;
- *the reliability of information*, implies that the information should be correct and represent the current situation,

- *the acceptance of information*, means that the information should be easily understandable.

To fulfil the above requirements credit information suppliers usually provide different information products according to the content and the delivery time to meet the need of their customers. For example the KSV 1870 in Austria provides ‘standard information’, ‘short report’, ‘quick-report’, ‘partial-report’, data bank report, etc.

To improve the acceptability of information modern credit information suppliers have developed a rating system like the system of marks in schools. In this way the payment behaviour and the solvency situation of a firm are represented by a rating index. Thus the credit information can easily be understood by every buyer.

The establishment of a credit information market with professional producers as suppliers has contributed to improve the quality of credit information and to reduce its price because of ‘special economies of scale’ which will be explained later in this paper.

There are two differences between the credit information and the information provided by the mass media:

- the content of information: the main content of credit information is the report about the payment behaviour and insolvency situation of a business firm or an individual while that of mass media is those of general interests to the public; and
- the buyers or users of credit information usually are only firms or individuals who are going to provide credit to other firms or persons, while the buyers or users of mass media are the general public.

Important ways for delivering credit information are: mail, telephone, telefax, and on-line information.

Among these four different ways to order and deliver credit information the on-line system belongs to the most popular ones which has been increasingly preferred both by buyers and providers since the establishment of this system. On-line buyers can order every time (day and night) and also get CR independent of the office time of the supplier. This system has been favoured by the supplier due to its minimal cost of providing CR.

Due to higher transaction costs ‘cash sale’ has been reduced in the modern economies. Instead of it credit sale has become the popular form of business. Therefore, the supplier of goods and services has taken over also the risk of financing the transaction, i.e., an uncertainty about the date of repayment of the business credit and a risk of default of the loan. According to the information supplied by *Verband Creditreform* (VC) the average repayment period of business credit in Germany has

been about 3 months and in Italy about 6 months. To reduce the risk involved in a sale on credit the supplier has to get information about the solvency situation of the buyer before making the sales decision. According to an estimation of the VC the total amount of business credit in Germany has reached at several trillion DM.

What is economics of credit information all about? We can say that the economics of credit information (ECI) is a special branch of economics that studies the

- demand for credit information;
- technology and cost of credit information;
- supply of credit information;
- special properties of credit information market;
- determination of price for credit information products;
- international trade of credit information products;
- the relationship between the credit information industry and other sectors of the economy;
- the welfare effects of credit information;
- the credit information and risk of credit sales, and
- the effects of credit information on economic development.

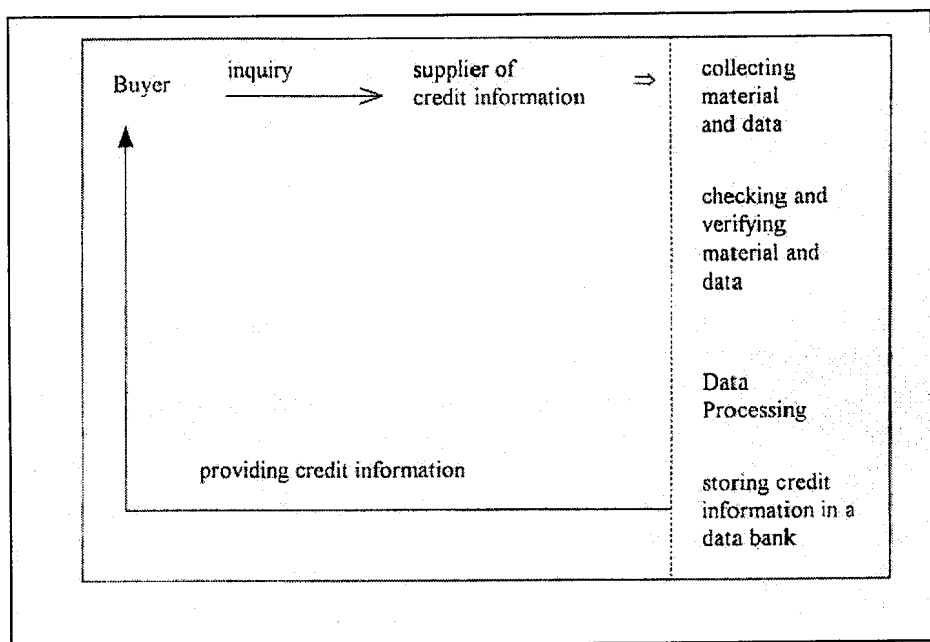
Accordingly, the contents of economics of CI can be classified as that of applied microeconomics. Analysis of special properties of credit information industry are best studied by applying methods of microeconomic analysis.

Production of CIP

Production Process

The production process of a CIP can be described by using the Figure 1. Usually the production of a credit information is initiated by an order of a buyer who has to make a decision to grant credit. After receiving the order the supplier begins the production process by collecting material and data about the firm or person on whom information is required. Since there are usually material and data from different sources there may be inconsistencies. Therefore it is necessary to check and verify the material and data collected before using them for data processing. After checking and verifying material and data are used for data processing to produce a credit information. The output of the data processing is the credit information product which is stored in a data bank. The CR is then sent (delivered) to the buyer. Another CR of the credit information product stored in the data bank can be delivered to further buyers. The same CR can be provided to a lot of buyers as long as the solvency situation of the firm or person is unchanged.

Figure 1: Graphic description of production process of a credit information product:



The main sources of the material and data for CIP are as follows:

- registration data: business registration and registration of real estate;
- publication, notification, announcement, proclamation of courts;
- news papers, journals, magazine, broadcasting, TV news;
- bank information;
- information of business partners, and
- own information given by the object on report.

Technology

Inputs needed to produce credit information are: man power, computers, telephones, telefax, and offices etc. They can be classified in the following three groups of factors, namely:

labour: manpower;

capital: computer, tele communication, tools, offices etc., and

intermediates: paper and office supplies.

The technology of credit information industry can be described in three stages of production process:

- *First*, data collection: The technology of data collection can be described by a constant returns to scale technology. In this step labour, capital (transport, telecommunication equipment and computer etc.) are used by the producer of credit information to collect materials and data. The output of this stage is used as intermediate in the stage of data processing. The checking and verification of materials and data belongs to this stage of credit information production. Only after checking and verification the quality of material and data collected can be guaranteed. This is essential for the quality of credit information. Neo-classical production function seems to be able to describe the relationship between output (data) and inputs at this stage of production.
- *Second*, the production of modern credit information industry does not only consist in putting or collecting data together in a standard form for credit report but also includes data processing i.e. estimation and forecasts evaluated based on the data collected at the first stage. Every supplier of credit information has developed his own system for rating the solvency of a firm, making forecasts and giving recommendations about the payment behaviour and insolvency situation of the firm reported. Some suppliers use already quite sophisticated rating and prediction systems. Some suppliers still use rating and forecasts based on rules of thumb according to the individual judgement of their staff members.

To increase the acceptance and understanding of credit information the results of rating and prediction about the payment behaviour and insolvency situation of the firm on report are represented by a 'rating system' like the marks used in the school. For example, the credit information product of the VC is called 'Solvency Index' and is given at the beginning of the first page of their credit report. Usually, the prediction has been calculated by a computer in the headquarters of the credit information supplier who has several local offices. For example, not only the rating of the German firms but also of the Austrian companies is carried out in the computer Centre of the VC in Neuss in Germany. The use of computers to produce credit information has changed the technology of the credit information industry. Because of the enormous storage capacity, high speed of calculation and transportation of data the use of computer has caused a weak form of increasing returns to scale technology. Up to the capacity of the computer the cost will underproportionally increase for additional output of credit information.

- *Third*, the delivery of credit information to the buyer. The on-line system of order and delivery of credit information is the most important communication

system used since the 1980s. In comparison to the traditional communication systems the on-line system caused a revolution not only in the sense of technology but also of communication costs. In using the on-line system the cost of communication is automatically carried by the buyers who order and get information on-line. In another communication form the cost of delivering information has to be charged by the supplier.

From the above discussion, it follows that there are two different ways of producing credit information:

- (1) separation of data collection, processing and delivery, and
- (2) pooling of data collection, processing and delivery.

In first method the three stages of production are separately carried out by different units. Every unit is responsible and specialises in the activity of one or two stages. The VC has practiced this form of producing credit information. Every local office has to collect the data. The credit information is produced at the computer centre in the headquarters at Neuss.

In the second method no specialisation in data collection and processing is made. The resource of credit information producer is pooled. In this case every local office has to collect data, carry out data processing and produce credit information in its own office.

Before computers were introduced to produce credit information the separation of data collection and processing has been done by big suppliers and the pooling system by the smaller ones.

The technology of the first form of organisation can be described by the following production functions:

$$Q_1 = F_1(L_1, K_1)$$

$$Q_2 = \min\{Q_1, F_2(L_2, K_2)\}$$

Where, Q_i = output of the i -th stage; L_i = labour input in the i -th stage; K_i = capital of the i -th stage; $i = 1$: data and material collection; $i = 2$: data processing

The technology of data collection can be described by a neo-classical production function. It is linear homogenous.

The technology of data processing can be described by a limitational production function (Leontief production function). Both the data collection and data processing are necessary for producing credit information and the substitution between them is very limited.

The technology of data processing to provide credit information can be described by a neo-classical production function. The technology might have a weak form of

economy of scale, i.e. the technology has a property of non decreasing returns to scale.

According to the technology presented above an efficient combination of data collection and data processing is given by

$$Q_2 = Q_1 = F_2(L_2, K_2)$$

This means that the same number of datas are needed to produce as the units of credit information output.

The technology of the second form (pooling system) can be described by a simple neo-classical production function.

Cost and Cost Function

There are different items of cost which can be classified as follows:

- fee for procuring data from an administration or court, like the copy of business registration, registration of real estate, etc.,
- wages and salary for labour and employee (staff members)
- cost of using office equipment, computer, etc.

The total cost of data collection is the sum of cost spent for data collection and data processing:

$$C = C_1 + C_2$$

$$C_1 = aQ_1 + wL_1 + rK_1$$

$$C_2 = wL_2 + rK_2$$

where, C = total cost of credit information production; C_1 = cost of data collection; C_2 = cost of data processing; a = fee for official data; w = wage rate; r = price of using capital.

The cost function can be derived by

$$\text{Min } C = (aQ_1 + wL_1 + rK_1) + wL_2 + rK_2$$

$$s.t. \quad Q_2 = Q_1 \leq F_2(L_2, K_2)$$

$$Q_1 \leq F_1(L_1, K_1)$$

The first part of the first constraint gives the condition for an efficient input combination of data collection and data processing since for every unit of credit

information, the corresponding data should be collected. The second part of the first constraint represents the technology of the data processing.

The second constraint represents the relationship between the output and inputs of data collection.

Keeping consideration of efficient relationships between output and inputs of data collection and data processing in mind, the above problem of minimising cost can be simplified as:

$$\text{Min } C = aF_1(L_1, K_1) + W \sum_{i=1}^2 L_i + z \sum_{i=1}^2 K_i$$

$$\text{s.t. } Q_1 = Q_2 = F_2(L_2, K_2)$$

The solution of this optimisation problem can be written as the following cost function:

$$C = \zeta(a, w, r)Q_2$$

The cost function of credit information is linear due to the linear homogenous technology of data collection and data processing.

Production Decision: Supply of Credit Information

Production decision of supplier of credit information can be studied under the assumption of profit maximisation. As mentioned earlier, several suppliers of credit information have organised themselves in form of an association. Nevertheless, according to several discussions with managers of the credit information industry profit maximisation has been their main goal (of their decision). This is true also for those suppliers who are organised as an association.

To study the supply decision of credit information a main special property of the credit information has to be mentioned: a credit information product can be used by many buyers at the same time or within a period in which there is no significant change in the insolvency position of the object under consideration without reduction of the usefulness and quality of a credit information in any way. Thus a credit information product can be provided to many buyers. The total supply of credit information from a supplier can be presented as follows:

$$x_1 + x_2 + \dots + x_n$$

where x_i the number of supply of the i -th credit information product

n = the number of credit information product

To simplify the presentation we order the credit information products according to the number of units sold, i.e.

$$x_1 \geq x_2 \geq \dots \geq x_n$$

Now the profit of a credit information supplier can be defined as:

$$G = \sum_{i=1}^n P_i x_i - bn - A$$

where G = profit; P_i = price of the i -th product; x_i = number of the i -th product sold; b = marginal cost; n = number of credit information products; A = fixed cost.

Thus, above discussion the credit information product has a special property which can be called „special economy of scale‘, i.e. a credit information product can be used by different buyers without causing any additional cost for the producers, especially if information is delivered in an online system.

Demand for Credit Information

Buyers of Credit Information

The buyers of credit information are those who intend to give a loan or provide credit to a firm or a person. There are several groups of credit providers such as, banks, firms who deliver commodities or services on credit, credit insurance, factoring firms, leasing, credit card companies or part payment business.

What determines the demand for credit information? This is one important question to be studied in economics of credit information.

The buyers of credit information mentioned above usually are companies, not consumers. Thus the demand for credit information has to be derived from decisions of firms. The relevant theory for this case is the microeconomic production theory. In this context demand for credit information can be considered like demand for an intermediate. Because of the risk caused by default a credit provider can reduce loss (i.e. increase profit) if credit information is used to avoid a wrong decision. A decision of the lender is wrong if a credit is given to a bad debtor or a credit is refused to a good debtor. A bad debtor is somebody who delays or does not repay a part or the whole amount of a credit.

The reason why credit information is needed for a decision of providing credit is the uncertainty about the default of the credit. If the credit provider is sure that the credit will be default or not he does not need a credit information. Therefore the demand for credit information should be derived from a decision under uncertainty.

Here, we want to show how to derive a demand function of a credit supplier for credit information. For simplification only the case of risk neutral behaviour will be discussed.

Demand Function of a Credit Supplier

We assume the goal of a credit supplier is to maximise expected utility which is a positive function of the net interest revenue. The net interest revenue is defined as the difference of gross interest revenue and the cost of credit information. This definition is a simplification for our analysis, since we ignore other costs of credit business.

In this case the objective of the credit provider can be described by the following equation:

$$\text{Max } E[rS - g(I)(1+r)S - WI]$$

where, *Max* = maximise; *E* = expectation operator; *r* = interest rate; *S* = amount of credit; *I* = demand of credit information; *g(I)* = function of loan - default rate; *W* = price of credit information

$$\text{with } 1 \geq g(I) \geq 0$$

The loan - default rate of credit is assumed to be a decreasing function of credit information used for decision. Since more credit information used for decision can avoid wrong decisions we assume the following properties of *g(I)*

$$g'(I) = \frac{dg(I)}{dI} < 0$$

$$g''(I) = \frac{d^2g(I)}{dI^2} > 0$$

The second derivative of *g(I)* is assumed to be positive due to the decreasing marginal effect of credit information on the loan - default rate. In reality it might not always be possible to avoid losses by providing credits because of some random factors.

The first term of the net interest revenue is the gross interest revenue which is just the product of interest rate and the amount of credit. The second term is the loss of giving credit if a part of the credit will not be repaid by debtors. The loss does not only include interest revenue but also the principal. The last term is the cost of credit information for the decision.

This is a simple maximisation problem with one control variable I . The first order condition is given by:

$$-g'(I)(1+r)S = W$$

The second order condition

$$-g''(I)(1+r)S < 0$$

is fulfilled due to $g''(I) > 0$

The demand function for credit information can be derived from the first order condition as:

$$I = I \left[\frac{(1+r)S}{W} \right]$$

where $I(\dots)$ is a monotonically increasing function of r and S and a monotonically decreasing function of W .

From the above demand function for credit information we can easily find the following relationships:

- 1) The demand for credit information will be higher the higher the amount of credit;
- 2) The demand for credit information will be higher the higher the interest rate, and
- 3) The demand for credit information will be higher the lower the price of credit information.

The Properties of the Credit Information Market (CIM)

Properties of CIP

Summarising the discussion about the technology of credit information two properties of credit information product can be summarised as following:

- 1) constant returns to scale technology and
- 2) special economies of scale

Due to these properties the market of credit information products cannot be competitive.

CIM

Usually the area of a credit information market is identical to the territory of a country because of the following three reasons:

1) a credit information has to be represented in a language. Therefore the credit information supplier has to provide the information in a language according to the requirement of the buyer,

2) the business of credit information is regulated by the national data protection law which is different from country to country,

3) the credit information industry belongs to the service sector which is usually protected against international competition. This might change if the rules of WTO have been implemented.

The Properties of CIM

The market of credit information in Europe is oligopolistic, (see Table 1). For example, there are three main suppliers in Germany, i.e. the VC, D & B Company and Buergel Company who together have a market share of more than 99 per cent. In Austria there are also three main suppliers: KSV 1870, Creditreform and D & B Co who together have a market share of about 95 per cent. In Switzerland the three main suppliers of credit information are Creditreform, Noviform and D & B Co., together having a market share of 95 per cent. In the Netherlands the three main suppliers together have a market share of 96 per cent.

Due to the special economies of scale every supplier of credit information in any European country seems to be able to provide credit information to every buyer. Therefore, if the product of credit information provided is homogenous then the Bertrand paradox has to occur in the long-run after implementation of online systems and its general acceptance.

Price of CIP

Two kinds of prices are used by the credit information supplier: membership fees and a price for credit information.

In combining these two prices a credit information supplier usually differentiates two groups of CI buyers, i.e. member - and non-member-buyers. This is generally done not only by a supplier who is organised in form of an association or a club, but also by those who are organised as a company.

A buyer of CI who is member of the association organised by the CI supplier has to pay an annual membership fee which is independent of the units of CI bought and additionally pay a price for every CI which he gets for the CI supplier.

Some CI suppliers provide CI only to their members. Other CI suppliers do not only provide CI to members but also to other buyers with different prices for the CI. Usually the price of CI for the member is lower than to another buyer.

CI suppliers usually give decreasing marginal prices for increasing demand. In this way the average price is lower if more units of CI are bought.

Thus there is a similar problem as the so called Disneyland Dilemma (Oi, 1971).

International Trade of CI

Trade Liberalisation, Regionalisation and Globalisation of Economic Activities

Trade Liberalisation, regionalisation and globalisation of economic activities have increased demand for foreign credit information. The regionalisation in Europe like the European Union has changed the foreign trade between its member countries to 'domestic trade', also in the sense that 'letter of credit' are no longer used for arranging trade between the member countries. The buyer usually asks his domestic supplier to provide foreign credit information which is a credit information referred to a foreign firm or person.

The credit information supplier has two different ways to provide foreign credit information: He can produce foreign credit information by himself and provide it both to domestic and foreign buyers. He can also get foreign credit information by exchanging domestic credit information with a foreign supplier in the country. The necessary condition for a co-operation with a foreign supplier is that there is at least one supplier in the country under consideration. In 1990 after the fall of the *iron curtain* this was not the case in the Eastern European countries. Therefore, the KSV 1870 as well as the VC had to produce credit information in these countries by establishing new companies there.

Since the implementation of online systems international networks of credit information suppliers have been constructed for exchange of credit information. There are three online networks in Europe, i.e. Eurogate, BIGNet and the D & B Net.

What is the advantage or shortcoming for a credit information supplier to produce or to exchange foreign credit information? Should a credit information supplier cooperate with a foreign provider to exchange credit information or produce foreign credit information by himself?

Exchange or Produce Foreign CI

Should a supplier of credit information exchange domestic with foreign credit information, i.e. cooperate with a foreign supplier, or produce both domestic and foreign credit information by himself?

To answer this question we study the profit maximisation behaviour of the supplier who combines both exchange and production of domestic as well as foreign credit information:

$$\begin{aligned} \text{Max} \left\{ \lambda \left[b_d n_d + P \int_{I_d=1}^n h(I_d) dI_d + P_f \int_{I_f=1}^{m_d} h_d(I_f) dI_f - (bn + b_f m_d) \right] + \right. \\ \left. (1-\lambda) \left[P \left(\int_{I_d}^{n_d} h_d(I_d) dI_d + \int_{I_d=1}^n h(I_d) dI_d \right) + P_f \int_{I_f=1}^{m_d} h_d(I_f) dI_f + \right. \right. \\ \left. \left. P_f \int_{I_f}^m h_f(I_f) dI_f - bn + b_g m \right] \right\} \\ \text{with } 1 \geq \lambda \geq 0 \end{aligned}$$

where, n_d = number of domestic credit information products sold on foreign market; n = number of domestic credit information products sold on domestic market; m_d = number of foreign credit information products sold on domestic market; m = number of foreign credit information products produced by a domestic supplier sold on foreign market; b_d = price of domestic information for exchange with a foreign supplier; b = unit cost of domestic credit information; b_f = price of foreign credit information required by the foreign supplier for exchange credit information; b_g = unit cost of foreign credit information; P = price of domestic credit information; P_f = price of foreign credit information; $H_d(I_d)$ = function for demand structure for domestic credit information on foreign market; λ = share of information exchange with a foreign CI supplier; $h(I_d)$ = function of demand structure for domestic credit information on domestic market; $h(I_f)$ = function of demand structure for foreign credit information on domestic market; $h_f(I_f)$ = function of demand structure for foreign credit information on foreign market.

The objective function in the above optimization problem is the total profit on the domestic and foreign market for a supplier by exchanging a share of domestic credit information with a foreign supplier to get foreign information, producing the rest of foreign credit information by himself and providing these informations also in the foreign market.

In the goal equation defined above we assume that the same price of domestic information is required on both domestic and foreign market.

If domestic suppliers exchange domestic credit information for foreign credit information the domestic supplier will get foreign information and pay for every unit a price but he can provide the same unit of foreign credit information several times without additional cost. Also the foreign supplier will pay a price to get a unit of domestic credit information and can provide it several times according to the demand structure of the market.

In general the number of domestic credit information bought on the domestic market is higher than on the foreign market, i.e. $n > n_d$, analogically $m > m_d$

Because of the special economies of scale of the credit information industry and because of $n > n_d$ and $m > m_d$ entering into the foreign market either by co-operation or by own production the revenue from selling domestic information on the foreign market will increase without an additional cost of production. Thus in the short-run an entrance into foreign market only to provide domestic information there would increase profit for a supplier.

If a domestic supplier enters into the foreign market not only to supply domestic information but also to produce foreign information for both domestic and foreign market the foreign supplier might also try to follow and enter the domestic market. Thus the competition on the domestic and foreign market will be enforced. But if credit information supplier would cooperate and exchange information then both suppliers will be able to increase revenue by providing information they produce for their own domestic market. By providing foreign information which is produced by the foreign co-operating partner a supplier can also increase profit if the marginal revenue would not be lower than the marginal cost.

In the profit maximisation problem of the credit information supplier given above there are several control variables, i.e. price of domestic credit information, price of foreign credit information, the share of self production of foreign information (λ). The number of domestic and foreign information supplied by a credit information firm on domestic and foreign market might negatively depend on the prices required by the supplier of the credit information. Considering these relationships will make the profit maximisation problem much more complicated.

Welfare Effects of Credit Information Industry

Welfare Effects of Credit for Consumer

To show the welfare effect of credit information for consumers we will construct a very simple intertemporal consumption decision model. In a two-period-model the

budget is assumed to be given and has to be used up in these two periods. If there is no possibility for the consumer to get credit then the end situation in every period is only optimal in a very special case. The budget set of the consumers can be shown as:

$$C_1 \leq Y_1$$

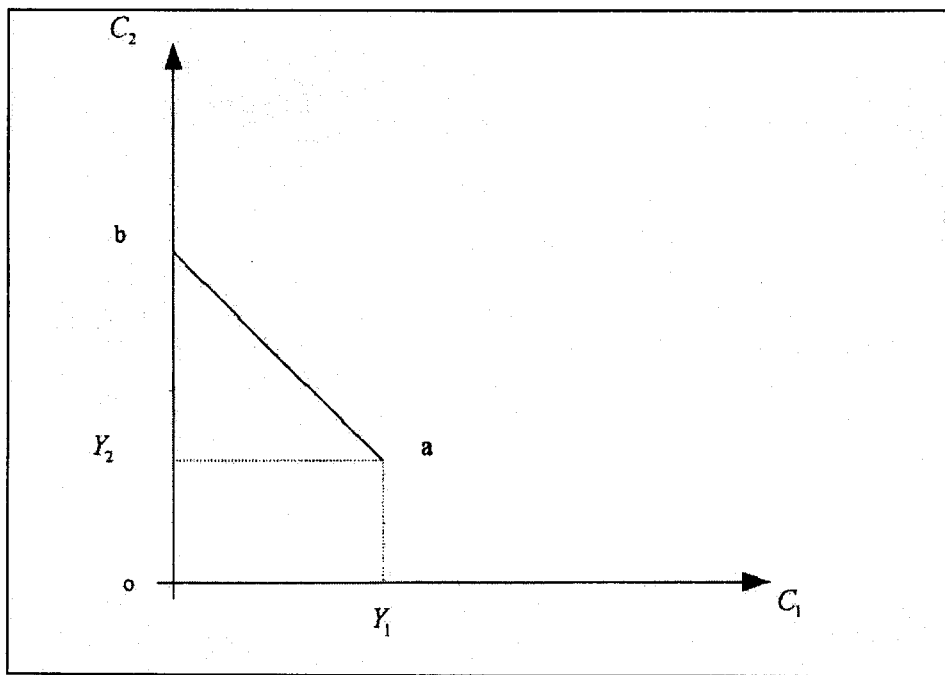
$$C_2 \leq (Y_1 - C_1) + Y_2$$

where C_i = consumption in the i -th period

Y_i = endowment in the i -th period

or as in Figure 2:

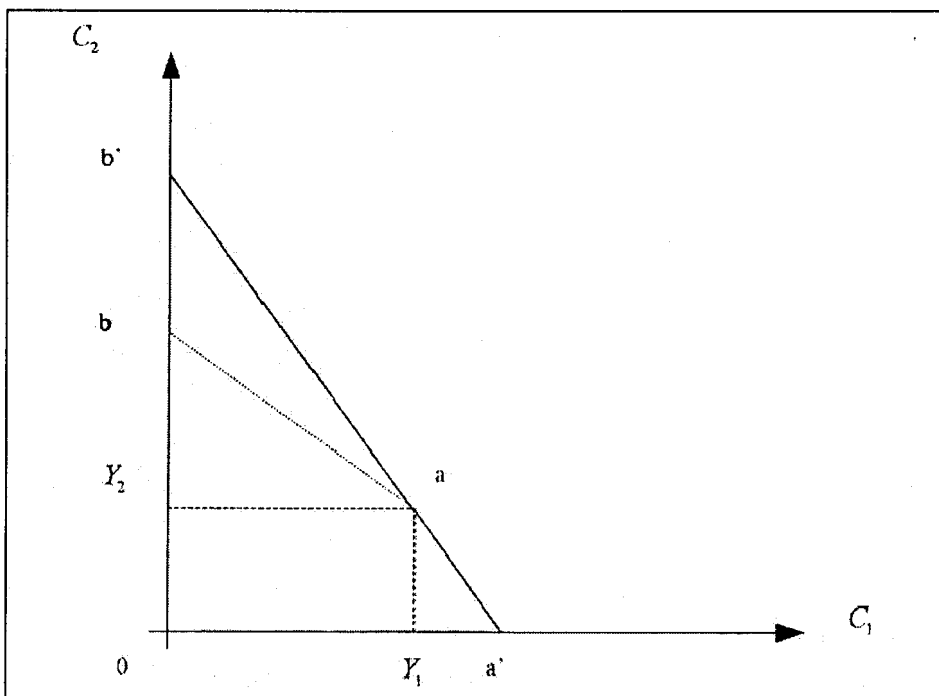
Figure 2.: The budget set of consumers



If consumer has the possibility to get or to give credit the budget set can be revised as:

$$(1+r)C_1 + C_2 \leq (1+r)Y_1 + Y_2$$

Figure 3.: The budget set and the credit possibility



In Figure 3 the budget set of the case with credit possibility is shown by the triangle $0a'b'$ while the budget set without credit possibility is represented by the triangle Y_2ab . Thus the budget set of the last case is a proper subset of the first case. In this case the utility level and thus welfare is never lower than that of the case without credit possibility. If a consumer borrows money to pay his consumption in the first period, his budget set can be represented by the area $0a'aY_2$. If his consumption in the first period is less than his endowment and lends his saving in the first period to other people then his budget set can be shown by the area $0Y_1ab'$. The area of the triangle abb' represents the interest for his saving. Thus the possibility to borrow or to lend money increases the welfare for consumer.

Welfare Effect of CI

Figure 3 represents a case that both the lender and the borrower are confronted with the same interest rate. If there is a credit tax then the interest rate for lender and

borrower will be different, i.e. the interest rate paid by the borrower will be higher than it received by the lender.

If there is a risk of default credit the expected net interest which the lender receives will be usually lower than that of the credit agreement. There are two effects of the credit risk for lender.

First, because of risk aversion lender will reduce credit supply and

Second, because of the lower real interest rate paid by borrower the supply of credit will be lower also.

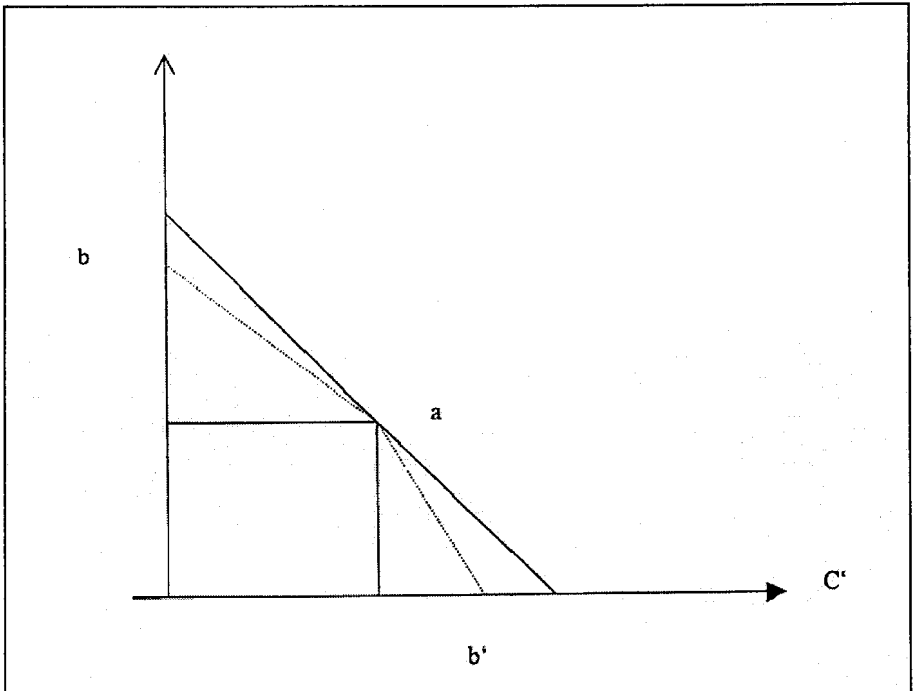
Due to the reduction of credit supply the interest rate will be higher. But the expected interest rate got by lender will be lower because of the default credit.

Now three cases of welfare effects can be classified as follows:

1) a borrower who does not repay his debt will improve his welfare as a free rider. But he cannot be able to get credit later.

2) a solvent borrower must pay a higher interest rate and, thus deteriorates his welfare situation comparing to the case of no credit risk.

Figure 4.: Budget set with credit possibility but without credit risk



3) a lender will get a lower expected net interest rate than the case of no credit risk. The expected net interest rate is usually lower because of the loss caused by default credit.

In Figure 4, the continuous budget line represents the line shown in Figure 3 (budget set with credit possibility but without credit risk). There are two broken lines ab and ab' . The line ab represents the budget line of lender (the 3rd case). The Line ab' shows the budget line of borrower (the 2nd case). This credit risk has a negative effect on the welfare of both the borrower and the lender. If credit risk reduces then the two budget lines will lie nearer to the continuous budget line. This shows that credit information which reduces credit risk has a positive welfare effect both for the borrower as well as the lender.

NOTES

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¹ The *Mercantile Agency*, founded by Lewis Tappan in New York 1841, was the first credit information supplier of the world. Thus the credit information industry has already a history of more than 158 years. The *Dun and Bradstreet Company*, the successor of the *Mercantile Agency*, is now one of the world wide leading credit information suppliers. In Austria the most important credit information supplier is the '*Kreditschutzverband 1870*' which was founded in Vienna 1870 as indicated by the name. Therefore the credit information industry in Austria is already more than 128 years old. The *Verband Creditreform* was founded as an association (*Verein Creditreform*) in Mainz 1879 is now the most important credit information supplier in Germany having a market share of nearly 70 per cent and is one of the leading credit report institutions in Europe. The *Joint Credit Information Centre* is one of the first credit information suppliers in Taiwan and was founded in Taipei 1983.

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Appendix

Structure of the European credit information market

Country	Supplier	Revenue	employees	Market-share	Group	Online-Netw.
Germany	Creditreform	465	3.000	69%	Creditreform	BigNet
	Buergel	110	800	16%		Eurogate
	D&B	95	650	14%	D&B	D&B
		670	4.450			
Austria	KSV	20	150	48%		Eurogate
	D&B	12	100	29%	D&B	D&B
	Creditreform	8	70	19%	Creditreform	BigNet
	sonstige	2	20	5%		
		42	340			
Switzerland	Creditreform	20	130	36%	Creditreform	BigNet
	Novinform	18	100	33%	D&B	-
	D&B	14	80	25%	D&B	D&B
	sonstige	3	20	5%		
		55	330			
England	D&B	100	630	36%	D&B	D&B
	Infocheck	30	300	11%	Equifax	-
	CCN	30	250	11%	CCN	BigNet
	Gravdon	10	85	4%	Gravdon	Eurogate
	sonstige	110	785	39%	-	-
		280	2050			
Netherlands	Gravdon	40	250	50%	Gravdon	Eurogate
	D&B	30	200	38%	D&B	D&B
	IS-N	7	60	9%	-	BigNet
	sonstige	3	20	4%		
		80	530			
Belgium	D&B	18	150	41%	D&B	D&B
	Gravdon	14	100	32%	Gravdon	Eurogate
	Infotrade	5	40	11%	-	-
	OR B	4	35	9%	OR	BigNet
	sonstige	3	25	7%	-	-
		44	350			
France	OR T	86	350	20%	OR	BigNet
	SCRL	100	480	23%	-	Eurogate
	D&B	51	273	12%	D&B	D&B
	S&W	46	375	11%	D&B	-
	sonstige	152	300	35%	-	-
		435	1.778			
Spain	Incesa	25	300	29%	-	BigNet
	D&B	20	200	23%	D&B	D&B
	Iberinform	10	150	12%	-	Eurogate
	Intorma	11	110	13%	OR	-
	sonstige	20	300	23%	-	-
		86	1.060			

Continued on the next page

Portugal	D&B	18	300	56%	D&B	D&B
	Mope	12	200	38%	-	Eurogate
	Infocomer	2	50	6%	CR/OR	BigNet
		32	550			
Itali	D&B	40	450	37%	D&B	D&B
	Orefiro	15	200	14%	D&B	-
	Lince	15	180	14%	-	-
	Dimensionoc	12	160	11%	-	BigNet
	Eurocredit	8	100	7%	-	Eurogate
	sonstige	18	210	17%	-	-
		108	1.300			
Irland	D&B	5	50	50%	D&B	D&B
	ITPA	2	20	20%	-	BigNet
	sonstige	3	30	30%	-	-
		10	100			
Denmark	Koeb	14	80	56%	-	BigNet
	D&B	11	60	44%	D&B	D&B
		25	140			
Sweden	D&B Soliditet	36	140	51%	D&B	D&B
	UC	34	160	49%	-	BigNet
		70	300			
Norway	D&B Soliditet	22	95	69%	D&B	D&B
	Creditinform	10	55	31%	-	BigNet
		32	150			
Finland	Asiakastieto	25	120	50%	-	-
	Finska	17	100	34%	Asiakastieto	BigNet
	D&B Soliditet	8	60	16%	D&B	D&B
		50	280			
		2.019	13.708			