

THE REGULATORY ENVIRONMENT FOR BUSINESS INFORMATION SHARING*

Nicola Jentzsch[†]

Working Paper

This Draft: 10.7.2003

JEL Classification C43, K2, L51

Keywords: Index Theory and Aggregation, Regulation and Business Law, Economics of Regulation

Abstract

Information sharing is a crucial precondition for the development of a thriving credit market and for the access to finance by firms. The focus of this paper is the regulation of the exchange of information on firms as intermediated by credit registries. The paper presents different kinds of indices to test their explanatory power for information distribution for a panel of 90 countries. In a second step, the relationship of information distribution and bank lending is analyzed. It can be stated that an open business reporting environment facilitates information distribution, which positively influences access to credit. The paper concludes with a discussion of policy implications.

* **ACKNOWLEDGEMENTS:** This research has been conducted with the financial support of the World Bank (Private Sector Advisory, Doing Business Project). The author especially thanks Carelee McLiesh, Joanna Kata-Blackman, Nataliya Mylenko and Arnd Plagge for helpful comments. Moreover, the author is grateful to Nadine Brandt and Arnd Plagge for their excellent research assistance.

[†] The author is lecturer and research fellow at the Freie Universität Berlin, John F. Kennedy-Institut - Lansstr. 7- 9 - 14195 Berlin – Germany, Tel. ++49-30-838 52877, Fax ++49-30-838 52885, e-mail: jentzsch@zedat.fu-berlin.de

CONTENTS

I. INTRODUCTION	3
II. REVIEW OF THE LITERATURE	4
III. THE REGULATION OF BUSINESS REPORTING	7
3.1 THE ACTIVITY OF BUSINESS REPORTING	7
3.2 PUBLICLY AND PRIVATELY ACCESSIBLE INFORMATION	10
3.3 DISCLOSURE REGULATIONS	11
3.3 BANK SECRECY ACTS	13
3.4 DATA PROTECTION LAWS	14
IV. METHODOLOGY	18
4.1 VARIABLES OF THE INDEX	18
4.2 ELEMENTARY INDICES	19
4.3 SUPERLATIVE INDICES	22
4.4 ROBUSTNESS OF THE RESULTS	26
V. DATA ANALYSIS	28
5.1 THE MODELS	28
5.1.1 <i>Regulatory Indices and Information Sharing</i>	29
5.1.2 <i>Information Sharing and Credit Markets</i>	31
VI. CONCLUSION	32
REFERENCES	34

I. INTRODUCTION

Access to finance is a crucial precondition for the healthy development of credit markets and for increased investment that translates into economic growth. A vibrant private sector development depends on efficient information flows in credit markets that increase and facilitate access of firms to finance. In the industrialized countries, the past decade has brought the large-scale adoption of information technologies and with it came the collection and distribution of vast amounts of financial information on firms as well as individuals. In most developing countries, however, credit markets are thin, information sharing is underdeveloped and existing (or even non-existing) regulations may hamper the development of these vital flows. In markets, where information distribution is underdeveloped, capital could be more costly.

Credit markets are characterized by asymmetric information between borrowers and creditors that lead to credit rationing, inefficient credit allocation and credit decisions based upon an incomplete picture of the credit risk associated with the borrower. Therefore, the present paper focuses on the trends in the regulatory environment for business information sharing, on the information flows in different countries and on what governments may do to establish an efficient flow of information in their credit markets. The access to finance is always the result of information exchange in the credit market. However, this kind of transaction has not received much attention in the past. As we will discuss in more detail below, much of the academic literature has been devoted to models that formalize asymmetrical information and moral hazard as well as credit rationing problems. Only lately, empirical works started to assign some importance to the analysis of the information exchange as well as institutional preconditions for it. This paper presents a new data set on the regulation of the exchange of information in markets, where firms seek to find funds.

First, we describe the activity of business reporting and the regulatory environment which is basically a patchwork of laws derived from diverse fields such as bank secrecy, data protection, company information disclosure laws, tax laws or regulations of the registration of businesses. In the next step, indices are developed based upon index theory. This is due to the fact that we are interested in the robustness of results that derive from a variation in index construction. In the empirical part of the paper, different models are tested. The first hypothesis is the impact of the regulatory index on information distribution, second, we test the impact of information distribution on credit market variables. Due to our approach in measuring regulatory regimes, we are able to derive policy proposals.

The paper is organized as follows: Part II presents a review of literature, part III summarizes the most important features of business information sharing. The IV. part discusses the methodological approach and V. presents the econometric analysis. A discussion of policy proposals, especially regarding to developing countries concludes the paper.

II. REVIEW OF THE LITERATURE

There is a large body of analytical work that has been devoted to the analysis of asymmetric information and credit rationing in credit markets. The first generation of asymmetric information and adverse selection models were introduced by Akerlof (1970) for a used car market, by Rothschild and Stiglitz (1976) for insurance markets and Stiglitz and Weiss (1981, 1983, 1992) for credit markets. These models are mainly static and do not include a treatment of information sharing among market participants. The second generation has focused on collateral that may sort privately informed borrowers in a separating equilibrium (Bester 1985), for a discussion of this strand see also Besanko and Thakor (1987). In the third generation of models, moreover, authors discuss proprietary information and its implications for banking competition (Dell'Araccia 2001, Marquez 2002), while others concentrate on screening by banks that raises the probability that the borrower does not default strategically (Khalil and Parigi 2001). The latter disciplinary effect is also discussed by Padilla and Pagano (1997, 2000), who find an incentive to refrain from defaulting, because of its adverse effect on the reputation of the borrower. Information sharing among creditors via credit registries has been introduced only lately into models by Pagano and Jappelli (1993) and van Cayseele, Bouckaert and Degryse (1994). Credit registries help to reduce asymmetric information and establish a reputational system that generates disciplinary effects for the borrower. Theory predicts that moral hazard, strategic defaults and credit rationing are reduced.

Due to the lack of adequate data sets, it took until the end of the decade to empirically prove the theoretical implications. In the past, several studies have discussed the role and economic effects of the activities of credit registries (Galindo and Miller 2001; Jappelli and Pagano 2000a, 2000b; Jentzsch 2003a; Love and Mylenko 2003; Miller 2003). In sum, the existing works find positive effects of credit reporting: access to credit is expanded, since information sharing has the positive effects derived from the models. In addition, information sharing is positively correlated with borrower mobility as well as heterogeneity and size of the credit market (Pagano and Jappelli 1993: 1693, 1714). Moreover, firms in economies with information sharing and private credit bureaus are less likely to report financing constraints (Love and Mylenko 2003).

The effects on credit market depth as well as credit risk, however, are ambiguous (Jappelli and Pagano 2000a and Jentzsch 2003a, Pagano and Jappelli 1993). The volume of lending is increased if adverse selection is severe and good risks are priced out of the market, while there is a weak negative correlation with overall credit risk (as measured by the International Country Risk Guide Financial Indicator in Jappelli and Pagano 2000a: 33). However, there seems to be a positive correlation of information sharing and increased lending with consumer credit risk when measured as household debt-service burden (Jentzsch 2003a). These results are prone to reverse causality due to the endogeneity of information sharing and credit market outcome

variables. Other contributions have emphasized the regulatory side and the effects of data protection restrictions in credit markets. Some of these micro-level works show that incomplete information sets reduce the precision of scoring models that are used by banks and credit registries (Avery et al. 2000; Barron and Staten, 2003; Bostic and Calem, 2003). Other authors discuss the regulation, i.e. the institutional background upon which information sharing and credit reporting is based (del Villar, de Leon and Gil Hubert 2003; Jentzsch 2001, 2003a). Del Villar, de Leon and Gil Hubert (2003) explore the regulatory differences of the EU, U.S. and several Latin American countries at the end of the past decade, whereas Jentzsch (2003a) conducts a 4-country comparison of regulatory regimes in consumer credit reporting in the U.S., Germany, Great Britain and France. In this work, an index is constructed that measures the relevant data protection regulations. The cross-country analysis shows that countries with higher data protection display lower information allocation (in terms of credit report sales), while in the individual countries higher indices are associated with higher information allocation in consumer credit markets.

Works on business reporting agencies and their activities in credit markets for borrowing companies are rare, exceptions are Kallberg and Udell (2003) and the historical account of Olegario (2003). In addition, surveys that explore the *regulation* of business reporting in different countries are non-existent to our knowledge, hence, this is the focus of the present study.

One of the central problems of the paper is the construction of a regulatory index. In the past, indices have been constructed by a range of non-profit and for-profit organizations. They are used for credit and investment decisions, but also for academic research on regulatory environments and their impact on economic development. A variety of institutions provide proprietary as well as non-proprietary indices, among them are International Monetary Fund and World Bank, international development banks, political and business risk rating agencies and non-governmental organizations. As Knack (2002: 2) reports, the focus on governance and the use of large cross-country data started in the 1980s. At that time mainly indices of civil liberties and political stability were used as proxies for good governance. In the 1990s, increasingly ratings from private companies such as the PRS Group were used. These are classified by Knack (2002: 17) as “first generation” indicators that had the deficiency of providing only limited guidance toward particular reforms, especially for the public sector. Therefore, the second generation of indices is currently developed at the World Bank.

Moreover, a vast range of indices has also been developed by the academic community. In the latter realm, two approaches can be distinguished: the first are macro-indices that approximate overall institutions (Acemoglu, Johnson and Robinson 2001; Dollar and Kraay *forthcoming*; and Rodik, Subramaniam and Trebbi 2002). The second are micro-indices that measure specific

regulatory environments in capital or credit markets (Barth, Caprio and Levine 2002, La Porta, Lopez-de-Silanes and Shleifer 2002 and Jentzsch 2003a).¹

As stated, the World Bank currently develops the second generation of indices and some of the aforementioned authors are taking part in this effort. The rationale behind the second generation of indices is the following: “More specific measures of government performance, coupled with more specific measures of governmental processes or institutional arrangements, would permit analyses that provide more indication of which reforms are likely to be effective.” (Knack 2002: 17). For the project, several authors contributed works, such as La Porta et al. (1998) and more recently Djankov et al. (2002) that rate the environment for starting a business or contract enforcement (Djankov et al., *forthcoming*). Other works are Barth, Caprio and Levine (2002) that analyse banking regulations and La Porta, Lopez-de-Silanes and Shleifer (2002) that discuss security market regulations.

Our indices are based upon index theory for the reason of avoiding structural effects that could arise in time-series. There are several approaches to find an adequate index formula, however, the current paper employs the axiomatic approach as opposed to economic or stochastic approaches.² Index theory is mainly applied to price measurement, hence, not all its insights are easily transferable to other fields. The application, however, to other problems allows the creation of indices with special characteristics that diverge from those of aggregated scores (this is discussed further below).

Hence, this paper contributes to the existing literature in several respects: first, we measure the regulation of business reporting and explicitly discuss the construction of indices. Second, we test for the impact of regulatory regimes on information distribution and bank lending. Moreover, we are interested in the design of the regulatory environment and in the question as to whether there is a specific combination of regulations that contributes to increased information flows.

¹ For an overview of ratings and indices see Kaufmann, Kraay and Ziodo-Lobaton (2002: 36 – 53).

² The stochastic approach (although its indices satisfy sophisticated theoretical requirements) generally lacks the transparency appreciated in the construction of international indices.

III. THE REGULATION OF BUSINESS REPORTING

3.1 The Activity of Business Reporting

In capital as well in credit markets, different types of information intermediaries collect and distribute information on the financial status of borrowers. In capital markets, the major institutions are credit rating agencies (such as Standard & Poor's, Fitch or Moody's) that rate large corporate borrowers or countries (see Estrella et al. 2000). In most cases, these agencies rely on publicly available information that is evaluated quantitatively as well as qualitatively by including macroeconomic indicators and political factors. These ratings, although interesting, are not included in the present paper due to our focus on small and medium companies.

There is a range of other types of information intermediaries that can be found in credit markets: credit reporting agencies, public credit registries and export credit agencies.³ Public credit registries, for instance, often serve banking supervision purposes, therefore, they are located at the central bank and administered by it. These intermediaries exist in 54 countries of the World Bank's 110-sample for the Doing Business report (for a detailed description, see World Bank 2003). The primary function of banking supervision especially holds for many European registries (for an overview, see Estrella et al. 2000). Moreover, the reporting thresholds differ, hence only some of the registries also include households.

The majority of the larger privately owned credit reporting agencies collect and distribute information on firms and individuals. Moreover, in many developing countries, no difference is made concerning consumer and business reporting (Olegario, 2003: 116). Those agencies are at the center of the present discussion. They developed in the first half of the 19. Century in the U.S. and they are highly specialized today. Some of them conduct consumer and business reporting, while others operate in niche segments, distributing information to employers and landlords only.

In consumer reporting, the major information sources are all kinds of financial institutions such as commercial banks or savings & loans institutions, credit unions and consumer as well as mortgage financing companies. More and more parties are connecting to the reporting network, such as insurers, telecommunication providers, electric utility companies, mail order and trade companies as well as e-commerce firms. The exchange is based upon "give and take:" institutions that transmit information are also receivers (contractual reciprocity principle). In many cases, only the kind of information that is delivered (for instance negative information) is also received. To reduce competitive effects, the sources of the data are erased before the report is transmitted to another party. Moreover, some registries provide a permanent update of the information the customer has already received.

Consumer and commercial reporting differ in several respects. Commercial reporting focuses on firms, not consumers. Moreover, in the U.S. the first agencies have been established in the

³ The latter are irrelevant to the present paper.

1840s, roughly twenty years before the arrival of consumer reporting agencies (for an historical account see Olegario 2003). Also the exchange network itself differs, many companies that deliver information may also serve as recipients in business reporting, but there is no reciprocity principle existent (further explained below).

However, the borders between both are increasingly blurred. This is due to the fact that some companies provide both kinds of services and that there are market entries observable in UK and Germany, for instance, by commercial reporting firms in consumer reporting.

Commercial reporting companies gather their information from a variety of sources (also discussed below), for instance the reported companies themselves, trade registries or courts and other publicly accessible data bases. Some of the largest providers are D&B (former Dun & Bradstreet), Graydon, Experian, Equifax, Creditreform and CRIF Group. D&B is the largest international provider, it stores information on approximately 70 million companies in 200 countries worldwide (Securities and Exchange Commission 2001: 3). However, in the past not only new competitors entered the market, but also increasing competition from online services emerged. Crucial competitive advantages are the accuracy and reliability of the information and the deliverance via different channels. However, the strong price pressure has led to an increase in value-added services such as risk management solutions.

Commercial reporting agencies constantly expand their range of products and services. Whereas it was traditionally the case to mainly provide reports, all kinds of services are offered nowadays, such as risk management solutions, sales and marketing solutions and tools for the management of customer-vendor relationships (supply management). The first category is the primary business field and will increasingly play a role in B2B e-commerce.

Risk management solutions include scoring services that predict delinquency risk over certain time horizons. Other risk solutions help to approve loans, underwrite insurance, manage risks across portfolios or give credit limit recommendations. Apart from the scoring of the data subject, software packages are provided that enable the customer to run automated credit decisions based upon customized scoring models. Hence companies can not only identify and judge new trading partner, but also manage relationships with existing ones.

Credit reports are information goods and they may be provided as comprehensive reports, standard or basic reports. In general, they contain a profile of the company and data on financial status, payment history and payment trends, ownership details and important events such as natural disasters or judicial proceedings. Moreover, for some of the registries update reports in real-time with information from the SEC filings in the U.S. (stock quotes, etc.). The reports also contain information on judgements and pending suits including sums of suit amounts and judgements awards, for instance. Banking and financial information that is included in a credit

report contains current assets and liabilities or net profit. It is sometimes furnished with an industry median or it includes a rating from another agency such as Standard & Poor's.

For information goods it holds that certain characteristics such as non-excludability, non-rivalry, immateriality, indivisibility and experience character may create problems in commercial trading of them. Hence, the regulatory environment for the trade of information goods is also important. D&B, for instance, controls a number of trademarks, service marks and data bases. It relies upon a combination of copyright, trademarks, trade secrets and patents for the protection of its business (Securities and Exchange Commission 2001: 8)

As stated, data for credit reports are collected from publicly accessible sources, but also from non-public ones. An important source is the company itself, upon which a report is established. Another non-public source is the information provided by companies upon other trading partners (also further discussed below).

Such records are then sold to companies that would like to extend credit to other firms, that monitor current trading relationships or that receive unusually high orders from their customers. Moreover, also commercial credit executives are also interested in such information (Cole 1992: 396). Banks and credit insurers are another major category of customers for a commercial reporting registry. The information collection exhibits economies of scale (and scope), hence the picture becomes more complete by requesting information from registries and informational asymmetries are reduced. Trade companies and small businesses are also becoming increasingly customers. Pricing depends on the requested volume per year, but sometimes also on whether the party contributes to the data base. Due to the absence of the reciprocity principle, information contribution is voluntarily and serves as source of valuable payment behaviour data. Some registries are only accessible if the company becomes a member of the registry, which demands a long-term relationship, but others provide reports on an ad hoc basis.

Most of the aforementioned registries compete on the international level. They either establish subsidiaries as is the case in industrialized countries or work together with local firms and correspondents as in low and least developed countries. In Europe, some companies have established reporting networks.

Large international providers such as D&B, ICP or Graydon provide reports on companies in all regions of the world, from the Americas to Eastern Europe, the Middle East and Asia. The report provision for firms in developing countries, for instance, takes up to two weeks and in urgent cases 3-5 days. Pricing then also depends on the delivery time with express service costing up to US-\$ 150. Hence, the reporting is established via intranets or other company networks. The registries have either teams of correspondents in individual countries or work together with a local company. The kind of expansion into countries is self-evidently limited by

political situations, which holds for Afghanistan and Iraq. Nevertheless, there are possibilities to serve the market across borders while being based in from neighboring countries.

In Europe there are currently three larger international networks that compete with one another: BIGNet, Eurogate and D&B as company. BIGNet has been founded by Experian and Creditreform, it provides information on 19 million companies in 15 European countries. The network is owned by its 12 partners that are major credit registries. The members connected their data bases and provide standardized reports as well as comparable scores. The major competitor of BIGNet is EuroGate, founded by Graydon, Bürgel Wirtschaftsinformationen and SCRL. This network provides data on more than 10 million companies in 13 different European countries. The industry association on the European level is the Federation of Business Information Services (FEBIS) located in Frankfurt, more than 60 commercial reporting and collection agencies are organized in this association.

3.2 Publicly and Privately Accessible Information

There is a range of information sources from which commercial reporting agencies may derive the information they sell. In general it can be stated that the lesser this kind of source is centralized the more expensive is information collection. Moreover, the more it is considered to be private, the more it is difficult to collect. In the following, we discuss public and private information sources and then single out regulations that are important.

Trade and commercial registers are in general publicly accessible, this holds for the majority of our panel of countries. Laws and regulation mandate which kind of companies have to register, the register procedure and costs and to whom the information is transmitted (other governmental authorities, for instance). The registration confers a legal status upon a company, which may then write contracts, take legal action, etc. Information about the year of operation, firm organization, business ownership and business activity is also collected, which is in most cases assumed to be public knowledge once stored. Trade registries operate in most of the reviewed countries, but in only 72 countries their access is reported to be open and in only 59 countries the registered data is collected in a nationally centralized way.

Another important and publicly available item is bankruptcy information. Commercial reporting agencies are in general interested not only in such information, but also in judgements and judicial proceedings. In 63 countries, data on bankruptcy is found at the courts, but only 29 report that the data is collected in a centralized way. In 17 countries also Chambers of Commerce and Ministries of Justice collect this information. 11 countries report that also the tax data bases can be accessed, for instance in South Africa, Romania, Russia and Bangladesh.

Central data bases of financial statements are mainly focused on large corporate borrowers. Estrella et al. (2000) report that in general this kind of data collection is designed to capture 10-20% of the largest bank counter-parties weighting for 80-90% of the total exposure. Mainly

banks are recipients of the information. Owned by the central bank in many cases, this kind of data base has been built up to discount trade bills to refinance banks. Hence, these are mainly national data bases, but they are not open for privately-owned registries.

In some cases, financial statements data bases serve the purpose of disclosure of company information to inform investors and credit grantors about the financial situation of a company. These data sources are in many cases operated by the authority in charge for the enforcement of security and disclosure laws (discussed below). Such information collection constitutes an important source of information, although it is fairly incomplete, since it does not contain information on the greater number of small and medium companies.

As mentioned, for commercial reporting agencies companies serve as information source, i.e. firms provide information on the payment behaviour of trading partners. If one firm acts as creditor (as often the case with suppliers) and the other as borrower, the creditor may give information to the private registry if this is not hampered by trade secret or contractual confidentiality requirements. Information that might be shared concerns the credit, account balances, current and past due categories and payment terms (Cole 1992: 393).

In addition also companies upon which a report is to be furnished serve themselves act as information source, as stated. In this case the credit registry directly contacts the company to verify information in the trade registry and to get a more detailed picture. This also contains personal information on the firm's principal (such as age and University graduation). Some companies voluntarily furnish the registry with annual reports and other important information upon themselves. Industry officials claim that this kind of cooperation is easier with larger companies, meaning that large ones seem to have a greater incentive in providing information compared to smaller ones.⁴ In general a range of local, regional and national firms deliver information.

Potentially useful data sources would be banks or any organization that pools information from banks. Banks in general do *not* deliver information to business reporting agencies, although they also request the reports. However, in many countries, banks may share general information on firms or individual borrowers, such as if the subject has a bank account. Other information that may be shared are liabilities, assets, loan defaults, delinquencies, the opinion about a borrower or his/her rating.

3.3 Disclosure Regulations

In many developed countries, disclosure acts have been enacted after the Great Depression in the 1930s. For instance, in the U.S. the Securities Exchange Act of 1934 mandates the

⁴ In fact, industry officials state that the depth of information (in commercial reporting) depends on the size of the company which is the data subject.

disclosure of information by all publicly listed companies. It varies from country to country which kind of information has to be disclosed and especially which type of company is mandated to publicly report. It is mostly the largest firms that have to report, due to the public trade in their stocks, however, filing time and detail varies (for a discussion see also La Porta, Lopez-de-Silanes and Shleifer 2002: 23). Moreover, financial statements may also differ from corporate form to corporate form. Some firms only have to provide simplified financial reports with less detail depth than larger corporations, which have to publish comprehensive detailed reports. Moreover, in many developing countries, the disclosure obligation is not really enforced and companies report more or less from time to time. In the industrialized countries, on the other hand, accounting standards as well as auditing are mandated to provide incentives for increased information quality and transparency.

Such disclosure acts mandate that publicly traded firms have to transmit information to a data base that in turn discloses it to interested parties. In the vast majority of our panel, such disclosure regulations exist and especially listed stock companies have to report publicly (in 72 countries of 90), but also state owned companies (in 51 of 90 countries) and general partnerships have to report (in 16 countries).

Sole proprietorships, on the other hand, are in most countries not obliged to disclose information. Hence, the collection of valuable information is reasonably difficult in this area, therefore credit registries also use personal credit reports of the business principals, as discussed further below. In some countries it depends on the corporate form, in others on a certain threshold.

In markets, where firms do not release a lot of information, they could face higher costs of capital and market liquidity might be low. Moreover, as Admati and Pfleiderer (2000) show, the release of information by one firm might be beneficial in evaluating another. In their model, the authors show that the amount of information a firm should release is a function of its costs and its relation to other firms. Hence a change in cost structure can create major changes in the amount of information that should be released (for a further discussion, see Admati and Pfleiderer 1999 as well as La Porta, Lopez-de-Silanes and Shleifer 2002: 23)

Disclosures are sometimes collected by the central data base, but also by private credit bureaus. It is possible to derive a range of banking and financial information from the disclosures such as current assets and liabilities including loans, notes payable and other current liabilities. Moreover, the picture is completed by accumulating data on the net worth, sales and net profit. For international commercial reporting activity, however, it is still a problem that accounting standards are different from country to country. Hence, the standards are not easily comparable (see also Lucas 2002).

In most of the Eastern European countries, filing is required for large firms, such as in Russia, Czech Republic and Hungary. However, where enforcement of disclosure laws is lax, late

filings are frequent. In the Latin American countries, the same holds: mostly large companies have to report. However, the publication in publicly accessible media differs as well as the institutions that collect the information. Interviews with managers can fill in the gap but only when there is no reluctance to share at least some information with a commercial agency, which is the case in many countries. The latter is also the case in Asian countries. There are legal obligations in Japan and Hong Kong (although less detailed in the latter case), in China the rules are codified in the Securities Law of the People's Republic of China.

3.3 Bank Secrecy Acts

Banks could also potentially serve as a source of high-quality information, however, in most countries the access to their data is restricted. Bank secrecy traditionally derives from the duty of confidentiality, which implies to keep all economic and personal affairs of clients – natural as well as juristic persons – privately. This custom has already developed in the Middle Ages, hence, bank secrecy is as old as banks themselves. In the past, it has been especially strongly pursued by financial institutions in Switzerland (even before the Federal Banking Law of 1934) and in Austria.

It may be constituted either by an act, by regulations or contractual provisions. In many countries, bank secrecy is contractual based, meaning that it is established through the contract between customer and bank. In general the bank has the duty of confidentiality, on one side, while having the right not to disclose financial affairs on the other. However, nowadays there are major exemptions from this kind of confidentiality. This holds for access in cases of insolvency and collection procedures, death of the account holder, for criminal prosecution, tax evasion or money laundering. These exemptions are in many cases mandated by law, hence, one cannot claim the existence of “bank secrecy” in the strict sense anymore.

Moreover, further exemptions are made for supervisory purposes as described above. Banks are then mandated to disclose information on borrowers to supervisors either located at the Ministry in charge or at the central bank. Moreover, data is also disclosed in case of auditing by third persons.

If the confidentiality requirement is contract based, information sharing can be allowed if the individual or firm authorizes it. In 28 countries of our panel it is allowed to share information on firms, if there is a written permission in 31 cases the same holds for individuals.

Various data items may be shared then, such as bank account information, liabilities, assets, loan defaults and delinquencies or the opinion on the credit risk of the borrower. Another major exception from bank secrecy is consumer reporting: in this case the bank shares information on individuals with credit registries. In many countries this is allowed in the case of negative information only, were a breach of contract such as default is reported (for individuals or firms). In the case of consumer reporting, the information may also be used for evaluating the risk of

granting credit to persons that have a sole proprietorship, as explained below. There are only few comparative works on different bank secrecy laws, an international overview is provided by Campbell (1992).

In European countries such as Germany, UK, France, Ireland or Netherlands, it is generally forbidden for banks to share information, except for individual authorization. However, most of these countries share information via private (consumer reporting) or public registries. In Latin American countries, some require authorization (Panama, Chile, Peru and Venezuela), while others see information as extremely confidential. For the Eastern European countries it holds that most of them demand authorization, such as Russia, Poland and Czech Republic.

In Asia, there is also mainly the picture of not revealing information without the written consent of the account holder. However, some respondents claim that this is not possible with authorization (China, Japan, Singapore). Some of the Asian countries, of course, share the information via credit reporting registries. In the Middle East, especially Saudi Arabia considers bank information on firms as extremely confidential, while it can be disclosed in Saudi Arabia, Yemen and Egypt.

3.4 Data Protection Laws

Data protection acts have been introduced in western Europe and the United States in the 1970s with the first wave of computerization. These acts underwent considerable reforms in the late 1980s and especially the 1990s, when the internet further raised concerns about adequate data protection. Due to the liberalization of financial services and credit markets, data protection increasingly plays a role on the international level. The international instruments are displayed in Box 1 in the Appendix. Moreover, the issue is increasingly discussed on the international level,⁵ for instance within the WTO as privacy regulation has also an international dimension.⁶

The international contracts are either voluntarily (OECD, UN) or mandate regulations (EU Data Protection Directive). Many countries have national data protection authorities or authorities that are charged with the enforcement of data protection principles.

In Europe, there is a slow convergence of privacy regimes (Jentzsch 2003a). EU members apply comprehensive data protection acts that are guarded by data protection authorities and that transpose the Data Protection Directive of 1995. In general, more property rights to information are granted to the data subjects than in other parts of the world. Most of the countries share

⁵ A whole range of international institutions are involved in formalizing data protection rules, the OECD, EC, WTO as well as the EU. Despite international activities, there are still large differences in the approach to privacy creating systemic as well as divergence and compliance conflicts, as Reidenberg (1998) notes.

⁶ The Financial Service Annex to the GATS includes in the field “banking services and other financial services” also the category credit reporting. Moreover, GATS, Art. XIV states that nothing in the agreement shall be construed to prevent the adoption (or enforcement) of measures necessary to secure compliance with laws or regulations relating to the protection of privacy.

information via registries, but the regimes still differ in terms of positive or negative data sharing.

In the case of the U.S., Australia, New Zealand and Canada, data protection is based upon different combinations of common and case law, administrative law and legislative rights. Together, these countries' legislations are based upon English law tradition. In these regimes, basic data protection rights are granted, but especially the U.S. may be characterized as a country with a less stringent data protection regime. It can be derived from our results, that this group has in general lower scores on granting property rights to individuals.

In Asia the regimes of data protection differ widely from country to country as the legal origin also differs (Japan is for instance German legal origin, whereas Hong Kong is of English origin). There are no harmonization efforts. For instance, Hong Kong was the first nation in the region to enact a law based upon the Data Protection Directive of the European Union, the Data Privacy Law (Ordinance). In Japan, on the other hand, a new bill is currently discussed, but not enacted yet. In 1990 the country enacted the Protection of Computer Processed Personal Data Act. And in Singapore there is no general data protection act at all, except for some provisions in their e-commerce legislation. The ad hoc practices in Asian countries generally provide a lower data protection compared to Europe (for a discussion see also Greenleaf 1996). The protection of financial data is mainly derived from Banking Acts in South Korea and Singapore.

With the political changes in the Latin American countries also came a new approach to data protection. In some of the countries (Brazil, Paraguay, Peru, Ecuador, Columbia), the constitution incorporates the "Habeas Data." This right is based upon consumer rights such as access to data or correction (Guadamuz 2000). Several countries in the region grant access to information of credit bureaus as well as correction possibilities, for instance Argentina, Brazil, Columbia, Chile and Peru (del Villar, de Leon and Gil Hubert 2003). It seems there are some nations that base their regulations upon European experiences, however, the constitutional protection of personal data is new, since in many western countries it is only indirectly derived from the constitution (such as in the U.S.)

Much less is known about data protection in African countries or the Middle East. Kenya, Malawi and Mozambique report that individuals have no right to access their data, same holds for Niger, Nigeria and Senegal. The latter three countries also seem to not grant other important rights such as correction and the right to stop disclosures in dispute.

For Syria, Morocco, Iran and Egypt most of these rights are also not reported. In the United Arab Emirates there seems to be the same situation, also in Saudi Arabia. As stated, these rights certainly contribute to transparency and the increasing quality of credit information.

It appears that these countries as well as the African ones either do not have any data protection acts or grant only rudimentary rights. Moreover, the public lacks an awareness of data protection issues, hence reforms have to include clarification of legislation or implementation of it.

Personal credit profiles on individuals also increasingly play an important role. In small loans segments, where informational asymmetries are severe and relationship lending prevails, information gathering might be especially difficult. Therefore, small business scoring is partially based upon the personal profile of the businesses principals (see Asch 1995, Feldman 1997, Furash 1995, Mester 1997). In the U.S., tests of small business scoring models found that one of the most important indicators of loan performance were the characteristics of the business owner rather than the ones of the business itself (see Mester, 1997: 5). This the reason, why data protection acts also play a role in commercial reporting. Business information is combined with information on the owner of the business to indicate the likelihood of repayment. The reporting agencies are aware that small firms cannot be rated the same way as large ones (Robertson Demby 2001).

3.5 Regional Pattern in Obstacles to Commercial Credit Reporting

In general, there seem to be some regional patterns concerning the obstacles to credit reporting. Whereas the developed countries such a U.S. and European countries have matured reporting industries this is not the case in other regions. In the industrialized countries, major reform proposals are either the collection of positive data or centralization of public data bases. Some industrialized countries explicitly mentioned that the status quo should be saved and no further regulations should be introduced.

For instance in many African countries, the technical infrastructure does not exist, reporting is paper-driven and the information is collected locally. There are very fundamental steps that have to be taken to reform this. For instance, in countries such as Tanzania, South Africa and Kenya, legislative clarification is needed. In general the utility of reporting has to be made known and public centralized registries for company information should be established. Reforms should include better coordination of the banking industry with registries and the implementation of laws that regulate the activity and grant consumer some protection.

In the Middle East the picture is different. Generally information sources are there, although not all of them are centralized (for instance the in the United Arab Emirates, each Emirate has its own Chamber of Commerce and hence trade registry). Many companies only have P.O. Box numbers and it is therefore considerably difficult to locate them physically. A lack of address systems further deteriorates the situation. Business is based on relationships and very little information is available to outsiders, because of a strong preference for non-disclosure. However, when questioned many of our respondents did not consider any reforms due, such as

in the countries Lebanon, Iran, Syria, United Arab Emirates and Yemen. However, where reforms are needed, they include a call for transparency and legislation for information sharing and for increased data quality.

In Asia, sources exist and the technical infrastructure is mainly not a problem. Especially smaller companies are often critical in sharing their information with others, however, this is not as severe as in the Middle East. Reform proposals should include relaxation of banking laws, more cooperation by the courts and penalties in case of inaccuracies. Still in many countries, the respondents did not indicate a need for change (Hong Kong, Japan, Philippines, Singapore, Taiwan).

In Eastern Europe is strongly growing due to the accession to the European Union, however, companies there also reveal a relatively closed business mentality, which changes quickly the more the advantages of commercial reporting are known. Moreover, local collection techniques improved and there is an increasing growth in inquiries. However, there seems to be a specific need for the legislative clarification of credit reporting. This is especially the case in Moldova, Georgia, Mongolia, Russia, Uzbekistan and Kazakhstan. Other reforms should include the increase of public-private information sharing and the relaxation of bank secrecy acts. The Eastern European countries are those that are considered by industry officials as the markets with the greatest growth in commercial reporting. Moreover, there is some activity in setting up credit registries such as in Serbia and Romania.

Information gathering is also difficult in some Latin American countries. As stated, banking and security acts exist in most countries, but it seems that their design could be improved for facilitation on credit information collection. This is the case in some countries for banking acts that severely restrict the use of information outside of the banking industry or the cooperation of public registries with private ones. In other countries, laws do not exist and the actual activity is not regulated except for banking acts. Moreover, some official registers for public records are still not automated and the information is collected in a decentralized way. This increases search costs and processes can become slow and cumbersome. In the following, we review the theoretical background of indices to construct one for the measurement of the regulatory environment for business reporting.

IV. METHODOLOGY

In this section, we discuss the development of indices. In general, numbers that are aggregated are termed indices. Indices are then defined as encompassing the output of either an index formula or the simple aggregation of indicators. In this paper the terms “rating” and “score” are used interchangeably with index, all three define the output of a mathematical operation. Indicators, on the other hand, are the smallest unit that is introduced in the operation to produce an index. If such indicators are grouped (and this is the case for most indices), we call such a group of indicators “variable.” The variables are then added up to gain an index.⁷ As defined in our case, we only speak of indices if the number is a *relative* (for a functional definition see Eichhorn 1978: 3). The development of our indices is based upon index theory, which is also applied to wage and labour or population measurement (see also Barta and Vogt 1997: 143). However, these generalizations play a marginal role in index theory. The major advantage of this approach is that the characteristics of the canonical indices have been tested in the past and they have been extensively discussed. For instance after accounting for homogenous scaling, structural problems (emerging in time-series, for instance) can be reduced by applying weighted indices. In international comparisons, countries receive a common basis through index application.

In the following, several indices are presented that are intended to measure the regulatory environment of business reporting. For this purpose, we aggregate information from the *Global Survey on the Legal and Regulatory Environment for Business Information Sharing* conducted with financial support from the World Bank. This project has been a joint research and data collection effort of the Free University of Berlin and the World Bank. For primary data collection, questionnaires were sent out to bank supervisory authorities and credit registries in more than 90 countries.

4.1 Variables of the Index

The proposed indices are intended to measure the regulatory environment relevant for commercial reporting. The variables are constituted of the following: existence of information source, access, centralization, content and property rights to information (Table 1 in the Appendix). For the first variable (existence of information source by law or regulation) we collected information on bankruptcy data bases, financial statements data bases or the ones that accumulate information from banks (either via associations or Chambers of Commerce, for instance).

⁷ Not all authors mentioned below label their ratings as “indices.” But we will still apply this language for coherence. A narrow statistical definition of index would regard only such numbers as indices that are based upon relatives and not absolute numbers (Bonini and Spurr 1973: 540 and von der Lippe 2002a:3).

The second variable is the access to these sources mandated via laws and regulations. Access is important for getting information from the trade registry, from bankruptcy data bases and those that contain tax information, financial statements or company information.

The third variable is centralization degree (rated as either open or closed). This is important from the credit registries' point of view, since the value of the existence of the information source is reduced if the information is scattered and not collected in a centralized manner. This increases search costs as well as collection costs for the agency.

The fourth variable summarizes the "content indicators." In this field, we measure which kind of information may be distributed based upon law and regulation. This includes indicators about positive or negative information as well as detailed or standardized financial statements and the information banks may distribute about their firm or individual customers.

Last but not least, the fifth variable sums up information on the property rights to information. This variable includes laws and regulations that mandate certain rights for data subjects such as access to the information, correction, blocking in dispute and the right to know to whom information was disclosed. This was measured for both firms and individuals, respectively.

The major intention is to quantify the regulatory environment in such a way that it can easily be inferred whether a strict regulatory environment or a rather lax one exists that allows for exchange of vast amounts of information. We denoted positive values for open access, for a centralization that is national (or consolidated in a data base) and for the allowance to share information items. We encoded the individual property rights in a way that they mainly gain positive values, since they help to increase the quality of information in circulation.

Correlations of the 90 indicators showed that most of them are not significantly correlated to one another. Those indicators that are correlated exhibit mostly a weak correlation. When correlating with credit as outcome variable, only a minority showed significant correlations. This holds for access to bankruptcy data bases, the financial statements indicators and access to information of banks. The picture remains largely unchanged when controlling for intervening influences variables such as law and order.

4.2 Elementary Indices

In the past, great multitude of indices has been produced. However, we concentrate on the canonical ones such as Carli, Dutot and Jevons indices. Some of these are type-biased or weight-biased (see Box 2. in the Appendix). The first holds for Carli (upward bias) and the harmonic index (downward bias). The only indices among the elementary ones that do not have these biases are Jevons and Dutot. For reasons explained below, we chose the elementary indices Carli, Dutot and Jevons. For "unit value indices," price relatives are used, but it is also possible to reinterpret those relatives. In the following, we proceed in two steps: First, we use

elementary quantity indices for which we reinterpret the inputs as quantities.⁸ In fact, we are counting regulations to rate if they are either existent or non-existent. In a second step, we apply second and third generation superlative indices. We first display the general notation and then apply them to our problem. We start with the Carli index (I^C):

$$(1) \quad I^C = \frac{\frac{x_1^{b+1}}{x_1^b} + \frac{x_2^{b+1}}{x_2^b} + \dots + \frac{x_n^{b+1}}{x_n^b}}{n} = \sum_{n=1}^n \frac{\left(\frac{x_n^{b+1}}{x_n^b} \right)}{n} \quad \forall x_n \in R^+$$

$$(2) \quad I_1^C = \frac{\frac{x_{IN}^{b+1}}{x_{IN}^b} + \frac{x_{AC}^{b+1}}{x_{AC}^b} + \frac{x_{CE}^{b+1}}{x_{CE}^b} + \frac{x_{CO}^{b+1}}{x_{CO}^b} + \frac{x_{PR}^{b+1}}{x_{PR}^b}}{n} \quad \forall x_i^{b+1} \in N_0, x_i^b \in N$$

Where x_{IN} , x_{AC} , x_{CE} , x_{CO} , x_{PR} denote different variables (see Table 1. in the Appendix), b denotes the base and $b+n$ the theoretically possible sequence of observation periods.⁹ Carli fulfils continuity, identity, monotonicity, proportionality and commensurability. However, it does not satisfy factor and time reversal tests and circularity. Dutot (I^D) is constructed as follows:¹⁰

$$(3) \quad I^D = \frac{(x_1^{b+1} + x_2^{b+1} + \dots + x_n^{b+1})}{(x_1^b + x_2^b + \dots + x_n^b)} \quad \forall x_n \in R^+$$

$$(4) \quad I_1^D = \frac{(x_{IN}^{b+1} + x_{AC}^{b+1} + x_{CE}^{b+1} + x_{CO}^{b+1} + x_{PR}^{b+1})}{(x_{IN}^b + x_{AC}^b + x_{CE}^b + x_{CO}^b + x_{PR}^b)} \quad \forall x_i^{b+1} \in N_0, x_i^b \in N$$

This index fulfils the mean value test, the circularity test, identity, homogeneity, monotonicity and proportionality. However, the commensurability axiom is not fulfilled. This is the reason why virtually nobody uses this formula today (see also Diewert 1993: 73).

As noted by von der Lippe (2002a: 12) the calculation of relatives is a necessary condition for deriving a sum of variables of different dimensions, but this is by no means a sufficient condition to derive a meaningful result.¹¹ In price measurement, Dutot is seen as problematic not only from a theoretical point of view (Fisher 1922: 40, 207 and von der Lippe 2002a: 1),¹² but also from an applied one (International Monetary Fund 2002: 6; World Bank 2002: 16).

⁸ See Fisher (1922: 28).

⁹ Currently, there is no time series available. However, we work with this in mind, since it is one of the purposes of the World Bank's Doing Business project. The artificial base is calculated by taking the maximum of possible indicators in the variables divided by 2.

¹⁰ All indices may be multiplied by the factor 100, but we prefer decimal notation.

¹¹ The index can only be applied if the input items observe strict theoretical requirements (homogeneity and discrete measurement).

¹² Fisher called the index "freakish" as it is affected by the change in the units of measurement.

Moreover, for the original version of the index, determination does not hold, the polynomial function is undefined if the denominator is zero.¹³ In addition, the index neither has a type-bias nor a weight-bias due to the absence of explicit weights. Weighting, however, is a problem here.¹⁴ At first sight, it seems that the index is non-weighted. However, different ranges of the variables introduce different variability, hence their impact on the result varies. This implicit weighting effect changes from country to country, certainly an unappreciated characteristic. The problem of implicit weighting is not so strong in the case of the geometric Jevons (I^J):

$$(5) \quad I^J = \sqrt[n]{\frac{x_1^{b+1}}{x_1^b} \cdot \frac{x_2^{b+1}}{x_2^b} \cdot \dots \cdot \frac{x_n^{b+1}}{x_n^b}} = \sqrt[n]{\prod \left(\frac{x_n^{b+1}}{x_n^b} \right)} \quad \forall x_n \in R^+$$

$$(6) \quad I_1^J = \sqrt[5]{\frac{x_{IN}^{b+1}}{x_{IN}^b} \cdot \frac{x_{AC}^{b+1}}{x_{AC}^b} \cdot \frac{x_{CE}^{b+1}}{x_{CE}^b} \cdot \frac{x_{CO}^{b+1}}{x_{CO}^b} \cdot \frac{x_{PR}^{b+1}}{x_{PR}^b}} \quad \forall x_i^{b+1} \in N_0, x_i^b \in N$$

$$(7) \quad \Rightarrow I_1^J = \left(\frac{x_{IN}^{b+1}}{x_{IN}^b} \cdot \frac{x_{AC}^{b+1}}{x_{AC}^b} \cdot \frac{x_{CE}^{b+1}}{x_{CE}^b} \cdot \frac{x_{CO}^{b+1}}{x_{CO}^b} \cdot \frac{x_{PR}^{b+1}}{x_{PR}^b} \right)^{\frac{1}{5}}$$

This unweighted index accounts for interdependencies via its multiplicative structure.¹⁵ Compared to Dutot and Carli, Jevons is superior. Apart from the mean value test, it fulfils circularity, identity, monotonicity and proportionality as well as commensurability and the time reversal test. Furthermore, since circularity is satisfied, it produces the same results in chain or fixed-base systems when applied in time series.

Type-bias or tendencies under the time reversal test are absent, this means forward index and backward index multiplication do not produce an error, but there is a small one under the factor reversal test. Several authors have stated the superiority of the index (Fisher 1922: 35, von der Lippe 2002: 5), which is reinforced by observations of international institutions (International Monetary Fund 2002: 6; World Bank 2002: 16). However, this index never really proceeded beyond academic appreciation to a wider application in price measurement because of its lack of weights. Bonini and Spurr (1973: 547) emphasize the basic positive aspect associated: “The geometric mean also minimizes the influence of extremely large relatives, which may distort the arithmetic mean of a small number of items.” However, the index is problematic in terms of transparency. The empirical application of the index introduces more problems, apart from the theoretical considerations: since it is a multiplicative one, it turns zero as soon as one of the variables turns zero, hence many countries get zero results.

In sum, elementary indices are easily interpreted, but they do not explicitly account for the relative importance of the inputs to the index. There is a range of advanced indices employing weights that depend on the value share or expenditure share of their inputs. The weights are

¹³ In our case the denominator is a constant: the maximum of values divided by 2, as stated.

¹⁴ See Boxes 2 and 3 in the Appendix.

¹⁵ With “unweighted” the absence of explicit weights is meant.

either taken from the base period (e.g. Laspeyres) or the reference period (e.g. Paasche). They may be geometric means between both (Walsh) or arithmetic means (Edgeworth-Marshall). There are only a few indices that use constant weights that are “arbitrarily” assigned, i.e. independent of value shares. The latter is the case for the Cobb-Douglas index for which it holds that $\sum \alpha_i = 1, 0 \leq \alpha_i \leq 1 \sum \alpha_i$. This feature has posed severe difficulties for a reasonable justification in price measurement (for a discussion, see also Barta and Vogt 1997; Fisher 1922: 275; Funke, Hacker and Voeller 1979; von der Lippe 2002).

Clearly, in the price measurement context, constant weights do not make much sense: prices as well as consumed quantities change all the time, therefore any approach that assigns constant weights must appear artificially rigid. However, in the context of regulation measurement, constant weights can be justified, since there is an established catalogue of variables from which “quantity-based weights” can be deduced.¹⁶ Therefore, it is also possible to apply the Cobb-Douglas index which is seen as a theoretical curiosity, since it is a uniqueness theorem (it fulfils the five fundamental axioms). For comparison purposes, we also apply Laspeyres, which is a well-known and widely used index. All the aforementioned indices may then be benchmarked against Fisher’s “ideal” index.¹⁷

4.3 Superlative Indices

In the following section, we discuss three superlative indices: Cobb-Douglas, Laspeyres and Fisher. We start with Laspeyres (I^L), then present two versions of Cobb-Douglas (I_1^{CD}, I_2^{CD}) and Fisher (I^F). A major problem is posed by the weighting system, since we do not really have “prices” and “quantities.” Instead, we have the maximum number of regulations as weights (and their number divided by factor 2 as base) as well as their empirical value. To reduce the problem of implicit weighting, we have to find explicit weights. These weights may be constructed in two ways: (1) they can be derived empirically by using correlation or regression coefficients; and (2) they might be assigned by using *maximum values* that are achievable in the individual variables (see Box 3). We use the latter method for weighting and denote the explicit weights with z:

$$(8) \quad I^L = \frac{\sum(y^{b+1} \cdot x^b)}{\sum(y^b \cdot x^b)} \quad \forall x, y_n \in R^+$$

¹⁶ This does not hold, of course, if the catalogue is expanded from year to year introducing more and more variables that take account of new regulatory measures. Since regulatory inertia can be observed (acts are not modified several times a year, not even every year), we prefer the fixed-base system. However, after a certain period, say 5 years, the catalogue could be expanded and a new base could be chosen.

¹⁷ Of course, it is not clear what the “ideal index” is. Different authors prefer different indices and axiom systems (for different approaches, see Vogt and Barta 1997: 39 – 66).

$$(9) \quad \frac{\Sigma(x^{b+1} \cdot z^b)}{\Sigma(x^b \cdot z^b)} \quad \forall x, z \in N_0$$

$$(10) \quad I^L = \frac{x_1^{b+1} z_1^b + x_2^{b+1} z_2^b + \dots + x_n^{b+1} z_n^b}{x_1^b z_1^b + x_2^b z_2^b + \dots + x_n^b z_n^b} \quad \forall x \in N_0, z \in N$$

$$(11) \quad I_1^L = \frac{x_{IN}^{b+1} z_{IN}^b + x_{AC}^{b+1} z_{AC}^b + x_{CE}^{b+1} z_{CE}^b + x_{CO}^{b+1} z_{CO}^b + x_{PR}^{b+1} z_{PR}^b}{x_{IN}^b z_{IN}^b + x_{AC}^b z_{AC}^b + x_{CE}^b z_{CE}^b + x_{CO}^b z_{CO}^b + x_{PR}^b z_{PR}^b}$$

For Laspeyres, the weights are taken from the base period and used for both situations base and observation, respectively. Laspeyres fulfils identity, homogeneity and commensurability. However, despite its wide usage, it fails the circularity test [12,13] and the time reversal test [14,15] applied for the general form function:

$$(12) \quad I_{0-1}^L \cdot I_{1-2}^L \stackrel{?}{=} I_{0-2}^L$$

$$(13) \quad = \frac{\Sigma(x_1 \cdot y_0) \Sigma(x_2 \cdot y_1)}{\Sigma(x_0 \cdot y_0) \Sigma(x_1 \cdot y_1)} \neq \frac{\Sigma(x_2 \cdot y_0)}{\Sigma(x_0 \cdot y_0)} \quad \forall y, x \in N_0$$

$$(14) \quad I_{0-1}^L \cdot I_{1-0}^L \stackrel{?}{=} 1 \Rightarrow \frac{1}{I_{1-0}^L} \stackrel{?}{=} I_{0-1}^L$$

$$(15) \quad = \frac{1}{\frac{\Sigma(x_0 \cdot y_0)}{\Sigma(x_1 \cdot y_0)}} \quad \text{where} \quad \frac{\Sigma(x_0 \cdot y_0)}{\Sigma(x_1 \cdot y_0)} = I_{1-0}^P$$

The index displays the time-reversed Paasche in the denominator (*not* its time-reversed counterpart, $I_{1-0}^L = \frac{\Sigma(x_0 \cdot y_1)}{\Sigma(x_1 \cdot y_1)}$). Transitivity is a kind of consistency in temporal aggregation,

but as some authors note that this test is controversial, since base period and observation period do not have the same logical status (von der Lippe 2002: 5). We move on to the Cobb-Douglas index, an analogy to the well-known production function. We also present a modification in (19):

$$(16) \quad I^{CD} = \left(\frac{x_1^1}{x_1^o} \right)^{\alpha_1} \left(\frac{x_2^1}{x_2^o} \right)^{\alpha_2} \dots \left(\frac{x_n^1}{x_n^o} \right)^{\alpha_n} \quad \text{with } \alpha_i > 0, \sum_{i=1}^n \alpha_i = 1$$

$$(17) \quad I^{CD} = \prod_{i=1}^n \left(\frac{x_i^1}{x_i^o} \right)^{\alpha_i}$$

$$(18) \quad I_1^{CD} = \left(\frac{x_{IN}^{b+1}}{x_{IN}^b} \right)^{\alpha_1} \left(\frac{x_{AC}^{b+1}}{x_{AC}^b} \right)^{\alpha_2} \left(\frac{x_{CE}^{b+1}}{x_{CE}^b} \right)^{\alpha_3} \left(\frac{x_{CO}^{b+1}}{x_{CO}^b} \right)^{\alpha_4} \left(\frac{x_{PR}^{b+1}}{x_{PR}^b} \right)^{\alpha_5} \quad \forall x^{b+1} \in N_0, x^b \in R^+ / \{0\}$$

$$(19) \quad I_2^{CD} = \left(\frac{x_{IN}^{b+1}}{x_{IN}^b} \right)^{\alpha_1} \left(\frac{x_{AC}^{b+1}}{x_{AC}^b} \right)^{\alpha_2} \left[\left(\frac{x_{CE}^{b+1}}{x_{CE}^b} \right)^{\alpha_3} + \left(\frac{x_{CO}^{b+1}}{x_{CO}^b} \right)^{\alpha_4} + \left(\frac{x_{PR}^{b+1}}{x_{PR}^b} \right)^{\alpha_5} \right]$$

The Cobb-Douglas index has explicit weights α . I_2^{CD} accounts for the fact that if x_{IN} or x_{AC} turn zero, the whole index turns zero. The multiplicative feature accounts for the strong interdependencies that we observe due to the strong interrelation of the variables. While the above characteristic is appreciated, the Cobb-Douglas index does not meet factor reversal (for a general discussion of the index, see Eichhorn and Voeller 1983, Selvanathan and Rao 1994 and von der Lippe 2002).¹⁸ When fixed weights are assigned, the Cobb-Douglas index fulfils the time reversal test [20, 21] and the circularity test [22 - 24], i.e. transitivity exists:

$$(20) \quad I_{0-1}^{CD} \cdot I_{1-0}^{CD} = 1$$

$$(21) \quad I^{CD} = \left(\frac{x_1^1}{x_1^o} \right)^{\alpha_1} \left(\frac{x_1^0}{x_1^1} \right)^{\alpha_1} = 1 \quad \text{with } \alpha_i > 0, \sum_{i=1}^n \alpha_i = 1$$

$$(22) \quad I_{0-1}^{CD} \cdot I_{1-2}^{CD} = I_{0-2}^{CD}$$

$$(23) \quad I^{CD} = \left(\frac{x_1^1}{x_1^o} \right)^{\alpha_1} \left(\frac{x_2^1}{x_2^o} \right)^{\alpha_2} \dots \left(\frac{x_n^1}{x_n^o} \right)^{\alpha_n}$$

$$(24) \quad I^{CD} = \left(\frac{x_1^1}{x_1^o} \right)^{\alpha_1} \left(\frac{x_1^2}{x_1^1} \right)^{\alpha_1} = \frac{(x_1^1)^{\alpha_1} (x_1^2)^{\alpha_1}}{(x_1^o)^{\alpha_1} (x_1^1)^{\alpha_1}} = \left(\frac{x_1^2}{x_1^o} \right)^{\alpha_1}$$

Thus, the index allows consistent comparisons of adjacent periods. We also use the Fisher quantity index, a geometric means of (25) and (26):

$$(25) \quad I^L = \frac{\Sigma(y^{b+1} \cdot x^b)}{\Sigma(y^b \cdot x^b)} \Rightarrow \frac{\Sigma(x^{b+1} \cdot z^b)}{\Sigma(x^b \cdot z^b)} \quad \forall x, z \in N_0$$

$$(26) \quad I^P = \frac{\Sigma(y^{b+1} \cdot x^{b+1})}{\Sigma(y^b \cdot x^{b+1})} \Rightarrow \frac{\Sigma(x^{b+1} \cdot z^{b+1})}{\Sigma(x^b \cdot z^{b+1})}$$

$$(27) \quad I^F = \sqrt{\left(\frac{\Sigma(x^{b+1} \cdot z^b)}{\Sigma(x^b \cdot z^b)} \right) \cdot \left(\frac{\Sigma(x^{b+1} \cdot z^{b+1})}{\Sigma(x^b \cdot z^{b+1})} \right)} = \left(\frac{\Sigma(x^{b+1} \cdot z^b)}{\Sigma(x^b \cdot z^b)} \cdot \frac{\Sigma(x^{b+1} \cdot z^{b+1})}{\Sigma(x^b \cdot z^{b+1})} \right)^{\frac{1}{2}}$$

¹⁸ The factor reversal test states that the product of the (price, value) index with the analogue quantity index yields the value ratio. As even the most widely used indices, Laspeyres and Paasche, do not fulfil the factor reversal test, hence we do not regard this as a severe drawback.

$$(28) \quad I_1^F = \left[\frac{\left(\frac{x_{IN}^{b+1} z_{IN}^b + x_{AC}^{b+1} z_{AC}^b + x_{CE}^{b+1} z_{CE}^b + x_{CO}^{b+1} z_{CO}^b + x_{PR}^{b+1} z_{PR}^b}{x_{IN}^b z_{IN}^b + x_{AC}^b z_{AC}^b + x_{CE}^b z_{CE}^b + x_{CO}^b z_{CO}^b + x_{PR}^b z_{PR}^b} \right)}{\left(\frac{x_{IN}^{b+1} z_{IN}^{b+1} + x_{AC}^{b+1} z_{AC}^{b+1} + x_{CE}^{b+1} z_{CE}^{b+1} + x_{CO}^{b+1} z_{CO}^{b+1} + x_{PR}^{b+1} z_{PR}^{b+1}}{x_{IN}^b z_{IN}^{b+1} + x_{AC}^b z_{AC}^{b+1} + x_{CE}^b z_{CE}^{b+1} + x_{CO}^b z_{CO}^{b+1} + x_{PR}^b z_{PR}^{b+1}} \right)} \right]^{\frac{1}{2}} \quad \forall x^{b+1} \in N_0, x^b \in R^+ \setminus \{0\}$$

The problem here is that we not really have values for the two periods of the explicit weights z . This did not matter for the Laspeyres index, but it matters for Paasche and Fisher. We take for z^b the maximum values that are achievable in the variables and for z^{b+1} the average that was empirically achieved by all countries in the individual variables.¹⁹

Fisher is superior to other indices since it fulfils identity, linear homogeneity, commensurability and determination. Moreover, it satisfies the factor and time reversal test [29, 30] as well as product test [31, 32]:

$$(29) \quad I_{0-1}^F = \sqrt{I_{0-1}^L I_{0-1}^P} = \sqrt{\left(\frac{\Sigma(x_1 y_0)}{\Sigma(x_0 y_0)} \right) \left(\frac{\Sigma(x_1 y_1)}{\Sigma(x_0 y_1)} \right)} = \frac{1}{\sqrt{\frac{\Sigma(x_0 y_1)}{\Sigma(x_1 y_1)} \frac{\Sigma(x_0 y_0)}{\Sigma(x_1 y_0)}}} \quad \forall x, y \in N_0$$

$$(30) \quad I_{0-1}^L = \frac{1}{I_{1-0}^P} = \sqrt{\frac{1}{I_{1-0}^L} \frac{1}{I_{1-0}^P}} = \frac{1}{\sqrt{I_{1-0}^L I_{1-0}^P}} = \frac{1}{I_{1-0}^F} \quad \Rightarrow I_{0-1}^F I_{1-0}^F = 1$$

$$(31) \quad I_{0-1}^{F^U} = I_{0-1}^{F^X} I_{0-1}^{F^Y} = \sqrt{I_{0-1}^{L^X} I_{0-1}^{P^X}} \sqrt{I_{0-1}^{L^Y} I_{0-1}^{P^Y}} = \sqrt{\left(\frac{\Sigma(x_1 y_0)}{\Sigma(x_0 y_0)} \right) \left(\frac{\Sigma(x_1 y_1)}{\Sigma(x_0 y_1)} \right) \left(\frac{\Sigma(y_1 x_0)}{\Sigma(y_0 x_0)} \right) \left(\frac{\Sigma(y_1 x_1)}{\Sigma(y_0 x_1)} \right)}$$

$$(32) \quad = \sqrt{\left(\frac{\Sigma(x_1 y_1)}{\Sigma(x_0 y_0)} \right) \left(\frac{\Sigma(y_1 x_1)}{\Sigma(y_0 x_1)} \right)} = \sqrt{\left(\frac{\Sigma(x_1 y_1)}{\Sigma(x_0 y_0)} \right)^2} \Rightarrow \frac{\Sigma(x_1 y_1)}{\Sigma(x_0 y_0)} = I_{0-1}^{F^U}$$

Although the Fisher index is appreciated by index theorists, its non-transparent formalization may have prevented a wide-spread application.²⁰

¹⁹ This is a preliminary approach for experimental purposes. When time series are applied, this problem should be solved.

²⁰ This could change now. In the 1990s, the U.S. Bureau of Labour Statistics switched to chain-type indices using a Fisher formula for measuring changes in real GDP. Moreover, it started to address formula bias by adopting the geometric mean for lower-level estimation.

4.4 Robustness of the Results

For the 90 country panel, the results of the variables and indices are given in Table 3 in the Appendix.²¹ Next, Table 4 shows the Top 10 (panel A) as well as the bottom 10 (panel B) of countries in terms of their sum in the variables. Remarkably, more French law countries than English law countries occupy the highest places. Mostly transition and African countries can be found on the lower places.

Concerning the rankings in the individual variables, the highest ranking countries in existence of information sources are Chile and Argentina, but also developed countries such as United Kingdom, Italy, Germany and Jordan. On the bottom, we find transition countries such as Uzbekistan, Russia and African countries such as Tanzania, Burkina Faso, Cote d'Ivoire, Niger and Senegal. This picture is more or less repeated for access to information sources and their centralization degree.

In the content sharing variable, we mostly find developed countries such as the United States, United Kingdom, Canada, Australia and Ireland (here, the English law countries are the majority), but also Argentina, Ecuador and South Africa. Low ranking countries on the other hand are: Azerbaijan, Georgia, Uzbekistan, Moldova as well as Venezuela, Nicaragua and Uruguay, but also Bangladesh.

Lastly in the property rights variables, the top countries are Venezuela, Argentina, Ecuador (all French law countries) as well as Canada, Ireland, UK, Singapore and South Africa (English law). The bottom places are occupied by Senegal, Niger, Zambia, Bangladesh and Burkina Faso as well as Moldova and Uzbekistan.

Concerning the ranking, the results are in general relatively robust, the picture does not vary to much from index to index. However, depending on the construction, countries may move up or down 5-6 places, which is, of course, *not* marginal if the ratings are used for important economic decisions.²²

Also the categories of countries sorted according to World Bank income groups show significant differences. High income countries have on average higher scores in the regulations of access to information sources, the centralization degree and especially the property rights variable. Descriptives for the country groups are reported in Table 5. to 10.²³

The overall sum shows that high income countries achieve the highest score, 36.75 on average. In this category OECD and non-OECD members are included. For the OECD group itself this value is even higher (38.53). The upper middle income countries follow with 33.06

²¹ The ranking change from World Bank (2003) due to revisions and clarifications.

²² Hence, if countries are sorted into quintiles that determine financial assistance, the construction of the index would determine whether a country is eligible for such funds and it would possibly determine the amount of it.

²³ We chose the simple approach and did not weight the results with population or GNI of a country.

and the lower middle income countries with 31.96 and the low income countries 23.52. Hence, the low income countries exhibit the least favourable regulatory environment for business information sharing on average.

In the variable that measured the existence of information sources, the country panel does not differ a lot in terms of the mean. The same holds for the upper three income groups in access to those sources, where the low income group displays a relatively weak result. There are also important differences in the variable on centralization degree. Again the first three countries do not display major differences (around 4.5), but the low income category achieves only 2.5 in this variable on average.

In the content variable, an interesting picture emerges. High income countries again display the highest result, meaning that more information may be shared (14.92 and for OECD only 15.79), lower income countries (12.83) follow before upper middle income countries (11.83). The worst result is again displayed by the low income countries (11.58), however, the distance to the high income ones is not so great (3.34), but to the OECD members it is large (4.21). This difference is even higher in the property rights variable. Here, high income countries again take the lead (8.29 and OECD 8.84), followed by middle income countries (7.61) and lower income countries (5.43). The developing countries with the lowest income only achieve 3.25 in this variable on average, increasing the distance to the developed countries (for all high income countries it is 5.04 and for OECD only 5.59, respectively).

The summary statistics of the whole panel are displayed in Table 5. Note that especially the multiplicative indices, despite some of their advantages, produce extreme results. The variance is especially low for Carli and Dutot as well as Laspeyres and Fisher. The Cobb-Douglas indices produce the worst results in this respect. The same, self-evidently, holds for the standard deviation. The following patterns are discernable: Carli and Dutot are similar in their statistics, the same holds for Jevons and Cobb-Douglas 1. Fisher and Laspeyres are also similar as implied by their construction. An outstanding difference is Cobb-Douglas 2. This index was a partially multiplicative and partially additive one, it produces the most biased results.

We weighted the elementary indices with implicit weights (the artificial bases) to gain relatives. For superlative indices, we attributed experimental explicit weights. It was stated that this preliminary approach can be abandoned as soon as there is time series data. Then, however, rescaling and splicing problems are posed. These indices are intentionally more strongly influenced by categories with higher values such as content, access and centralization degree, for instance. The problem that remains inherent in the additive indices is that countries can even out scores in some categories with higher ones in others.

In the past, especially systems of axioms as well as the fulfilment of certain tests served to judge indices, which we only briefly discuss here. The Fisher properties demand factor reversal,

time reversal, circularity, proportionality, determinateness and commensurability,²⁴ while the Eichhorn-Voeller approach emphasizes monotonicity, dimensionality, commensurability, identity and linear homogeneity. The latter system is independent since any four of these axioms can be satisfied by a function, however, the remaining one will be left unsatisfied (Eichhorn and Voeller 1976: 25 – 26). These axiom systems have in common that they demand certain properties for price indices, therefore, not all of them can be directly applied in our context. In summary, there remains considerable randomness in judging which kind of index should be employed.

V. DATA ANALYSIS

5.1 The Models

As stated in the section on the review of literature, credit market models on information asymmetries generally emphasize the positive side of information sharing (Dell’Ariccia 2001; Khalil and Parigi 2001; Marquez 2002; Padilla and Pagano 1997, 2000; Pagano and Jappelli 1993). Credit reporting serves as a reputational system that generates disciplinary effects for the borrower. Moral hazard, strategic defaults and credit rationing are reduced. The empirical works on this issue thus find positive effects of credit reporting in the sense that access to credit is expanded (Galindo and Miller 2001; Jappelli and Pagano 2000a, 2000b; Miller 2003). In addition, information sharing is positively correlated to borrower mobility as well as heterogeneity and the size of the credit market (Pagano and Jappelli 1993: 1693, 1714). The effects on credit risk are far from clear due to the blurred proxies used for credit risk.

Moreover, Kallberg and Udell (2003) provide evidence on the importance of the information sharing on the lending level. They find that information generated from the exchange has significant explanatory power in prediction models, when one controls for other information easily accessible by lenders. This is value-added in the lending decision for assessing borrower quality. Hence, this is seen as indirect evidence that information exchange is able to solve credibility as well as data coverage problems (Kallberg and Udell 2003: 466). In the following, we are especially interested in the relationship of the regulatory indices (including the simply aggregated sums), the amount of the distribution of credit profiles in the credit market and credit market outcomes.

The problem associated to most of the aforementioned studies is the severe endogeneity in measuring the effects of credit reporting, our survey is no exemption. Whereas we assume the regulatory environment as relatively exogenous, reacting only slowly to the progress in information technology adoption and information distribution, the relationship of information sharing and credit market outcome variables is not so clear.

²⁴ In fact, the Fisher index satisfies 16 different reversal tests that we will not show here (see Fisher 1922).

5.1.1 Regulatory Indices and Information Sharing

In the following, we estimate the relationship of our regulatory proxies with those for information allocation. First, we are interested in the relationship of regulations and the two information proxies (see Table 11 in the Appendix for definitions of variables). First, bivariate correlations of variables, sums and info proxies are given in Table 12 in the Appendix. These correlations show that some of the variables in the index are statistically significant correlated with one another and that most of them are correlated on the 0.05 level with the information proxy except for content. In the first three models, we estimate the relationship of the regulatory variables and information allocation.

H.1: Some regulations are statistically significant in increasing information sharing.

$$1.1: R(IN_POP1) = \alpha + \beta_0 X_{IN} + \beta_1 X_{AC} + \beta_2 X_{CE} + \beta_3 X_{PR} + \beta_4 CRED_GDP + \beta_5 CONTRACT + \beta_6 CON_INDX$$

$$1.2: R(IN_POP3) = \alpha + \beta_0 X_{IN} + \beta_1 X_{AC} + \beta_2 X_{CE} + \beta_3 X_{PR} + \beta_4 CRED_GDP + \beta_5 CONTRACT + \beta_6 CON_INDX$$

$$1.3: R(IN_POP1) = \alpha + \beta_0 SUM + \beta_1 CRED_GDP + \beta_2 CONTRACT + \beta_3 CON_INDX$$

In these regressions (Table 13), only property rights and the sum are significant. Hence, it seems that the sum of regulations works, but individual variables are not significant except for property rights in certain specifications. However, apart from the content variable, all of them are significantly positively correlated with the existence of a privately-owned credit bureau (results are reported in Table 14). The panel excludes outliers Japan, Hong Kong and New Zealand.

Next, we turn to the overall regressions of sums, indices and information allocation. We experimented with several substitutes for our proxies of telecommunication development (mainlines per 1.000 inhabitants, waiting time in years for a mainline, internet hosts per 10.000 inhabitants and connectivity index) as well as for rule of law and enforcement, respectively. The latter was approximated with Rule of Law Index by Kaufmann, Kraay and Zoido-Lobaton, the International Country Risk Guide and the Contract Enforcement Formalism Index (definitions are given in Table 11)

The models are based on the research logic of the cited empirical literature (Galindo and Miller 2001, Jappelli and Pagano 2000). However, we diverge on several points. First, we use other proxies for information distribution and we have more observations in the panel. We also control for other variables (not legal origin, for instance). Instead our intervening variables are telecommunication development, legal enforcement and credit market depth to account for the effect of the regulatory environment on information allocation. In this case, we are interested in

how the results change by introducing different proxies for regulatory environment (namely sums and indices).

H.2: Increasing indices reflect a positive environment for information sharing, hence proxies for information sharing should increase with increasing indices (including sums).

$$2.1: R(IN_POP1) = \alpha + \beta_0 \mathbf{SUM} + \beta_1 CON_INDX + \beta_2 PRCR_EX + \beta_3 PCR_EX + \beta_4 CONTRACT + \beta_5 L_LLRES + \beta_6 COV_PCR + \beta_7 CRED_GDP$$

$$2.2: R(IN_POP1) = \alpha + \beta_0 \mathbf{CARLI} + \beta_1 CON_INDX + \beta_2 PRCR_EX + \beta_3 PCR_EX + \beta_4 CONTRACT + \beta_5 L_LLRES + \beta_6 COV_PCR + \beta_7 CRED_GDP$$

$$2.3: R(IN_POP1) = \alpha + \beta_0 \mathbf{JEVONS} + \beta_1 CON_INDX + \beta_2 PRCR_EX + \beta_3 PCR_EX + \beta_4 CONTRACT + \beta_5 L_LLRES + \beta_6 COV_PCR + \beta_7 CRED_GDP$$

$$2.4: R(IN_POP1) = \alpha + \beta_0 \mathbf{CDI} + \beta_1 CON_INDX + \beta_2 PRCR_EX + \beta_3 PCR_EX + \beta_4 CONTRACT + \beta_5 L_LLRES + \beta_6 COV_PCR + \beta_7 CRED_GDP$$

$$2.5: R(IN_POP1) = \alpha + \beta_0 \mathbf{LASPEYRES} + \beta_1 CON_INDX + \beta_2 PRCR_EX + \beta_3 PCR_EX + \beta_4 CONTRACT + \beta_5 L_LLRES + \beta_6 COV_PCR + \beta_7 CRED_GDP$$

$$2.6: R(IN_POP1) = \alpha + \beta_0 \mathbf{FISHER} + \beta_1 CON_INDX + \beta_2 PRCR_EX + \beta_3 PCR_EX + \beta_4 CONTRACT + \beta_5 L_LLRES + \beta_6 COV_PCR + \beta_7 CRED_GDP$$

We estimate six different models that only vary to the extent of their differing regulatory indices. Table 15 in the Appendix presents the results. The comparisons of the adjusted R squared already shows that some of the indices derive better result, when the other variables are held constant.

We control for different variables that might influence the relationship of regulatory environment and information allocation, such as telecommunication (CON_INDXX), existence of a private credit bureau (PRCR_EX), existence of a public credit registry (PCR_EX), contract enforcement (CONTRACT), risk of lending (L_LLRES), coverage of the PCR (COV_PCR) and the size of the credit market (CRED_GDP). Durbin Watson statistics as well as tolerance statistics indicate that autocorrelation and multicollinearity in the model specifications is not so much a problem.²⁵ The results show that in all cases, the regulatory proxy remains significant, except for the Fisher index.

Moreover, we would expect the indicators to enter with the following signs: connectivity (+), coverage via a PCR (+) and open regulatory environment (+) that provides for accessible and centralized information sources and a high volume of content sharing as well as clearly defined property rights for data subjects. Negative influences should be if no PRCR or PCR exists, if the credit market size is small and contract enforcement as well as credit risk decreases. As the regressions show, most of the variables are insignificant.

²⁵ The same does not hold for other specifications with which we experimented (results are not reported).

The highest explanatory power has the connectivity index (which is certainly also a proxy of economic development due to high correlation with GNI pc), however, the regulatory proxies follow on the second position.

The regulatory environment in business reporting may be more exogenous than other factors. This is due to the regulatory lag displayed by different legislative systems as well as the fact that business reporting as a very specialized activity has not attracted the legislators' interest so far (there is not a single country with an act on commercial reporting). Hence, the patchwork of laws might be influenced by other considerations such as data protection and bank secrecy. Altogether, the regulation is statistically significant and the coefficients have the expected signs, but some of the weaker tolerance statistics indicate increasing multicollinearity.

In general, we can conclude that the regulatory environment plays a significant role in the distribution of information in credit markets. This holds especially for property rights, i.e. the right of access, correction and blocking of information in case of disputes.

5.1.2 Information Sharing and Credit Markets

In a second step, we estimate the effects information sharing has on different market and credit risk indicators. Table 16 (Appendix) displays the simple bivariate correlations of different information proxies with the variable for credit (for the whole panel excluding influential outliers Hong Kong, Japan and New Zealand). A major problem of the following models are their endogeneity. We estimate the following models only for a panel with PRCRs (36 and 37 observations).

H.3: Increasing information allocation extents access to credit, hence a positive relationship with credit access should be discernable.

$$3.1: R(\text{CRED_GDP}) = \alpha + \beta_0 \text{IN_POP1} + \beta_1 \text{PCR_EX} + \beta_2 \text{COV_PCR} + \beta_3 \text{PCR_QUAL} \\ + \beta_4 \text{CON_DE} + \beta_5 \text{GDP_GR} + \beta_6 \text{SPREAD}$$

$$3.2: R(\text{CRED_GDP}) = \alpha + \beta_0 \text{IN_POP1} + \beta_1 \text{PCR_EX} + \beta_2 \text{COV_PCR} + \beta_3 \text{PCR_QUAL} \\ + \beta_4 \text{CON_DE} + \beta_5 \text{GDP_GR} + \beta_6 \text{SPREAD} + \beta_7 \text{L_IMP}$$

$$3.3: R(\text{CRED_GDP}) = \alpha + \beta_0 \text{IN_POP1} + \beta_1 \text{PCR_EX} + \beta_2 \text{COV_PCR} + \beta_3 \text{PCR_QUAL} \\ + \beta_4 \text{CON_DE} + \beta_5 \text{GDP_GR} + \beta_6 \text{SPREAD} + \beta_7 \text{GNI_PC}$$

Results of the regressions are reported in Table 17 in the Appendix. The adjusted R squared are lower than in the other models, however, the info proxy remains significant especially when we control for proxies for the PCR (such as existence, coverage, quality), which also influence bank lending/GDP. The indicators enter with the expected signs: positive influences are information distribution by private registries and quality of PCR information. The GDP growth rate is not significant. Negative influences are PCR existence, interest rate spread and concentration on the

deposit side of the balance sheets. The adjusted R squared is slightly reduced if one includes a risk indicator (loans impaired, L_IMP).

It has to be noted that the weak significance of the info proxy vanished completely when one controls for contract enforcement or different telecommunication proxies. Moreover, it is only significant on the .10 level. The explanatory power overall is mediocre and in the different specifications and the standardized Beta also show that the power of explanation of the individual info proxies is not very high. In the third model, GNI per capita is included (L_IMP is excluded), the regression shows that in this case, the info proxy is not significant anymore.

VI. CONCLUSION

The present paper focused on the regulation of the sharing of business information by institutions in industrialized and developing countries. It presented a new panel that maps the regulatory environment for commercial reporting. The indices that were developed were introduced in the econometric analysis to show their impact in the regressions. Apart from the methodological side, we were interested in the impact of regulation on information sharing as well as the effect of the latter on credit market breadth.

The major differences that could be found using descriptives showed that high income countries achieve higher scores than middle and low income countries on average and those scores are even higher for OECD members only. Low income countries, therefore, do have the least favourable regulatory environment for information sharing on firms. This result is especially driven by large distances of poor countries to rich ones in the variables of content, property rights and centralization degree. The distance is not so high in existence of information sources as well as access. This is already indicative for regulatory reform as will be discussed below.

The regressions showed that the regulatory environment is crucial for information sharing and that it has a significant impact. More information sources (mandated via laws or regulation), better access to them, a high centralization degree as well as increasing content are important for a thriving credit market. Property rights to information play a special role. They are not only significant, but they should be strengthened to further increase information flows. It seems that firms as well as individuals tend to give more information, when they know that they can access, correct and block this information in cases of dispute.

Reforms have to include several things. First and foremost, they should be seen within the democratic culture of a country. We would *not* propose *any* data collection and centralization measures for undemocratic regimes. Second, it seems that there has to be a rise in public awareness of commercial reporting. This is especially the case for Asia, Middle East and the African countries. Eastern European countries already seem to get aware of the advantages.

Moreover, for Africa, the technical infrastructure has to be established. Here, commercial reporting is in many cases still paper based and national registers are not available.

Regulatory reforms in this area should follow a “sequencing approach.” first, the property right regime should be reformed to maintain transparency and high data quality. Property rights should be structured in a way that the firm or the individual clearly knows what kind of rights may be exerted concerning the information that is distributed in the market. Of special importance are certain basic rights such as access, correction and blocking in case of dispute. However, also important is the right to know to whom the information was disclosed as well as the right to updated data. This might help to reduce the scepticism some firms reveal towards commercial reporting.

In a second step, new information sources should be established while at the same time they should be regulated in a way that they are accessible by credit registries. The existing sources should be centralized whenever possible, this is a major lack in the developing countries. This kind of approach would lead to increased information flows that facilitate the access to finance especially for small and medium companies. Of course, the technical infrastructure is of major importance in this respect. An accelerated and more efficient flow of information in markets is based upon telecommunication infrastructure.

As benchmark, the achievement of industrialized country scores would be probably too cumbersome for low income countries. Hence, the benchmark could be their regional average or that of the major trading partners. As member of a Free Trade Agreement, the average of trading partners could serve as benchmark. Within individual countries cooperation of all interested parties should be strengthened to realize the scale effects in credit reporting. Moreover, across borders, regional integration could certainly be increased by establishing international reporting networks as described for Europe. These networks only operate if credit reports are standardized. After achieving the mean of the region, a country could move on by reforming its regime according to achieving better results such as the countries in the next higher category.

Some of the proposed measures severely hinge on the adoption of information technology as is the case in centralization. In addition, technological knowledge is needed to install such information systems. Here, industrialized countries could provide valuable assistance and urgently needed technology transfer.

References

- Acemoglu, D., S. Johnson, and J.A. Robinson (2001). The Colonial Origins of Comparative Development: An Empirical Investigation, *American Economic Review*, 91 (5): 1369-1401.
- Admati A.A. and P.C. Pfleiderer (2000), Forcing Firms to Talk: Financial Disclosure Regulation and Externalities, *Review of Financial Studies*, Vol. 13, 2000, pp. 479-519
- Akerlof, G.A. (1970). The Market For 'Lemons': Quality Uncertainty and the Market Mechanism, *Quarterly Journal of Economics* 84: 488 – 500.
- Asch, M. (1995), How the RMA/Fair, Isaac Credit Scoring Model was built, *Journal of Commercial Lending*, 77 (10): 1 – 4.
- Avery, B.R. et al. (2000), Credit Scoring: Statistical Issues and Evidence from Credit-Bureau Files, *Real Estate Economics*, 28 (3): 523 – 547.
- Barta, J. and A. Vogt, 1997. The Making of Tests for Index Numbers (Physica-Verlag, Heidelberg).
- Barth, J.R., G. Caprio and R. Levine (2002). Bank Regulation and Supervision: What Works Best? NBER Working Paper, no. w9323 (Nov.), <http://papers.nber.org/papers/W9323>
- Barron, J.M. and M. Staten (2003). The Value of Comprehensive Credit Reports: Lessons from the U.S. Experience, in M. Miller (ed.), *Credit Reporting Systems and the International Economy* (MIT Press, Cambridge).
- Besanko D. and A. V. Thakor (1987). Competitive Equilibrium in the Credit Market under Asymmetric Information, *Journal of Economic Theory* 42: 167 – 182.
- Bester, H. (1985), Screening versus Rationing in Credit Markets with Imperfect Information, *American Economic Review*, 75: 850 – 855.
- Bonini, C.P. and W.A. Spurr (1973), *Statistical Analysis for Business Decisions* (Richard D. Irwin, Inc., Homewood).
- Bostic, R. and P. Calem (2003) Privacy Restrictions and the Use of Data at Credit Registries, in: M. Miller (ed.), *Credit Reporting Systems and the International Economy* (MIT Press, Cambridge).
- Campbell, D. (1992). *International Bank Secrecy*, (Sweet & Maxwell, London).
- Cole, Robert H. (1992), *Consumer and Commercial Credit Management* (Irwin, Homewood).
- Dell'Araccia, G. (2001). Asymmetric Information and the Structure of the Banking Industry. *European Economic Review* 40: 1957–1980.
- Del Villar, R., A.D. de Leon and J. Gil Hubert (2003), Regulation of Personal Data Protection and of Reporting Agencies: A Comparison of Selected Countries of Latin America, the United States and Europe Union, in M. Miller (ed.), *Credit Reporting Systems and the International Economy* (MIT Press, Cambridge).
- Diewert, W.E. (1996), *Axiomatic and Economic Approaches to International Comparisons*, University of British Columbia Discussion Paper, No. 96-11.
- . (1993). Index Numbers, in Diewert W.E. and A.O. Nakamura, *Essays in Index Number Theory*, Vol. 1 (North-Holland, Amsterdam/London), 71 – 104.
- Djankov, S., R. La Porta, F. Lopez-de-Silanes and A. Shleifer (2002). The Regulation of Entry, *Quarterly Journal of Economics* CXVII (1): 1 – 37.
- . (*forthcoming*). The Practice of Justice, *forthcoming* in May 2003, *Quarterly Journal of Economics*.
- Dollar, D. and A. Kraay (*forthcoming*). Institutions, Trade, and Growth, *Carnegie-Rochester Conference Series on Public Policy*.
- Eichhorn W. (1978). What is an Economic Index? An Attempt of an Answer, in: W. Eichhorn, R. Henn, O. Opitz and R.W. Shepard, *Theory and Applications of Economic Indices* (Physica Verlag, Würzburg).
- Eichhorn W. and J. Voeller (1976). Theory of the Price Index. Fisher's Test Approach and Generalisations. *Lecture Notes in Economics and Mathematical Systems*, 140 (Springer Verlag: Berlin-Heidelberg).
- Estrella, A. et al. (2000). Credit Ratings and Complementary Sources of Credit Quality Information, *Basel Committee on Banking Supervision Working Papers*, No. 3 (August).
- Feldman, R. (1997), Small Business Loans, Small Banks and a Big Change in Technology Called Credit Scoring, *Region* (Federal Reserve Bank of Minneapolis), 11 (3): 18 – 25.
- Fisher, I. (1922). *The Making of Index Numbers* (Houghton Mifflin Company, Boston/New York).
- Funke, H., G. Hacker and J. Voeller (1979). Fisher's Circular Test Reconsidered, *Schweizerische Zeitschrift für Volkswirtschaft und Statistik* 115 (4): 677 – 688.
- Furush, E.E. (1995), The Small Business Bandwagon (Management Strategies), *Journal of Commercial Lending*, 77 (6): 1 – 4.

- Galindo, A. and M.J. Miller (2001). Can Credit Registries Reduce Credit Constraints? Empirical Evidence on the Role of Credit Registries in Firm Investment Decisions, Paper prepared for the Annual Meetings of the Inter-American Development Bank, Santiago Chile, March.
- Greenleaf, G. (1996) International Privacy Standards – Implications for Australia and the Asia-Pacific, *Journal of Computer Mediated Communications*, 2 (1), <http://jcmc.huji.ac.il/>
- Guadamuz, A. (2000), Habeas Data: The Latin American Response to Data Protection, *The Journal of Information, Law and Technology*, 2, <http://elj.warwick.ac.uk/jilt/00-2/guadamuz.html>
- International Monetary Fund, 2002. PPI Manual, <http://www.imf.org/external/np/sta/teggpi>
- Jappelli, T. and M. Pagano (2000a), Information Sharing, Lending and Defaults: Cross-Country Evidence, Working Paper, (October), http://www.banque-france.fr/gb/fondatio/papers/discuss/shar_old.htm
- . (2000b), Information Sharing in Credit Markets: The European Experience, CSEF Working Paper No. 35 (March).
- Jentzsch, N. (2003a). The Regulation of Financial Privacy: United States versus Europe, ECRI Research Report, No. 5, Brussels.
- . (2001). The Economics and Regulation of Financial Privacy – A Comparative Analysis of the United States and Europe, JFKI Working Paper, no. 128/2001.
- Kallberg, J.G. and G.F. Udell (2003). Private Business Information Exchange in the U.S., in M. Miller (ed.), *Credit Reporting Systems and the International Economy* (MIT Press, Cambridge).
- Kaufmann, D., A. Kraay and P. Zoido-Lobaton (2002), Governance Matters II – Updated Indicators for 2000/2001, World Bank Policy Research Working Paper, No. 2772, Washington, DC.
- . (1999). Aggregating Governance Indicators, World Bank Policy Research Working Paper, No. 2195, Washington, DC.
- Khalil F. and B.M. Parigi (2001). Screening, Monitoring and Consumer Credit, Draft Paper, <http://www.iue.it/FinConsEU/workingpapers/kpfall2001.PDF>
- Knack, S. (2002). Governance and Growth: Measurement and Evidence, Working Paper, World Bank, <http://www.inform.umd.edu/EdRes/Colleges/BSOS/Depts/IRIS/IRIS/docs/fr8.pdf>
- La Porta, R., F. Lopez-de-Silanes, and A. Shleifer (2002). What Works in Security Laws? Working Paper <http://www.law.uchicago.edu/Lawecon/workshop-papers/shleifer.pdf>
- La Porta, R. et al. (1997). Legal Determinants of External Finance, *Journal of Finance* 52: 1131 – 1150.
- La Porta, R., F. Lopez-de-Silanes, A. Shleifer and R. Vishny (1998), Law and Finance, *Journal of Political Economy* 106: 1113 – 1155.
- Love I. and N. Mylenko (2003). Credit Reporting and Perceived Financing Constraints, Draft.
- Lucas, P. (2002), Commercial Credit Bureaus: Keeping an Eye on Business, Collections & Credit Risk (Special Report, February 2002).
- Marquez, R. (2002). Competition, Adverse Selection, and Information Dispersion in the Banking Industry, *Review of Financial Studies* 15 (3): 901-926.
- Mester, L. (1997), What's the Point of Credit Scoring?, *Business Review* (Federal Reserve Bank of Philadelphia, Sept./Oct., 3 – 16.
- Miller, M. (2003). Credit Reporting Systems Around the Globe: The State of the Art in Public and Private Credit Registries, in M. Miller (ed.), *Credit Reporting Systems and the International Economy* (MIT Press, Cambridge).
- Olegario, R. (2003), Credit Reporting Agencies: A Historical Perspective, in M. Miller (ed.), *Credit Reporting Systems and the International Economy* (MIT Press, Cambridge).
- Padilla, J.A. and M. Pagano (1997). Endogenous Communication Among Lenders and Entrepreneurial Incentives, *Review of Financial Studies* 10 (1), 205 – 236.
- . (2000). Sharing Default Information as a Borrower Discipline Device, *European Economic Review* 44, 1951 – 1980.
- Pagano, M. and T. Jappelli (1993) Information Sharing in Credit Markets, *Journal of Finance* 48 (5): 1693 – 1718.
- Reidenberg, J.R. (1996), International Data Transfers and Methods to Strengthen International Cooperation, 20th Conference of Data Protection Authorities, 1998.
- Robertson Demby, E. (2001), Getting a Line on Lending, Collections & Credit Risk (Special Report, January 2001).
- Rodrik, D., A. Subramanian, F. Trebbi (2002). Institutions Rule: The Primacy of Institutions over Geography and Integration in Economic Development, Working Paper, <http://ksghome.harvard.edu/~drodrik.academic.ksq/institutionsrule.%205.0.pdf>
- Rothschild, Michael and Joseph E. Stiglitz (1976). Equilibrium in Competitive Insurance Markets: An Essay on the Economics of Imperfect Information, *Quarterly Journal of Economics* 90: 629 – 650.
- Schnell, R. (1993). Methoden der Empirischen Sozialforschung (Oldenburg, Wien).
- Securities and Exchange Commission (2001), Form 10-K The Dun & Bradstreet Corporation, Washington D.C.

- Stiglitz, J.E. and A. Weiss (1981). Credit Rationing in Markets with Imperfect Information, *American Economic Review* 72 (3): 393 – 410.
- _____. (1983). Incentive Effects of Terminations: Applications to the Credit and Labour Markets, *American Economic Review* 73: 912 – 927.
- _____. (1992). Asymmetric Information in Credit Markets and Its Implications for Macro-economics, *Oxford Economic Papers* 44 (4): 694 – 724.
- Van Cayseele, P., J. Bouckaert and H. Degryse (1994). Credit Market Structure and Information Sharing Mechanisms, in: A. van Witteloostuijn (ed.), *Market Evolution – Competition and Cooperation* (Kluwer Academic Publishers, Boston).
- Von der Lippe, P.M. (2002a). General Introduction and Elementary Price Index Theory, TES Script, www.vwl.uni-essen.de/dt/stat
- _____. (2002b) Log-change Index Numbers I: Cobb-Douglas and Törnqvist-Index, Script, www.vwl.uni-essen.de/dt/stat/dokumente/tes/preb34.pdf
- World Bank (2003). *Doing Business*, Washington, DC.
- World Bank (2002a). CPI Manual Draft, <http://www.worldbank.org/data/icp/documents/chap20e.doc>
- _____. (2002b). Country Policy and Institutional Assessment Questionnaire, World Bank, <http://siteresources.worldbank.org/IDA/Resources/CPIA2002.pdf>

APPENDIX

Box 1. International Data Protection Instruments

1980 OECD Guidelines for Privacy Protection and Trans-border Personal Data Flow Protection

1981 EC Convention for Individuals Protection in Relation to Personal Data Automated Processing

1990 UN Guidelines for Personal Data Automated Files

1995 EU Data Protection Directive

Table 1. Number of Indicators and Variables

Variables	Variables	Indicators
Existence of Information Sources	$X_{IN,x}$	13
Access to Information Sources	$X_{AC,x}$	18
Centralization Degree of Information Sources	$X_{CE,x}$	16
Content of Information	$X_{CO,x}$	29
Property Rights to Information	$X_{PR,x}$	14
TOTAL		90

Box 2. Weight-system bias

Different weight systems introduce systematic biases as Fisher (1922: 54) has already showed:

$$(1) p_0^b q_0^b, p_1^b q_1^b, \dots, p_n^b q_n^b$$

$$(2) p_0^b q_0^{b+1}, p_1^b q_1^{b+1}, \dots, p_n^b q_n^{b+n}$$

$$(3) p_0^{b+1} q_0^b, p_1^{b+1} q_1^b, \dots, p_n^{b+1} q_n^b$$

$$(4) p_0^{b+1} q_0^{b+1}, p_1^{b+1} q_1^{b+1}, \dots, p_n^{b+1} q_n^{b+1}$$

For any given index formula, systems (1) and (2) produce smaller results than systems (3) and (4). It strictly holds that (1)<(3) and (2)<(4), whereas (1)<(4) and (2)<(3) is highly probable, but not necessarily the case.

Box 3. The Weighting System Approach

As stated, two types of weighting systems may be employed. In the empirical one, correlation or regression coefficients could be used as weights (see Table 2 which gives the percentage of weight assigned taking the aggregated total (column 1, 2). Next, the correlation coefficients are displayed (variables correlated with indices) as percentage and they are normalized to 100.

If we now take the empirical weights as benchmarks (columns 3, 5, etc.) and calculate the divergence as ratio of empirical weight and quantity-based weight (columns 4, 6, etc.), one gets a notion of the performance of quantity-based weights compared to empirical ones.

From index to index the correlation coefficients change, therefore, also the divergence changes. We have to admit that there are large deviations (see, for instance, column 8, x_{CO}). A purely empirical approach would demand the re-estimation of weights from year to year, which creates problems for intertemporal comparisons. However, a compromise would be to take the empirical weights and hold them constant of a period of time (say 5 years, for instance). In this paper, the quantity based approach is preferred for reasons of transparency and time-invariance of the index weighting system.

Table 2. Weighting Systems
Panel A. Carli, Dutot and Jevons*

	(1) ABS.	(2) ABS. weight	(3) Carli weight (=100)	(4) abs. Devi. (2)/(3) *100	(5) Dutot weight (=100)	(6) abs. Devi. (2)/(5) *100	(7) Jevons weight (=100)	(8) abs. Devi. (2)/(7) *100
Xin	13	14,44	20,01	72,19	18,95	76,22	20,04	72,09
Xac	18	20,00	19,26	103,84	19,37	103,25	20,28	98,60
Xce	16	17,78	19,96	89,07	18,83	94,41	23,21	76,60
Xco	29	32,22	19,82	162,57	23,30	138,29	14,34	224,66
Xpr	14	15,56	20,96	74,22	19,54	79,61	22,13	70,29
sum	90,00	100,00	100,01	501,89	99,99	491,79	100,00	542,25

Panel B. Cobb-Douglas 1, Cobb-Douglas 2, Laspeyres and Fisher*

	(1) ABS.	(9) CD1 weight (=100)	(10) abs. Devi. (2)/(9) *100	(11) CD2 weight (=100)	(12) abs. Devi. (2)/(11) *100	(13) Lasp weight (=100)	(14) abs. Devi. (2)/(13) *100	(15) Fisher weight (=100)	(16) abs. Devi. (2)/(15) *100
Xin	13	19,14	75,47	20,26	71,30	17,78	81,24	17,28	83,59
Xac	18	20,41	97,99	21,39	93,50	19,20	104,17	18,85	106,10
Xce	16	22,76	78,11	22,26	79,86	17,39	102,23	16,56	107,35
Xco	29	15,65	205,89	15,72	204,98	27,43	117,47	28,79	111,92
Xpr	14	22,05	70,55	20,38	76,33	18,20	85,47	18,51	84,04
sum	90,00	100,01	528,01	100,01	525,96	100,00	490,58	99,99	493,01

* devi denotes the percentage deviation of the empirical weighting of the respective index from the quantity-based weights (=100). Numbers are rounded

Table 3. Variables, Sums and Indices (90 countries)

Country	xIN	xAC	xCE	xCO	xPR	Sum	Carli	Dutot	Jevon	CD1	CD2	Laspey	Fisher
Argentina	5	10	4	25	12	56	1,1638	1,2444	1,0478	1,1267	3,1106	1,3460	1,40359
Australia	3	6	4	21	10	44	0,9010	0,9778	0,7954	0,8683	2,5300	1,0750	1,12959
Azerbaijan	2	2	3	7	8	22	0,5061	0,4889	0,4267	0,4235	1,6556	0,4759	0,49298
Bangladesh	3	2	0	5	0	10	0,2057	0,2222	0,0000	0,0000	0,4697	0,2464	0,25279
Belarus	3	1	6	8	4	22	0,4892	0,4889	0,4138	0,4144	1,5516	0,4938	0,50014
Belgium	4	5	6	24	7	46	0,9152	1,0222	0,8425	0,9264	2,5914	1,1557	1,2111
Benin	3	4	4	13	10	34	0,7462	0,7556	0,6663	0,6861	2,2102	0,7749	0,80591
Bolivia	3	2	6	8	4	23	0,5114	0,5111	0,4753	0,4760	1,7823	0,5140	0,51784
Brazil	4	5	5	18	8	40	0,8360	0,8889	0,7876	0,8346	2,4974	0,9586	0,9971
Bulgaria	8	6	7	12	4	37	0,8343	0,8222	0,8057	0,8002	2,6928	0,8152	0,80922
Burk.Faso	0	1	0	15	0	16	0,2291	0,3556	0,0000	0,0000	0,0000	0,5073	0,55727
Canada	3	4	5	22	12	46	0,9525	1,0222	0,8028	0,8700	2,3962	1,1165	1,17749
Chile	8	7	11	10	10	46	1,1004	1,0222	1,0534	0,9725	2,9422	0,9362	0,91575
China	2	3	0	8	4	17	0,3528	0,3778	0,0000	0,0000	1,1796	0,4121	0,43375
Costa Rica	4	4	5	10	10	33	0,7606	0,7333	0,7003	0,6838	2,2703	0,7100	0,72499
Côte d'Iv.	0	1	0	15	0	16	0,2291	0,3556	0,0000	0,0000	0,0000	0,5073	0,55727
Croatia	4	8	5	11	4	32	0,6919	0,7111	0,6826	0,7024	2,5053	0,7290	0,72984
Czech Rep.	5	6	6	9	9	35	0,8185	0,7778	0,7896	0,7522	2,5281	0,7346	0,73436
Denmark	0	1	0	7	8	16	0,3474	0,3556	0,0000	0,0000	0,0000	0,3729	0,4054
Dom. Rep.	6	4	9	19	10	48	1,0463	1,0667	0,9712	0,9898	2,6638	1,1030	1,1335
Ecuador	5	9	6	22	12	54	1,1502	1,2000	1,0846	1,1378	3,0631	1,2643	1,30749
Egypt, AR.	2	5	0	11	4	22	0,4387	0,4889	0,0000	0,0000	1,3734	0,5498	0,57782

Finland	5	8	5	9	8	35	0,8093	0,7778	0,7876	0,7574	2,6316	0,7413	0,73793
France	2	4	3	10	7	26	0,5634	0,5778	0,5125	0,5344	1,9558	0,5980	0,61963
Georgia	2	4	0	7	4	17	0,3613	0,3778	0,0000	0,0000	1,2246	0,3998	0,41598
Germany	6	4	4	14	10	38	0,8523	0,8444	0,7769	0,7766	2,4626	0,8511	0,87905
Greece	4	5	1	9	9	28	0,6405	0,6222	0,5088	0,5107	2,1454	0,6103	0,6303
Guatemala	4	4	6	9	4	27	0,6004	0,6000	0,5921	0,5920	2,1596	0,6013	0,6016
Honduras	2	5	3	7	4	21	0,4585	0,4667	0,4462	0,4566	1,9104	0,4737	0,4782
Hong Kong	2	3	4	6	6	21	0,4824	0,4667	0,4487	0,4398	1,7691	0,4502	0,4555
Hungary	4	5	4	14	4	31	0,6416	0,6889	0,6236	0,6641	2,3121	0,7480	0,7702
India	3	6	1	12	4	26	0,5304	0,5778	0,4487	0,4914	2,1016	0,6349	0,6589
Iran	3	3	1	8	5	20	0,4372	0,4444	0,3766	0,3887	1,7701	0,4603	0,4785
Ireland	3	4	5	22	12	46	0,9525	1,0222	0,8028	0,8700	2,3962	1,1165	1,1788
Italy	7	9	7	19	10	52	1,1382	1,1556	1,1202	1,1383	3,1582	1,1825	1,2049
Japan	3	4	4	13	4	28	0,5748	0,6222	0,5548	0,5949	0,5949	0,6809	0,7040
Jordan	8	5	12	8	4	37	0,8819	0,8222	0,7979	0,7452	2,5808	0,7548	0,7199
Kazakhstan	3	6	5	17	4	35	0,6994	0,7778	0,6638	0,7319	2,3825	0,8690	0,8985
Kenya	3	2	4	10	4	23	0,4890	0,5111	0,4583	0,4759	1,7794	0,5431	0,5604
Latvia	4	5	6	12	4	31	0,6640	0,6889	0,6558	0,6792	2,3272	0,7189	0,7641
Lebanon	4	6	5	12	4	31	0,6612	0,6889	0,6558	0,6819	2,3875	0,7212	0,7306
Lithuania	3	4	3	8	4	22	0,4808	0,4889	0,4753	0,4834	1,9636	0,5006	0,5089
Madagascar	3	2	5	9	2	21	0,4430	0,4667	0,4085	0,4297	1,7214	0,4972	0,5051
Malawi	2	3	0	20	4	29	0,5184	0,6444	0,0000	0,0000	1,3716	0,8018	0,8659
Malaysia	4	6	5	12	4	31	0,6612	0,6889	0,6558	0,6819	2,3875	0,7212	0,7306
Mali	3	4	4	13	10	34	0,7462	0,7556	0,6663	0,6861	2,2102	0,7749	0,8059
Mexico	3	4	6	12	10	35	0,7824	0,7778	0,7112	0,7186	2,2418	0,7783	0,7996
Moldova	3	4	5	3	0	15	0,3476	0,3333	0,0000	0,0000	1,1572	0,3113	0,2889
Mongolia	4	5	7	20	2	38	0,7422	0,8444	0,6521	0,7388	2,4109	0,9653	0,9970
Morocco	3	6	2	11	4	26	0,5417	0,5778	0,5065	0,5405	2,1549	0,6204	0,6377
Mozamb.	3	5	3	15	4	30	0,5996	0,6667	0,5636	0,6190	2,2006	0,7480	0,7790
Netherlands	4	7	5	17	8	41	0,8667	0,9111	0,8329	0,8764	2,6539	0,9664	0,9966
N. Zealand	4	7	5	19	10	45	0,9514	1,0000	0,8905	0,9405	2,7199	1,0627	1,1027
Nicaragua	3	4	3	7	6	23	0,5242	0,5111	0,5018	0,4932	1,9826	0,4994	0,5068
Niger	0	1	0	15	0	16	0,2291	0,3556	0,0000	0,0000	0,0000	0,5073	0,5573
Nigeria	2	4	3	10	4	23	0,4776	0,5111	0,4583	0,4899	1,8961	0,5510	0,5687
Pakistan	4	6	3	24	4	41	0,7767	0,9111	0,6801	0,7786	2,5213	1,0750	1,1332
Panama	2	5	4	11	10	32	0,7101	0,7111	0,6214	0,6411	2,1417	0,7156	0,7393
Peru	3	8	6	21	10	48	0,9955	1,0667	0,9136	0,9885	2,7375	1,1512	1,1950
Philippines	6	7	8	15	4	40	0,8614	0,8889	0,8425	0,8711	2,7521	0,9216	0,9255
Poland	2	5	1	9	8	25	0,5504	0,5556	0,4326	0,4537	1,9269	0,5655	0,5886
Portugal	1	6	4	12	8	31	0,6582	0,6889	0,5460	0,5976	2,0025	0,7223	0,7467
Romania	6	11	9	15	4	45	0,9752	1,0000	0,9442	0,9737	3,0342	1,0202	1,0109
Russia	1	3	4	10	4	22	0,4497	0,4889	0,3989	0,4404	1,6465	0,5342	0,5534
Saudi Arab.	3	3	1	16	0	23	0,4047	0,5111	0,0000	0,0000	1,2371	0,6417	0,6816
Senegal	0	1	0	15	0	16	0,2291	0,3556	0,0000	0,0000	0,0000	0,5073	0,5573
Singapore	6	9	8	13	12	48	1,1068	1,0667	1,0725	1,0378	3,0178	1,0224	1,0248
Slovak Rep.	3	6	6	14	12	41	0,9116	0,9111	0,8249	0,8425	2,4957	0,9149	0,9412
Slovenia	3	5	3	20	0	31	0,5543	0,6889	0,0000	0,0000	1,5499	0,8477	0,8911
South Africa	3	7	4	22	12	48	0,9942	1,0667	0,8587	0,9352	2,6495	1,1590	1,2174
Spain	4	5	6	15	10	40	0,8768	0,8889	0,8236	0,8416	2,5017	0,9104	0,9378
Sri Lanka	3	5	3	15	4	30	0,5996	0,6667	0,5636	0,6190	2,2006	0,7480	0,7790

Sweden	4	7	5	12	7	35	0,7692	0,7778	0,7564	0,7673	2,5362	0,7884	0,9246
Switzerland	3	6	3	12	8	32	0,6947	0,7111	0,6421	0,6654	2,3106	0,7335	0,7566
Syria	3	6	1	11	4	25	0,5167	0,5556	0,4410	0,4778	2,0802	0,6025	0,6229
Taiwan	2	4	4	9	9	28	0,6317	0,6222	0,5590	0,5654	1,9948	0,6148	0,6324
Tanzania	1	4	2	14	4	25	0,4771	0,5556	0,3935	0,4596	1,7434	0,6484	0,6854
Thailand	3	6	1	22	8	40	0,7827	0,8889	0,5819	0,6654	2,3550	1,0224	1,0868
Tunisia	4	6	3	9	4	26	0,5698	0,5778	0,5590	0,5676	2,2473	0,5879	0,5927
Ukraine	3	5	5	10	4	27	0,5806	0,6000	0,5756	0,5948	2,1657	0,6215	0,6284
UA Emira.	2	5	1	10	4	22	0,4499	0,4889	0,3847	0,4214	1,8708	0,5353	0,5567
UK	6	11	10	20	12	59	1,2978	1,3111	1,2724	1,2914	3,3309	1,3259	1,3425
US	3	7	3	23	8	44	0,8687	0,9778	0,7542	0,8463	2,5695	1,1109	1,1705
Uruguay	3	3	0	4	10	20	0,4999	0,4444	0,0000	0,0000	1,2330	0,3908	0,4044
Uzbekistan	2	3	0	5	0	10	0,1972	0,2222	0,0000	0,0000	0,4804	0,2520	0,2582
Venezuela	2	4	5	6	14	31	0,7582	0,6889	0,5887	0,55295	1,9982	0,6137	0,6240
Yemen, Rep.	3	6	1	10	4	24	0,5029	0,5333	0,4326	0,4634	2,0573	0,5700	0,5868
Yugoslavia	3	6	2	7	4	22	0,4865	0,4889	0,4628	0,4672	2,0526	0,4905	0,4934
Zambia	2	5	3	12	0	22	0,4132	0,4889	0,0000	0,0000	1,3355	0,5734	0,7799
Zimbabwe	4	6	4	12	4	30	0,6362	0,6667	0,6271	0,6554	2,3568	0,7033	0,0000

Table 4. Top 10 and Bottom 10 of the Countries (by Sum)
Panel A. Top 10 of Countries

Country	Legalo	xIN	xAC	xCE	xCO	xPR	Sum	Carli	Dutot	Jevon	CD1	CD2	Laspey	Fisher
UK	English	6	11	10	20	12	59	1,2978	1,3111	1,2724	1,2914	3,3309	1,3259	1,3425
Argentina	French	5	10	4	25	12	56	1,1638	1,2444	1,0478	1,1267	3,1106	1,3460	1,40359
Ecuador	French	5	9	6	22	12	54	1,1502	1,2000	1,0846	1,1378	3,0631	1,2643	1,30749
Italy	French	7	9	7	19	10	52	1,1382	1,1556	1,1202	1,1383	3,1582	1,1825	1,2049
Dom. Rep.	French	6	4	9	19	10	48	1,0463	1,0667	0,9712	0,9898	2,6638	1,1030	1,1335
Peru	French	3	8	6	21	10	48	0,9955	1,0667	0,9136	0,9885	2,7375	1,1512	1,1950
Singapore	English	6	9	8	13	12	48	1,1068	1,0667	1,0725	1,0378	3,0178	1,0224	1,0248
South Africa	English	3	7	4	22	12	48	0,9942	1,0667	0,8587	0,9352	2,6495	1,1590	1,2174
Belgium	French	4	5	6	24	7	46	0,9152	1,0222	0,8425	0,9264	2,5914	1,1557	1,2111
Canada	English	3	4	5	22	12	46	0,9525	1,0222	0,8028	0,8700	2,3962	1,1165	1,17749

Panel B. Bottom 10 of Countries

Country	Legalo	xIN	xAC	xCE	xCO	xPR	Sum	Carli	Dutot	Jevon	CD1	CD2	Laspey	Fisher
China	Transition	2	3	0	8	4	17	0,3528	0,3778	0,0000	0,0000	1,1796	0,4121	0,43375
Georgia	Transition	2	4	0	7	4	17	0,3613	0,3778	0,0000	0,0000	1,2246	0,3998	0,41598
Burkina Faso	French	0	1	0	15	0	16	0,2291	0,3556	0,0000	0,0000	0,0000	0,5073	0,55727
Côte d'Ivoire	French	0	1	0	15	0	16	0,2291	0,3556	0,0000	0,0000	0,0000	0,5073	0,55727
Denmark	Scandinavian	0	1	0	7	8	16	0,3474	0,3556	0,0000	0,0000	0,0000	0,3729	0,4054
Niger	French	0	1	0	15	0	16	0,2291	0,3556	0,0000	0,0000	0,0000	0,5073	0,5573
Senegal	French	0	1	0	15	0	16	0,2291	0,3556	0,0000	0,0000	0,0000	0,5073	0,5573
Moldova	Transition	3	4	5	3	0	15	0,3476	0,3333	0,0000	0,0000	1,1572	0,3113	0,2889
Bangladesh	English	3	2	0	5	0	10	0,2057	0,2222	0,0000	0,0000	0,4697	0,2464	0,25279
Uzbekistan	Transition	2	3	0	5	0	10	0,1972	0,2222	0,0000	0,0000	0,4804	0,2520	0,2582

Table 5. Summary Statistics for the 90-country Panel

Descriptive Statistics							
	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance
XIN	90	8	0	8	3,29	1,657	2,747
XAC	90	10	1	11	4,96	2,146	4,605
XCE	90	12	0	12	3,90	2,631	6,922
XCO	90	22	3	25	12,93	5,238	27,434
XPR	90	14	0	14	6,03	3,646	13,291
SUM	90	49	10	59	31,11	10,888	118,549
CARLI	90	1,1006	,1972	1,2978	,659592	,2446143	,060
DUTOT	90	1,0889	,2222	1,3111	,691359	,2419560	,059
JEVON	90	1,2724	,0000	1,2724	,549469	,3164974	,100
CD1	89	1,2914	,0000	1,2914	,577233	,3225105	,104
CD2	90	3,3309	,0000	3,3309	2,025207	,7464271	,557
LASPEY	90	1,0997	,2464	1,3460	,732238	,2517545	,063
FISHER	90	1,4036	,0000	1,4036	,750907	,2731844	,075
Valid N (listwise)	89						

Table 6. Descriptive Statistics: High Income Countries

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance
XIN	24	7	0	7	3,50	1,668	2,783
XAC	24	10	1	11	5,67	2,200	4,841
XCE	24	10	0	10	4,37	2,183	4,766
XCO	24	18	6	24	14,92	5,532	30,601
XPR	24	12	0	12	8,29	2,851	8,129
SUM	24	43	16	59	36,75	10,735	115,239
CARLI	24	,9504	,3474	1,2978	,785646	,2325180	,054
DUTOT	24	,9556	,3556	1,3111	,816667	,2385539	,057
JEVON	24	1,2724	,0000	1,2724	,686958	,2993200	,090
CD1	24	1,2914	,0000	1,2914	,714075	,3066030	,094
CD2	24	3,3309	,0000	3,3309	2,237082	,7381839	,545
LASPEY	24	,9530	,3729	1,3259	,857968	,2569677	,066
FISHER	24	,9371	,4054	1,3425	,892365	,2658031	,071
Valid N (listwise)	24						

Table 7. Descriptive Statistics OECD only

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance
XIN	19	7	0	7	3,63	1,674	2,801
XAC	19	10	1	11	5,79	2,226	4,953
XCE	19	10	0	10	4,47	2,144	4,596
XCO	19	17	7	24	15,79	5,381	28,953
XPR	19	8	4	12	8,84	2,035	4,140
SUM	19	43	16	59	38,53	10,244	104,930
CARLI	19	,9504	,3474	1,2978	,822656	,2150450	,046
DUTOT	19	,9556	,3556	1,3111	,856141	,2276332	,052
JEVON	19	1,2724	,0000	1,2724	,738011	,2609857	,068
CD1	19	1,2914	,0000	1,2914	,772289	,2687427	,072
CD2	19	3,3309	,0000	3,3309	2,288819	,7813305	,610
LASPEY	19	,9530	,3729	1,3259	,901101	,2501866	,063
FISHER	19	,9371	,4054	1,3425	,939804	,2575096	,066
Valid N (listwise)	19						

Table 8. Descriptive Statistics: Upper middle Income countries

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance
XIN	18	6	2	8	3,72	1,406	1,977
XAC	18	7	3	10	5,33	1,749	3,059
XCE	18	11	0	11	4,56	2,431	5,908
XCO	18	21	4	25	11,83	4,681	21,912
XPR	18	14	0	14	7,61	3,806	14,487
SUM	18	36	20	56	33,06	8,728	76,173
CARLI	18	,7591	,4047	1,1638	,727615	,1967952	,039
DUTOT	18	,8000	,4444	1,2444	,734568	,1939487	,038
JEVON	18	1,0534	,0000	1,0534	,628127	,2783184	,077
CD1	18	1,1267	,0000	1,1267	,637309	,2810099	,079
CD2	18	1,8777	1,2330	3,1106	2,250344	,4761322	,227
LASPEY	18	,9552	,3908	1,3460	,746920	,2062138	,043
FISHER	18	,9992	,4044	1,4036	,766031	,2137911	,046
Valid N (listwise)	18						

Table 9. Descriptive Statistics: Lower Middle Income Countries

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance
XIN	23	7	1	8	3,78	1,858	3,451
XAC	23	10	1	11	5,39	2,251	5,067
XCE	23	12	0	12	4,52	3,189	10,170
XCO	23	15	7	22	12,83	5,314	28,241
XPR	23	8	4	12	5,43	2,777	7,711
SUM	23	37	17	54	31,96	11,137	124,043
CARLI	23	,7973	,3528	1,1502	,681429	,2382082	,057
DUTOT	23	,8222	,3778	1,2000	,710146	,2474996	,061
JEVON	23	1,0845	,0000	1,0845	,595630	,2812862	,079
CD1	23	1,1378	,0000	1,1378	,620832	,2929993	,086
CD2	23	1,8834	1,1796	3,0631	2,218280	,5145868	,265
LASPEY	23	,8522	,4121	1,2643	,746482	,2653372	,070
FISHER	23	,8737	,4338	1,3075	,763964	,2765912	,077
Valid N (list)	23						

Table 10. Descriptive Statistics Low Income countries

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance
XIN	25	4	0	4	2,32	1,249	1,560
XAC	25	5	1	6	3,60	1,708	2,917
XCE	25	7	0	7	2,40	2,082	4,333
XCO	25	21	3	24	11,92	5,008	25,077
XPR	25	10	0	10	3,28	2,993	8,960
SUM	25	31	10	41	23,52	8,135	66,177
CARLI	25	,5796	,1972	,7767	,469513	,1821565	,033
DUTOT	25	,6889	,2222	,9111	,522668	,1807759	,033
JEVON	25	,6801	,0000	,6801	,318377	,2774809	,077
CD1	24	,7786	,0000	,7786	,353551	,2949583	,087
CD2	25	2,5213	,0000	2,5213	1,482082	,8453883	,715
LASPEY	25	,8287	,2464	1,0750	,587862	,1980381	,039
FISHER	25	1,1332	,0000	1,1332	,592206	,2448687	,060
Valid N (listwise)	24						

Table 11. Variables

CRED_GDP	Private credit. The variable is the ratio of domestic credit provided by deposit money banks to GDP. The number is an average of the years 1997 – 2001. Higher rates indicate greater access to credit. Source: IMF, International Financial Statistics.
CON_DE	Concentration in deposits of banks. Data was compiled by the World Bank and stems from the Doing Business Report.
CON_INDX	Connectivity index. This index belongs to the ICT development indices and it aggregates information on the distribution of telephones, mobiles and PCs in the countries. It is more complete than other indicators of technical infrastructure such as telephone mainlines or internet hosts. Source: UNCTAD.
CONTRACT	Contract Enforcement Formalism Index. Index measures the degree of formalism in the procedure to resolve disputes. It measures substantive and procedural statutory intervention in judicial cases at lower level trial courts. Higher indices indicate more formalism. Source: World Bank.
COV_PCR	Number of individuals and/or firms listed in the public credit registry as of December 31 2001 with current information on repayment history, unpaid debts, or credit outstanding. The number is scaled to country's population (per 1000 capita). Source: World Bank.
GNI_PC	Gross national income per capita. This variable is measured according to the Atlas method (current US-\$). It constitutes the average of 1999-2000. The variable approximates wealth or economic development. Source: World Bank.
L_LLRES	Loan loss reserves / gross loans. This is an average for the years 1997 – 2001. Proxy for credit risk in a country. Source: World Bank.
L_IMP	Impaired loans / gross loans. This is an average for the years 1997 – 2001. Proxy for credit risk in a country. Source: World Bank.
IN_POP1, IN_POP3	Information proxies. Both proxies stand for information distribution (we experimented with different ones) that are scaled by population. The numbers of credit reports sold in a country were estimated by credit reporting agencies. For confidentiality the estimates are not disclosed. Source: The author.
PCR_EX	Public credit registry. The dichotomous variable indicates as to whether there is a public credit registry operating or not. According to the World Bank, a public credit registry is defined as a database managed by the public sector, usually by the Central Bank or Superintendent of Banks, that collects information on the standing of individual borrowers (persons and/or businesses) in the financial system and makes it available to the financial system to facilitate credit analysis. Source: World Bank.
PCR_QUAL	This index assigns positive scores for different quality-increasing measures, such as penalties for reporting inaccurate data. Scores range from 0 to 100 where higher values indicate more extensive rules on the quality of information in the registry. Source: World Bank.
PRCR_EX	Private credit bureau. The dichotomous variable indicates as to whether there is a private credit bureau operating or not. A private registry is a private firm or non-profit organization which maintains a data base on the financial standing of borrowers (individuals or firms) and its primary role is to facilitate the exchange of credit information (World Bank definition). Source: World Bank.
POP	Population. This variable denotes the absolute number of inhabitants in a country. It is derived from World Bank data base and available for a panel of 110 countries.
SPREAD	Interest rate spread. Spread between the deposit and lending rates that reflects the efficiency of competition in the banking system. The lower, the more intensive is competition between banks. Source: IMF, International Financial Statistics.
SUM, CARLI	These variables are the indices that resulted from the survey. The mathematical construction is discussed in the paper. The data set is available for all countries surveyed. Source: The author.
TEL_MAIN	Telephone mainlines. Number of mainlines per 1,000 inhabitants. Variable approximates roughly the telecommunication infrastructure. Source: World Bank

Table 12. Correlations of Variables, Sums and Info Proxies

		IN_POP1	IN_POP3	XIN	XAC	XCE	XCO	XPR	SUM
IN_POP1	Pearson Correlation	1	,765**	,277*	,316**	,284*	,189	,437**	,417**
	Sig. (2-tailed)	.	,000	,023	,009	,020	,125	,000	,000
	N	67	61	67	67	67	67	67	67
IN_POP3	Pearson Correlation	,765**	1	,102	,123	,150	,316*	,425**	,368**
	Sig. (2-tailed)	,000	.	,427	,335	,242	,012	,001	,003
	N	61	63	63	63	63	63	63	63
XIN	Pearson Correlation	,277*	,102	1	,622**	,762**	,175	,318**	,655**
	Sig. (2-tailed)	,023	,427	.	,000	,000	,104	,003	,000
	N	67	63	87	87	87	87	87	87
XAC	Pearson Correlation	,316**	,123	,622**	1	,497**	,394**	,412**	,743**
	Sig. (2-tailed)	,009	,335	,000	.	,000	,000	,000	,000
	N	67	63	87	87	87	87	87	87
XCE	Pearson Correlation	,284*	,150	,762**	,497**	1	,203	,386**	,688**
	Sig. (2-tailed)	,020	,242	,000	,000	.	,059	,000	,000
	N	67	63	87	87	87	87	87	87
XCO	Pearson Correlation	,189	,316*	,175	,394**	,203	1	,280**	,729**
	Sig. (2-tailed)	,125	,012	,104	,000	,059	.	,009	,000
	N	67	63	87	87	87	87	87	87
XPR	Pearson Correlation	,437**	,425**	,318**	,412**	,386**	,280**	1	,696**
	Sig. (2-tailed)	,000	,001	,003	,000	,000	,009	.	,000
	N	67	63	87	87	87	87	87	87
SUM	Pearson Correlation	,417**	,368**	,655**	,743**	,688**	,729**	,696**	1
	Sig. (2-tailed)	,000	,003	,000	,000	,000	,000	,000	.
	N	67	63	87	87	87	87	87	87

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Table 13. Regression Results Hypothesis 1

Model (Dep. Variable)	N	Ad. R Squ.	Coefficients			
			Constant			
			Independent variables			
			Unstand. B	Std. Coeff. Beta	t	Toler.
1.1 (IN_POP1)	64	,466				
Constant			3,479E-02		,273	
XIN			5,478E-04	,004	,024	,332
XAC			-2,565E-03	-,022	-,187	,587
XCE			1,698E-02	,186	1,283	,403
XPR			1,117E-02	,167	1,466	,652
CRED_GDP			-5,800E-02	-,082	-,713	,641
CONTRACT			,706	,588	4,900	,588
CON_INDX			-3,318E-02	-,122	-1,159	,766
1.2 (IN_POP3)	60	,340				
Constant			4,484E-03	-,028	,067	
XIN			-2,002E-03	-,196	-,160	,372
XAC			-1,066E-02	,082	-1,415	,581
XCE			3,865E-03	,287	,519	,452
XPR			9,320E-03	-,094	2,231	,676
CRED_GDP			-3,154E-02	-,004	-,707	,634
CONTRACT			-4,813E-04	,575	-,032	,788
CON_INDX			,347		4,018	,546
1.3 (IN_POP1)	64	,455				
Constant			-3,428E-02		-,261	
SUM			4,460E-03	,197	1,931	,828
CON_INDX			,721	,601	5,054	,613
CONTRACT			-2,236E-02	-,082	-,792	,806
CRED_GDP			-4,653E-02	-,066	-,584	,684

Table 14. Correlations of the Variables with Private Credit Registry Existence

		PRCR_EX	XIN	XAC	XCE	XCO	XPR	SUM
PRCR_EX	Pearson Correlation	1	,311**	,393**	,228*	,133	,367**	,369**
	Sig. (2-tailed)		,003	,000	,033	,219	,000	,000
	N	87	87	87	87	87	87	87
XIN	Pearson Correlation	,311**	1	,622**	,762**	,175	,318**	,655**
	Sig. (2-tailed)	,003		,000	,000	,104	,003	,000
	N	87	87	87	87	87	87	87
XAC	Pearson Correlation	,393**	,622**	1	,497**	,394**	,412**	,743**
	Sig. (2-tailed)	,000	,000		,000	,000	,000	,000
	N	87	87	87	87	87	87	87
XCE	Pearson Correlation	,228*	,762**	,497**	1	,203	,386**	,688**
	Sig. (2-tailed)	,033	,000	,000		,059	,000	,000
	N	87	87	87	87	87	87	87
XCO	Pearson Correlation	,133	,175	,394**	,203	1	,280**	,729**
	Sig. (2-tailed)	,219	,104	,000	,059		,009	,000
	N	87	87	87	87	87	87	87
XPR	Pearson Correlation	,367**	,318**	,412**	,386**	,280**	1	,696**
	Sig. (2-tailed)	,000	,003	,000	,000	,009		,000
	N	87	87	87	87	87	87	87
SUM	Pearson Correlation	,369**	,655**	,743**	,688**	,729**	,696**	1
	Sig. (2-tailed)	,000	,000	,000	,000	,000	,000	
	N	87	87	87	87	87	87	87

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Table 15. Regression Results Hypothesis 2

Model IN_POP1	N	Ad. R Squ.	Coefficients			
			<i>Constant Independent variables</i>			
			Unstand. B	Std. Coeffi. Beta	t	Toler.
2.1	64	,516				
(Constant)			9,238E-02		,600	
SUM			6,127E-03	,264	2,250	,639
CON_INDX			,778	,597	4,595	,521
CONTRACT			-2,458E-02	-,088	-,698	,548
PRCR_EX			-6,586E-02	-,115	-1,006	,669
PCR_EX			-6,529E-02	-,130	-1,058	,584
L_LLRES			-1,058E-02	-,228	-2,073	,730
COV_PCR			4,741E-04	,142	1,330	,769
CRED_GDP			-,128	-,184	-1,372	,491
2.2	56	,526				
(Constant)			,112		,746	
CON_INDX			,759	,582	4,505	,515
PRCR_EX			-7,164E-02	-,126	-1,104	,666
PCR_EX			-6,472E-02	-,129	-1,067	,590
CONTRACT			-2,872E-02	-,103	-,825	,549
L_LLRES			-1,063E-02	-,229	-2,127	,746
COV_PCR			4,614E-04	,139	1,309	,768
CRED_GDP			-,132	-,189	-1,426	,491
CARLI			,299	,292	2,497	,631
2.3	56	,536				
(Constant)			,201		1,383	,520
CON_INDX			,754	,579	4,545	,631
PRCR_EX			-8,885E-02	-,156	-1,345	,587
PCR_EX			-6,894E-02	-,137	-1,145	,547
CONTRACT			-3,381E-02	-,122	-,980	,741
L_LLRES			-1,104E-02	-,237	-2,225	,772
COV_PCR			4,877E-04	,146	1,400	,491
CRED_GDP			-,123	-,176	-1,346	,617
JEVONS			,256	,316	2,700	

Table 15. (continued) Regression Results Hypothesis 2

Model IN_POP1	N	Ad. R Squ.	Coefficients			
			Constant Independent variables			
			Unstand. B	Std. Coeffi. Beta	t	Toler.
2.4	56	,525				
(Constant)			,194		1,321	
CON_INDX			,772	,592	4,616	,525
PRCR_EX			-8,282E-02	-,145	-1,242	,633
PCR_EX			-6,353E-02	-,126	-1,047	,592
CONTRACT			-3,191E-02	-,115	-,915	,548
L_LLRES			-1,116E-02	-,240	-2,194	,720
COV_PCR			4,861E-04	,146	1,380	,771
CRED_GDP			-,124	-,178	-1,340	,491
CD1			,229	,291	2,466	,621
2.5	56	,499				
(Constant)			9,103E-02	,625	,570	,536
CON_INDX			,815	-,094	4,795	,683
PRCR_EX			-5,376E-02	-,121	-,815	,580
PCR_EX			-6,074E-02	-,078	-,965	,544
CONTRACT			-2,175E-02	-,212	-,605	,728
L_LLRES			-9,859E-03	,150	-1,896	,771
COV_PCR			4,989E-04	-,180	1,379	,491
CRED_GDP			-,126	,211	-1,321	,677
LASPEYR.			,214		1,821	
2.6	56	,488				
(Constant)			,115		,718	
CON_INDX			,821	,630	4,723	,523
PRCR_EX			-3,689E-02	-,065	-,568	,719
PCR_EX			-5,592E-02	-,111	-,879	,580
CONTRACT			-2,343E-02	-,084	-,646	,545
L_LLRES			-8,861E-03	-,191	-1,717	,755
COV_PCR			5,142E-04	,154	1,407	,773
CRED_GDP			-,126	-,180	-1,307	,491
FISHER			,154	,171	1,498	,716

Table 16. Correlations of Information Proxies and Market Variables

		IN_POP1	IN_POP3	GDP_GR	GNI_PC	CRED_GDP	L_IMP	L_LLRES
IN_POP1	Pearson Correlation	1	,765**	-,195	,599**	,331**	-,284*	-,347**
	Sig. (2-tailed)		,000	,114	,000	,007	,025	,005
	N	67	61	67	67	66	62	65
IN_POP3	Pearson Correlation	,765**	1	-,136	,562**	,286*	-,133	-,266*
	Sig. (2-tailed)	,000		,287	,000	,024	,319	,038
	N	61	63	63	63	62	58	61
GDP_GR	Pearson Correlation	-,195	-,136	1	-,279**	-,283**	,004	,159
	Sig. (2-tailed)	,114	,287		,009	,008	,973	,147
	N	67	63	87	87	86	81	84
GNI_PC	Pearson Correlation	,599**	,562**	-,279**	1	,577**	-,341**	-,359**
	Sig. (2-tailed)	,000	,000	,009		,000	,002	,001
	N	67	63	87	87	86	81	84
CRED_GDP	Pearson Correlation	,331**	,286*	-,283**	,577**	1	-,102	-,317**
	Sig. (2-tailed)	,007	,024	,008	,000		,366	,004
	N	66	62	86	86	86	80	83
L_IMP	Pearson Correlation	-,284*	-,133	,004	-,341**	-,102	1	,521**
	Sig. (2-tailed)	,025	,319	,973	,002	,366		,000
	N	62	58	81	81	80	81	81
L_LLRES	Pearson Correlation	-,347**	-,266*	,159	-,359**	-,317**	,521**	1
	Sig. (2-tailed)	,005	,038	,147	,001	,004	,000	
	N	65	61	84	84	83	81	84

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Table 17. Regression Results Hypothesis 3

Model	N	Ad. R Squ.	Coefficients			
			<i>Constant Independent variables</i>			
			Unstand. B	Std. Coeff. Beta	t	Toler.
3.1	37	,462				
(Constant)			1,132		4,100	
IN_POP1			,275	,247	1,756	,759
PCR_EX			-,313	-,485	-2,068	,272
COV_PCR			5,230E-04	,145	,998	,710
PCR_QUAL			6,239E-03	,601	2,379	,234
CON_DE			-,885	-,402	-2,615	,632
GDP_GR			9,335E-03	,092	,726	,938
SPREAD			-2,472E-02	-,464	-2,756	,528
3.2	36	,451				
(Constant)			1,070		3,794	
IN_POP1			,324	,295	1,824	,599
PCR_EX			-,302	-,470	-1,980	,278
COV_PCR			5,727E-04	,161	1,083	,709
PCR_QUAL			5,920E-03	,573	2,232	,238
GDP_GR			1,170E-02	,117	,887	,904
CON_DE			-,887	-,396	-2,479	,614
SPREAD			-2,465E-02	-,468	-2,730	,533
L_IMP			8,043E-03	,147	1,041	,783
3.3	36	,451				
(Constant)			,892		3,893	
IN_POP1			,175	,147	,875	,393
PCR_EX			-,334	-,520	-2,649	,287
COV_PCR			6,803E-04	,174	1,374	,692
PCR_QUAL			6,466E-03	,601	2,804	,241
GDP_GR			7,283E-03	,078	,684	,856
CON_DE			-,657	-,311	-2,398	,656
SPREAD			-1,791E-02	-,364	-2,722	,617
GNI_PC			6,303E-06	,148	,887	,399