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Institutions and credit
Kristine Farla

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**AFD-MGSoG/UNU-Merit Working Paper Series on
« Institutions, Governance and Long term Growth »**

In 2010, the French Development Agency (AFD) initiated a partnership with the Maastricht Graduate School of Governance (Maastricht University - UNU-Merit) with a view to exploring the conceptual and econometric relationships between institutions and long-term growth. As a development bank with a long-term lending horizon, AFD is particularly interested in better understanding the determinants of countries' long term economic, social, and political trajectory.

AFD has thus developed a programme on “Institutions, Governance, and Long-term Growth” dealing with the five following dimensions:

- (i) Measuring institutions and discussing the meaning of such measures, notably through the Institutional Profiles Database;
- (ii) Testing the econometric relationship between institutional measures and long term growth;
- (iii) Exploring through a series of country case studies the historical relationship between processes of economic accumulation, forms of political organisation, and social cohesion;
- (iv) Discussing conceptual frameworks for making sense of the interaction between political, social and economic forces in the process of development;
- (v) Developing methodologies for political economy analyses.

The MGSoG/UNU-Merit team is involved in the five dimensions with a particular focus on the first two. Its primary objective is to explore the Institutional Profiles Database jointly developed by AFD and the French Ministry of the Economy since 2001. Institutional Profiles Database is unique by its scope (about 350 elementary questions pertaining to all institutional dimensions covering 148 countries in 2012), its entirely free access, and its ambition to incorporate the most recent theoretical advances in the field of political economy.

The present series intends to convey the results of our ongoing research, and in so doing to reflect the wealth of issues that can be fruitfully addressed from an “institutionalist” perspective. We hope that readers will find these papers stimulating and useful to develop their own understanding and research.

Nicolas Meisel (AFD)
Adam Szirmai (MGSoG/UNU-Merit)

For more information on the programme, please visit our websites:

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Institutions and Credit*

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WORKING PAPER

Abstract

It is well-known that the extent of credit lent to private agents differs widely between countries. The ‘financial deepening’ of the economy offers opportunities as well as financial risks. This study investigates the extent to which institutional characteristics are related to countries’ level of credit depth. The findings suggest that the formalization of property rights, contracting, and competition institutions is positively related to an increase in the level of credit to the private sector. This result remains robust when controlling for the effect of financial policy. The effect of institutional characteristics on banks’ lending capacity and investment is mixed. However, overall, institutional formalization has a positive impact on credit deepening and investment.

Keywords: Institutions, Financial Development, Property Rights, Contract, Competition

JEL Classification: E44, G18, O11, O43

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1 Introduction

Credit to the private sector in the United States, Japan, Canada, Germany, and China is higher than 100% of GDP. In countries in Sub-Saharan Africa credit to the private sector is, on average, lower than 20% of GDP. Why do these wide differences occur? And are they important? This study focuses on the effect of institutional characteristics on mediating factors in the relationship between institutions and growth. The financial sector functions as an important intermediary; its role is the transformation of savings into profitable investments. Specifically, we are interested in the influence of institutional characteristics on private sector credit deepening. Credit deepening is defined as an increase in the volume of credit.

Credit deepening makes possible an increase in investment, an expansion of production, technological change, and economic growth, and attracts foreign direct investment. [Levine \(2005, p. 921\)](#) summarizes that “empirical analyses, including firm-level studies, industry-level studies, individual country-level studies, time-series studies, panel investigations, and broad cross-country comparisons, demonstrate a strong positive link between the functioning of the financial system and long-run economic growth”. However, since 2008, it is undeniable that rapid private credit build-up, caused by financial system deregulation and privatization, can trigger a crisis big enough to have negative long-run consequences on growth. As such, there are limitations to the extent to which capital deepening is beneficial to growth. This has been recognized by previous literature, such as [Minsky \(1986\)](#); [Kindleberger and Aliber \(2005\)](#); [Reinhart and Rogoff \(2009\)](#).

Financial development has been studied with focus on different determinants: legal origins ([LaPorta, Lopez-de-Silanes, and Shliefer, 2008](#)), political institutions and democracy ([Acemoglu and Johnson, 2005](#); [Huang, 2010](#)), openness ([Baltagi, Demetriades, and Law, 2009](#)), and financial reform ([Tressel and Detragiache, 2008](#)). The general interest of such studies is to understand how financial development can be stimulated. For example, [Tressel and Detragiache \(2008\)](#); [Quintyn and Verdier \(2010\)](#); [Huang \(2010\)](#) find that political institutions are related to short-run financial performance and the degree of stability of financial accelerations, in particular in lower income countries. Political institutions describe, for example, the degree of legality of political representation and political authority. In contrast to political institutions, we expect that institutional rules have an influence on long-run financial development. Institutional rules describe, for example, the functioning of the public administration and the strength of the legal system. Institutional rules are determined within the public sector and shape incentives for the private sector, constrain and generate costs and enforce a social

order that maintains a given cost structure.

Institutional rules influence the degree of risk that financial intermediaries, firms, and private investors are willing to take on in their lending operations. For example, fear of expropriation of firms' property influences firms' willingness to borrow and firms' borrowing eligibility.¹ Also, institutional rules affect the degree of systemic risk. As a result, institutional rules influence access to credit, the cost of credit, the volume of credit extended, and the allocative efficiency of credit distribution.

Credit depth is measured using data on domestic credit to the private sector by financial intermediaries: the total value of loans, trade credits and non-equity securities, as a ratio to GDP. Credit data is commonly used in the literature on financial development.² In comparison to other financing sources, (e.g. government finance, equity finance, and corporate bond finance) credit to the private sector is a good proxy for financial development in low-income countries. Especially in low income countries the financial system is bank dominated and the benefits from credit market development are greater. Firstly, in low income countries savings are relatively smaller than in high income countries, and savings tend to be invested in liquid forms and trade credits. Secondly, in low income countries there are relatively few credit worthy, reputable organizations that are worth investing in making bond and equity financing a challenge. Thirdly, compared to high income countries, low income countries have relatively few large firms; smaller firms rely more on bank financing as a source of formal credit allocation. Fourthly, corporate bond markets depend on formalized financial markets and institutional arrangements which, on average, low income countries have not acquired.

[Acemoglu and Johnson \(2005\)](#) disentangle the effect of property rights and contracting institutions on economic and financial performance. They find that property rights protection has a positive influence on GDP per capita, investment, private credit, and stock market capitalization. However, contracting is argued to merely have an effect on stock market capitalization. The results of [Acemoglu and Johnson \(2005\)](#) are based on institutional measurements from different sources. We expect that estimates of the effect of closely related institutional characteristics on economic performance are more accurate when using the same source for the institutional indicators. Furthermore, lack of cross-country comparability of indicators is a shortcoming of many institution and/or governance indicators. Often researchers' inter-

¹See [Sacerdoti \(2005\)](#) for a study on firms' ease of access to financing in developing countries.

²For example, [Huang \(2010\)](#); [Quintyn and Verdier \(2010\)](#); [Baltagi et al. \(2009\)](#); [Djankov et al. \(2007\)](#); [Safavian and Sharma \(2007\)](#); [Acemoglu and Johnson \(2005\)](#) use credit data in their studies.

pretation of institutional development has been compromised due to choices made in the selection of the existing measurements on institutions and governance (Arndt, 2009).

We construct indicators for property rights, contracting, and market competition institutions using the same data source. To our knowledge, the relevance of this combination of institutional characteristics has not been previously investigated in relation to financial development. The institutional indicators are transparent in their composition, comparable in scale and construction, and include both de-jure and de-facto perspectives on countries' institutional development. The institutional indicators describe institutional characteristics which are stable and inert in the medium/long-term. The Hausman-Taylor method with Amemiya-MaCurdy (1986) specification is used in order to retrieve the parameter estimates of these time-invariant institutional indicators.

On the basis of panel data of 81 countries for the period 1994-2005, we conclude that there is a strong causal relationship between property rights, contracting and competition institutions and the level of credit to the private sector. The institutional indicators remain positive and significant when controlling for the effect of financial policy, and when using alternative measures of financial depth and investment.

2 Theory

The idea that institutional rules range from formal to informal has been used in the works of several authors.³ Greif and Tabellini (2010) argue that, in China, institutions rely more on an informal organization of enforcement, but, in Europe, institutions rely more on a formal organization of enforcement.⁴ Credit markets that function on the basis of informal rule systems are dependent on close relationships between financial intermediaries and firms. Loans and trade credits are established on a personalized basis and loan commitment is a personal matter for the parties involved. Entrepreneurs and start-ups that have not established relationships may, for this reason, have different borrowing opportunities than incumbents. In credit markets that function on the basis of formalized rules, credit is allocated following formal requirements. The history of today's high income countries shows

³See North (1994); Meisel and Ould Aoudia (2008); de Crombrughe and Farla (2011), and Greif and Tabellini (2010).

⁴Easterly (2008) makes a different, yet similar, distinction to the formal and informal institutional differences and argues that written laws are top-down institutions, and social norms, customs, traditions, beliefs, and values of individuals are bottom-up institutions.

that previous informal social rules and trust based social systems were transformed to formalized rule based societies. This change has lowered costs of lending, generated a higher lending base, and increased the financing of more long-term commitments. In the remainder of this section, we propose explanations for how (1) property rights protection, (2) contracting and (3) competition institutions influence the level of credit to the private sector.

Firstly, property rights protection has been defined as a key corner stone in the development of an economic market. [Acemoglu and Johnson \(2005, p. 955\)](#) describe property rights institutions as “rules and regulations protecting citizens against the power of the government and elites”. Property rights protection consists of measures protecting current and future tangible and intangible property and revenues that originate from property, i.e., land and non-land assets and intellectual property. Property rights protection develops in societies where elitist groups are interested in protecting their properties.

Formalized property rights institutions secure property ownership over time. Weak security of property rights can endanger investors’ and borrowers’ ability to retrieve future revenue from investment. This has a negative impact on firms’ ability to borrow and invest and may lower the size of loans. Also, firms may concentrate investment in sectors that benefit from a relatively higher level of protection and may under-invest in others.⁵ Banks need to secure a high recovery rate and limit the financing of operations with high risk, especially risk that they can not diversify. [Bae and Goyal \(2009\)](#) find that banks issue higher loan amounts with longer loan maturities and request relatively lower loan spreads in countries with strong property rights protection than in countries with weak property rights protection.

Secondly, the formalization of contracting institutions is likewise argued to be crucial for financial development ([Dixit, 2009](#)). Contracting institutions consist of arrangements protecting the security of contracts, government respect for contracts, transparency in the banking system, enforcement of the justice system, creditor rights, the speed of rulings and effectiveness of commercial courts. The formalization of contracting institutions reduces information asymmetry, the costs of contracting, the risk of contractual breach, and can enhance the credibility of contracting. Equal treatment and transparency in the allocation of public procurement contracts reinforces market competitiveness. In countries with formalized contracting institutions, when a contract is terminated, the contracting agent can expect (the enforcement of) compensation as established in the contract. In societies with informal contracting institutions private contractual agreements are enforced by

⁵E.g., the underdevelopment of intellectual property rights causes organizations to under-invest in intangible assets ([Claessens and Laeven, 2003](#)).

personal relationships. Here, contracting agreements may not protect the interest of all actors against the interests of powerful elitist groups.

[Acemoglu and Johnson \(2005\)](#) find that contracting institutions are not significantly related to credit market development. They hypothesize that contracting institutions are relatively unimportant because agents can change financial intermediation and terms of contracts. Indeed, private sector regulations can act as a complement or substitute for contracting institutions. According to [Djankov, McLiesh, and Shleifer \(2007\)](#), private registries can stimulate the private sector by facilitating information exchange between firms, which decreases transaction costs.⁶ Moreover, a transition from low income to middle income is associated with an increase in firms using banks to finance investment. Personalized contracting systems may be sufficient to protect ‘small’ loans. In particular for short-run lending arrangements, investors and firms may prefer to avoid formal contracting arrangements. Nevertheless, we argue that substantial credit deepening requires formal contracting institutions.

Thirdly, we expect that market competition institutions are fundamental to sustain financial market deepening. The objectives of competition regulations are to “control or eliminate restrictive agreements or arrangements among enterprises, or mergers and acquisitions or abuse of dominant positions of market power, which limit access to markets or otherwise unduly restrain competition, adversely affecting domestic or international trade or economic development” ([UNCTAD, 2007](#), p. 3).⁷ The absence of competition institutions may create an environment that only supports the development of the existing industry. Powerful organizations may block competition and may become powerful beyond state control. The monopolization of industry creates entry restrictions and can cause firms to under invest. A lack of competition is especially detrimental to small organizations, risky projects, and ‘infant’ firms’ willingness to borrow. Moreover, a lack of competition could result in concentrated sectoral allocation of investment and general inefficient allocation of investment across sectors and project owners.⁸ Finally, monop-

⁶Public and private agents collect information about firms and share this with financial institutions. Access to more information about firms may allow banks to make a more accurate and generally a more positive risk assessment when extending credit. [Djankov et al. \(2007\)](#) find evidence that the private credit to GDP ratio increases along with the introduction of credit registries, in poorer countries *only*.

⁷Competition policy generally comprises the following elements: antitrust and cartels, market liberalization, state aid control, and merger control. Because competition policy is formalized in countries’ legal framework, in the context of this study we prefer the label ‘competition institutions’.

⁸Following [La Porta, Lopez-De-Silanes, and Shleifer \(2002, p. 279\)](#), “governments are less able to use the banks they own to redistribute wealth to political supporters when

olization of the banking industry can cause frequent breaching of contracts, lack of risk-diversification, and could undermine credibility in the financial system.

The benefits from formalizing rules on competition are larger in countries that have a relatively large private sector. In markets where market access is limited (e.g. rent creation is an activity of the ruling dominant coalition) there is an absence of competition. In countries with a small private sector there is basic absence of competition, but there also is no incentive to develop rules to stimulate competition.

3 Empirical Approach

3.1 Institutional Indicators

There are several indicators for property rights, constraints on the executive, contracting institutions, and creditor rights. Some indicators are not necessarily a good proxy for institutional characteristics. First, ‘constraint on the executive’ from the Polity IV project ([Marshall and Jaggers, 2009](#)) is used as a proxy for property rights protection by several scholars; e.g. [Acemoglu and Johnson \(2005\)](#); [Tressel and Detragiache \(2008\)](#); [Quintyn and Verdier \(2010\)](#).⁹ However, as described by [Glaeser, LaPorta, Lopez-de-Silanes, and Shliefer \(2004\)](#), ‘constraint on the executive’ is a volatile measurement which is more a reflection of the result of elections.¹⁰

Second, in order to measure the effect of contracting institutions, [Acemoglu and Johnson \(2005\)](#) use de-jure descriptions of legal arrangements intended to protect contracts. However, the existence of de-jure rules does not in itself guarantee that these rules are followed. A general difficulty in measuring and interpreting institutions lies in quantifying concepts that are value-loaded and are more easily measured de-jure than de-facto.

they are subject to greater oversight by the electorate”. The authors argue that with electorate oversight governments have less incentives for bank ownership.

⁹[Tressel and Detragiache \(2008, p. 16\)](#) argue that only countries with stronger constraints on executive experience sustainable financial acceleration after a financial reform, and that creditor rights, contract enforcement, and legal origins do not determine the success of sustainable financial accelerations. Similarly, [Quintyn and Verdier \(2010\)](#) find that countries’ probability to achieve a period of sustained long-run financial development after a financial acceleration is positively influenced by ‘constraint on executive’ and the durability of democracy.

¹⁰Following calculations on the basis of the sample of 88 countries used throughout this study, the indicator ‘constraint on the executive’ indeed has more variation over time than between countries.

Third, some institutional indicators purport to explain general governance concepts and can not be used to measure the relative impact of institutional characteristics. For example, ‘legal origins’ has frequently been interpreted as a proxy for property rights and contracting institutions, e.g. [Acemoglu and Johnson \(2005\)](#); [Acemoglu, Johnson, and Robinson \(2001\)](#). [LaPorta et al. \(2008\)](#) summarize that legal origin have influenced the formation of several institutional aspects: procedural formalism, judicial independence (influencing property rights protection), regulation of entry, government ownership of the media, labour laws, conscription, company law and securities law, bankruptcy law, and government ownership of banks.

Finally, some composite indexes have several underlying variables and sources. A lack of transparency is a common problem of governance indicators that results in unfit indicators for policy advice which, e.g., is a weakness of the World Bank World Wide Governance Indicators ([Arndt, 2009](#)).

We construct institutional indicators using a relatively unexploited perception based survey, the Institutional Profiles Database ([IPD, 2009](#)). The IPD documents perceptions on both de-jure and de-facto institutional rules. The data describes ‘stable’ institutional arrangements and do not focus on describing current change in states’ rule. The advantage of using raw data is that transparent indicators are constructed. We can trace the weights of the countries on the constructed indicator and the weights of the underlying variables on the constructed indicator. Another advantage of using institutional data from the same source is that there is no difference in data collection and treatment. The data are fit for cross-country comparison and for comparison across indicators.¹¹ The major disadvantage of the IPD data is that it lacks a panel dimension.

The variables that are selected describe institutional arrangements for property rights, contracting, and competition (see [Table 6](#) in the appendix).¹² The core concern with comparing the contribution of the institutional vari-

¹¹Lack of cross-country and over time comparability is a weakness of data from the World Bank World Wide Governance Indicators, the International Country Risk Rating (ICRG) / PRS Group, and the Fraser institute ([de Crombrughe, 2010](#)).

¹²The 4-digit elementary items are not recoded or rescaled. The variables describe aspects of countries’ institutional setting that influence the cost of operations in the private sector. This selection does not include variables that describe local and sub-national institutional arrangements, variables that describe costs for foreign actors, variables that describe change and reforms, survey questions that are not relevant for all countries, and survey questions that are unclear, ambiguous, or may be particularly difficult for country experts to answer. For example, the variable A3070 about the influence of economic stakeholders in economic regulatory policy has the scale *1 = very frequently to 4 = very rarely*. The surveys respondents may differ in their interpretation of what is frequent. For this reason this survey question is excluded from the selection.

ables on a countries' level of credit is that the variables are closely related. The correlation between the variables is particularly high because the variables all describe aspects of countries' institutional formalization.¹³

Principal component analysis with varimax orthogonal rotation is used to create three 'new' indicators. Orthogonal rotation avoids multicollinearity of the institutional indicators. The varimax rotation method is chosen because it produces components that contain high loadings for a few variables.¹⁴ Three components are retained because the variable selection is made with the objective to describe three conceptual constructs (property rights, contracting and competition).

Figure 1 shows the component loadings on each variable. Component 1 contains 32% of the total variation. This component loads high on the variables B7020, B7021, C7010, and C7011 which describe the degree of existence and effectiveness of competition regulations. Component 1 is therefore interpreted as the component describing the degree of formalization of competition institutions. Countries that score high on this component are for example Ireland, Korea, and the Netherlands. Countries that score low on this component are for example Kuwait, Qatar, and Mali. The lower bound of the component captures countries that have little or no arrangements to stimulate competition.

Component 2 contains 25% of the total variation and loads high on the variables A6001 and A6002. These variables describe the degree of reasonable compensation granted in the event of expropriation of property. Component 2 is therefore identified as describing institutional rules to secure property rights. The upper bound of component 2 describes countries that have secured property rights protection across sectors. Countries that score high on this component are Slovenia, Czech Republic, and Kuwait. Countries that score low on component 2 are Pakistan, Cameroon, and Syria.

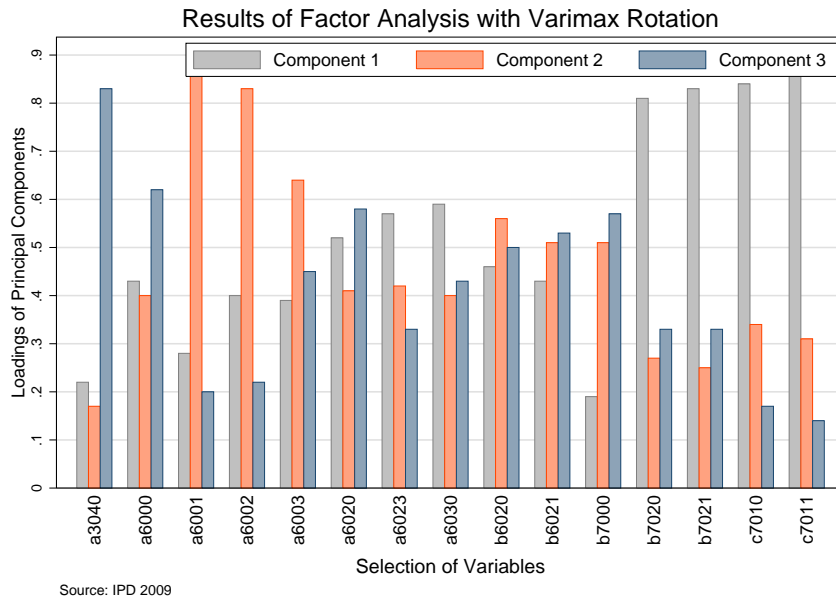
Component 3 contains 21% of the total variation and loads high on variable A3040 which describes the predictability of the results of public procurement contract bids. This component captures the de-facto role of the state in

¹³The variables have correlations roughly around 0.6. On average, the correlations between the variables in the IPD are less than 0.5. In particular, variables that fall under the functions (2) 'Safety, law and order', (4) 'Markets' operating freedom', and (8) 'Openness to the outside world', have relatively lower correlations with our selection of variables. IPD variables that are strongly correlated with the selection of variables are also conceptually closely related. These include survey questions regarding intellectual property rights, respect for law, independence of the court, transparency in state owned enterprises, and corruption.

¹⁴The principal component analysis is run using the 88 countries listed on page 28 in the appendix. The principal component analysis is run using the Stata command 'factor' with specification pcf.

contracting. Countries that have transparent contracting regulations score on the upper bound of this component, for example Finland, Cyprus, and Philippines. Countries that score low on component 3 are Guatemala, Benin, and Chad. In the sequel, component 1 is referred to as ‘Competition’, component 2 as ‘Property’, and component 3 as ‘Contract’.

Figure 1: Construction of Orthogonal Institutional Measurements



As illustrated by the scatter plots and the correlation table in the appendix, higher levels of credit in the private sector are associated with higher values of Competition, Property, and Contract. European countries score on the upper bound of the institutional indicators but differ substantially in the level of credit to the private sector. Some more pronounced differences between the institutional indicators include Qatar and Kuwait that score low on Competition but high on Property. Syria, Philippines, and Pakistan score low on Property but high on Contract. Chad, and the Czech Republic score low on Contract but high on Property. Argentina, Cameroon, China, and India score low on Property but high on Competition. Guatemala and Korea score low on Contract but high on Competition.

3.2 Model and Methodology

The aim of this study is to estimate effects of the between-country difference of the institutional time-invariant (TI) indicators and both the between-

county and over-time variation of the time-varying (TV) indicators. In this section, the basic model is introduced as well as some terminology that is used throughout the remainder of this study.

Our main methodological challenge is the estimation of the effect of TI institutional indicators without biases or inconsistencies. The model is estimated using a Hausman-Taylor estimator with Amemiya-MaCurdy (1986) specification, hereafter AM. The AM method builds on the instrumental variable method proposed by Hausman and Taylor (HT) (1981). The HT method estimates the parameters using the TV variables both to estimate their own coefficients and as instruments for the endogenous TI variables (Hausman and Taylor, 1981). The HT method uses the time-average of the TV exogenous variables as instruments. Amemiya and MaCurdy (1986) propose combining the between-country and over-time information of the TV exogenous variables as instruments. The model is mathematically represented by equation 1 below.

$$Y_{i,t} = \beta X_{i,t} + \gamma Z_i + \alpha_i + \epsilon_{i,t} \quad (1)$$

$Y_{i,t}$ is the dependent variable, the level of credit to the private sector in country i in year t . α_i represents the unobservable country-specific effect. α_i is assumed a random variable that is distributed independently across our country sample with constant variance σ_α^2 . $\epsilon_{i,t}$ is the error term and is assumed to have a zero mean and constant variance σ_ϵ^2 , conditional on $X_{i,t}$ and Z_i . $X_{i,t}$ is a vector of TV indicators and is assumed to contain both exogenous and endogenous indicators. Z_i is a vector of TI indicators and also is assumed to contain both exogenous and endogenous indicators. The endogenous part of Z_i contains the institutional indicators. Only the between-country variation of the institutional characteristics is observed and the institutional characteristics are assumed inert in the medium-term.

The vector $X_{i,t}$ includes several macroeconomic indicators. Data sources are given in Table 9 in the appendix. We control for the effect of savings on $Y_{i,t}$ because the availability of collateral is a major requirement for creditors. Countries' external debt may be negatively related to financial development. Countries that have a large capital account surplus may rely on foreign funding for investment instead of stimulating saving and investment in the domestic economy.¹⁵ We control for the influence of exchange rates. Finally, we control for inflation measured as the rate of change in the consumer price index. High inflation discourages lending. All these variables are assumed to be exogenous, i.e., uncorrelated with α_i and $\epsilon_{i,t}$.

The following TI indicators are used: incidence of malaria, temperate

¹⁵As illustrated in Table 8 in the appendix, the variables savings and external debt are highly correlated.

zones, and ethnic, linguistic, and religious fragmentation.¹⁶ These are all assumed to be exogenous. On the one hand, scholars studying the effect of endowment, e.g. [Engerman and Sokoloff \(1997\)](#), propose that countries' natural resources and climate influences institutional development. The formalization of property rights is argued to be related to the incidence of malaria and to temperate zones by deep historical roots. [Acemoglu et al. \(2001\)](#) argue that there were less incentives to 'settle' and develop formal property rights institutions in regions with high incidence of malaria and tropical climates. Similarly, tropical climates may be related to relative underdevelopment of contracting institutions. Also, it is more likely that industry developed in countries with temperate zones favorable to agricultural development. As a result, in such areas there may be a higher need for competition institutions. On the other hand, institutional formalization may be related to class fragmentation. The formalization of competition regulations may be influenced by ethnic fragmentation; high ethnic fragmentation may contribute to the economic/political dominance of a (small) ethnic majority. Countries with high linguistic fragmentation may have established more formal regulations to facilitate business. In countries with religious fragmentation, states may have had more incentive to separate the church from private sector regulations. Thereby, such countries may have early establishments of a more formal institutional setting.

In order to assess the sensitivity of the data to unobserved unit effects and reverse causality, the model is also tested using OLS with panel corrected standard errors (PCSE)¹⁷ and fixed effects vector decomposition, hereafter FEVD.¹⁸

¹⁶[Acemoglu and Johnson \(2005\)](#) use an IV approach with legal origins and settler mortality as instruments for property rights and contracting. These frequently used indicators are both based on the argument that the legal system and institutional heritage of countries influence today's institutions. Scholars have extensively argued that these indicators suffer from measurement bias, reverse-causality and/or estimations may suffer from omitted variable bias.

¹⁷PCSEs, as proposed by [Beck and Katz \(1995\)](#), correct for 'extreme overconfidence' and yield standard errors that are within 10% of the true variability, also for data containing heteroskedasticity and contemporaneously correlated errors. PCSE does not address unit effects.

¹⁸The FEVD estimates for TV variables are the same as Fixed Effect (FE) estimates and are assumed endogenous. Yet unlike FE estimations, FEVD estimates TI variables in panel data models with unit effects. TI variables are assumed exogenous and the method does not control for causality. FEVD and HT estimators provide equal results when all TV variables are treated as endogenous and the TI variables are treated as exogenous ([Breusch, Ward, Hoa, and Kompas, 2011](#)). FEVD has received several critiques, e.g. see [Greene \(2011\)](#); [Chatelain and Ralf \(2010\)](#); [Breusch et al. \(2011\)](#). The FEVD estimations here are based on an updated 2009 version (xtfevd4.0beta.ado) with revised standard

A Hausman specification test rejects a random effects model over a fixed effects model. A Hausman test of the difference between a FE model and Amemiya-MaCurdy (AM) yields a χ^2 value of 0.37, which is insignificant; this supports estimating using AM.¹⁹ The low χ^2 statistic indicates that the coefficients of the FE estimation and the AM estimation are close. A Hausman test based on the difference between HT and AM yields a χ^2 value of 3.47 which also is insignificant. Thereby, this Hausman test does not reject the additional exogeneity assumptions of AM.

4 Results

4.1 Descriptive Statistics

This study is based on a balanced panel dataset for the period 1994 to 2005. The sample of countries used throughout the analyses is listed in Table 5 in the appendix.²⁰

There is substantial cross-country variation in the level of credit to the private sector. As illustrated by Figure 2 in the appendix, the average of countries' ratio of credit to the private sector to GDP during 1994-2005 ranges from less than 10% to more than 150%.²¹ In Table 7 in the appendix are the summary statistics for the sample. The average level of credit to GDP is 47.35%. Figure 3 in the appendix illustrates the variation of credit to GDP by geographic region. The data show that both the level of credit to the private sector and the formalization of institutional rules are high in some geographic regions and low in other regions. For example, in Sub-Saharan Africa the level of credit to GDP is low and organizations rely on informal institutional rules.

errors (Plumer and Troeger, 2011).

¹⁹The Hausman tests are based on the estimations presented in Table 1 where Competition, Property, and Contract are endogenous.

²⁰The countries Azerbaijan, Brazil, Bulgaria, Democratic Republic of Congo, Iran, India, Kazakhstan, Paraguay, Ukraine, Zimbabwe, and Zambia are not included in the sample because of hyperinflation rates and/or high levels of exchange rate over-valuation.

²¹The dependent variable Credit has missing data for the following countries: Austria, Belgium, France, Mauritania, Netherlands, and Norway. These countries are excluded when using the variable Credit. In addition, Japan is excluded because of the country's high level of Credit. For some countries, data on the credit claims includes credit to public enterprises.

4.2 Main Results

Table 1 reports the relation between credit to the private sector and institutional characteristics whilst controlling for macroeconomic influences. Column 1 to 3 report the estimation results using the different regression methods. There is a strong and significant relationship between credit and the formalization of institutional characteristics. Unlike the OLS with PCSE and FEVD methods, the AM method controls for endogeneity of the institutional indicators in an attempt to establish a causal relationship. The magnitude of the institutional coefficients is relatively similar. This similarity suggests limited reverse causality between credit markets and institutional formalization.

The AM estimations in column 3 report that the formalization of Competition, Property, and Contract institutions has a significant and positive impact on credit deepening.²² Temperate and Malaria are significant at a 10% level and have a direct impact on credit deepening. Following the results of the OLS estimation, Religion and Language are also related to credit deepening. External debt and savings have the expected sign, are significant, and the estimations are relatively constant across regressions. The coefficients for Inflation and ExchangeRate are close to zero.

Column 4 in Table 1 reports the aggregate / combined magnitude of the formalization of institutional characteristics on the private sector, measured by ‘Composite’.²³ Composite is measured by the first retained component from an unrotated principal component analysis on the total selection of IPD variables. Unrotated principal component analysis yields only one strong institutional dimension. Composite contains 66% of the total variation and loads on all underlying variables.²⁴ The coefficient of Composite indicates the overall degree to which the institutional characteristics are related to financial depth.²⁵ The coefficient of Composite is higher than the coefficient of Competition, Property and Contract. The AM model in column 4 predicts that, *ceteris paribus*, a one standard deviation increase in the formalization of rules corresponds to a 0.71 standard deviation increase in credit to the private sector as a percentage of GDP.

²²The first component (Competition) contains the highest of the total variation and therefore we expect that this component is more closely related to the overall dimension of institutional formalization than Property and Contract. For this reason, the relative contribution of each institutional characteristics is not emphasized.

²³See also Figure 5 in the appendix.

²⁴The second component contains 7% of the variation and the third component contains 5% of the variation.

²⁵The results of the Hausman tests in section 3.2 are confirmed when Competition, Property, and Contract are replaced by Composite.

One concern with data on credit to the private sector is that high levels of credit may be an indication of excess borrowing. Excess borrowing results in high systemic risks and, in the long-run, may have a negative impact on growth. For the years 1994-2005, the average level of credit to GDP exceeds 100% for the following countries: New Zealand, Portugal, China, Germany, Thailand, South Africa, United Kingdom, Canada, Malaysia, Switzerland, United States, and Cyprus. The above mentioned countries are excluded in the analysis presented in column 5 and 6 of Table 1. The 100% threshold does not imply that countries above the threshold experienced a credit bubble. In fact, there are no cross-country thresholds that can be used to identify what level of credit to GDP is associated with credit repression, what level is associated with abundance, and what level of debt is appropriate at a given stage of economic development. However, by comparing the results in column 3, 4, 5, and 6, we can identify the extent to which the estimations are influenced by countries with high levels of credit to the private sector.

The coefficient for Competition is lower in column 5 compared to column 3 suggesting that competition institutions is more important for countries with high levels of credit. The coefficient for Property is higher in column 5 compared to column 3 suggesting that property rights protection is more important for countries with low or moderate levels of credit. The magnitude of the composite indicator is higher in column 3 than in column 5. This suggests that the private sector is less influenced by the formalization of institutional rules in countries with lower levels of credit.

Table 1: Regression Results: Dependent Variable Credit

	(1) FEVD	(2) OLS with PCSE	(3) AM \diamond	(4) AM \diamond	(5) AM \diamond	(6) AM \diamond
Competition	0.522*** (0.00)	0.525*** (0.00)	0.505** (0.01)		0.391** (0.01)	
Property	0.376*** (0.00)	0.362*** (0.00)	0.398* (0.01)		0.437*** (0.00)	
Contract	0.393*** (0.00)	0.355*** (0.00)	0.388** (0.01)		0.372** (0.00)	
Composite				0.710*** (0.00)		0.627*** (0.00)
Language	0.062 (0.60)	0.032** (0.00)	0.060 (0.75)	0.060 (0.67)	-0.065 (0.66)	-0.053 (0.68)
Ethnic	-0.028 (0.81)	-0.005 (0.78)	-0.035 (0.85)	-0.046 (0.74)	-0.114 (0.45)	-0.097 (0.45)
Malaria	-0.340** (0.01)	-0.306*** (0.00)	-0.334+ (0.09)	-0.329* (0.03)	-0.172 (0.30)	-0.188 (0.20)
Temperate	-0.374** (0.00)	-0.354*** (0.00)	-0.372+ (0.08)	-0.366* (0.03)	-0.254 (0.13)	-0.274+ (0.06)
Religion	0.152+ (0.07)	0.148*** (0.00)	0.153 (0.26)	0.155 (0.14)	0.004 (0.97)	0.003 (0.98)
ExDebt	-0.107*** (0.00)	-0.124** (0.00)	-0.108*** (0.00)	-0.107*** (0.00)	-0.178*** (0.00)	-0.175*** (0.00)
Savings	0.133*** (0.00)	0.121** (0.00)	0.132*** (0.00)	0.132*** (0.00)	0.205*** (0.00)	0.198*** (0.00)
Inflation	-0.023+ (0.08)	-0.157*** (0.00)	-0.024+ (0.05)	-0.025* (0.04)	-0.043* (0.02)	-0.046* (0.01)
ExRate	-0.015 (0.62)	-0.082*** (0.00)	-0.018 (0.54)	-0.020 (0.49)	-0.028 (0.49)	-0.031 (0.43)
N	972	972	972	972	828	828
R^2	0.912	0.548				

Standardized beta coefficients; p -values in parentheses

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

\diamond exogenous = (ExternalDebt, Savings, Inflation, ExchangeRate, Language, Malaria, Ethnic, Temperate, Religion)

\diamond endogenous = (Competition, Property, Contract, Composite)

4.3 Institutions - Policy Mix

Financial policy is an important tool for states by which they can influence the allocation of credit. Financial policy may have a positive or a negative impact on credit deepening. We control for the effect of financial policy on credit to the private sector using three indicators from [Abiad, Detragiache, and Tressel \(2010\)](#). We use a smaller sample of 61 countries.²⁶

²⁶The following countries are excluded because of missing policy data: Benin, Botswana, Central African Republic, Cyprus, Gabon, Honduras, Kuwait, Libya, Mali, Mongolia, Mauritania, Niger, Panama, Qatar, Saudi Arabia, Sudan, Slovak Republic, Slovenia, Syr-

We control for the influence of the degree of privatization of banks (decrease in State ownership), for the effect of the degree of bank supervision (decrease in independence from executive influence), and for the effect of entry barriers in the banking sector (decrease in state control over credit allocation). These TV policy indicators are assumed to be endogenous.

The privatization of banks could result in more lending to the private sector. [La Porta et al. \(2002\)](#) find that in countries with high government ownership of banks, financial development, productivity and growth is lower.²⁷ Privatization could result in more efficient and effective allocation of credit. Furthermore, privatization could result in higher competition, increasing borrowing opportunities for organizations. Yet, in comparison to government-owned banks, the cost of borrowing is generally higher in privatized banks.²⁸

Banking supervision may increase transparency. The implementation of prudential regulations can restrain the allocation of credit into unproductive, high risk projects. In the 1980's, the objective of most high-income countries was financial market deregulation. Since 2008, deregulation is heavily debated by stakeholders with the aim to re-gain control over financial safety.

The indicator 'Barriers' captures the degree of entry restrictions of banks' activities. Such entry barriers may also restrict the lending capacity of the financial sector. Entry barriers may drive up the cost of borrowing which in return can cause a lower demand for credit.

There is a positive relation between countries' degree of supervision in the banking sector and the level of credit in the private sector. The correlation between credit and banking supervision is, in comparison, substantially higher than the correlation between credit on the one hand and privatization and entry barriers on the other hand (see [Table 8](#) in the appendix).

ian Arab Republic, Chad, and Togo. In addition, the following countries are excluded: Austria, Belgium, France, Netherlands, Norway, and Japan. See also footnote [21](#).

²⁷Following the political view, [La Porta et al. \(2002\)](#) explain that "government ownership leads to miss-allocation of resources" and that "governments are less able to use banks they own to redistribute wealth to political supporters when they are subject to greater oversight by the electorate. As a consequence they have less interest in owning such banks" ([La Porta et al., 2002](#), p. 188,179).

²⁸Government-owned banks may select less risky projects to finance. On the basis of a model of banking [Andrianova, Demetriades, and Shortland \(2008, p. 230\)](#) find that "where private and government-owned banks co-exist, the former will offer a higher interest rate to depositors reflecting the higher risk".

Table 2: AM Regression Results: Dependent variable Credit

	(1)	(2)
Competition	0.389*	
	(0.02)	
Property	0.438**	
	(0.00)	
Contract	0.404**	
	(0.00)	
Composite		0.729***
		(0.00)
Privatization	-0.019	-0.019
	(0.50)	(0.49)
Supervision	0.072**	0.074**
	(0.00)	(0.00)
Barriers	0.089**	0.087**
	(0.00)	(0.00)
Language	0.019	0.014
	(0.91)	(0.93)
Ethnic	-0.027	-0.008
	(0.89)	(0.96)
Malaria	-0.424*	-0.403*
	(0.03)	(0.02)
Temperate	-0.619**	-0.611**
	(0.01)	(0.00)
Religion	0.223+	0.214+
	(0.09)	(0.06)
ExternalDebt	-0.149***	-0.150***
	(0.00)	(0.00)
Savings	0.243***	0.244***
	(0.00)	(0.00)
Inflation	-0.015	-0.016
	(0.34)	(0.31)
ExchangeRate	-0.042	-0.045
	(0.21)	(0.18)
<i>N</i>	732	732

Standardized beta coefficients; *p*-values in parentheses

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Exogenous = (ExternalDebt, Savings, Inflation, ExchangeRate, Language, Malaria, Ethnic, Temperate, Religion)

Endogenous = (Competition, Property, Contract, Composite, Privatization, Supervision, Barriers)

Table 2 reports the regression results when the policy indicators are included. Column 1 and 2 report that the effect of banking supervision and entry barriers on the level of credit is significant, and the coefficient is positive, albeit low. The coefficient for banking privatization is not significant. Temperate is significant at a 1% level, and Malaria is significant at a 5% level. The coefficients for Temperate and Malaria are substantially higher in Table 2 than in Table 1. Religion is significant at a 10% level. On the one

hand, when controlling for policy, the coefficients of Contract, Property and Composite are higher. On the other hand, the coefficient for Competition is lower.²⁹

4.4 Alternative Dependent Variables

In this section, we present the estimation results using alternative dependent variables.³⁰ First, we test the impact of institutional characteristics on the level of domestic bank credit to the private sector.³¹ Unlike the dependent variable Credit, this indicator does not include the volume of credit issued by development banks. The correlation between these indicators is 0.97. Second, we test our model using the level of bank deposits to GDP.³² The correlation between Credit and Bank deposits is 0.85. Third, the model is also estimated using investment as a share of GDP as the dependent variable. The correlation between Credit and Investment is 0.49.

The estimations results are reported in Table 3. When using bank credit as the dependent variable the AM method yields coefficients for the institutional indicators that are relatively similar to those presented in Table 2. In column 3 and 4, Property, Contract, and Composite are significantly related to the level of Bank Deposits, although their estimated impact is lower. The coefficient for Competition is not significant. This suggests that banks' lending capacity is dependent on the formalization of property rights and contracting but is unrelated to competition institutions.

The regression results in column 5, with investment as the dependent variable, indicate that Competition has a positive and significant impact on the level of investment to GDP. Composite is likewise related to Investment, presumably because of the underlying competition indicator. The coefficients for Property and Contract are not significant. These results suggest that competition drives investment. Countries that have substantially higher levels of investment have implemented formal competition institutions. Some oil rich countries have strong property rights protection but have relatively low competition and relatively lower levels of investment as a percentage of GDP. This could imply that the translation of credit deepening into higher levels of investment requires the implementation of competition regulations.

²⁹The policy measurements have a strong correlation with the institutional indicators.

³⁰As in section 4.3, countries with missing policy data are excluded. See also footnote 26. Data sources are given in the appendix, Table 9.

³¹This regression analysis does not include data for Austria, Belgium, Botswana, France, Japan, Netherlands, and Norway.

³²The countries Austria, Belgium, Bangladesh, China, France, Japan, Libya, Netherlands, and Qatar are excluded from this regression analysis.

When using investment as the dependent variable, the coefficients of Temperate are close to zero whilst the coefficients for ExternalDebt and Savings are high.

Table 3: AM Regression Results: Alternative Dependent Variables

	(1)	(2)	(3)	(4)	(5)	(6)
	BankCredit	BankCredit	BankDeposit	BankDeposit	Investment	Investment
Competition	0.364*		0.348		0.336*	
	(0.03)		(0.11)		(0.04)	
Property	0.426**		0.526**		0.192	
	(0.00)		(0.01)		(0.21)	
Contract	0.395**		0.385*		0.044	
	(0.01)		(0.04)		(0.75)	
Composite		0.704***		0.763***		0.323*
		(0.00)		(0.00)		(0.02)
Privatization	-0.086**	-0.086**	-0.042+	-0.044+	0.091***	0.089***
	(0.00)	(0.00)	(0.08)	(0.07)	(0.00)	(0.00)
Supervision	0.085***	0.085***	0.148***	0.149***	0.040***	0.039***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Barriers	0.078**	0.077**	0.070**	0.068**	0.036*	0.036*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.02)	(0.02)
Language	0.075	0.070	0.196	0.164	0.048	0.042
	(0.68)	(0.67)	(0.39)	(0.33)	(0.79)	(0.73)
Ethnic	-0.063	-0.042	-0.084	-0.018	-0.149	-0.174
	(0.74)	(0.80)	(0.75)	(0.92)	(0.42)	(0.16)
Malaria	-0.485*	-0.463*	-0.461+	-0.452*	-0.214	-0.287*
	(0.02)	(0.01)	(0.08)	(0.02)	(0.29)	(0.04)
Temperate	-0.615**	-0.607**	-0.681*	-0.671**	-0.026	-0.050
	(0.01)	(0.00)	(0.02)	(0.00)	(0.91)	(0.76)
Religion	0.204	0.194	-0.020	-0.032	-0.116	-0.087
	(0.13)	(0.12)	(0.91)	(0.81)	(0.37)	(0.33)
ExternalDebt	-0.070*	-0.070*	0.046	0.042	-0.710***	-0.709***
	(0.02)	(0.02)	(0.11)	(0.14)	(0.00)	(0.00)
Savings	0.125**	0.125**	-0.012	-0.009	0.656***	0.665***
	(0.00)	(0.00)	(0.75)	(0.81)	(0.00)	(0.00)
Inflation	-0.003	-0.003	-0.016	-0.018	-0.000	-0.000
	(0.86)	(0.83)	(0.24)	(0.20)	(0.96)	(0.95)
ExchangeRate	-0.042	-0.044	-0.030	-0.032	-0.102***	-0.100***
	(0.18)	(0.16)	(0.32)	(0.28)	(0.00)	(0.00)
<i>N</i>	732	732	720	720	804	804

Standardized beta coefficients; *p*-values in parentheses

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Exogenous = (ExternalDebt, Savings, Inflation, ExchangeRate, Language, Malaria, Ethnic, Temperate, Religion)

Endogenous = (Competition, Property, Contract, Composite, Privatization, Supervision, Barriers)

In contrast to the estimation results with Credit as the dependent variables, the estimations in Table 3 report a significant impact of all policy

indicators. The models in column 1 to 4 suggest that privatization of the banking sector has had a negative effect on the level of bank deposits and bank credit to the private sector. From column 5 and 6 we conclude that privatization is important for stimulating investment, albeit its effect is small.

Overall, both the formalization of institutional characteristics and financial policy are important for countries' financial market. Nevertheless, the differences across the models support the thesis that the formalization of institutional rules is a stage by stage process.

4.5 Robustness

The dynamics are further explored by lagging the TV macroeconomic and policy variables by one year. The importance of substituting a current value with a one year lag may be relevant for the estimation of some countries. The regulatory processes to obtain credit may be relatively slower in countries that have relatively low levels of credit. The estimation results with the lagged variables are reported in Table 4 column 1, 2, 3, and 4. The estimations for the institutional indicators are positive and significant, Yet, several coefficients of institutional indicators are lower than the coefficients of institutional indicators presented in Table 1 and Table 2. In addition, we smooth the TV data into five year average levels and growth rates. Current values are substituted for the average of the observations in the current year and for those in the previous four years. The results are presented in Table 4 column 5, 6, 7, and 8. The institutional variables remain positive and significant. However, the policy indicators are not significant. This supports the thesis that financial policy only has an impact on short term macroeconomic changes.

Table 4: Robustness Tests. AM Regression Results: Dependent Variable Credit

	<i>Models with lags</i>				<i>Models with smoothed averages</i>			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Competition	0.486** (0.01)		0.400* (0.02)		0.542** (0.00)		0.350+ (0.06)	
Property	0.380* (0.01)		0.461** (0.00)		0.358* (0.02)		0.566*** (0.00)	
Contract	0.373* (0.01)		0.385** (0.01)		0.502*** (0.00)		0.450** (0.00)	
Composite		0.681*** (0.00)		0.742*** (0.00)		0.771*** (0.00)		0.822*** (0.00)
Privatization			-0.005 (0.86)	-0.005 (0.85)			0.021 (0.66)	0.021 (0.64)
Supervision			0.060* (0.01)	0.061** (0.01)			0.044 (0.21)	0.045 (0.20)
Barriers			0.077** (0.01)	0.075* (0.01)			0.074 (0.13)	0.069 (0.15)
Language	0.063 (0.73)	0.063 (0.65)	0.018 (0.92)	0.007 (0.97)	0.019 (0.90)	0.031 (0.84)	-0.021 (0.91)	-0.043 (0.81)
Ethnic	-0.040 (0.83)	-0.051 (0.71)	-0.028 (0.88)	-0.002 (0.99)	0.023 (0.89)	-0.014 (0.93)	-0.030 (0.88)	0.034 (0.85)
Malaria	-0.332+ (0.08)	-0.327* (0.03)	-0.399+ (0.05)	-0.392* (0.03)	-0.303+ (0.07)	-0.284+ (0.09)	-0.335+ (0.10)	-0.320 (0.11)
Temperate	-0.345+ (0.10)	-0.339* (0.03)	-0.598** (0.01)	-0.596** (0.00)	-0.345+ (0.06)	-0.344+ (0.06)	-0.593** (0.01)	-0.574* (0.01)
Religion	0.156 (0.24)	0.158 (0.12)	0.212 (0.11)	0.206+ (0.08)	0.141 (0.22)	0.140 (0.22)	0.200 (0.12)	0.183 (0.16)
ExternalDebt	-0.126*** (0.00)	-0.126*** (0.00)	-0.189*** (0.00)	-0.190*** (0.00)	-0.264*** (0.00)	-0.260*** (0.00)	-0.354*** (0.00)	-0.361*** (0.00)
Savings	0.160*** (0.00)	0.158*** (0.00)	0.286*** (0.00)	0.286*** (0.00)	0.293*** (0.00)	0.288*** (0.00)	0.486*** (0.00)	0.473*** (0.00)
Inflation	-0.032* (0.01)	-0.034** (0.01)	-0.026 (0.11)	-0.027 (0.10)	-0.041* (0.02)	-0.041* (0.02)	-0.032 (0.20)	-0.035 (0.16)
ExchangeRate	-0.012 (0.69)	-0.014 (0.63)	-0.033 (0.33)	-0.035 (0.30)	-0.014 (0.72)	-0.018 (0.65)	-0.042 (0.37)	-0.044 (0.35)
<i>N</i>	891	891	671	671	648	648	488	488

Standardized beta coefficients; *p*-values in parentheses

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Exogenous = (ExternalDebt, Savings, Inflation, ExchangeRate, Language, Malaria, Ethnic, Temperate, Religion)

Endogenous = (Competition, Property, Contract, Composite)

5 Conclusion

The results of this study only partially confirm those of [Acemoglu and Johnson \(2005\)](#). Following these authors' conclusive argument, property rights institutions are related to countries' level of credit to the private sector. However, the authors find that contracting institutions do not matter for credit deepening. We find evidence that credit deepening increases along

with countries' formalization of property rights protection, contracting, and competition institutions. Only property rights and contracting institutions are related to banks' lending capacity, and only competition institutions have a positive impact on investment. The overall dimension of institutional formalization is positively related to financial development and higher levels of investment to GDP.

The financial sector is an important mediating factor in the institutions - growth relationship. Before the crisis formalized institutional rules were generally described as beneficial because of their association with high volumes of credit. Since the crisis more focus is on understanding to what extent credit deepening is beneficial for economic growth. We emphasize that a lack of credit to the private sector is expected to form an obstacle to growth and development.

This study documents why institutional characteristics are difficult to measure. On the one hand, composite institutions / governance indicators as well as broad institutional surveys can not be used to assess a country's performance on specific institutional aspects. On the other hand, specific institutional aspects are closely related amongst each other and are closely related to composite indicators. Therefore, we estimate the impact of closely related institutional characteristics by constructing orthogonal institutional indicators. Policymakers need to be careful when assessing a country's institutional development. Because of the interrelatedness of the institutional characteristics, the degree of formalization of institutional characteristics may be best documented on the basis of a more general institutional dimension.

This study would benefit from further analysis on the impact of institutional characteristics on credit markets, investment, and growth. Questions that arise include: Under what institutional conditions does credit deepening have a positive effect on growth? Does formalization of intellectual property rights protection lead to a higher degree of investment in intangible assets? What is the effect of institutional formalization on informal lending?

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6 Appendix

Table 5: Country List

Code	Country	Region Classification
ARG	Argentina	Latin America
AUS	Australia	Western Europe and North America
AUT	Austria	Western Europe and North America
BEL	Belgium	Western Europe and North America
BEN	Benin	Sub-Saharan Africa
BFA	Burkina Faso	Sub-Saharan Africa
BGD	Bangladesh	South Asia
BOL	Bolivia	Latin America
BWA	Botswana	Sub-Saharan Africa
CAF	Central African Republic	Sub-Saharan Africa
CAN	Canada	Western Europe and North America
CHE	Switzerland	Western Europe and North America
CHN	China	East Asia
CIV	Cote d'Ivoire	Sub-Saharan Africa
CMR	Cameroon	Sub-Saharan Africa
COL	Colombia	Latin America
CYP	Cyprus	Western Europe and North America
CZE	Czech Republic	Eastern Europe and post Soviet Union
DEU	Germany	Western Europe and North America
DNK	Denmark	Western Europe and North America
DOM	Dominican Republic	Latin America
DZA	Algeria	North Africa and the Middle East
ECU	Ecuador	Latin America
EGY	Egypt, Arab Rep.	North Africa and the Middle East
ESP	Spain	Western Europe and North America
EST	Estonia	Eastern Europe and post Soviet Union
FIN	Finland	Western Europe and North America
FRA	France	Western Europe and North America
GAB	Gabon	Sub-Saharan Africa
GBR	United Kingdom	Western Europe and North America
GHA	Ghana	Sub-Saharan Africa
GRC	Greece	Western Europe and North America
GTM	Guatemala	Latin America
HND	Honduras	Latin America
HUN	Hungary	Eastern Europe and post Soviet Union
IND	India	South Asia
IRL	Ireland	Western Europe and North America
ISR	Israel	North Africa and the Middle East
ITA	Italy	Western Europe and North America
JOR	Jordan	North Africa and the Middle East
JPN	Japan	East Asia
KEN	Kenya	Sub-Saharan Africa
KOR	Korea, Rep.	East Asia

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KWT	Kuwait	North Africa and the Middle East
LBY	Libya	North Africa and the Middle East
LKA	Sri Lanka	South Asia
LTU	Lithuania	Eastern Europe and post Soviet Union
LVA	Latvia	Eastern Europe and post Soviet Union
MAR	Morocco	North Africa and the Middle East
MDG	Madagascar	Sub-Saharan Africa
MEX	Mexico	Latin America
MLI	Mali	Sub-Saharan Africa
MNG	Mongolia	Eastern Europe and post Soviet Union
MOZ	Mozambique	Sub-Saharan Africa
MRT	Mauritania	Sub-Saharan Africa
MYS	Malaysia	South-East Asia
NER	Niger	Sub-Saharan Africa
NLD	Netherlands	Western Europe and North America
NOR	Norway	Western Europe and North America
NPL	Nepal	South Asia
NZL	New Zealand	Western Europe and North America
PAK	Pakistan	South Asia
PAN	Panama	Latin America
PER	Peru	Latin America
PHL	Philippines	South-East Asia
POL	Poland	Eastern Europe and post Soviet Union
PRT	Portugal	Western Europe and North America
QAT	Qatar	North Africa and the Middle East
ROM	Romania	Eastern Europe and post Soviet Union
RUS	Russian Federation	Eastern Europe and post Soviet Union
SAU	Saudi Arabia	North Africa and the Middle East
SDN	Sudan	Sub-Saharan Africa
SEN	Senegal	Sub-Saharan Africa
SVK	Slovak Republic	Eastern Europe and post Soviet Union
SVN	Slovenia	Eastern Europe and post Soviet Union
SWE	Sweden	Western Europe and North America
SYR	Syrian Arab Republic	North Africa and the Middle East
TCD	Chad	Sub-Saharan Africa
TGO	Togo	Sub-Saharan Africa
THA	Thailand	South-East Asia
TUN	Tunisia	North Africa and the Middle East
TUR	Turkey	North Africa and the Middle East
TZA	Tanzania	Sub-Saharan Africa
UGA	Uganda	Sub-Saharan Africa
URY	Uruguay	Latin America
USA	United States	Western Europe and North America
VEN	Venezuela, RB	Latin America
ZAF	South Africa	Sub-Saharan Africa

Table 6: Selection of Institutional Variables -IPD 2009-

Competition: Degree of formalization of pro-competition institutional arrangements.

Degree of administrative barriers (e.g. red tape) restricting firm entry (B7000)

Effectiveness of competition regulation arrangements (non-banking) to combat restrictive collective agreements i.e. cartels (B7020)

Effectiveness of competition regulation arrangements (non-banking) to combat abuses of dominant positions (B7021)

Existence of competition arrangements in the banking system to combat restrictive collective agreements i.e. cartels (C7010)

Existence of competition arrangements in the banking system to combat abuse of dominant position (C7011)

Property: Degree of formalization of property rights protection across sectors.

Effectiveness of legal measures to defend property rights between private agents (A6000)

Degree of reasonable compensation in the event of de-jure or de-facto expropriation of land property (A6001)

Degree of reasonable compensation in the event of de-jure or de-facto expropriation of property for production (A6002)

Frequency of arbitrary government pressure on private property (e.g. using red tape) (A6003)

Respect for intellectual property protection in terms of manufacturing secrets, patents (B6020)

Respect for intellectual property protection in terms of counterfeiting (B6021)

Contract: Degree of formalization of institutional arrangements facilitation contracting.

Predictability of the results of public procurement contract bids (A3040)

Independence of the commercial courts from the government in commercial disputes (A6020)

Extent of enforcement and speed of commercial court rulings

Extent of enforcement of bankruptcy law (A6030)

Figure 2: Credit in the Private Sector

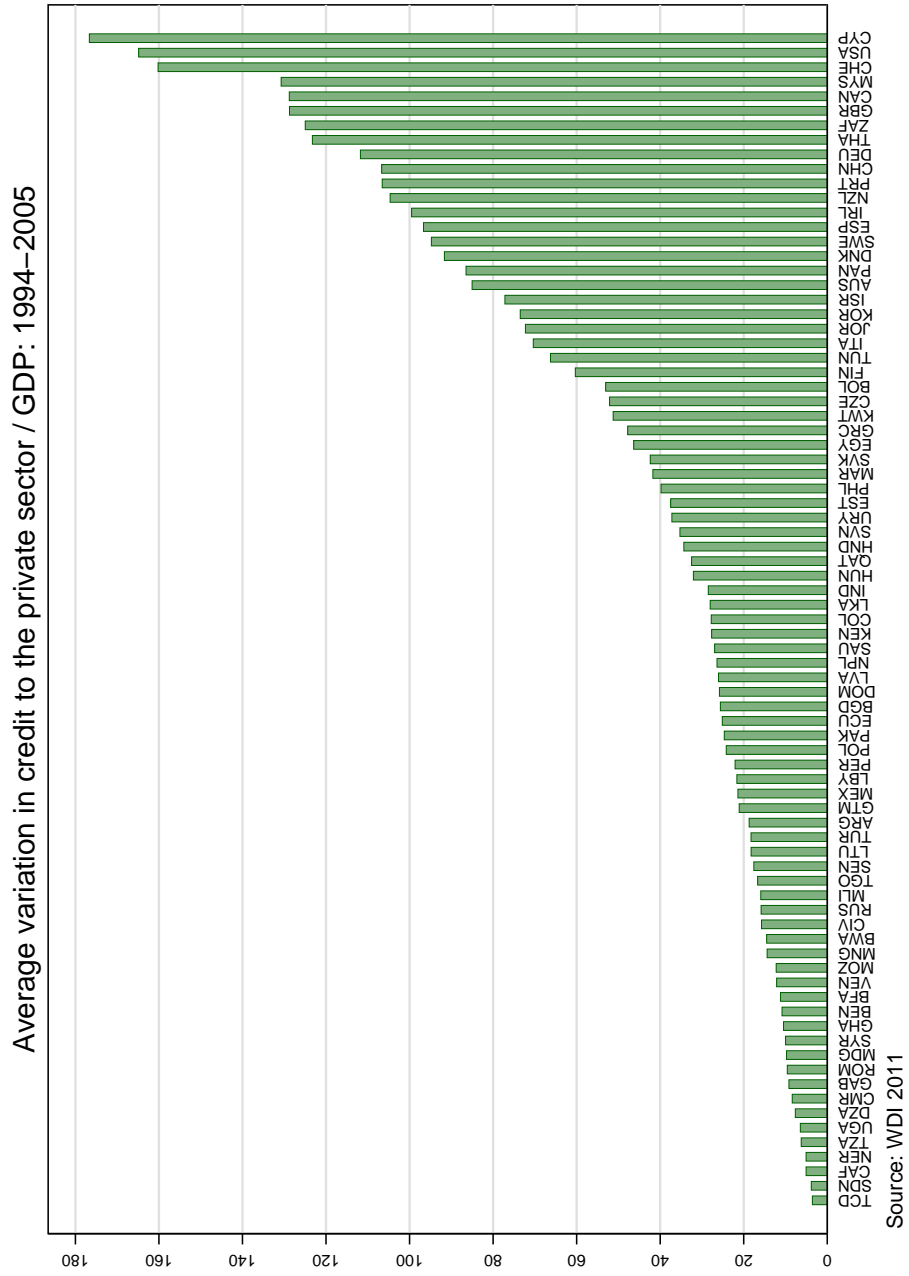


Figure 3: Credit in the Private Sector

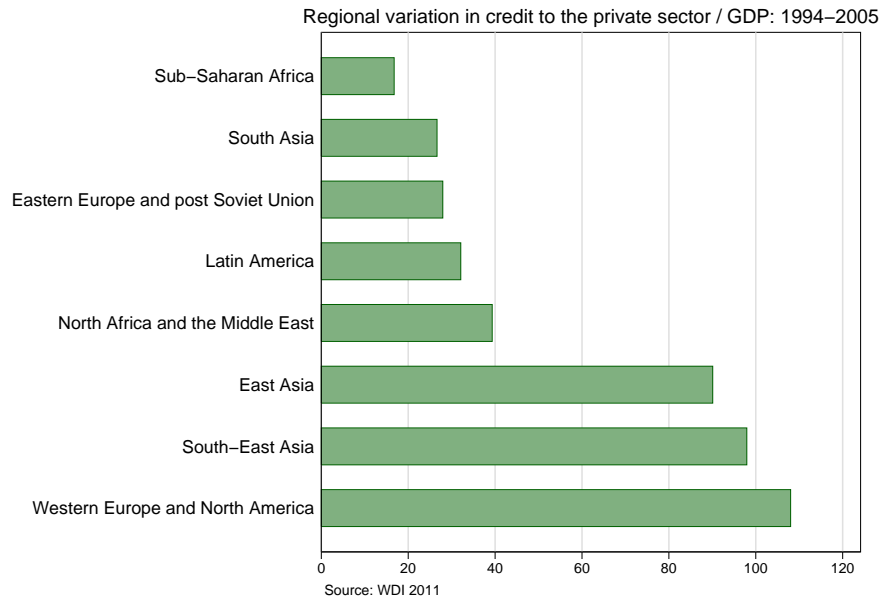


Table 7: Summary Statistics

	Mean	Standard Deviation	Min	Max	Number of observations
Credit	47.35	45.10	0	231.7	972
Credit*	52.77	45.29	0	195.52	732
BankCredit*	65.10	48.32	1.89	225.17	732
BankDeposit*	43.76	28.84	6.66	151.28	720
Investment*	20.85	9.30	1.16	48.612	804
Composite	0.47	0.31	0	1	1056
ExternalDebt	-1.66	10.73	-100.97	44.95	1056
Savings	20.21	11.52	-40.81	69.61	1056
Inflation	9	18.63	-9.8	307.63	1056
ExchangeRate	182.71	382.12	0.03	2877.65	1056
Privatization	1.77	1.12	0	3	804
Supervision	1.64	0.92	0	3	804
Barriers	2.65	0.72	0	3	804

*Summary statistics for sample with policy indicators

Table 8: Pairwise Cross-Correlations

	Credit	BankCredit	BankDeposit	Investment	Competition	Property	Contract	Composite	Privatization	Supervision	Barriers	ExternalDebt	Savings	Inflation	ExchangeRate	Language	Ethnic	Malaria	Temperature	Religion
Credit	1																			
BankCredit	0.97	1																		
BankDeposit	0.49	0.47	1																	
Investment	0.85	0.85	0.51	1																
Competition	0.43	0.41	0.36	0.49	1															
Property	0.35	0.31	0.35	0.39	0	1														
Contract	0.32	0.35	0.34	0.13	0	0	1													
Composite	0.67	0.65	0.63	0.6	0.65	0.57	0.5	1												
Privatization	0.28	0.2	0.14	0.07	0.09	0.3	0.25	0.35	1											
Supervision	0.53	0.52	0.48	0.39	0.39	0.37	0.37	0.62	0.39	1										
Barriers	0.07	0.04	0.07	0.13	0.18	0.22	0.16	0.31	0.31	0.29	1									
ExternalDebt	0.19	0.22	0.21	0.15	0.22	0.07	0.13	0.25	0.08	0.22	0.13	1								
Savings	0.25	0.27	0.29	0.44	0.25	0.14	0.05	0.27	-0.01	0.2	-0.01	0.84	1							
Inflation	-0.24	-0.23	-0.26	-0.08	0.02	-0.1	-0.17	-0.13	-0.23	-0.27	0.02	-0.07	-0.07	1						
ExchangeRate	-0.32	-0.37	-0.37	-0.36	-0.18	-0.14	-0.33	-0.36	0.03	-0.18	0.11	-0.15	-0.19	-0.01	1					
Language	-0.21	-0.23	-0.26	-0.42	-0.32	-0.16	-0.07	-0.33	0.07	-0.26	-0.25	-0.18	-0.23	-0.03	0.21	1				
Ethnic	-0.35	-0.36	-0.38	-0.58	-0.5	-0.21	-0.26	-0.58	0.18	-0.31	-0.15	-0.18	-0.29	0.04	0.37	0.69	1			
Malaria	-0.47	-0.5	-0.5	-0.61	-0.46	-0.34	-0.25	-0.62	-0.14	-0.44	-0.3	-0.34	-0.41	0.04	0.46	0.68	0.64	1		
Temperature	0.43	0.43	0.4	0.58	0.6	0.39	0.36	0.79	0.14	0.55	0.38	0.15	0.2	-0.04	-0.36	-0.48	-0.67	-0.72	1	
Religion	0.18	0.16	0.03	-0.12	0.11	0.09	0.08	0.16	0.28	0.18	-0.05	0	-0.04	-0.08	0.1	0.4	0.22	0.22	0.03	1

$Z_1, Z_2,$ & $X_1 = 1056$ observations; $X_2 = 804$ observations;

Credit = 972 observations ; BankCredit = 732 observations; BankDeposit = 720 observations; Investment = 804 observations.

Figure 4: Scatter Plots: Credit and Institutional indicators

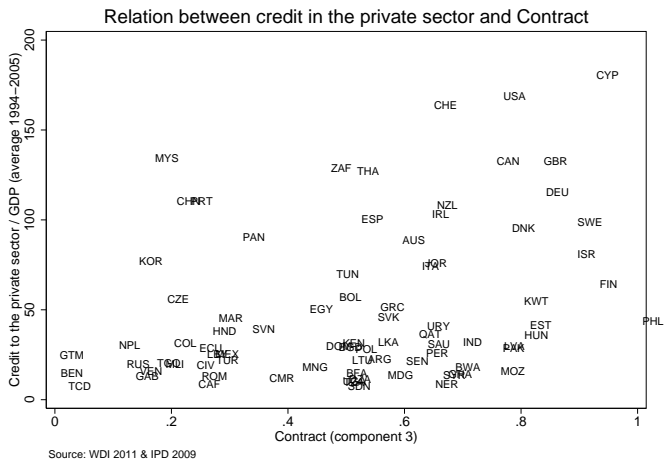
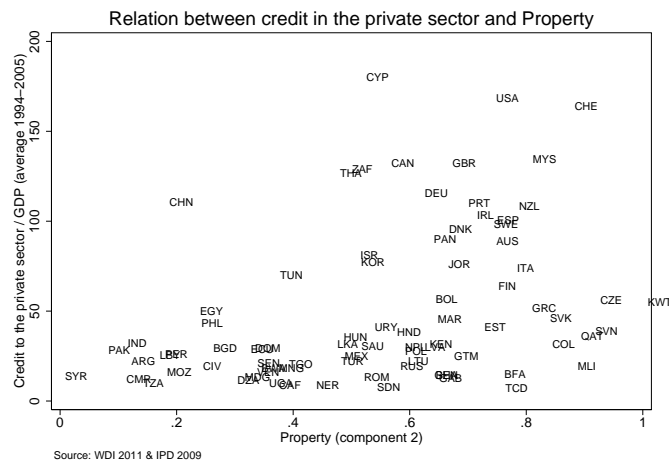
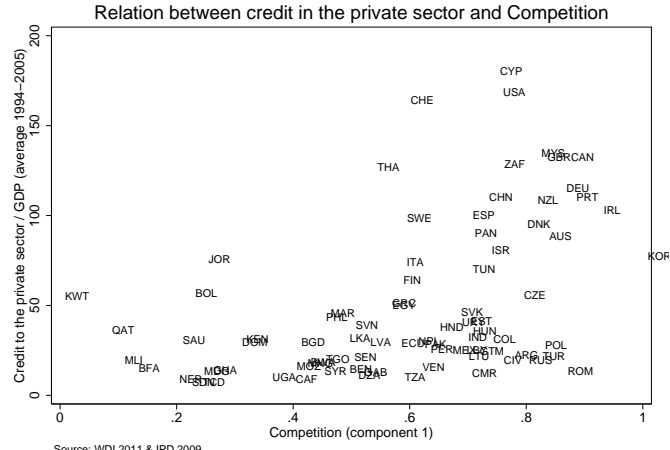


Figure 5: Scatter Plots: Credit and Composite

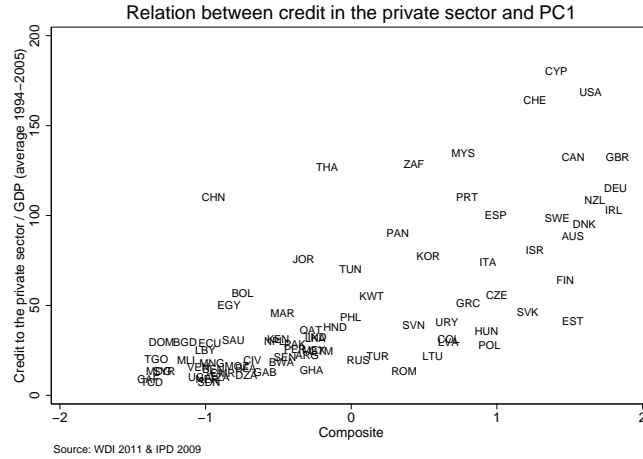


Table 9: Sources

Variable	Definition	Source	Scale
Credit	Domestic credit to private sector	World Bank (2011), IMF	% of GDP
BankCredit	Domestic credit provided by banking sector	World Bank (2011), IMF	% of GDP
BankDeposit	Deposits of deposit monetary institutions	Beck and Demirgüç-Kunt (2009), IMF	% of GDP
Investment	Investment, Current Price National Accounts at PPPs	Heston, Summers, and Aten (2009)	% of GDP
Property, Contract, Competition, Composite	Institutional indicators	IPD (2009)	Indicators are normalized on a scale of 0 = low formalization of rules to 1 = high formalization of rules. Original data ranges from 0-4 and 1-4
Supervision	Prudential regulations and supervision of the banking sector	Abiad et al. (2010)	From 0 = unregulated, to 3 = regulated
Privatization	State ownership in the banking sector	Abiad et al. (2010)	From 0 = repressed, to 3 = liberalized

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Barriers	Entry barriers in the banking sector	Abiad et al. (2010)	From 0 = repressed to 3 = liberalized
Inflation	Rate of change in the consumer price index	World Bank (2011) , IMF	% change
Savings	Gross domestic savings	World Bank (2011)	% of GDP
ExternalDebt	External balance on goods and services	World Bank (2011)	% of GDP
ExchangeRate	Exchange rate	Heston et al. (2009)	US = 1
Malaria	Population at risk of malaria transmission in 1994	World Health Organization 1997 / Glaeser et al. (2004)	Probability of 0 = no malaria risk to 1 = high malaria risk
Temperate	Population in Koeppen-Geiger Climatic zone in 1995	J. L. Gallup and A. D. Mellinger and J. D. Sachs (2001)	% of population
Religion	Religious fractionalization	Alesina, Devleeschauwer, Easterly, Kurlat, and Wacziarg (2003)	Probability of 0 = homogenous to 1 = fractionalized society
Ethnic	Ethnic fractionalization	Alesina et al. (2003)	Probability of 0 = homogenous to 1 = fractionalized society
Language	Linguistic fractionalization	Alesina et al. (2003)	Probability of 0 = homogenous to 1 = fractionalized society
Region	The geographic region of the country	Data adapted from Hadenius and Teorell (2005)	Dummy variable

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