Investment in Relationship-Specific Assets: Does Finance Matter?*

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Abstract

Banks promote economic growth by facilitating relationship-specific investment between buyers and suppliers of intermediate goods. We motivate this novel channel from banking to real economy by bringing together the intuition from research on relationship-specific assets and signaling role of banks. A supplier would be reluctant to undertake relationship-specific investment if she cannot observe financial stability and planning horizon of buyer. A strong banking sector is well-suited to address these information asymmetries. Empirical results from 28 industries in 90 countries confirm that industries dependent on relationship-specific investment from their suppliers grow disproportionately faster in countries with a strong banking sector.

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The finance literature traditionally focuses on the interactions between agents from the financial sector (e.g., banks) on the one side and firms in the real economy on the other side. In this paper, we look at the role of banks in encouraging value-enhancing interactions between firms in the real economy. We provide empirical evidence consistent with a strong banking sector promoting economic growth by alleviating the information asymmetries between firms buying and supplying intermediate goods. To motivate this new transmission channel from banking to real economy, we combine the insights from two strands of literature: research on *relationship-specific assets* and scholarly work on the role of financial intermediaries.

The distinguishing feature of relationship-specific assets is the fact that their value is greater within a relationship than outside it. A typical example involves an upstream supplier who makes investments in order to customize her product for the needs of the downstream purchaser. After the investment is sunk, the buyer can refuse to meet her commitment and trigger ex post renegotiation. The seller is in a weaker position as she has already adjusted the product for the needs of one specific purchaser and would thus not be able to achieve the original price with a different customer. The pathbreaking work of Nobel laureate Oliver Williamson (1971, 1975, 1979) and the follow-up literature sees this well-known hold-up problem as the ultimate reason why agents underinvest in relationship-specific assets.[1] In the above example, forward-looking sellers would be reluctant to adjust their products to the specific needs of their customers, hurting the downstream firms with negative ramifications for aggregate growth. Consequently, the standard way for the government to stimulate relationship-specific investment would be a well-functioning legal enforcement of written contracts.

This paper looks beyond the hold-up problem and stresses two other reasons behind suppliers' underinvestment in relationship-specific assets: financial vulnerability and short-term planning horizon of buyers. Firstly, even if a detailed contract makes the buyer *willing* to pay for a product at the agreed price, she might be *unable* to do so due to liquidity or solvency problems. The most effective contract enforcement might fail to protect the supplier in tough times when the buyer lacks access to a reliable source of financing. The recent financial crisis made this point painfully clear. Secondly, the probability of the buyer's opportunistic behavior depends on her planning horizon. A long-term oriented downstream firm would arguably prefer to establish permanent business relationships. A buyer with a short-term planning horizon would be much more

[1] See also the seminal paper of Klein et al. (1978). Hart (1995) and Royal Swedish Academy of Science (2009) provide an intuitive introduction to this literature.

likely to aim for one-shot gains from defaulting on the original commitments.

An upstream firm suspecting a financially unstable or shortsighted contractual partner would therefore be notably reluctant to make specific product adjustments. By implication, a buyer dependent on the willingness of her supplier to undertake relationship-specific investment would particularly benefit from being creditworthy and shunning myopic behavior. However, a firm usually cannot disclose such qualities in an easy and credible way. Contrary to the standard hold-up problem, a well-functioning legal system is here of little avail. In our view, it is rather the banking sector that can overcome this information asymmetry and help the buyer to convince a supplier hesitating to undertake relationship-specific investment. Existing work on financial intermediaries backs this claim. In a seminal paper, Fama (1985) argues that obtaining a bank loan is a particularly suitable way to signal creditworthiness to business partners. Similarly, von Thadden (1995) shows how a monitoring contract closely resembling a standard bank-firm lending relationship can lengthen the firms' planning horizon.

Consequently, a well-developed financial (especially banking) system should disproportionately boost industries dependent on the willingness of their business partners to undertake relationship-specific investments. We confirm this theoretical prediction by attesting that industries requiring a high share of relationship-specific inputs grow faster in countries with a well developed financial system. Furthermore, we provide evidence that this effect comes from a more developed banking sector rather than from a deeper stock market.

Consistent with the theoretical arguments of Fama (1985) and von Thadden (1995), our channel works mostly via increased entry of new firms (extensive margin) and higher capital accumulation. New firms especially need to signal their creditworthiness in order to stimulate relationship-specific investment from their business partners. Existing firms have already established a reputation with the suppliers and depend less on the signals from third parties like banks. Similarly, the increased planning horizon should affect sectoral output growth primarily via higher capital accumulation.

This paper contributes to two strands of literature. First, it provides evidence for a novel channel through which banking affects the real economy. The finance-growth literature has so far focused on the role banks and/or financial markets play in solving the information asymmetries between firms on one side and external investors on other side. The mechanism in this paper is about the role banks play in alleviating firm-to-firm information asymmetries. In our story, a well-developed banking sector reassures the suppliers unsure about financial vulnerability and planning horizon of the firms buying

their products.

Second, our paper complements the existing literature on economic specificity that has focused on the hold-up problem and thus implied comprehensive and enforceable contracts as a standard way to promote investment in relationship-specific assets. This paper shows that a strong banking system plays an autonomous and equally important role in stimulating relationship-specific investment by the upstream suppliers, thus promoting the growth of their downstream customers. In that sense, the paper identifies a new source and offers a new remedy for underinvestment in relationship-specific assets.

The rest of the paper is structured as follows. The next section provides theoretical background for our hypothesis. Section II explains the methodology and describes the data. Section III presents evidence from a broad cross-section of 90 countries and 28 industries. Section IV concludes.

I Theoretical Motivation

An influential body of theoretical literature (Klein et al. 1978, Williamson 1979, Grossman and Hart 1986, Hart and Moore 1990, Caballero and Hammour 1998) argues that rational agents underinvest in assets whose value is higher inside relationship than outside it. According to these authors, the reason lies in possible opportunistic behavior of the contractual partner. A supplier investing into adjustment of her product to the specific needs of one particular buyer is creating an appropriable specialized quasi rent. After such relationship-specific investment is sunk, an opportunistic buyer can renege on the original contract and try to appropriate the quasi rent during a renegotiating process. The supplier will not be able to prevent such development unless she can use legal means to enforce the original contract.

The recent literature on trade and incomplete contracts builds upon this insight and identifies a prominent role for institutional quality in reassuring a supplier undertaking relationship-specific investment. Levchenko (2007) develops a theoretical model suggesting institutional quality as a source of comparative advantage in industries requiring relationship-specific investment from their suppliers. Levchenko (2007) and Nunn (2007) empirically confirm this prediction by showing that these industries perform better in the export markets if their home country possesses superior judicial quality and contract enforcement.

The existing literature on economic specificity thus focuses on the hold-up problem - a deliberate abuse of power from the buyer after the supplier has sunk the relationship-

specific investment. However, there are two corporate aspects to the relationship-specific investment that in our opinion have not received adequate attention in academic literature.

The first aspect is the possibility of financial problems of the downstream customer. A detailed written contract is of little help for the supplier if the buyer turns out to be unable to pay the bill. The financial consequences for the party undertaking relationship-specific investment might be even more severe in this case. Here the buyer does not just try to renegotiate the original contract, she is objectively not able to meet her financial commitment. The supplier will thus definitely have to find a new buyer for a product adjusted for the needs of the original customer. A supplier suffering from her buyer's financial distress is not a mere theoretical construct. Hertzel et al. (2008) show that firms' bankruptcy filings lead to decrease in stock price of their suppliers. Interestingly, there is no such adverse effect on the customers of the filing firms.

The second aspect involves the length of the buyer's planning horizon. The hold-up literature emphasizes the immediate monetary gain for a firm that defaults on the original contract. In the real world, the buyer would also consider the costs of such action in terms of alienating her business partner. The planning horizon of the downstream firm is a crucial factor in this costs-benefits analysis. A shortsighted buyer would be much more willing to endanger a long-term business relationship in order to achieve a short-term gain from renegotiating the original contract.

A supplier usually cannot observe the true financial situation or planning horizon of the buyer. However, existing work on financial intermediaries suggests that a buyer can signal both creditworthiness and a long-term planning horizon via obtaining a loan or a line of credit from her bank.

Fama and Jensen (1983) noticed that most agents in organizations have contracts promising them fixed payoffs or incentive payoffs tied to specific measures of performance. This first group of agents is rather heterogenous and includes both suppliers and outside debtholders like banks. A second group of agents called residual claimants (owners of the company) then receives the difference between stochastic inflows of resources and fixed payments promised to the first group. Fama and Jensen (1985) point out that the conflicts of interest between suppliers and residual claimants are similar to those between debtholders and residual claimants. It would therefore be inefficient if both suppliers and debtholders independently monitored the actions of residual claimants. According to Fama (1985), bank loans are particularly suitable to avoid duplication of information and monitoring costs. In case of a default, bank loans usually have low priority among

the contracts promising fixed payoffs. The renewal process of short-term bank loans thus implies a regular assessment of the borrower's ability to meet such contracts and signals the reliability of the borrower. Suppliers and other agents with fixed payoffs consider those signals to be credible, as the bank backs them with its own resources. The value of such signals can be seen in the fact that many firms pay monitoring fees for lines of credit without effectively taking the offered resources (Fama 1985, p. 37).

There is a closely related strand of literature explaining the existence of financial intermediaries as a natural response to asymmetric information between borrowers and lenders (Leland and Pyle 1977). According to Diamond (1984), the lenders delegate the costly task of monitoring the loan contracts to an intermediary in order to avoid the alternative of either effort duplication or a free-rider problem. Von Thadden (1995) provides a dynamic interpretation of this framework. In his model, a firm dependent on external finance may undertake short-term investments, which yield lower long-run returns but minimize the risk of early termination by outside investors. Von Thadden (1995) shows how a monitoring contract closely resembling a standard credit-line agreement can help to overcome this myopia problem. A standard bank-firm lending relationship can thus eliminate the short-term bias in investment and lengthen the firms' planning horizon.

The presence of relationship-specific assets is in our opinion an important factor determining the economic value of signals associated with the bank loans. A supplier of standardized products can always find another buyer if the original customer is either not able or not willing to fulfil the original contract. A supplier of relationship-specific products has much more to lose if her customer lacks financial robustness or long-term planning horizon. Consequently, a buyer dependent on the willingness of her supplier to undertake a sufficient level of relationship-specific investment would disproportionately benefit from positive signals a bank loan can provide. Combining the insights from the literature on relationship-specific investment with the theoretical literature about monitoring and signaling role of financial intermediaries thus yields a testable empirical implication. A strong banking sector benefits disproportionately those industries that rely on the relationship-specific investment from their suppliers.

It is important to realize that the main hypothesis of the paper relies on unique characteristics of banks that cannot be easily replicated by stock markets or other financial institutions. Firstly, the theoretical mechanisms of Fama (1985) and von Thadden (1995) depend on the monitoring skills of banks in the presence of information asymmetries. Many prominent theories of financial intermediation see this ability to monitor the firms as the main advantage of banks over public markets (Boot 2000, Ongena and Smith

1998). Secondly, a buyer eager to reassure a supplier of relationship-specific products would particularly benefit from another comparative advantage of banks: their capability to support the borrowers in financially difficult times. Ongena and Smith (1998) identify such "leaning against the wind" as one of the historical tasks of banks, citing a source from the early 19th century. Financial intermediaries have retained this insurance role up to the present day. Building upon the work by Kashyap et al. (2002), a recent strand of finance literature (Gatev and Strahan 2006, Gatev et al. 2006, 2009) sees banks as "liquidity provider of last resort" during financial crises. In this line of argument, banks enjoy the status of safe haven for investors due to their explicit and implicit government backing. In time of financial distress, banks therefore experience an inflow of funds from public markets. Banking system can use these additional resources to meet increased demand for credits by firms hit by the very same financial hardship. As banks gain additional funds at the same time when firms need them most, they are able to offer insurance against market-wide liquidity shocks at lower costs than other financial institutions. The recent global financial crisis, which occurred after the time span of our sample, profoundly tested the limits of explicit and implicit government guarantees. However, even then we could observe the great lengths to which central banks and governments went in order to protect their banks.

Due to their missing safe haven status and intrinsically anonymous character, stock markets are at a comparative disadvantage when it comes to insuring and monitoring their borrowers. Public markets are therefore less likely to reassure a supplier who demands credible signals about her customer's financial robustness before adjusting a product to some buyer-specific requirements. Shleifer and Summers (1998) go even one step further and discuss a possible negative impact of stock markets on the relationship-specific investment between a firm and its suppliers. After a hostile takeover, the new owners can easier renege on existing implicit contracts of the firm in order to transfer relationship-specific rents from suppliers and other stakeholders to the shareholders. Shleifer and Summers argue that such a transfer is the true rationale behind many takeovers. Consequently, a seller might be more reluctant to invest in relationship-specific inputs if assertive stock markets can expropriate the resulting rents.

II Methodology and Data

A Empirical Model

Our empirical approach relies on the use of data that are rather aggregated (at the industry level) but available for a broad sample of countries at different stages of financial, economic, and institutional development. This allows us to test the robustness of the novel channel introduced in this paper while at the same time controlling for traditional channels from both finance literature (Rajan and Zingales 1998) and relationship-specific literature (Nunn 2007, Levchenko 2007).

The chosen methodology also allows us to control for possible endogeneity in a way that the use of more disaggregated data would not. The question of whether financial development promotes growth or merely follows the real economy goes back at least to Schumpeter (1912) and Robinson (1952). The endogeneity issue seems to be the main reason why the research focus in the finance-growth literature gradually shifted towards differences-in-differences estimations. These econometric techniques compare the difference in outcome for treated and control groups before and after a treatment.[2]

We rely on the differences-in-differences approach in order to establish a causal link from banking sector to relationship-specific investment and then to economic growth. In our case, the affiliation with a treated group is measured by the importance of relationship-specific inputs for given industry and the treatment corresponds to the varying level of banking development across countries. In particular, our empirical model makes use of the differences-in-differences methodology of Rajan and Zingales (1998) and estimates the following equation:

$$G_{ic} = \alpha + \beta CI_i * BD_c + \gamma X_{ic} + \delta_i + \eta_c + \varepsilon_{ic}, \tag{1}$$

where the subscripts i and c indicate industry and country, respectively. As a dependent variable we use several proxies for industrial growth: growth of output, growth of the number of establishments, growth of output per establishment, growth of employment, growth of the capital stock, and growth of total factor productivity (TFP). Our variable of interest is $CI_i * BD_c$, where BD_c is the banking development in country c and CI_i is the contract intensity measure introduced by Nunn (2007), which quantifies the importance of relationship-specific inputs for different industries. X_{ic} is a vector of controls and δ_i and

[2] Beck (2008) and Levine (2005) discuss in more detail the application of difference-in-difference estimations in finance-growth literature.

η_c are industry and country dummies that take care of a wide range of omitted variables. These fixed effects also absorb the direct effects of contract intensity CI_i and banking development BD_c. For this reason, the regression does not include separate terms for CI_i and BD_c but only the industry-country interaction term $CI_i * BD_c$.

Petersen (2009) and Thompson (2011) propose clustered standard errors as an alternative to the use of dummies when controlling for fixed effects. Clustering undoubtedly possesses some advantages over dummies inclusion, especially in panel data where time dimension and autocorrelation issues play an important role. However, dummies explicitly entering the regression are an indispensable part of the Rajan-Zingales methodology applied in a broad cross-section of countries and industries.[3]

A positive estimated coefficient for our variable of interest, $CI_i * BD_c$, indicates that a well-developed banking system benefits especially the industries dependent on the relationship-specific investment of their suppliers. This would be consistent with the notion that a strong financial system can reassure suppliers by signaling financial stability and long-term planning horizon of buyers. Our theoretical motivation stresses the decisive role of banks in this regard. In our paper, we therefore use the terms financial development and banking development interchangeably unless specified otherwise.

In order to account for alternative channels that might be correlated with our mechanism, we include several interaction terms between various country and industry characteristics into our set of control variables X_{ic}. Specifically, we interact industry's dependence on external finance with country's banking development ($ExF_i * BD_c$) to confirm that our results are not driven by the fact that financial intermediaries help especially industries dependent on external finance (Rajan and Zingales 1998). Similarly, we include into vector X_{ic} an interaction between contract intensity measure and rule of law ($CI_i * RL_c$). This controls for the traditional argument from the hold-up literature that efficient legal enforcement stimulates relationship-specific investment. Similarly to $CI_i * BD_c$, we expect a positive coefficient sign for the interaction terms controlling for these two alternative theories. We also put the initial share of the sector in total output into all regressions. We expect a negative coefficient for this control variable, as more mature industries usually have less scope for future growth.

It is important to emphasize that the industry characteristic CI_i is computed solely from U.S. industrial data. This approach is based on two assumptions. First, assuming that U.S. markets are well functioning and (relatively) frictionless, equilibrium values in

[3] Cameron et al. (2006, p. 18ff) discuss the case when included fixed effects are at higher level of aggregation than the units of observation.

the United States can be taken as good proxies for exogenous technological characteristics of the production process in a given industry. Second, as long as the relative ranking of industry characteristics is the same across countries, the technological characteristics of the U.S. industries are representative of technologies used in other countries. Under these assumptions, we can interpret the estimated coefficients for the interactions of country and industry characteristics in a causal way. Following Rajan and Zingales (1998), we also drop the United States from our sample to further assure the exogeneity of US based industrial characteristics in our regressions.

Another crucial point in this econometric approach is the potential endogeneity of country characteristics like banking development. Here we follow existing literature and use countries' legal origins to address this issue. We instrument the interaction terms of country characteristics (banking development, rule of law) and industry characteristics (importance of relationship-specific inputs, dependence on external finance) by the interaction terms of the latter variables with legal origin dummies.

Our database has a complex structure with both country and industry dimensions where heteroskedasticity might be present. If this is the case, the GMM estimator is more efficient than the simple 2SLS estimator. In the absence of heteroskedasticity the GMM estimator is asymptotically equivalent to the 2SLS estimator.[4] However, the optimal weighting matrix that is used in the efficient GMM procedure is a function of fourth moments. Obtaining a reasonable estimate of fourth moments requires a large sample size. As a result, the efficient GMM estimator can have poor small sample properties. If in fact the error is homoskedastic, 2SLS would be preferable to efficient GMM in a small sample. In our main specification, we perform the heteroskedasticity test proposed by Pagan and Hall (1983) and reject the null hypothesis of no heteroskedasticity at 1% level. Therefore we rely on GMM estimation for our analysis.

B Data

The international industry-level data come from the Trade, Production, and Protection Database by Nicita and Olarreaga (2007) that covers up to 100 countries over the period 1976 to 2004. It uses production data from the United Nations Industrial Development Organization (UNIDO) that are reported according to the 3-digit ISIC Revision 2 classification. We transform data from current U.S. dollars into constant international dollars,

[4] Baum et al. (2003) discuss the advantages of using GMM over 2SLS in the presence of heteroskedasticity in the error term.

using capital and GDP deflator from the Penn World Table (Heston, Summers, and Aten, 2002). We drop the observations from the United States, as the industry characteristics in our analysis are computed from the US data. The resulting sample includes data for 28 manufacturing industries in 90 countries for the period between 1980 and 2004. The list of the countries used in our sample is reported in Appendix A.

We construct a country-industry dataset by averaging variables over the period 1980-2004. Similarly to the paper of Rajan and Zingales (1998), eliminating the time dimension allows us to use legal origins as instruments for endogenous country characteristics like banking development. As a measure of the initial industry share, we use the data for industry share from 1980 or the earliest year available.

In order to test our main hypothesis on the differentiated impact of banking development across industries, we borrow the notion of contract-intensive (institutionally intensive) sectors from the recent trade literature on incomplete contracts and comparative advantage (Nunn 2007, Levchenko 2007). Following Nunn (2007), we rely on the variable contract intensity that measures for every industry the proportion of intermediate inputs requiring relationship-specific investment. Based on the classification by Rauch (1999), these inputs cannot be sold on an organized exchange, nor are they reference-priced in trade publications.[5] The non-existence of an organized exchange or reference price suggests some non-standard feature of the product. If a producer requires a non-standardized intermediate good for production, the supplier has to undertake ex ante investment in order to customize it. The value of such specific input is higher inside a buyer-seller relationship than outside it. Moreover, in the absence of organized exchange or reference price, the supplier might have a hard time selling her product at the original price if the initial buyer is unable or unwilling to pay. Given that the original measure in Nunn (2007) is reported in the US input-otput classification, we use the measure of contract intensity recomputed for the 3-digit ISIC Revision 2 classification. This recomputed version comes from Nunn's website and has been already used in the literature (e.g., Levchenko 2011).

The second industry characteristics we use is the measure of external finance dependence introduced by Rajan and Zingales (1998). It is defined as capital expenditure minus cash flow divided by capital expenditure. The original variable from Rajan and Zingales (1998) is calculated for a mix of three-digit and four-digit ISIC industries. The version of the measure used in our paper comes from Laeven et al. (2002) and follows the 3-digit

[5]Rauch (1999) classifies SITC Rev. 2 industries according to three possible types of its final good: differentiated, reference-priced, and homogeneous. Naturally, the final good of an industry can serve as intermediate input for other industries.

ISIC Revision 2 classification.

The country-level financial data is taken from Beck, Demirguc-Kunt, and Levine (2000), which contains various indicators of financial development across countries and over time. In our analysis, we use the two most standard proxies for financial development from the existing empirical literature. The ratio of private credit by banks to GDP serves as a proxy for the level of banking development. The ratio of stock market capitalization to GDP measures the strength of stock market in a given country. Due to possible endogeneity concerns, we use the initial levels of banking and stock market development, measured in 1980 or the earliest year available.

We rely on these standard financial measures in order to keep comparability with previous literature, especially as we control for the alternative channel of dependence on external finance (Rajan and Zingales 1998). In the wake of the global financial crisis, there has recently been some discussion regarding the existing measures of financial development on country level. Cecchetti and Kharroubi (2012) reveal a non-monotonic relationship between these measures and economic growth. Beck et al. (forthcoming) find that, after controlling for the generic size of the financial system, a strong banking sector as measured by the ratio private credit over GDP nevertheless does have a positive impact on long run economic growth. Solving this debate goes beyond the scope of this paper (see also the meta-analysis by Valickova et al. 2013). That being said, our variables for banking and stock market development are measured at the beginning of 1980s, i.e., before the widespread financial liberalization and securitization might have compromised the suitability of private bank credit and stock market capitalization as proxies for financial development. In our empirical analysis, we also exploit instrumental variables (legal origins) that even further precede the surge in financial activities taking place during 1990s and 2000s.

The data for quality of legal institutions, the "rule of law", is taken from the database constructed by Kaufmann, Kraay, and Mastruzzi (2008). This is the weighted average of several variables that measure perceived effectiveness and predictability of the judicial system and contract enforcement in each country. For our analysis, we use data for 1996, which is the earliest available estimate for this variable.

For instrumental variable regressions, we rely on the data of legal origin from Glaeser et al. (2004). Legal origins are essentially indicator variables. For example, the common law variable equals one for countries whose legal origin is the British common law and zero otherwise. The remaining legal origins include French civil law, German civil law and Socialist law. The omitted variable is Scandinavian civil law.

In Appendices C and D we present data sources and summary statistics for our sample. Appendix E presents the correlation matrix for the interaction terms of country and industry variables that we use in the empirical analysis.

III Empirical Evidence

A OLS Estimation: Banks, Law and Stock Markets

Table I reports the results of estimating equation (1) using OLS. The dependent variable is the average output growth in industry i and country c. The first column of Table I reports the estimation results of our baseline specification. The regressors include the industry's share in a country's GDP at the beginning of the sample period and the interaction term of contract intensity and banking development. We use the ratio of private credit by banks to GDP as proxy for banking development. The estimated coefficient for the interaction term $CI_i * BD_c$ is positive and statistically significant at the one percent level. This corroborates the hypothesis that a strong banking sector especially promotes industries dependent on the relationship-specific investment of their suppliers. The initial industry share has the expected negative sign, confirming the idea that more mature industries with a high share in a country's GDP have less scope for further growth.

[Table I about here]

The estimated relation between banking development and output growth is not only statistically significant but also economically relevant. The industrial sector most dependent on relationship-specific inputs is "transport equipment", the sector least dependent on them is "petroleum refineries". According to the estimate from the first column of Table I, a hypothetical catch-up in Mexico's banking development with the average OECD level would give the growth rate of the transport equipment sector an additional boost of 5% relative to the sector of petroleum refineries.[6]

[6] This is calculated as follows. The estimated coefficient for the interaction term is 0.167. The value of variable CI, capturing the importance of relationship-specific inputs, is 0.859 for transport equipment and 0.058 for petroleum refineries. Mexico's ratio of private credit to GDP is 0.16 and OECD average is 0.532. If Mexico's banking development reached the level of OECD average, then the growth rate in the "transport equipment" industry relative to "petroleum refineries" industry would increase by: $\beta * \triangle CI * \triangle BD = 0.167 * (0.859 - 0.058) * (0.532 - 0.16) \approx 5\%$

The subsequent columns present the regression results with an augmented set of explanatory variables. Columns (2) and (3) control for two alternative economic channels that have already found considerable empirical support and might be correlated with our mechanism. Recent trade literature (Nunn 2007, Levchenko 2007) has shown that the industries with a high share of relationship-specific inputs benefit disproportionately from a good contracting environment. Banking development BD_c might be correlated with legal and contracting institutions in country c. In this case, the variable of interest $CI_i * BD_c$ would also capture the effect of superior institutions on the contract-intensive industries. We control for this possibility by adding an interaction term of the contract intensity measure with the rule of law ($CI_i * RL_c$) in the second column of Table I. Another omitted variable bias can arise from the industry characteristic CI_i. Contract-intensive industries might well be the industries that require larger external funds to support their operations. If so, then our main interaction $CI_i * BD_c$ would also capture the beneficial effect of banking development on the industries dependent on external finance (Rajan and Zingales 1998). In the third column, we therefore include an interaction term of industry's dependence on external finance and country's banking development ($ExF_i * BD_c$). In both augmented specifications, the variable of interest $CI_i * BD_c$ maintains a positive and statistically significant coefficient. The coefficients for the two other interactions, while positive, fail to have a statistically significant effect.[7]

In the last three columns, we test the hypothesis about the singular role of banks as promoters of industries requiring relationship-specific investment from their suppliers. Country level studies document a positive effect of both bank and stock market development on long run economic growth (Levine and Zervos 1998). Our mechanism, however, depends crucially on the unique capacity of banks to reassure the sellers of relationship-specific inputs via signaling the financial robustness and long-term planning horizon of the buyers. The regressions in columns (4) to (6) mirror the estimation of the previous three columns, but they add the interaction terms of stock market capitalization over GDP with contract intensity ($CI_i * StM_c$) and with dependence on external finance ($ExF_i * StM_c$) into the set of explanatory variables. The main interaction capturing the strength of banking sector $CI_i * BD_c$ remains positive and statistically significant at 1% level. The interaction term of the contract intensity measure with the stock market capitalization to GDP $CI_i * StM_c$ is never significant and even enters the regressions with a

[7]The insignificance of the two controls arises not due to some peculiar features of our sample, but it is indeed the consequence of controlling for our main channel. When we repeat the estimation in the second and third column without our main variable $CI_i * BD_c$ (not reported), both $CI_i * RL_c$ and $ExF_i * BD_c$ are statistically significant at the 5% level.

negative sign. The results confirm the dominance of banks over anonymous stock markets in fostering the industries requiring relationship-specific investment from their suppliers. The econometric horse-race thus verifies our theoretical motivation, and we focus on the banking sector (BD_c) in the rest of the paper.

B Instrumental Variables Estimation

The results of the OLS estimation cannot be taken as conclusive evidence for our main hypothesis due to the possibility of reverse causality affecting both country characteristics (banking development BD_c and rule of law RL_c) used in previous regressions. If industries requiring a high share of relationship-specific inputs contribute disproportionately to overall economic growth, the country might have stronger incentives to invest in banking and institutional development. To take care of this potential endogeneity problem, we use countries' legal origins to construct our instrumental variables, following the existing literature.[8] Specifically, we interact the contract intensity CI_i with four variables: $BRIT_c$, FR_c, GER_c, and SOC_c. These are dummy variables equal to one if country c has British, French, German, or Socialist legal origin, respectively. The omitted category is the Scandinavian legal origin $SCAN_c$. We use the resulting interaction terms $CI_i{*}BRIT_c$, $CI_i * FR_c$, $CI_i * GER_c$, and $CI_i * SOC_c$ as instruments for the endogenous interaction terms $CI_i * BD_c$ and $CI_i * RL_c$. We also multiply the dependence on external finance ExF_i with legal origins variables. This yields four more interactions ($ExF_i * BRIT_c$, $ExF_i * FR_c$, $ExF_i * GER_c$, and $ExF_i * SOC_c$) which we use as *additional* instruments in estimations containing the endogenous variable $ExF_i * BD_c$. In this way we instrument every endogenous interaction term by appropriate interactions of industry characteristics and legal origins dummies. Such an approach enables us to combine the instrumentation with a proper control for theoretical mechanisms different from ours.

Table II presents results of the instrumental variable (GMM) estimation of equation (1). The first three columns are the GMM analogue for the first three columns from Table I. The coefficient for the interaction term of the contract intensity measure and banking development $CI_i{*}BD_c$ remains positive and significant at least at the 5% level in all three specifications. The coefficient for the rule of law interaction $CI_i * RL_c$ becomes significant at the 5% level as well, suggesting that contract-intensive industries benefit from both legal and financial development. The interaction term of external finance dependence and

[8] La Porta et al. (1997, 1998) show that the origin of the legal system affects investor protection and financial development. Djankov et al. (2003) find that legal origin has an impact on judicial quality and contract enforcement.

banking development $ExF_i * BD_c$ remains positive but insignificant after instrumentation.

[Table II about here]

At the bottom of Table II, we report the weak instrument test suggested by Stock and Yogo (2002), the partial R-squared measure suggested by Shea (1997), and the Sargan/Hansen test of overindentifying restrictions. The first stage statistics confirm that our excluded instruments are highly correlated with the endogenous variables. The F statistics from the first stage regressions are mostly above 26. The somewhat lower value for the third specification is probably due to the higher number of instruments.[9] However, it is still above the rule of thumb value of 10 proposed by Stock and Yogo. We also report the Cragg-Donald statistic suggested by Stock and Yogo in the presence of several endogenous regressors.[10] Both tests reject the null hypothesis of weak instruments. The Sargan/Hansen test of overidentifying restrictions checks the validity of the instruments: the instruments are uncorrelated with the error term under the null hypothesis. The test rejects this null hypothesis at the 10% level of significance in two out of three specifications, implying that our set of instruments does not satisfy the required orthogonality condition. Some of the instruments might be either not truly exogenous or incorrectly excluded from the regression.

Legal origin can influence different spheres of economic and political life of the country, which might pose problems when using it as an instrument. In our case, the financial and institutional development are highly correlated with overall economic progress. For example, sectors with a high share of relationship-specific inputs might also require a disproportionate share of skilled labour or modern technologies. These sectors might then grow faster in developed countries that happen to be rich in human capital and operate on the technological frontier. To take care of this problem, we add the interaction terms of the industry dummies with the log of real GDP per worker into the regression equation.[11] The overall economic development can now affect each sector in an unrestricted way via those interactions. We thus explicitly control for the possibility that developed countries

[9] Four interaction terms of external finance dependence related to the Rajan and Zingales (1998) channel ($ExF_i * BRIT_c$, $ExF_i * FR_c$, $ExF_i * GER_c$, and $ExF_i * SOC_c$) add up to four instruments ($CI_i * BRIT_c$, $CI_i * FR_c$, $CI_i * GER_c$, and $CI_i * SOC_c$) affiliated to our main endogenous term $CI_i * BD_c$.

[10] The critical values of the Cragg-Donald statistics are tabulated in Stock and Yogo (2002).

[11] Levchenko (2007) uses the interaction terms of industry dummies and economic development while refraining from the use of instrumental variables. Nunn (2007) relies on legal origins as instruments for institutional quality, but he does not include the industry dummies interactions in the IV regressions. Here we combine both approaches.

have some (possibly unobservable) features that facilitate growth in contract-intensive industries.[12]

We report the results of the GMM estimation with industry dummies interactions in columns (4), (5) and (6) of Table II. Comparing these last three columns with columns (1)-(3) documents the robustness of our mechanism to this more stringent specification. The coefficient for the variable of interest $CI_i * BD_c$ slightly decreases in the presence of industry dummies interactions, but it remains positive and significant. Columns (2) and (5) offer probably the most interesting comparison. Controlling for differentiated impact of economic development across industries in the fifth column decreases the significance for both $CI_i * BD_c$ and $CI_i * RL_c$, but to a very different degree. The main interaction term of contract intensity with bank credit misses the 5% significance level by the narrowest of the margins, with p-value reaching 5.1%. In contrast, the interaction term of rule of law and contract intensity $CI_i * RL_c$ becomes insignificant. In the sixth column, the external finance dependence interaction $ExF_i * BD_c$ remains insignificant and now even has a negative sign. The Sargan/Hansen statistics clearly improve: now we cannot reject the null hypothesis of instruments validity at a 10 % level of significance in two out of three specifications. The negative result for the Sargan/Hansen test in the last column suggests problems with the set of additional instruments controlling for the channel of dependence on external finance (see footnote 9).

C Decomposing Banks' Pro-Growth Effect

So far we have provided evidence that a well-developed banking system plays an important role in promoting the sectors requiring relationship-specific investments from their suppliers. In this section, we study in more detail the specific channels through which this link between banks and the real economy operates. We implement two decompositions of the overall output growth. First, we examine whether our mechanism works on the extensive margin (via increased entry of new firms) or on the intensive margin (via accelerated growth of existing firms). Then we carry out a standard growth accounting exercise testing whether overall growth comes from higher capital accumulation, increased employment, or faster technological progress (TFP growth).

[12] An alternative way would be to include additional interactions of country and industry characteristics in our instrumental variable estimation, but it would be extremely difficult to control for all possible channels. There might always be some other unobserved feature of developed countries generating a higher growth in the sectors relying on relationship-specific investments from their suppliers. Interaction terms of real income per worker with industry dummies control for all such unobservables. Econometrically, we include 28 additional regressors (number of industries in our sample) in our regression.

Tables III and IV isolate the extensive and the intensive margin of output growth. The dependent variables are average growth in number of establishments (Table III) and average growth per establishment (Table IV). The first three columns correspond to the OLS regressions from the first three columns of Table I, the following six columns mirror the instrumental variable (GMM) estimation of Table II. Columns (4) to (6) present the baseline GMM estimation, and the last three columns include the interaction terms of industry dummies with GDP per worker. The results provide clear evidence that the extensive margin is the driving force behind the positive effect of a strong banking system on the sectors with a high share of relationship-specific inputs. In Table III, the variable of interest $CI_i * BD_c$ is always positive and statistically significant. In the case of the intensive margin (Table IV), the disproportionate positive impact of bank credit over GDP on the growth of contract-intensive industries is statistically significant only in two out of nine specifications. Especially, there is no significant effect once we control for the endogeneity of banking development and rule of law (columns three to nine).

[Table III about here]
[Table IV about here]

These results suggest that banks facilitate the creation of new firms in contract-intensive industries rather than helping the existing companies to expand. This is in line with the signaling channel by Fama (1985). A new buyer, with no existing record of fulfilling her commitment, faces more wariness from the suppliers of relationship-specific inputs. Consequently, she is heavily dependent on credible signals about her financial stability that arise from a successfully obtained bank loan. In contrast, an existing firm has usually already built up a stable network of business partners. An established buyer can thus rely more on her own reputation and familiarity with suppliers and less on reputational signals from third parties like banks.

The prevalence of the extensive margin in our channel also complements the previous findings of Fisman and Love (2003). These authors argue that after a long-term successful business relationship, a supplier can assess the true financial situation of the buyer better than a financial intermediary. In accordance with this conjecture, they show that in poorly developed financial markets, trade credit from suppliers can substitute for standard bank loans. Crucially, their result holds only at the intensive and not at the extensive margin. Taken together, the evidence from Fisman and Love (2003) and our paper suggests that

banks [suppliers] have superior information about the financial health of new [established] firms.

Next, we analyze the effect of banking development on sectors with a high share of relationship-specific inputs within the growth accounting framework. In order to do so, we reconstruct capital stock using the methodology of Hall and Jones (1999) and TFP using the methodology of Solow (1957). Appendix B provides details of the procedure. Tables V to VII summarize the outcome of this second channel decomposition. The dependent variables are average growth of capital (Table V), average growth in employment (Table VI), and average TFP growth (Table VII). Again, the first three columns report the OLS estimations, the following three present the results of the baseline GMM estimation, and the last three columns report the results of the GMM estimation augmented with the interactions of industry dummies and GDP per worker.

The growth accounting suggests a higher capital accumulation as the most important source of the banking sector's beneficial impact on the industries relying on relationship-specific investment from their suppliers. After correcting for the endogeneity of banking and institutional development in columns (4) to (9) of Table V, the variable of interest $CI_i * BD_c$ becomes highly statistically significant. This positive effect of bank credit on capital growth in the contract-intensive industries provides empirical support for the theoretical channel proposed by von Thadden (1995). A higher capital accumulation would be a first-order implication of a theoretical mechanism working through bank loans attenuating the short-term investment bias and increasing the firms' planning horizon.

[Table V about here]

We have less clear-cut evidence for a positive role of the banking system in boosting employment in industries with a high share of relationship-specific inputs. In Table VI, the estimated coefficient for the main interaction $CI_i * BD_c$ is always positive and mostly significant. Still, the relationship between banking development and employment growth in the contract-intensive industries appears less robust than in the case of capital accumulation.

[Table VI about here]

There is no evidence that the banking system promotes productivity growth in the sectors dependent on relationship-specific investment from their suppliers. Table VII presents the estimation results with TFP growth as a dependent variable. The results in the first three columns show the interaction term of bank credit and contract intensity entering the OLS regressions at the 10% level of significance. Once we control for endogeneity (last six columns), this significance disappears, and sometimes the main variable $CI_i * BD_c$ enters with a negative sign.

[Table VII about here]

Overall, the two decompositions performed in this subsection suggest that a strong banking system promotes industries with a high share of relationship-specific inputs mainly via increased entry of new firms and higher capital accumulation. These results confirm the empirical relevance of the theoretical channels emphasizing bank loans as a signaling device for financial stability (Fama 1985) and as a source of long-term investment planning horizon for the firms (von Thadden 1995).

IV Conclusion

This paper provides robust empirical evidence that industries highly dependent on relationship-specific investment from their suppliers grow disproportionately faster in countries with a well-developed banking sector. This growth effect arises due to entry of new firms and capital accumulation. Banks thus seem to encourage value-enhancing cooperation between firms, helping especially new firms without existing track record to enter industries dependent on suppliers' trust. The motivation for this novel channel from banking to the real economy comes from combining the insights from research on relationship-specific assets (Williamson 1971, 1979, Klein et al. 1978, Grossman and Hart 1986, Hart and Moore 1990) and scholarly work on financial intermediation (Fama 1985, von Thadden 1995).

These results contribute to the finance literature that traditionally focuses on direct relations between banks and firms rather than on the role a well-developed banking sector might play in facilitating the cooperation among firms. The paper also contributes to the literature on relationship-specific assets that usually highlights the importance of contracts and legal enforcement for relationship-specific investment. Trade scholars (Nunn

2007, Levchenko 2007) also build upon this literature and demonstrate the beneficial impact of contract-enforcing institutions on sectors with a high share of relationship-specific inputs. Our empirical results suggest that banking sector might be at least as vital as legal enforcement for the economic performance of industries dependent on suppliers' willingness to invest in relationship-specific assets.[13]

There are several possible areas for future research that could improve our understanding of the banking-to-growth channel examined in this paper. Here we briefly outline three of them. Firstly, the use of more disaggregated data could provide complementary evidence to the methodological strategy chosen in this paper. Our "macro" approach allowed us to exploit comparable data from a broad sample of countries and directly control for traditional channels from existing finance and relationship-specific literature. Future work could look into firm-level data, which of course would imply a substantially narrower choice of countries. Secondly, the recent financial crisis and its aftermath could provide a useful laboratory to examine the importance of banking sector for relationship-specific investment among buyers and suppliers. Finally, the follow-up research could attempt to further disentangle the effects of banking and institutions on industries using relationship-specific inputs. Our banking channel proved to be robust to controlling for the more traditional institutional channel from the literature on relationship-specific assets. However, there might be interesting interactions between the two channels as good institutions might also boost banking development. Additionally, there is an issue of a possible non-monotonicity between contract enforcement and finance, briefly raised by Levine et al. (2000). The theoretical literature explains the very existence of financial intermediaries as the consequence of market imperfections (e.g., Boyd and Prescott 1985). In a world with perfect contract enforcement, there would be fewer reasons to have financial intermediaries in the first place. The channel introduced in this paper might be a good starting point to look into substitutability or complementarity between institutional and financial development.[14]

[13] To be precise, the results of this paper are not directly comparable with those in the trade literature. Our dependent variable is the growth of industrial output while Nunn (2007) and Levchenko (2007) focus on the export performance of industries. This is an important distinction as our channel works mostly via the extensive margin (increased entry of new firms). Arguably, the export performace of an industry relies mostly on older established firms.

[14] The previous, somewhat broader, version of this paper briefly looked into this substitutability/complementarity issue by using bank branch deregulation dates and varying levels in quality of state courts in the USA (Strieborny and Kukenova, 2010).

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Appendix A: Country List

Argentina; Armenia; Australia; Austria; Bangladesh; Benin; Bolivia; Botswana; Brazil; Bulgaria; Cameroon; Canada; Chile; Colombia; Costa Rica; Cote d'Ivoire; Cyprus; Czech Republic; Denmark; Ecuador; Egypt; El Salvador; Ethiopia; Finland; France; Gabon; Ghana; Greece; Guatemala; Honduras; Hong Kong; Hungary; Iceland; India; Indonesia; Iran; Ireland; Israel; Italy; Japan; Jordan; Kenya; Korea (Republic of); Kuwait; Kyrgyzstan; Latvia; Lithuania; Macao; Malawi; Malaysia; Malta; Mauritius; Mexico; Moldova; Mongolia; Morocco; Mozambique; Nepal; Netherlands; New Zealand; Nigeria; Norway; Oman; Pakistan; Panama; Peru; Philippines; Poland; Portugal; Qatar; Romania; Russia; Senegal; Singapore; Slovak Republic; Slovenia; South Africa; Spain; Sri Lanka; Sweden; Switzerland; Tanzania; Thailand; Trinidad &Tobago; Tunisia; Turkey; United Kingdom; Uruguay; Venezuela; Yemen

Appendix B: Reconstructing Capital Stock and Total Factor Productivity

The capital stock in industry i, country c, and year t is given by:

$$K_{ict} = (1 - \delta)K_{ict-1} + I_{ict}.$$

We use a depreciation rate $\delta = 0.08$ and apply the standard assumption that initial level of capital stock is equal to:

$$K_{ic0} = \frac{I_{ic0}}{\delta}.$$

We compute total factor productivity at the industry level using the following formula:

$$\ln TFP_{ict} = \ln Y_{ict} - (1 - \alpha_{ic}) \ln K_{ict} - \alpha_{ic} \ln L_{ict},$$

where Y_{ict} is the total output, K_{ict} is the capital stock, and L_{ict} is the total employment in the sector.

The α_{ic} is computed as the average of the total wage bill divided by value added for sector i for the US data;[15] this allows us to avoid an undue reduction in our sample as many countries do not have available data for value added and wage payment.

[15] Levchenko, Ranciere, and Thoening (2008), who use a similiar database to analyze the effect of financial liberalization on industry growth, show that results do not change if a country's average labour share of sector i is used instead.

Appendix C: Data Sources

Variables	Sources
Country-Level Financial Variables	Beck,Thorsten, Asli Demirgüç-Kunt and Ross Levine (2000)
Capital, GDP deflator, Real GDP per Worker	Heston, Alan, Robert Summers, and Bettina Aten (2002), "Penn World Table Version 6.1"
Contract intensity	Nathan Nunn's website
Dependence on external finance	Laeven, Luc, Daniela Klingebiel, and Randall S. Kroszner (2002)
Rule of Law	Kaufmann,Daniel, Aart Kraay and Massimo Mastruzzi (2008).
Legal origins	Glaeser, Edward L., Rafael La Porta, Florencio Lopez-de-Silanes and Andrei Shleifer (2004)
Industry data	Trade, Production and Protection Database (UNIDO data)

Appendix D: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Contract intensity (CI_i)	2313	0.4940411	0.1991557	0.058	0.859
Dependence on external finance (ExF_i)	2313	0.270601	0.3516976	-0.45	1.14
Growth of output	2313	0.0124505	0.1354976	-1.68474	1.592252
Growth of TFP	1813	-0.007303	0.1315739	-1.81938	1.526246
Growth of capital	1427	0.0362933	0.1321883	-0.63703	2.931202
Growth of employment	2297	0.0023664	0.0965697	-0.97985	1.609438
Growth of number of establishments	2212	0.036042	0.1024189	-0.65645	0.8731381
Growth of output per establishment	2196	-0.0277459	0.1588155	-1.17367	1.042946
Initial Industry Share	2313	0.0406847	0.0656483	8.43E-06	1
Initial Log of Real GDP per Worker	2313	9.525155	0.9893677	7.001464	11.6478
Initial Private Credit of the Banks to GDP (BD_c)	2313	0.3059856	0.2450181	0.013926	1.429799
Initial Stock Market Capitalisation to GDP (StM_c)	2136	0.1870087	0.28348	0.000504	1.417954
Dummy for French legal origin (FR_c)	2313	0.4803286	0.4997209	0	1
Dummy for German legal origin (GER_c)	2313	0.0384782	0.1923892	0	1
Dummy for Scandinavian legal origin ($SCAN_c$)	2313	0.0579334	0.233668	0	1
Dummy for Socialistic legal origin (SOC_c)	2313	0.1578037	0.3646357	0	1
Dummy for Common Law ($BRIT_c$)	2313	0.2654561	0.4416713	0	1
Private Credit of Banks to GDP multiplied by Dependence on external finance (ExF_i*BD_c)	2313	0.0837769	0.1551942	-0.64341	1.629971
Private Credit of Banks to GDP multiplied by Contract Intensity (CI_i*BD_c)	2313	0.1515907	0.1451216	0.000808	1.228197
Stock Market Capitalisation to GDP multiplied by Dependence on external finance (ExF_i*StM_c)	2136	0.0512258	0.1434681	-0.63808	1.616467
Stock Market Capitalisation to GDP multiplied by Contract Intensity (CI_i*StM_c)	2136	0.0923327	0.1557417	2.92E-05	1.218022
Rule of Law interacted with Contract Intensity (CI_i*RL_c)	2290	0.2782819	0.1503195	0.01334	0.778254

Appendix E: Correlation Matrix

Variable	pcrdbgdp_intensity	pcrdbgdp_fin_dep	legor_uk_fin_dep	legor_fr_fin_dep	legor_ge_fin_dep	legor_sc_fin_dep
pcrdbgdp_intensity	1					
pcrdbgdp_fin_dep	0.5466	1				
legor_uk_fin_dep	0.0737	0.3113	1			
legor_fr_fin_dep	0.0473	0.3599	-0.1516	1		
legor_ge_fin_dep	0.3078	0.4565	-0.047	-0.0637	1	
legor_sc_fin_dep	0.0304	0.1301	-0.047	-0.0637	-0.0197	1
legor_so_fin_dep	-0.0464	0.1121	-0.0831	-0.1125	-0.0349	-0.0349
legor_uk_intensity	0.1049	0.0632	0.6259	-0.2501	-0.0775	-0.0775
legor_fr_intensity	0.0622	0.0439	-0.2704	0.5838	-0.1136	-0.1136
legor_ge_intensity	0.458	0.247	-0.0725	-0.0982	0.6649	-0.0305
legor_sc_intensity	0.0404	0.0244	-0.0725	-0.0982	-0.0305	0.6649
legor_so_intensity	-0.0817	-0.0383	-0.132	-0.1788	-0.0554	-0.0554

Appendix E: Correlation Matrix (cont.)

Variable	legor_so_fin_dep	legor_uk_intensity	llegor_fr_intensity	legor_ge_intensity	legor_sc_intensity	legor_so_intensity
legor_so_fin_dep	1					
legor_uk_intensity	-0.137	1				
legor_fr_intensity	-0.2007	-0.4461	1			
legor_ge_intensity	-0.0538	-0.1197	-0.1753	1		
legor_sc_intensity	-0.0538	-0.1197	-0.1753	-0.047	1	
legor_so_intensity	0.6475	-0.2178	-0.3189	-0.0856	-0.0856	1

Table I: Industry Growth - OLS

The dependent variable is the output growth in industry i and country c. All regressions are estimated by the OLS and include country and industry fixed effects, the constant is not reported. Our main variable of interest is (CI_i*BD_c): interaction between contract intensity of industry i (measure of importance of relationship-specific inputs computed from US data) and banking development in country c (ratio of bank credit to GDP). In all regressions we control for initial industry share: the share of industry i in manufacturing output of country c at the beginning of the sample period. Other control variables are (CI_i*RL_c): interaction between contract intensity of industry i and rule of law in country c (quality of legal institutions); (ExF_i*BD_c): interaction between external finance dependence of industry i (capital expenditure minus cash flow divided by capital expenditure computed from US data) and banking development in country c; (CI_i*StM_c): interaction between contract intensity of industry i and stock market strength in country c (ratio of stock market capitalization to GDP); (ExF_i*StM_c): interaction between external finance dependence of industry i and stock market strength in country c. Robust standard errors are in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Initial industry share	-0.428*	-0.461**	-0.430*	-0.180**	-0.181**	-0.183**
	(0.223)	(0.234)	(0.223)	(0.073)	(0.074)	(0.073)
Contract intensity	0.167***	0.140***	0.152***	0.166***	0.157***	0.165***
x Banks (CI_i*BD_c)	(0.051)	(0.049)	(0.051)	(0.060)	(0.059)	(0.062)
Contract intensity		0.077			0.040	
x Rule of law (CI_i*RL_c)		(0.083)			(0.092)	
External finance dependence			0.023			0.002
x Banks (ExF_i*BD_c)			(0.021)			(0.025)
Contract intensity				-0.018	-0.027	-0.029
x Stock market (CI_i*StM_c)				(0.041)	(0.042)	(0.042)
External finance dependence						0.018
x Stock market (ExF_i*StM_c)						(0.018)
Observations	2,313	2,290	2,313	2,136	2,136	2,136
R^2	0.259	0.262	0.259	0.260	0.260	0.260

Table II: Industry Growth - IV

The dependent variable is the output growth in industry i and country c. All regressions include country and industry fixed effects, the constant is not reported. The variables are defined in Table I. The regressions are instrumental variable (GMM) estimations. We use countries' legal origins to construct instrumental variables in order to control for the possible endogeneity of country characteristics (banking development BD_c and rule of law RL_c). Specifically, we interact the contract intensity CI_i with four variables: $BRIT_c$, FR_c, GER_c, and SOC_c. These are dummy variables equal to one if country c has British, French, German, or Socialist legal origin, respectively. The omitted category is the Scandinavian legal origin $SCAN_c$. The resulting interaction terms CI_i*$BRIT_c$, CI_i*FR_c, CI_i*GER_c, and CI_i*SOC_c are instruments for the endogenous interaction terms (CI_i*BD_c and CI_i*RL_c). We also multiply the dependence on external finance ExF_i with legal origins variables. This yields four more interactions (ExF_i*$BRIT_c$, ExF_i*FR_c, ExF_i*GER_c, and ExF_i*SOC_c) used as additional instruments in estimations containing the endogenous variable ExF_i*BD_c (columns three and six). In this way we instrument every endogenous interaction term by appropriate interactions of industry characteristics and legal origins dummies. The regressions in columns (4) to (6) include interaction terms of the industry dummies with the log of real GDP per worker. The overall economic development can affect each sector in an unrestricted way via those interactions. Robust standard errors are in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Initial industry share	-0.378*	-0.570***	-0.211	-0.468**	-0.600***	-0.307
	(0.196)	(0.220)	(0.188)	(0.198)	(0.216)	(0.188)
Contract intensity	0.171***	0.140**	0.142**	0.147**	0.127*	0.135**
x Banks (CI_i*BD_c)	(0.065)	(0.064)	(0.067)	(0.066)	(0.065)	(0.066)
Contract intensity		0.144**			0.161	
x Rule of law (CI_i*RL_c)		(0.068)			(0.104)	
External finance dependence			0.012			-0.013
x Banks (ExF_i*BD_c)			(0.034)			(0.034)
GDP per worker x Industry dummies				Yes	Yes	Yes
Observations	2,313	2,290	2,313	2,313	2,290	2,313
R^2	0.253	0.257	0.247	0.273	0.277	0.268
Cragg-Donald F statistic	103.5	92.44	46.51	119.1	98.77	56.52
F stat of excl instr	26.05	26.46	13.06	34.83	34.71	17.41
Partial R2 Shea	0.159	0.148	0.153	0.180	0.156	0.176
p value of Hansen test	0.054	0.161	0.005	0.123	0.174	0.031

Table III: Growth in Number of Establishments

The dependent variable is the growth of number of establishments (growth at extensive margin) in industry i and country c. All regressions include country and industry fixed effects, the constant is not reported. The variables are defined in Table I. The first three columns correspond to the OLS regressions from the first three columns of Table I, the following six columns mirror the instrumental variable (GMM) estimation of Table II. Columns (4) to (6) present the baseline GMM estimation and columns (7) to (9) include the interaction terms of industry dummies with GDP per worker. Robust standard errors are in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1) OLS	(2) OLS	(3) OLS	(4) GMM	(5) GMM	(6) GMM	(7) GMM	(8) GMM	(9) GMM
Initial industry share	-0.198*	-0.212*	-0.199*	-0.213**	-0.222**	-0.194**	-0.223**	-0.237**	-0.200**
	(0.104)	(0.109)	(0.104)	(0.101)	(0.106)	(0.094)	(0.105)	(0.111)	(0.098)
Contract intensity	0.107***	0.087*	0.097**	0.176***	0.181***	0.138**	0.139**	0.139**	0.111**
x Banks (CI_i*BD_c)	(0.039)	(0.051)	(0.041)	(0.059)	(0.066)	(0.060)	(0.055)	(0.056)	(0.055)
Contract intensity		0.058			-0.008			-0.005	
x Rule of law (CI_i*RL_c)		(0.068)			(0.060)			(0.083)	
External finance dependence			0.016			0.064*			0.056
x Banks (ExF_i*BD_c)			(0.019)			(0.038)			(0.041)
GDP per worker x Industry dummies							Yes	Yes	Yes
Observations	2,291	2,268	2,291	2,291	2,268	2,291	2,243	2,220	2,243
R^2	0.407	0.407	0.407	0.404	0.404	0.404	0.418	0.418	0.415
Cragg-Donald F statistic				127.8	107.9	60.40	107.0	89.38	52.65
F stat of excl instr				37.70	38.12	18.86	30.94	30.75	15.46
Partial R2 Shea				0.191	0.168	0.190	0.170	0.147	0.169
p value of Hansen test				0.229	0.123	0.315	0.145	0.068	0.300

Table IV: Growth of Output per Establishment

The dependent variable is the growth of output per establishment (growth at intensive margin) in industry i and country c. All regressions include country and industry fixed effects, the constant is not reported.The variables are defined in Table I. The first three columns correspond to the OLS regressions from the first three columns of Table I, the following six columns mirror the instrumental variable (GMM) estimation of Table II. Columns (4) to (6) present the baseline GMM estimation and columns (7) to (9) include the interaction terms of industry dummies with GDP per worker. Robust standard errors are in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	OLS	OLS	OLS	GMM	GMM	GMM	GMM	GMM	GMM
Initial industry share	-0.201	-0.214	-0.203	-0.220*	-0.248*	-0.188	-0.236**	-0.247**	-0.208*
	(0.130)	(0.138)	(0.130)	(0.122)	(0.133)	(0.121)	(0.115)	(0.124)	(0.113)
Contract intensity	0.106*	0.131**	0.096	0.063	0.057	0.066	0.054	0.061	0.063
x Banks (CI_i*BD_c)	(0.057)	(0.063)	(0.060)	(0.054)	(0.059)	(0.063)	(0.059)	(0.064)	(0.064)
Contract intensity		-0.054			0.020			-0.041	
x Rule of law (CI_i*RL_c)		(0.083)			(0.076)			(0.111)	
External finance dependence			0.016			-0.007			-0.020
x Banks (ExF_i*BD_c)			(0.026)			(0.037)			(0.037)
GDP per worker x Industry dummies							Yes	Yes	Yes
Observations	2,196	2,173	2,196	2,196	2,173	2,196	2,196	2,173	2,196
R^2	0.359	0.359	0.359	0.357	0.357	0.357	0.377	0.377	0.376
Cragg-Donald F statistic				91.38	82.15	42.03	109.8	89.97	52.87
F stat of excl instr				23.30	23.74	11.67	31.41	31.29	15.69
Partial R2 Shea				0.150	0.141	0.147	0.176	0.151	0.175
p value of Hansen test				0.214	0.108	0.087	0.275	0.151	0.117

Table V: Capital Accumulation

The dependent variable is the growth of capital in industry i and country c. All regressions include country and industry fixed effects, the constant is not reported. The variables are defined in Table I. The first three columns correspond to the OLS regressions from the first three columns of Table I, the following six columns mirror the instrumental variable (GMM) estimation of Table II. Columns (4) to (6) present the baseline GMM estimation and columns (7) to (9) include the interaction terms of industry dummies with GDP per worker. Robust standard errors are in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1) OLS	(2) OLS	(3) OLS	(4) GMM	(5) GMM	(6) GMM	(7) GMM	(8) GMM	(9) GMM
Initial industry share	-0.147***	-0.152***	-0.147***	-0.146***	-0.150***	-0.141***	-0.149***	-0.160***	-0.145***
	(0.041)	(0.044)	(0.041)	(0.040)	(0.043)	(0.040)	(0.038)	(0.042)	(0.038)
Contract intensity	0.050	0.029	0.047	0.141***	0.129***	0.107**	0.143***	0.134***	0.119***
x Banks (CI_i*BD_c)	(0.037)	(0.040)	(0.037)	(0.045)	(0.047)	(0.044)	(0.047)	(0.047)	(0.046)
Contract intensity		0.093*			0.019			0.042	
x Rule of law (CI_i*RL_c)		(0.051)			(0.057)			(0.073)	
External finance dependence			0.005			0.041			0.022
x Banks (ExF_i*BD_c)			(0.018)			(0.027)			(0.026)
GDP per worker x Industry dummies							Yes	Yes	Yes
Observations	1,855	1,833	1,855	1,855	1,833	1,855	1,855	1,833	1,855
R^2	0.335	0.342	0.335	0.331	0.339	0.327	0.348	0.356	0.343
Cragg-Donald F statistic				68.61	63.78	31.21	86.43	71.09	41.22
F stat of excl instr				16.44	16.93	8.236	28.10	28.03	14.03
Partial R2 Shea				0.136	0.133	0.134	0.167	0.143	0.165
p value of Hansen test				0.811	0.789	0.032	0.758	0.847	0.068

Table VI: Employment Growth

The dependent variable is the growth of employment in industry i and country c. All regressions include country and industry fixed effects, the constant is not reported. The variables are defined in Table I. The first three columns correspond to the OLS regressions from the first three columns of Table I, the following six columns mirror the instrumental variable (GMM) estimation of Table II. Columns (4) to (6) present the baseline GMM estimation and columns (7) to (9) include the interaction terms of industry dummies with GDP per worker. Robust standard errors are in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1) OLS	(2) OLS	(3) OLS	(4) GMM	(5) GMM	(6) GMM	(7) GMM	(8) GMM	(9) GMM
Initial industry share	-0.231*	-0.246*	-0.234*	-0.286**	-0.297**	-0.222*	-0.343***	-0.332**	-0.296**
	(0.131)	(0.139)	(0.131)	(0.122)	(0.134)	(0.117)	(0.123)	(0.135)	(0.119)
Contract intensity	0.063*	0.059*	0.042	0.106**	0.113**	0.051	0.085*	0.095*	0.062
x Banks (CI_i*BD_c)	(0.034)	(0.034)	(0.034)	(0.046)	(0.050)	(0.047)	(0.047)	(0.049)	(0.052)
Contract intensity		0.012			-0.017			-0.072	
x Rule of law (CI_i*RL_c)		(0.061)			(0.059)			(0.078)	
External finance dependence			0.032*			0.050**			0.010
x Banks (ExF_i*BD_c)			(0.017)			(0.025)			(0.029)
GDP per worker x Industry dummies							Yes	Yes	Yes
Observations	2,369	2,346	2,369	2,369	2,346	2,369	2,321	2,298	2,321
R^2	0.236	0.239	0.237	0.230	0.233	0.230	0.253	0.256	0.246
Cragg-Donald F statistic				138.8	115.3	64.93	116.8	96.72	56.13
F stat of excl instr				40.37	40.86	20.16	34.11	34.04	17.04
Partial R2 Shea				0.198	0.172	0.195	0.177	0.153	0.174
p value of Hansen test				0.101	0.049	0.000	0.216	0.182	0.004

Table VII: TFP Growth

The dependent variable is the growth of total factor productivity (TFP) in industry i and country c. All regressions include country and industry fixed effects, the constant is not reported. The variables are defined in Table I. The first three columns correspond to the OLS regressions from the first three columns of Table I, the following six columns mirror the instrumental variable (GMM) estimation of Table II. Columns (4) to (6) present the baseline GMM estimation and columns (7) to (9) include the interaction terms of industry dummies with GDP per worker. Robust standard errors are in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	OLS	OLS	OLS	GMM	GMM	GMM	GMM	GMM	GMM
Initial industry share	-0.218	-0.246	-0.219	-0.135	-0.224	-0.138	-0.214	-0.229	-0.209
	(0.213)	(0.228)	(0.213)	(0.179)	(0.222)	(0.177)	(0.186)	(0.211)	(0.183)
Contract intensity	0.091*	0.097*	0.087*	-0.015	-0.011	0.008	-0.004	0.002	0.018
x Banks (CI_i*BD_c)	(0.052)	(0.050)	(0.050)	(0.044)	(0.044)	(0.044)	(0.045)	(0.046)	(0.044)
Contract intensity		-0.037			0.053			0.006	
x Rule of law (CI_i*RL_c)		(0.073)			(0.067)			(0.099)	
External finance dependence			0.006			-0.036			-0.039
x Banks (ExF_i*BD_c)			(0.019)			(0.028)			(0.030)
GDP per worker x Industry dummies							Yes	Yes	Yes
Observations	1,813	1,791	1,813	1,813	1,791	1,813	1,813	1,791	1,813
R^2	0.160	0.162	0.160	0.155	0.158	0.152	0.183	0.184	0.182
Cragg-Donald F statistic				66.85	60.97	29.56	82.83	68.17	39.00
F stat of excl instr				16.13	16.70	8.126	27.89	27.85	13.94
Partial R2 Shea				0.135	0.130	0.133	0.165	0.141	0.162
p value of Hansen test				0.802	0.672	0.661	0.786	0.581	0.519