Institutions and Creative Destruction in CEECs:
Determinants of Inefficient Use of Assets

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Abstract

 We analyze the relationship between institutional quality and firm efficiency. Using rich data on firms in the European Union between 2005 and 2012, we show that high institutional quality lowers the share of persistently inefficiently used assets. The adverse effect of low institutional quality may be one of the narrow channels through which institutions affect income per capita in the long-run. Our approach combines institutional economics and Schumpeterian creative destruction. In addition, we observe similarities between inefficiently used assets in Europe and the phenomenon of zombie lending in Japan during the last decades.

1 Introduction

Our empirical analysis confirms that more efficient institutions ensure a more efficient use of assets in the economy. We define more efficient institutions by their ability to resolve insolvency. In general, weak institutions may reduce the ability as well as incentives to clean up the economy from unproductively used assets and are less successful in assuring necessary competition. We propose that this adverse effect of weak institutions is one of the many but narrow channels through which institutions potentially affect income per capita in the long-run. We observe that institutions are comparably weak in Central and Eastern European countries (CEECs) compared to mature economies like Germany, Austria, and Sweden. Our benchmark for efficiency at the firm-level is provided by the interest coverage ratio, as firms should be able to serve at least their interest payments from their current earnings. Firms which fall below a specific threshold for one year or even longer are potentially wasting the entrepreneurs' resources and suffer from severe inefficiency, since they have to provide interest payments from internal sources. The existence of such firms is facilitated by institutional weaknesses.

Institutional quality is generally believed to be an important precondition for long-term growth and per capita income, respectively (Acemoglu and Robinson, 2012). Nonetheless, there are numerous examples that also countries with low institutional quality can grow fast. The most prominent examples include Soviet Union in the 1950s and 1960s (Acemoglu and Robinson, 2012) or China more recently. However, the former example illustrates that growth in countries with low institutional quality may stop suddenly and that it is difficult for these countries to return to previous high growth dynamics. The recent literature has been putting more emphasis on the role of institutions related to economic growth and income per capita. Yet institutions are manifold and remain often vague despite the intensive discussion on this topic in the recent literature. Thus, even though there is a rich literature on the role of institutions, a precise definition of institutions and the corresponding channels via which institutions impact long-run growth is mostly agnostic.

Motivated by this puzzle in institutional economics, we analyze the relationship between institutional quality and the efficient use of assets at firm-level. Thereby, we analyze a narrow channel through which institutions potentially affect income per capita in the long-run. In particular, we investigate whether more efficient institutions, which are able to recover a higher share of assets in the case of a firm insolvency, lower the share of unproductively used assets in the economy. Thus, a better resolving insolvency framework facilitates the re-allocation of resources. In other words, an economy with more efficient institutions is more open to the Schumpeterian creative destruction. Institutions, which assure that firms tying up unproductive assets can be resolved efficiently, contribute to income and productivity growth. We test the hypothesis whether more efficient institutions lead to a more efficient use of assets in an economy. Indeed, our results confirm that institutional quality is important.

The issue of firm efficiency received a lot of attention at the beginning of the economic transition, especially regarding the importance of privatization (Estrin et al., 2009; Djankov and Murrell, 2002; Campos and Coricelli, 2002).

In contrast, the issue of severe firm inefficiency due to financing conditions has not been intensively analyzed in the more recent literature. In addition, the triangular relationship between domestic institutional quality, financing conditions, and firm inefficiency has been omitted from the discussion as well to our best knowledge. Thus, our contribution closes this gap in the recent literature. Through the analysis of this severe form of firm inefficiency, our paper contributes indirectly to the growth literature. We aim to address the relationship between institutional ability to resolve insolvency and the use of assets at firm-level. Moreover, our study contributes to the discussion regarding European integration since there are substantial differences in institutional quality between EU countries. This study contributes also to our understanding of a potentially narrow channel through which institutions potentially affect wealth in the long-run. Our results provide empirical insight into the determination of the existence of inefficiently used assets at the firm-level. Finally, by addressing basically macroeconomic issues with the use of micro data, our approach is closely related to a current trend in economics (Buera et al., 2014; Gollin et al., 2014; Kaboski et al., 2014).

2 Literature Review

2.1 Institutions, Competition and Growth

2.1.1 Competition and Growth

Nickell (1996) finds that competition, measured by the number of competitors, is associated with a significantly higher growth rate of total factor productivity. Since innovations matter with respect to productivity, another relevant finding is that less competitive industries generate fewer aggregate innovations but at the firm-level those firms with a higher market share tend to be more innovative (Blundell et al., 1999). Again at the firm level, Aghion et al. (2005) show that the relationship between competition and innovation follows a hump-shaped pattern. In addition to empirical analyses at firm or industry level, Dutz and Hayri (2000) provide a cross-country study which indicates that the effectiveness of antitrust and competition policy enforcement is positively associated with long-run growth. Aghion et al. (2008) find that high mark-ups or low-level product competition, respectively, have a large negative effect on productivity growth in the South African manufacturing industry.

To sum it up, the relationship of competition and growth differs when considered at firm- or aggregated-level. The narrow channel, we propose here, through which the resolving insolvency institution potentially affects growth in the long-run relies on the connection of competition and growth at the aggregated-level.

2.1.2 Institutions and Growth

Following seminal empirical contributions on growth (Mankiw et al., 1992; Levine and Renelt, 1992; Sala-i-Martin, 1997; Hall and Jones, 1999), Acemoglu et al. (2001) established the role of institutions in the empirical literature. Acemoglu et al. (2001) show, using European settler mortality rates as an instrument for current institutions in African countries, the large effect of institutions on income per capita. This initial contribution paved the way for an intense discussion of the relationship between institutions and income. Since then a lot of literature followed. Yet this initial contribution is not exempt of criticism, see in particular Albouy (2012). However, Acemoglu et al. (2012) address the critique using an alternative formulation of their instrument providing additional robust evidence for the long-run effect of institutions on income per capita. In additon, Glaeser et al. (2004) criticized the omission of human capital in Acemoglu et al. (2001). As a response to this point, Acemoglu et al. (2014) show that the impact of institutions on long-run development is robust with respect to historically-determined differences in human capital. Moreover, Alesina and Giuliano (2013) find that culture matters for a variety of economic outcomes based on one specific aspect of culture through its relationship with institutions. In addition, Acemoglu and Jackson (2014) emphasize the interplay between social norms and the enforcement of law.

However, institutions themselves remained a broad concept in the recent literature. The literature distinguishes between *de jure* and *de facto* institutions, which reflects the distinction between the legal rules as well as their enforcement. And even though institutions received a lot of attention in recent literature, there is still little understanding about the specific channels through which institutions are influencing growth. Acemoglu et al. (2014) describe institutions as fundamental determinants in a causal chain working through channels but argue as well that (p. 28): "Most empirical literature on this topic is agnostic about channels via which institutions impact long-run development [...]".

2.2 Institutional Quality

The empirical literature witnesses many attempts to measure the "quality of institutions" in order employ a numerical variable empirically. The Political Risk Services report an index reflecting protection against expropriation. This index is commonly used, for example by Acemoglu et al. (2001). However, Glaeser et al. (2004) critisize that a country under dictatorship can achieve the same level of protection against expropriation as a democratic country. The Polity IV dataset provides a measure of democracy and the World Bank's Worldwide Governance Indicator reports on six dimensions of governance of more than 200 countries. Besides the most well-known measures, many different measures are constructed for example to gauge the "quality of government" related to the functioning of the public sector, efficiency of bureaucracy, corruption etc. La Porta et al. (1998) emphasize the role of legal origins with respect to current investor protection.

In our empirical analysis we will employ an index provided by the World Bank which conceptually grounds on Djankov et al. (2008). Using data on time, cost, and the likely disposition of assets, Djankov et al. (2008) construct a measure of the efficiency of debt enforcement for 88 countries. In order to construct the index, they confront insolvency practitioners with a standardized case of an insolvent firm. This example assumes a midsize firm that has limited liability legal form. It has one major shareholder and one large secured creditor. Hence, the firm will default on straight debt and there is no financial complexity which could help to circumvent formal default. It is assumed that the firm could be able to serve bank debt for the next two years but then it will turn into trouble due its long-term inability to repay the debt. Employees want the firm to continue in business and tax administration will follow the procedure that maximizes its expected recovery rate. There are three possible procedures in place, namely foreclosure, reorganization, and liquidation. The liquidation can be followed by two possible outcomes: going concern or piecemeal sale. The major benefit compared to other measures of the World Bank's methodology is to provide recurrent and comparable measure that differs regarding country-specific design of institutions.

Based on this example, Djankov et al. (2008) provide a measure of efficiency which is defined as the present value of the terminal value of the firm after bankruptcy costs, referred to as *recovery rate*. This measure does not only reflect the institutional quality.

We understand this measure to create incentives for different parties at stake when considering whether to enter formal bankruptcy. Thus, a higher recovery rate means that different parties at stake may initiate a formal bankruptcy procedure rather sooner than later. In addition, the design of such an institution related to formal bankruptcy has *ex ante* effects on firms' performance due to its influence of firms' capital structure (Stiglitz, 1974). Finally, institutional quality proxied by the institutional ability to resolve insolvency is neither perfectly related to institutions-as-equilibria nor institutions-as-rules.[1]

2.3 Hypothesis

IMF (2013) proposes an intuitive measure to identify firms facing debt-servicing difficulties and describes such firms as (p. 32): "These firms would be unable to service their debts in the medium term unless they make adjustments such as reducing debt, operating costs, or capital expenditures." Correspondingly, such firms cannot use their assets efficiently, which in turn causes severe inefficiency at the firm-level and negatively affects potential growth for the whole economy.

We hypothesize that economies with more efficient institutions in terms of resolving insolvency suffer less from unproductive assets tied up in firms with debt-servicing difficulties. A lower recovery rate creates an incentive to keep a firm operating even if its assets cannot be employed most productively anymore. Thereby, market entry of new firms is prevented, which is economically not desirable since it prevents the re-allocation of resources. More efficient institutions regarding their ability to resolve insolvency ensure that such firms will not be kept artificially operating and that the share of assets employed in inefficient firms will be lower. This makes the economy more Schumpeterian since it facilitates market entry and the corresponding re-allocation of resource. According to Schumpeterian growth theory[2], market entry is desirable since the reallocation of resources from incumbents to new entrants is one major source of productivity growth (Aghion et al., 2013). In other words, a better resolving insolvency framework is proposed to enhance creative destruction. In turn, one could argue that Schumpeterian theory of creative destruction implies a harmful effect of high competition on growth. However, recent empirical analyses[3] confirm this relationship at firm level but reveal a positive correlation between productivity growth and competition at industry level and the corresponding theoretical modification is provided by Bento (2014). In addition, Chun et al. (2008) provide a positive empirical link of creative destruction and industry-specific productivity. Our interpretation of weak resolving insolvency frameworks as a subsidy to incumbents matches with the arguments presented by Acemoglu et al. (2013).

To sum it up, the narrow channel through which institutional quality is proposed to work here are assets tied up in firms which are restricted employ their assets efficiently. Hence, we address the question of how the existence of assets tied up in such firms is influenced by institutional ability to resolve insolvency.

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[1] See Alesina and Giuliano (2013) for a discussion of both definitions.
[2] See Aghion et al. (2015) for a summary and predictions.
[3] See our discussion of subsection 2.1.1 above.

Although differently determined, we see many similarities of such firms in terms economic consequences and so called "zombie firms". A zombie firm is defined as a firm which would become insolvent if banks do not continue lending, referred to as "evergreening". Caballero et al. (2008) find that misdirected bank lending played a substantial role in extending the macroeconomic stagnation in Japan beginning in the 1990s. Their findings summarize that the existence of zombie firms causes the following economic consequences: first, they document a reduction of profits of healthy firms, which discourages entry and investment. Second, sectors dominated by zombie firms are often characterized by a more depressed job creation and low productivity growth. Finally, they find that even healthy firms generate depressed employment growth. These stylized facts indicate that zombie firms have significant negative spillovers on the remaining firms in the same sector and the overall economy. Giannetti and Simonov (2013) conclude from the Japanese phenomenon that bank bail-outs characterized by too small capital injections during a banking crisis have encouraged the evergreening of nonperforming loans which differs from our definition of firms which are restricted employ their assets efficiently.

3 Data and Descriptive Statistics

3.1 Country Selection

We collect detailed firm data for twelve member states of the European Union - namely Austria, Bulgaria, Czech Republic, France, Germany, Hungary, Latvia, Poland, Romania, Slovenia, Slovak Republic, and Sweden. We selected these countries because they show large differences in institutional quality. Moreover, institutions in central eastern European countries have improved mainly stepwise as a part to the accession to the EU, which included the adoption of the acquis communautaire. Thus, institutional quality can be viewed as exogenous.

For those central European countries that are not included this is due to limited data availability. Moreover, we include Austria, France, Germany, and Sweden as examples of mature developed economies in the European Union which represent different origins of law (La Porta et al., 1998). Relatively detailed firm data are available from 2005 to 2012 for all countries except Latvia which is only availabe from 2008 to 2012.

We forgo to include other mature developed economies in the European Union in order to avoid biased results by firms suffering from inefficiency due to a domestic banking crisis. We consider the existence of "zombie firms" as more likely in the European periphery than in those mature developed economies included here. Bank loans subject to "evergreening" provide a misleading identification of firms with debt-servicing difficulties and, thus, would finally bias our results.

3.2 Institutional Indices

The World Bank provides various indices of governance and institutional quality. Among them, the efficiency of insolvency frameworks across economies is chosen for our analysis. It is measured by the recovery rate of creditors in case of insolvency. A higher recovery rate of creditors in case of insolvency reflects more efficient institutions (Djankov et al., 2008). The recovery rate of creditors naturally ranges between 0 and 1 which equals 0 to 100 per cent.[4]

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[4] The World Bank describes the relevance of its indicator as: "When a weak insolvency framework does not provide for effective formal and out-of-court mechanisms to address financial distress, more debts remain unsolved and more companies languish, unprofitable but with their assets unavailable to their creditors and little chance of turnaround."

Table 1: World Bank Index

Year	AUT	BUL	FRA	GER	HUN	LTV	POL	ROU	SVK	SLV	SWE	CZE
2005	0.725	0.335	0.457	0.832	0.379	0.359	0.324	0.069	0.396	0.424	0.723	0.168
2006	0.733	0.335	0.476	0.810	0.357	0.339	0.321	0.175	0.386	0.440	0.749	0.178
2007	0.737	0.344	0.480	0.812	0.397	0.348	0.338	0.199	0.481	0.449	0.757	0.185
2008	0.724	0.324	0.474	0.816	0.384	0.346	0.337	0.289	0.452	0.466	0.747	0.213
2009	0.715	0.321	0.447	0.802	0.384	0.290	0.341	0.295	0.459	0.455	0.751	0.209
2010	0.715	0.321	0.447	0.802	0.384	0.290	0.341	0.285	0.459	0.455	0.751	0.209
2011	0.731	0.310	0.452	0.816	0.379	0.319	0.358	0.257	0.553	0.509	0.773	0.559
2012	0.727	0.314	0.458	0.827	0.392	0.464	0.315	0.286	0.543	0.511	0.758	0.560
country mean	0.726	0.326	0.461	0.815	0.382	0.344	0.334	0.232	0.466	0.464	0.751	0.285

overall min	0.232	(ROU)
overall mean	0.466	
overall median	0.422	
overall max	0.815	(GER)

1.00 equals a recovery rate of 100%.

Table 1 provides an overview of the World Bank index. The arithmetic average of the recovery rate across countries and years is roughly 0.47 and the median is 0.42; the minimum recovery rate on average is 0.23 (Romania) and the maximum is 0.82 (Germany). Taking into account the development over time, among the central eastern European economies, even though still having weak institutional quality, Romania and the Czech Republic improved considerably between 2005 and 2012. Slovenia and Slovak Republic made progress as well. Bulgaria, Hungary, Latvia, and Poland seem to be stuck at an institutional quality level below the median. However, on average more than half of the value of a resolved firm is lost in CEECs. The fact that French institutional quality is below that of Germany, Sweden, and Austria is supposed to be due to different origins of law (La Porta et al., 1998).

3.3 Firm-Level Data

We focus on non-listed companies. In order to avoid financial complexity, we additionally restrict our analysis to companies whose debt is bank financed. On the one hand, this corresponds closely to the example of the insolvent firm discussed by Djankov et al. (2008). On the other hand, this group of firms represents also the most important domestic firms in the CEECs where domestic capital markets are generally underdeveloped and whose access to international capital markets is limited. In general, data collection is as closely as possible related to standardized case of an insolvent firm by Djankov et al. (2008). We use the Amadeus databank of Bureau van Dijk, which provides detailed data including balance sheets, profit and loss accounts, the legal form for European firms, and the industrial code (Nace, Rev. 2). Industrial codes are used for sectoral aggregation. We use the following information for each firm: cash flow (CF), total assets (TA), long-term debt (LTD), short-term debt (STD), interest expenses (IE), depreciation (DP), and earnings before interest, taxes, depreciation and amortization (EBITDA). Using these inputs for each firm, i, in period t, we define the interest coverage ratio (ICR_{it}) which equals

$$ICR_{it} = \frac{EBIT_{it}}{IE_{it}}, \tag{1}$$

where $EBIT_{it}$ equals $EBITDA_{it}$ minus DP_{it}. Brealey et al. (2008) call this ratio time-interest-earned and describe it as a measure of "how much clear air there is between hurdle and hurdler". This means that the current earnings should cover at least interest expenses, otherwise the internal sources of the firm have to be used for the repayment. Therefore, this will be the key variable for further analysis. We will use it for our definition of firms which are inefficient and have to exploit internal source in order to serve their interest payments. The explanatory variables at firm-level, that is cash flow divided by total assets and debt[5] divided by total assets, follow the findings of the previous literature (Benito and Whitley, 2003; Mojon et al., 2002). In total, we collect roughly 1.5 million observations across countries between 2005 and 2012. Table 2 illustrates pairwise correlation coefficients of the analyzed variables using individual data.

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[5] Debt equals long-term debt plus short-term debt.

Table 2: Pairwise Correlation

	ICR	CF/A	D/A	$INST$
ICR	1.000			
CF/A	0.024*	1.000		
D/A	-0.019*	-0.280*	1.000	
$INST$	0.022*	-0.001	0.013*	1.000

* denotes significance at 5%-level.

The ratio of cash flow to total assets is positively and statistically significantly correlated with the interest coverage ratio. Debt to total assets ratio is negatively and significantly correlated with the interest coverage ratio. Hence, both variables are correlated as expected with the interest coverage ratio. The recovery rate of creditors, which is employed in order to proxy institutional quality, is positively correlated with corporate financial health, which confirms also our expectations.

Table 3 illustrates differences between healthy firms and firms with an ICR below one. Comparing such firms with healthy firms, *t-tests* reveal intuitive results. However, comparing firms facing debt-servicing difficulties one period with those facing debt-servicing difficulties for more than one period provides some interesting findings. Firstly, firms facing debt-servicing difficulties for more than one period are larger, more indebted, but not significantly less liquid. Secondly, and that is surprising, they do not face much tougher financing conditions even though they are more indebted. The implicit lending rate, which equals interest expenses divided by outstanding bank debt, does not differ between those two groups of weak firms. In case our hypothesis holds, this can be interpreted as a lower recovery rate of creditors facilitates "evergreening".[6] The puzzling fact that firms which face financial distress but are still operating are larger than healty firms might be attributed to the political willingness to keep large firms operating. However, another reason could be loss aversion by stakeholders (Kahneman and Tversky, 1979; Odean, 1998).

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[6] This is where we see once again similarities to the lines of arguments presented by Caballero et al. (2008) but also a major difference since there is no reason that our results reflect evergreening of nonperforming loans due to insufficient bank bail-outs like in Japan (Giannetti and Simonov, 2013).

Table 3: Characteristics of an ICR $<$ 1.

Mean	AllFirms	Group1	Group1 vs.AllFirms	Group2	Group 2 vs. All Firms	Group2 vs.Group1
EBITDA	1429.813		−738.528		−896.048	
t-value			(28.008)		(21.651)	(5.062)
Interest Expenses	313.626		1006.124		1555.345	
t-value					(−7.446)	
Implicit Lending Rate	0.040		0.171		0.131	
t-value					(−3.583)	(0.693)
ST Debt	4984.730		8299.663		11557.560	
t-value					(−29.269)	
LT Debt	4916.609	ICR<1 for one period	6956.277		9552.258	
t-value					(−14.740)	
Cashflow	1036.780		−528.828		−545.818	
t-value			(26.745)		(19.483)	(0.215)
Total Assets	15016.110		22010.190	ICR<1 for two consecutive periods	31066.450	
t-value					(−23.166)	
Cashflow/Assets	0.097		−0.151		−0.155	
t-value			(117.819)		(85.822)	(0.913)
Debt/Assets	0.714		1.046		1.114	
t-value					(−130.000)	
LT_Debt/Assets	0.218		0.322		0.361	
t-value					(−21.404)	
ST_Debt/Assets	0.496		0.724		0.753	
t-value					(−37.523)	

Notes: The t-statistic is reported in parentheses. Null hypothesis is diff=0 where diff equals mean(0)-mean(1) and 1 represents the specific section.

3.4 Macroeconomic Data and Cross-Sectional Relationship

Figure 1: Institutional Quality, GDP per Capita, and Saving Gap
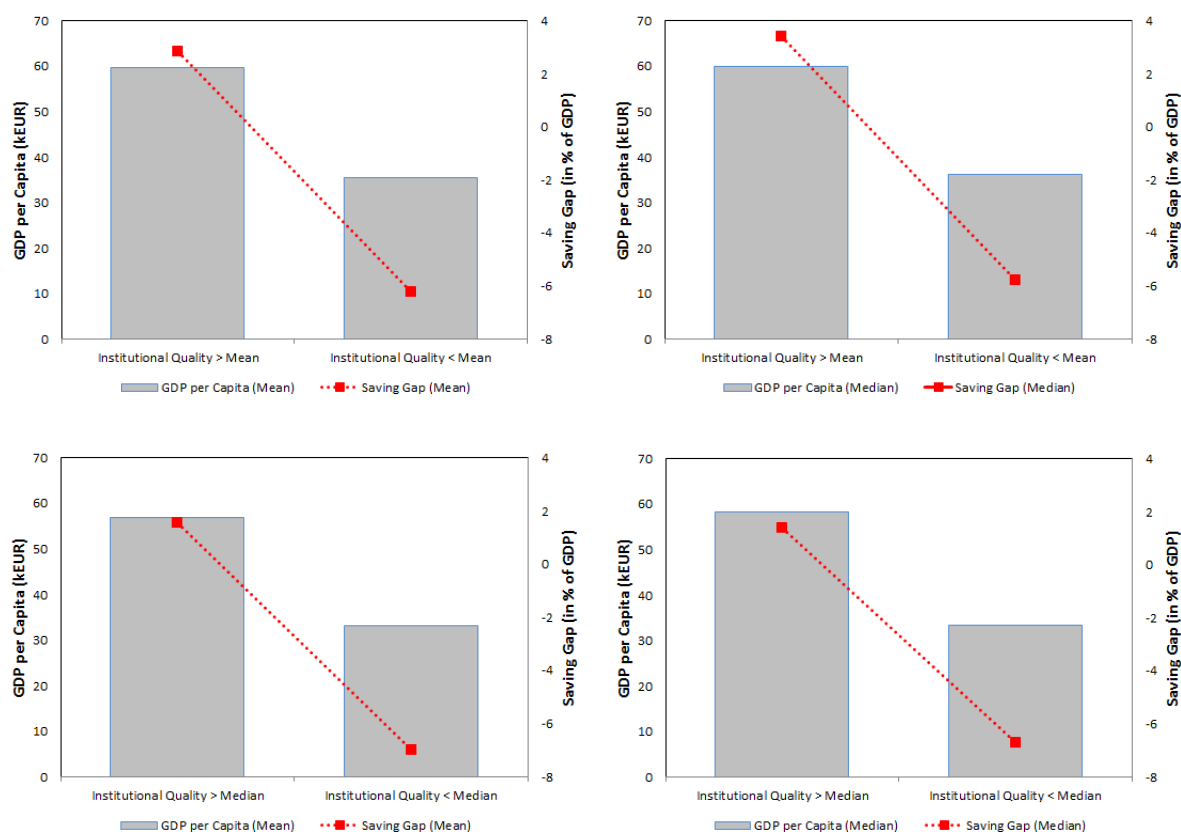
Our analysis is motivated and completed by the comparison of microeconomic and macroeconomic data. The macroeconomic data are taken from the World Economic Outlook Database of the International Monetary Fund (real growth rate of GDP, total investment as share of GDP, and gross national savings as share of GDP) and from the Ameco Database provided by the European Commision (GDP at current market prices per person employed).

The long-run correlation between institutions and GDP per capita is relatively well understood in the literature. As far as we proxy institutional quality by the recovery rate of creditors, we first have to check whether our measure satisfies this long-run relationship in the cross-section of analyzed countries. We take GDP at current market prices per person employed as a productivity indicator. In a Schumpeterian sense, productivity ought to be higher in countries with higher competition. In addition, we include a "saving gap" which equals gross national saving (as share of GDP) less total investment (as share of GDP).

Figure 1 illustrates the following stylized facts[7]: first, the mean and/or median of GDP per capita is higher for countries whose institutional quality is above the mean and/or median. Second, the mean and/or median of the saving gap is negative for countries whose institutional quality is below the mean and/or median.

3.5 Sectoral Agregation

In general, there are several channels through which institutional quality may affect economic performance in the long-run. We focus on the inefficient use of assets by firms facing debt-servicing difficulties. If a firm faces financial distress, defined by an interest coverage ratio below one, it will use internal sources to repay credits. In the long run, such firms will starve slowly to death and its assets will eventually be fully wasted. Moreover, we distinguish between firms which face financial distress for only one period and those which do so two consecutive observations, thus, we try to distinguish between firms with some and no long-term prospects, respectively.[8]

Using individual firm data, we define one sectoral variable of interest. Sectors are defined according to the industrial code (Nace, Rev. 2). The variable *Asset Ratio* is defined as the ratio of assets tied up in firms facing financial distress aggregated for sectors within countries. The lower the share of assets tied up unproductively in an industry, the more open this industry is to the benefits of Schumpeterian creative destruction such as market entry and the corresponding re-allocation of resources.

This variable is constructed based on firms which face debt-servicing difficulties for either one period or two consecutive observations.

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[7] Notes: Institutional quality is proxied by the resolving insolvency measure provided by the World Bank. Saving gap equals gross national saving (in % of GDP) minus total investment (in % of GDP). GDP per capita equals gross domestic product at current market prices per person employed. Sources: Ameco, IMF, World Bank.

[8] According to Djankov et al. (2008) firm in the standardized case is able to serve bank debt for the next two years but then it will turn into trouble due its long-term inability to repay the debt.

Figure 2: Share of Assets Tied Up in Weak Firms, GDP per Capita, and Saving Gap
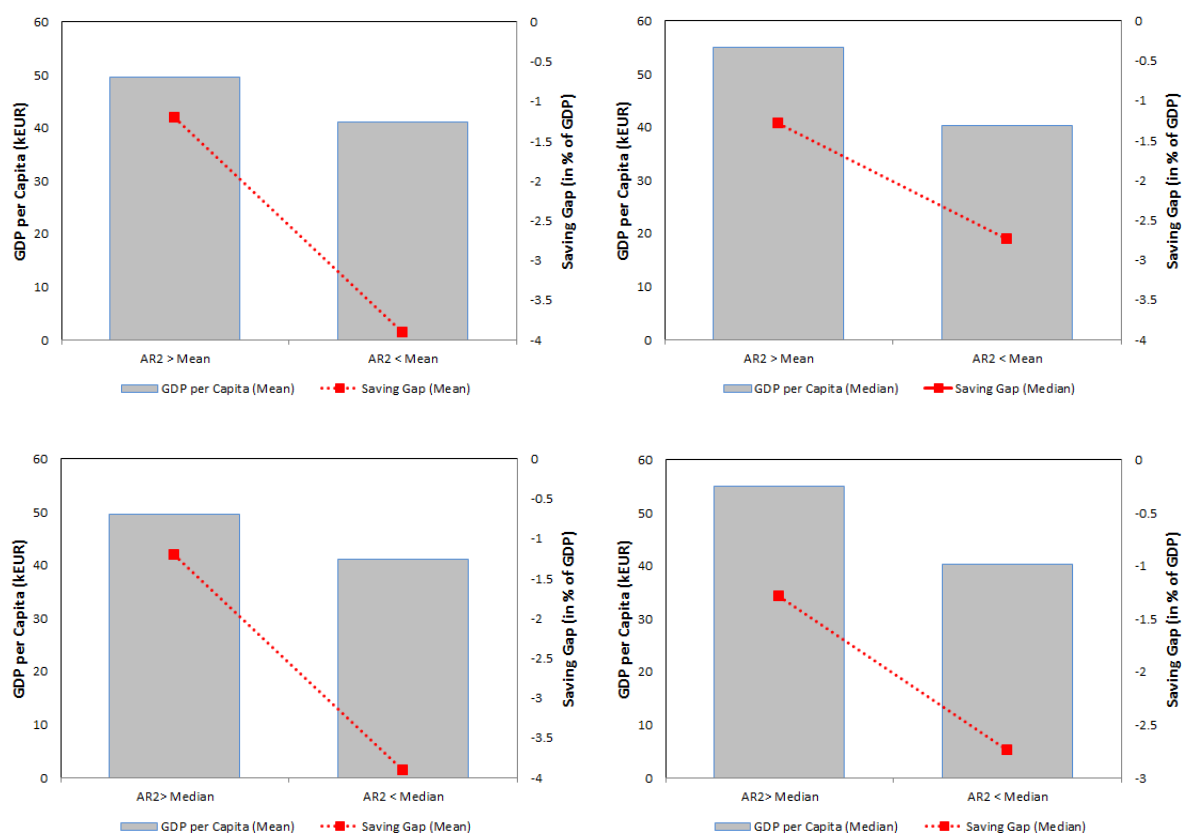
The measure of main interest is the *Asset Ratio* for two consecutive observations. Our intuition is that the longer the inefficient use of assets persists the lower the lower the growth potential of the economy which ought to be reflected in GDP per capita. Thus, this measure is required to reflect the characteristics observed in Figure 1. Actually, Figure 2 illustrates that the *Asset Ratio* for two consecutive observations shares – even though less pronounced – the long-run characteristics of our proxy for institutional quality.[9]

The amount of indivisual data is impressive, but its use does not address the hypothesis representing our research question, because we are interested in the determinants of the share of assets tied up in firms facing debt-servicing difficulties. As discussed above, competition has a different impact at firm-level than at sector-level. With respect to formal bankruptcy, Maksimovic and Phillips (1998) for example show that industry effects are important determinants of the frequency of bankruptcy and of economic decisions in bankruptcy. Thus, we construct sectoral aggregates and run analyses for sectors within countries. Moreover, this approach gives us additional deeper information about country-specific sectoral effects.

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[9] Notes: AR2 measures the share of assets tied up for two consecutive observations in weak firms. Saving gap equals gross national saving (in % of GDP) minus total investment (in % of GDP). GDP per capita equals gross domestic product at current market prices per person employed. Sources: Ameco, IMF, World, Bank, Amadeus.

   Firms facing unsustainable debt-servicing difficulties, that is firms which are not able to employ assets efficiently, are defined by an interest coverage ratio of below one. We distinguish between firms which face debt-servicing difficulties for one period and those which face debt-servicing difficulties for two consecutive observations. As dependent variable we calculate the share of assets tied up in these firms for each sector in each country each year, labelled as $Asset$ $Ratio$, $AR_{p;s;t}$. p is either 1 or 2 representing whether we use firms facing debt-servicing difficulties for one period or at least two consecutive observations. s represents a specific sector in a country and t the year of observation. The measure for two consecutive observations, $AR_{2;s;t}$, will be our preferred indicator at the sectoral level. The sectors are defined according to Nace (Rev. 2) classification. We drop sectors including less than 20 firms. Similarly, we aggregate cash flow and debt for sectors and divide them by sectoral total assets. Table 4 illustrates pairwise correlation coefficients of major variables employed. However, only the aggregated micro variables reveal a correlation coefficient as expected consistently. However, the lower part of the table reveals an interesting finding which is that the more efficient institutions are the less persistently assets are tied up in entrepreneurial artifacts.

Table 4: Pairwise Correlation, Sectoral Aggregation

	AR_1	AR_2	CF/A	D/A	$INST$
AR_1	1.000				
AR_2	0.912*	1.000			
CF/A	-0.343*	-0.298*	1.000		
D/A	0.190*	0.141*	-0.187*	1.000	
$INST$	-0.003	0.057*	-0.130*	-0.038	1.000

	$(AR1 - AR2)$	$INST$
$(AR1 - AR2)$	1.000	
$INST$	-0.133*	1.000

* denotes significance at 5%-level.

4 Estimation and Results

In order to identify the determinants of the share of assets tied up unproductively in sectors within countries empirically, we have take into account the dynamic proporties of the analyzed panel data. However, fixed effects panel estimations do not take into account the dynamic properties of the analyzed panel. Moreover, we need to consider possible reverse causality and endogeneity problems. In our baseline regression we employ cash flow and debt both divided by total assets and the institutional quality proxied by the by the recovery rate of creditors as independent variables. All may be endogenous in our estimations, e.g. due to reverse causality. For example facing debt-servicing difficulties constraints cash flow. Another important concern is that financial distress is often highly persistent. Therefore, we control for dynamic properties of our data by estimating a dynamic panel model:

$$\Delta AR_{p;s;t} = \alpha_{p;s} + \sum_{l=1}^{L} \delta_p AR_{p;s;t-l} + \sum_{k=1}^{K} \beta_k X_{s;t} + Z_{s;t}\gamma + \epsilon_{p;s;t}. \tag{2}$$

The dependent variable in equation (2) is specific to a sector within a country, s, and year t, where p is either 1 or 2 and reflects the respective ratio for either firms which face debt-servicing difficulties for one period or two consecutive observations. δ are autoregressive parameters for L lags of the share of assets tied up unproductively in sectors within countries. X includes three potentially endogenous independent variables of our baseline regression, which are cash flow and debt both divided by total assets and the recovery rate of creditors. Z includes additional control variables. We control for recessions using a binary variable. A recession is defined as a negative annual growth rate.[10] We control for different institutional indices other than the recovery rate of creditors.[11] Since different measures of institutional quality are normally correlated within countries, it is important to show that our results are not driven by the "general" level of institutional quality. Therefore, we control for measures of getting credit and the enforcement of contracts: first, $Strength\ of\ Legal\ Index$ which measures the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders and thus facilitate lending; second, $Depth\ of\ Credit\ Information\ Index$ which measures rules affecting the scope, accessibility, and quality of credit information available through public or private credit registries; third, $Enforcing\ Contracts$ assesses the efficiency of the judicial system by following the evolution of a commercial sale dispute over the quality of goods by tracking the time it takes in days. Moreover, we calculate a Herfindahl-stlye Competition Index (CI) for sectors based on $EBITDA$. The calculated Competition Index is by definition a sectoral variable. However, a Competition Index based on the EBITDA of firms in our sample does not necessarily capture sectoral competition appropriately. Firms in our sample also compete at a sectoral level with firms not only bank financed and public firms which are not part of our data. In addition, we always for time and country effects by binary variables. ϵ represents the residual.

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[10] This should be more or less identical to negative growth rates over two consecutive quarters, which is the standard definition of recession.
[11] All indices used are provided by the World Bank.

Table 5: System GMM, Asset Ratio one Period, 2005 - 2012

	(I)	(II)	(III)	(IV)	(V)	(VI)
dependent variable	AR1	AR1	AR1	AR1	AR1	AR1
Dependent Variable (t-1)	0.284***	0.284***	0.264**	0.285***	0.291***	0.278***
	(0.095)	(0.095)	(0.105)	(0.095)	(0.099)	(0.091)
Cash Flow/Assets	–0.825**	–0.745**	–1.055**	–0.823**	–0.796**	–0.855**
	(0.372)	(0.356)	(0.507)	(0.372)	(0.390)	(0.375)
Debt/Assets	0.313**	0.318**	0.284*	0.313**	0.314**	0.298*
	(0.159)	(0.160)	(0.161)	(0.159)	(0.159)	(0.160)
Institution	–0.162	–0.244*	–0.128	–0.157	–0.174	–0.164
	(0.128)	(0.148)	(0.128)	(0.127)	(0.125)	(0.126)
Recession		0.035				
		(0.025)				
Strength of Legal Index			–0.037			
			(0.032)			
Depth of Credit Information Index				–0.002		
				(0.022)		
Enforcing Contracts					0.000	
					(0.000)	
Competition Index						0.072
						(0.203)
Constant	0.001	0.005	0.245	0.009	0.091	0.009
	(0.157)	(0.157)	(0.302)	(0.193)	(0.186)	(0.157)
Time Dummies	yes	yes	yes	yes	yes	yes
Country Dummies	yes	yes	yes	yes	yes	yes
No of obs	1231	1231	1231	1231	1231	1231
No of groups	188	188	188	188	188	188
Hansen *p-value*	0.332	0.331	0.371	0.300	0.281	0.300
AR(1) *p-value*	0.000	0.000	0.000	0.000	0.000	0.000
AR(2) *p-value*	0.745	0.726	0.718	0.747	0.762	0.679

Notes:
(1) * (**) [***] denotes significance at the 10% (5%) $[1\%]$ level.
(2) Robust standard errors are reported in parentheses.

An OLS estimate may be significantly biased when number of time periods is small (Baltagi, 2008) because the lagged values of the dependent variable, $AR_{p;s;t-l}$, are correlated with the fixed effects, $\alpha_{p;s}$. Therefore, Arellano and Bond (1991) propose a GMM estimator which removes fixed effects by difference transformation (difference GMM). However, the difference transformation leads to the so called weak instrument problem when the dynamic terms are close to unity. Arellano and Bond (1995) and Blundell and Bond (1998) builds a system of two equations (system GMM) in levels and in first differences. We use two lags of each of the endogenous variables for the system GMM estimations. Time effects are included as exogenous instruments.

Table 5 and Table 6 reveal satisfying test statistics. Explaining the determinants of the share of assets tied up unproductively in sectors within countries for one year, Table 5 reveals a highly persistent dependent variable. In addition to its persistence this *Asset Ratio* is statistically significantly determined by the aggregated micro-variables. Liquidity reduces whereas indebtness increases the share of assets tied up unproductively.

Table 6: System GMM, Asset Ratio two consecutive Observations, 2005 - 2012

	(I)	(II)	(III)	(IV)	(V)	(VI)
dependent variable	AR2	AR2	AR2	AR2	AR2	AR2
Dependent Variable (t-1)	0.386***	0.387***	0.382***	0.377***	0.381***	0.366***
	(0.132)	(0.134)	(0.134)	(0.131)	(0.133)	(0.130)
Cash Flow/Assets	−0.944**	−0.961**	−1.152**	−0.967**	−0.982**	−1.034***
	(0.415)	(0.401)	0.521	(0.418)	(0.436)	(0.397)
Debt/Assets	0.164	0.161	(0.102)	0.182	0.164	0.129
	(0.140)	(0.142)	0.140	(0.139)	(0.141)	(0.152)
Institution	−0.309**	−0.285*	−0.248*	−0.245*	−0.299**	−0.322**
	(0.142)	(0.172)	(0.128)	(0.135)	(0.141)	(0.139)
Recession		−0.009				
		(0.023)				
Strength of Legal Index			−0.043			
			(0.026)			
Depth of Credit Information Index				−0.035*		
				(0.021)		
Enforcing Contracts					0.000	
					(0.000)	
Competition Index						0.196
						(0.167)
Constant	0.174	0.173	0.456*	0.313*	0.077	0.194
	(0.139)	(0.140)	(0.257)	(0.186)	(0.156)	(0.143)
Time Dummies	yes	yes	yes	yes	yes	yes
Country Dummies	yes	yes	yes	yes	yes	yes
No of obs	1231	1231	1231	1231	1231	1231
No of groups	188	188	188	188	188	188
Hansen *p-value*	0.500	0.585	0.561	0.561	0.447	0.434
AR(1) *p-value*	0.000	0.000	0.000	0.001	0.000	0.000
AR(2) *p-value*	0.335	0.335	0.235	0.417	0.305	0.293

Notes:
(1) * (**) [***] denotes significance at the 10% (5%) [1%] level.
(2) Robust standard errors are reported in parentheses.

Thus, both variables enter ou analyses with the hypothesized sign. Other variables employed, including the recovery rate of creditors, do not statistically significantly determine the dependent variable. However, we are more interested in the explanation of the share of assets tied up unproductively for at least two consecutive observations.

Table 6 again reveals a highly persistent dependent variable. Liquidity still reduces share of assets tied up unproductively but indebtness does not matter all anymore. However, the recovery rate of creditors statistically significantly reduces the share of assets tied up unproductively for at least two consecutive observations. This finding is line with our hypothesis. The results can be interpreted in a way that aggregated micro-variables become less but instutional quality more important the longer assets are tied up unproductively.

5 Conclusion and Policy Recommendation

The use of a rich dataset at the firm-level allows us to aggregate data across sectors within countries. We analyze a narrow channel through which institutions potentially affect income in the long-run – the institutional ability to resolve insolvency. We test whether the ability of institutions to resolve insolvency influences the existence of assets not used efficiently. In order to identify the determinants of inefficiently used assets at sector level and to mitigate the corresponding endogeneity problem, we use the dynamic panel system General Method of Moments (GMM) estimator. Estimations provide satisfying test statistics. The share of assets tied up in firms facing debt-servicing difficulties at least two consecutive observations is of main interest. We find that more efficient institutions reduce the share of assets tied up unproductively in firms facing debt-servicing difficulties for more than one year. This result is in line with our hypothesis and provides statistical evidence for that very specific effect of instutional quality in terms of resolving insolvency.

A further catch-up in terms of institutional quality by central eastern European countries is highly recommended. Taking into account that cross-border differences in institutions might be due to certain, country-specific cultural values, the implementation of institutional progress and, in particular, the enforcement of those changes are more challenging than they appear at first glance. Hence, we recommend imposing laws gradually as proposed by Acemoglu and Jackson (2014) in order to allow social norms to adopt. Yet in order to improve institutional quality, we follow the advice of Djankov et al. (2008) which is that countries with weak institutions ought to introduce relatively simple mechanisms like foreclosure with no or limited court oversight and floating charge, which essentially transfers control of the firm to the secured creditor in the case of default. In addition, a side-benefit of institutional improvement is that better insolvency frameworks correlate with more developed financial markets.

References

Acemoglu, D., U. Akcigit, N. Bloom, and W. Kerr (2013). Innovation, Reallocation and Growth. *NBER Working Paper No. 18993*.

Acemoglu, D., F. Gallego, and J. Robinson (2014). Institutions, Human Capital and Development. *NBER Working Paper No. 19933*.

Acemoglu, D. and M. Jackson (2014). Social Norms and the Enforcement of Laws. *Massachusetts Institute of Technology, Department of Econmics, Working Paper Series, Working Paper 14-16*.

Acemoglu, D., S. Johnson, and J. Robinson (2001). The Colonial Origins of Comparative Development: An Empirical Investigation. *American Economic Review 91*(5), 1369–1401.

Acemoglu, D., S. Johnson, and J. Robinson (2012). The Colonial Origins of Comparative Development: An Empirical Investigation: Reply. *American Economic Review 102*(6), 3077–3100.

Acemoglu, D. and J. Robinson (2012). *Why Nations Fail: The Origins of Power, Prosperity and Poverty*. New York: Crown Publishers.

Aghion, P., U. Akcigit, and P. Howitt (2013). What Do We Learn From Schumpeterian Growth Theory? *PIER Working Paper 13-026*.

Aghion, P., U. Akcigit, and P. Howitt (2015). Lessons from Schumpeterian Growth Theory. *American Economic Review: Papers & Proceedings 105*(5), 94–99.

Aghion, P., N. Bloom, R. Blundell, R. Griffith, and P. Howitt (2005). Competition and Innovation: An Inverted-U Relationship. *Quarterly Journal of Economics 120*(2), 701–728.

Aghion, P., M. Braun, and J. Fedderke (2008). Competition and productivity growth in South Africa. *Economics of Transition 16*(4), 741–768.

Albouy, D. (2012). The Colonial Origins of Comparative Development: An Empirical Investigation: Comment. *American Economic Review 102*(6), 3059–3076.

Alesina, A. and P. Giuliano (2013). Culture and Institutions. *NBER Working Paper No. 19750*.

Arellano, M. and S. Bond (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies 58*, 277–297.

Arellano, M. and S. Bond (1995). Another look at the instrumental-variable estimation of error-components. *Journal of Econometrics 68*, 29–51.

Baltagi, B. (2008). *Econometric analysis of panel data*. John Wiley & Sons Ltd.

Benito, A. and J. Whitley (2003). Implicit interest rates and corporate balance sheets: an analysis using aggregate and disaggregated UK data. *Bank of England - Working paper no. 193*.

Bento, P. (2014). Competition as a Discovery Procedure: Schumpeter Meets Hayek in a Model of Innovation. *American Economic Journal: Macroeconomics 6*(3), 124–152.

Blundell, R. and S. Bond (1998). nitial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics 87*, 115–143.

Blundell, R., R. Griffith, and J. van Reenen (1999). Market Share, Market Value and Innovation in a Panel of British Manufacturing Firms. *Review of Economic Studies 66*, 529–554.

Brealey, R., S. Myers, and F. Allen (2008). *Principles of Corporate Finance*. McGraw-Hill, New York.

Buera, F., J. Kaboski, and Y. Shin (2014). Macro-Perspective on Asset Grants Programs: Occupational and Wealth Mobility. *American Economic Review 104*(5), 159–164.

Caballero, R., T. Hoshi, and A. Kashyap (2008). Zombie Lending and Depressed Restructuring in Japan. *American Economic Review 98*(5), 1943–1977.

Campos, N. and A. Coricelli (2002). Growth in Transition: What We Know, What We Don't, and What We Should. *Journal of Economic Literature 40*(3), 793–836.

Chun, H., J. Kim, R. Morck, and B. Yeung (2008). Creative destruction and firm-specific performance heterogenity. *Journal of Financial Economics 89*, 109–135.

Djankov, S., O. Hart, C. McLiesh, and A. Schleifer (2008). Debt Enforcement around the World. *Journal of Political Economy 116*(6), 1105–1149.

Djankov, S. and P. Murrell (2002). Enterprise Restructuring in Transition: A Quantitative Survey. *Journal of Economic Literature 40*(3), 739–836.

Dutz, M. and A. Hayri (2000). Does More Intense Competition Lead to Higher Growth? *World Bank Policy Research Paper 2320*.

Estrin, S., J. Hanousek, E. Kocenda, and J. Svejnar (2009). The Effects of Privatization and Ownership in Transition Economies. *Journal of Economic Literature 47*(3), 699–728.

Giannetti, M. and A. Simonov (2013). On the Real Effects of Bank Bailouts: Micro Evidence from Japan. *American Economic Journal: Macroeconomics 5*(1), 135–167.

Glaeser, E., R. La Porta, F. López-de Silanes, and A. Shleifer (2004). Do Institutions Cause Growth? *Journal of Economic Growth 9*(3), 271–303.

Gollin, D., D. Lagakos, and M. Waugh (2014). Agricultural Productivity Differences across Countries. *American Economic Review 104*(5), 165–170.

Hall, R. and C. Jones (1999). Why do Some Countries Produce So Much More Output Per Worker than Others? *Quarterly Journal of Economics 114*, 83–116.

IMF (2013). *Global Financial Stability Report - Transition Challenges to Stability*. International Monetary Fund, Washington.

Kaboski, J., M. Lipscomb, and V. Midrigan (2014). The Aggregate Impact of Household Saving and Borrowing Constraints: Designing a Field Experiment in Uganda. *American Economic Review 104*(5), 171–176.

Kahneman, D. and A. Tversky (1979). Prospect Theory: An Analysis of Decision under Risk. *Econometrica 47*, 263–292.

La Porta, R., F. Lopez-de Silanes, A. Schleifer, and R. Vishny (1998). Law and Finance. *Journal of Political Economy 106*, 1113–1155.

Levine, R. and D. Renelt (1992). A Sensitivity Analysis of Cross-Country Growth Regressions. *American Economic Review 82*, 942–963.

Maksimovic, V. and G. Phillips (1998). Asset Efficiency and Reallocation Decisions of Bankrupt Firms. *Journal of Finance LIII*(5), 1495–1532.

Mankiw, G., D. Romer, and D. Weil (1992). A Contribution to the Empirics of Economic Growth. *Quarterly Journal of Economics 107*(2), 407–437.

Mojon, B., F. Smets, and P. Vermeulen (2002). Investment and monetary policy in the euro area. *Journal of Banking & Finance 26*, 2111–2129.

Nickell, S. (1996). Competition and Corporate Performance. *Journal of Policial Economy 104*, 724–746.

Odean, T. (1998). Are Investors Reluctant to Realize Their Losses? *Journal of Finance LIII*(5), 1775–1798.

Sala-i-Martin, X. (1997). I just Ran Two Million Regressions. *American Economic Review 87*, 178–183.

Stiglitz, J. (1974). On the irrelevance of corporate financial policy. *American Economic Review 64*, 851–866.