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**The Property Rights Security Is Important:  
How Exactly?**

*Bakalářská práce*

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## **Abstract**

This thesis focuses on the impact of institutional quality in a particular country on various firm characteristics on a sample of developing economies from the Central and Eastern Europe and Asia. In the first part we review the existing literature on the topic and formulate our two countervailing theoretical hypotheses, both of which use the transaction costs approach and predict different strategic behavior of the firms. In the empirical part we employ seven firm characteristics as response variables to determine the prevailing institutional influence on them, using microeconomic data from the World Bank's Business Environment and Enterprise Performance Survey (BEEPS) and corresponding institutional indices from the Worldwide Governance Indicators dataset. We find that in poor institutional environments, firms often engage in strategic behavior that allows them to minimize transaction costs imposed upon them so that they merge more activities together and become generally bigger.

## **Abstrakt**

Tato práce se zabývá dopady institucionální kvality určité země na různé firemní charakteristiky za použití výběru rozvíjejících se ekonomik států střední a východní Evropy a Asie. Nejprve zpracováváme přehled existující literatury na toto téma a formulujeme dvě základní protichůdné hypotézy, které obě operují s konceptem transakčních nákladů, ale předpovídají různé strategické chování firem. V empirické části používáme jako vysvětlovanou proměnnou sedm firemních charakteristik, abychom mohli zjistit u každé z nich převládající institucionální vliv. V této analýze používáme mikroekonomická data Světové banky - Business Environment and Enterprise Performance Survey (BEEPS) a odpovídající institucionální indexy z dat Worldwide Governance Indicators. Výsledkem naší analýzy je, že firmy často reagují na špatné institucionální podmínky strategicky a minimalizují transakční náklady tím, že se sdružují do větších funkčních celků.

## **Keywords**

Institutions, property rights security, enterprise effectivity, developing economies, business environment.

## **Klíčová slova**

Instituce, jistota vlastnických práv, efektivita podniků, rozvíjející se ekonomiky, podnikatelské prostředí.

**Rozsah práce: 102 868**

## **Declaration of authorship**

The author hereby declares that she compiled this thesis independently, using only the listed and properly cited resources and literature.

The author further declares that the thesis has not been used previously for obtaining any university degree.

Prague, May 18, 2012

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Signature

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# Bachelor Thesis Proposal

Charles University in Prague  
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## Proposed Topic:

The Property Rights Security is Important: How Exactly?

## Preliminary outline in English:

The relationship between property rights protection and economic growth in least developed countries has been in focus of many recent economic papers which suggest that lower property rights protection causes lower economic growth (Lewer & Saenz, 2005; Claessens & Laeven, 2003; Knack & Keefer, 1997). Schneider (2005) provides evidence that also in developed countries, there exists a similar relationship between intellectual property rights, economic growth and international trade. However, there is still space for further research in the microeconomic consequences of property rights security for the local firms in developing countries. In my thesis I will attempt to show how property rights security affects firms' performance and other characteristics of the firms.

First I will explain various effects of changing property rights security on the local economy. This will be done with the use of previously published literature, the comparison of the results and with my own contribution based on the analysis of the available data. By that I intend to achieve a complex look at the problematic aspects and a more complete answer to the core question „How exactly do property rights influence the firm's overall performance?“ with respect to firm competitiveness, profit



reinvestment rate and other important characteristics. I will partition the available macroeconomic data (e.g. Alan Heston, 2011; Freedom House, 2010) into regional groups as to possibly obtain different results for different world regions, on the microeconomic level I will use corresponding BEEPS (World Bank) survey dataset. I will be mainly concerned with the post-transition countries in the Central and Eastern Europe.

The preliminary goal and contribution of this thesis will be the analysis of the effect of property rights security change on firms in European post-transition countries, using newest microeconomic data on the subject.

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# 1. Introduction

Since Coase (1960) noted the importance of property rights and transaction costs for the production, numerous studies have been written that integrate these components into their economic analysis. While the new institutional economics has made it possible to include the analysis of institutions within the standard economic framework, the dawn of advanced statistical methods has been the key to the quantitative assessment of the influence of property rights on various other economic phenomena. Perhaps the most attention has been paid to date to the property rights in general and often with connection to the development of countries of the Third World, as well as to the environmental impact of the institutions – perhaps the most publicized is the case of exploiting the Amazon rain forests. Finally, another stream of institutional economists focused on the connection between the property rights and economic growth after North (1973) proclaimed institutions to be closely positively related to the country's growth. This area of research has too been covered extensively.

The number of studies which examine the direct effect of property rights on firms, has not however been so large. Indeed, there have been significant results on this field as well but as such the microeconomic institutional knowledge is still limited and has not yet answered all questions that remain open. That is one of the reasons behind the title of this study. In this bachelor thesis, our aim will be to examine the direct effect of property rights protection on firms, but not merely on one firm aspect – such as the reinvestment of profits as in Johnson, McMillan and Woodruff (2002) – but rather on more firm characteristics such as the marginal product of the workers, the number of employees the firm has or its propensity to invest. This is, however, only a selection from our research variables, the full set of them will be introduced in later chapters. We expect to find out what precise effect the institutions have on the firms in general, which can be used as a starting point for future, more profiled studies. In studying this effect, we compare two countervailing theoretical channels and look for their presence in the data. The first one suggests that higher transaction costs connected with worse institutions have generally a negative impact on various parts of firm functioning due to an inefficient enforcement of contracts and higher production costs due to e.g. more bureaucracy. The second hypothesis predicts that in poor institutional environments,

firms may merge with others so as to minimize the transaction costs by eliminating the need of contracts in the first place, as has been recently shown by Du et al. (2012). Thus the effect of worse institutions could be positive as well as negative.

In this study, we are interested in firms from 28 countries of the Central and Eastern Europe and Asia region because of their largely communistic history and because we aim to study whether the influence of institutions differs in them in comparison with least developed and developed countries. Among these countries, the majority are governed by post-Soviet political regimes and as such we have grounds to assume that in these countries, property rights protection is lower than in developed western states. However, we are not confronted with developing countries in the strict sense of the word either – our sample encompasses countries about in the middle of the scale of advancedness of the economies, which makes our results all the more relevant in comparison with studies conducted exclusively in developed or developing countries. We expect to extend the economical knowledge about property rights to countries that are „halfway through“ to being developed and most importantly, to determine the effect the institutions have on various firm qualities, if there is any.

First we will review the existing literature on our topic, from there we will continue by outlining our theoretical framework and formulating the institutional effect on each of our research variables, and lastly, we will conduct the empirical research itself and interpret the results we obtain.

## **2. A survey of recent literature relevant to the topic**

The role of property rights, even though rather modern in terms of economic analysis, is in itself a very old one. The first author to ever mention the need for property rights in the economic exchange was already Adam Smith, one of the founding „fathers“ of economics. In his *Wealth of Nations* (Smith 1937: 13) he states that economic exchange is in need of property rights because economic agents have „the disposition to truck, barter and exchange“. Although Smith does not mention property rights directly, he acknowledges the difference between people who act independently and exchange essentially the property rights to goods they want and animals which „seem to know neither this or any other species of contract“ (Smith 1937: 12). But what are these „invisible“ property rights actually good for in real life?

The concept of property rights is a vital component of the standard microeconomic theory, which we often automatically assume is existent upon the given circumstances of a problem. Yet this assumption, as straightforward as it may seem, is often not fulfilled without us even realizing it – simply because the consequences of such a seemingly simple act as „owning, having control over something“ are so far-reaching that it is impossible to tell at the first glance. In accordance with this, studies of property rights protection and security in the 20th century have been able to explain with the help of these instruments other economic phenomena which had not been understood properly before this approach in economic research found these significant results.

We can define a property right as a bundle of legal entitlements to the object of interest. These include the right to control the property, right to enjoy the fruits the property bears and right to alienate the property. Property rights are so vital in economic exchange because they shape the expectations of economic agents about the actions of other actors on the market (Leblang 1996: 7). If the agent owns the legal title for example to a house, then he knows (with some degree of certainty), that he will be able to sell the house, live in it or rent it to somebody if he chooses to. On the other hand he knows that no one will live in it without his permission or even take it from him. Without clear property rights, economic agents would not be able to take part in exchange simply because they could not be sure that the agreement (e.g. the sale of the house) would be enforced. Therefore they would not be able to maximize both utility and profit in the sense we understand it today.

This is, however, only the very first step. If we now consider a market where no one can be sure that his property will not be taken from him (for example by a predatory government), there will hardly be any investment or savings because it is not rational to earn more if someone could steal it. We could expect that such an economy would be stagnating or even shrinking until a sensible degree of security of the agents about their property rights would be guaranteed. And as we know from classical economic models, investment and technology factor give the primary fuel to economic growth. Without them there can virtually be none.

In addition to this, property rights help unveil the future to some extent. All economic agents face uncertainty as to which state of world will come next. The property rights are able to clarify this uncertainty at least to the extent that the agents know with a

reasonable degree of certainty that their agreements will be enforced. This again allows them to make rational decisions about investment and savings, something they would otherwise find very difficult to determine. We can assume that this additional piece of information will help the agents allocate their savings and investment choice closer to the optimum than without it. The link between property rights enforcement and more efficient allocation of resources has been deemed significant in recent research (Claessens & Laeven 2005). The authors test the hypotheses that not only the quality of financial market in the particular country but also property rights influence the degree to which firms allocate resources in an optimal way and thus lead to growth. They find that these two factors have approximately an equal effect on the allocation of resources by the firm, thus affecting investment decisions and growth of the firm.

In the following three chapters of my bachelor thesis I will present a review of existing literature on my topic of interest. Since the property rights enter many economic processes, I will divide the research dedicated to them and their immediate connected processes for the clarity's sake in three parts: property rights in general, property rights and economic growth, property rights and the firm.

## *2.1 Property rights in general*

De Soto (2000) argues the importance of property rights on a powerful example – countries of the Third World versus the developed capitalistic countries such as the USA. He questions how it is possible that even though the newly formed free market economies follow the advice of international financial bodies, they cannot achieve growth and prosperity just like the developed countries do. The author defends the opinion that it is capital that creates wealth of nations, but in a case where the underlying deeds and ownership rights are not recorded, the poor countries are not able to reproduce this capital further: „Because the rights to these possessions are not adequately documented, these assets cannot readily be turned into capital, cannot be traded outside of narrow local circles where people know and trust each other, cannot be used as a collateral for a loan, and cannot be used as a share against an investment.“ (de Soto 2000: 6)

In his other work (de Soto 1994), the author assesses the problem on the example of Peru and other developing countries. In comparison to the US, only 10% of Peruvian land is formally recognized as belonging rightfully to somebody. The rest remains in the

informal economy, which renders the land unable to serve as a collateral and even simple transfers of property are difficult because there always remains some level of uncertainty – is the seller the rightful owner, how can the buyer effectively prevent others from entering the property? The missing titles to land property are connected with another problem – exploiting of the land by farmers in the sense of the logic „I should get the most of it while I still can“. This is due to the fact that missing titles make investment in own property more risky and therefore the planning horizon shortens noticeably.

To decide whether the „de Soto hypothesis“ is wrong or not, Lewer & Saenz (2005) test the hypothesis that economic growth and property rights protection are significantly positively correlated with the help of annual panel data for a sample of 101 countries. In their empirical research, they confirm that this hypothesis is indeed true, which they theoretically explain by mentioning Schumpeter’s endogenous technological progress model and proposing a causal relationship between the property rights protection and innovation, which can be seen as the engine of economic growth. They also find that less developed countries benefit from an increased protection of property rights more than developed ones.

## *2.2 Property rights and economic growth*

Since the marginalistic revolution in economics the property rights entered the firm and utility optimization theory, where they were taken as something that is given exogenously and needs no further examination. The first research papers that studied the link between the economic growth of a country and its institutions were primarily trying to explain the variances in the GDP growth with the help of the type of political regime that reigned in that particular country (Galenson 1959; de Schweinitz 1959; Huntington 1968; Huntington & Dominguez 1975; Rao 1984; Olson 1991). However, the results were dubious – as Przeworski and Limongi (1993: 51) put it, „eight [studies] found in favor of democracy, eight in favor of authoritarianism, and five discovered no difference“. Therefore there was a need for a different approach in the specification of the model. Many authors have since then described the link between the country’s ability to enforce agreements, its commitment to property rights as individual property and the economic growth. The research in this direction has proved to be more fruitful than the previous one, as can be seen in the work of Nobel prize Laureate Douglas North



and Robert Thomas who discovered 1973 that institutions are a necessary precondition for economic growth (North & Thomas 1973: 2). Specifically, they argue that institutions have three important qualities: they increase the mobility of capital, spread the risk and reduce the information costs. According to North, institutions constrain human interactions and decrease uncertainty in exchanges, but they also determine transaction and production costs, so that the potential gains from trade are realizable.

Based on the findings of North many other authors confirmed the link between property rights and economic growth (see for example Barro (1997), Claessens & Laeven (2005), Levine & Renelt (1992), Nee (1998), Sala-I-Martin (1997), De Soto (2000), De Soto (1990), Scully (1988)). The results vary to a certain degree due to the absence of a consensus specification of the model – as Levine & Renelt (1991: 942) put it, „over 50 variables have been found to be significantly correlated with growth in at least one regression“.

The most important work in the field of endogenous growth theories is undoubtedly the one by Robert J. Barro. In his work *Determinants of Economic Growth* (1997) he describes the path through which the economic growth of a country is affected. In the neoclassical model, he states, it is true that if all the countries were very similar (except for their starting level of capital), then the so called convergence theorem would apply – that means, that all countries would tend to a certain level of economic growth rate. By this logic, poorer countries would tend to grow faster than the richer ones. If, however, this is not the case and the countries differ in more aspects, then the convergence would be conditional only – i.e. that every country tends to its steady-state position which may be different across the countries. On the other hand, political freedoms are often considered a precondition for greater economic growth.

Svensson (1995) discusses in his paper the link between investment rate in a country and the volatility of the political regime. He argues that weak property rights protection „create[s] a wedge between the marginal product of capital and the rate of return that can be privately appropriated by investors. [...] Consequently, to explain differences in investment rate and growth, one has to explain why property rights and contracts are enforced differently across countries“ (Svensson 1995: 1318). The logic behind the channel through which the investment is affected is such that governments in volatile

regimes tend to invest little in the legal infrastructure, which results in poor property rights enforcement and moreover, in little private investment.

### *2.3 Property rights and the firm*

In order to examine the exact effect the property rights protection has on firm decisions and its growth, we must turn our attention among many other topics to the foreign direct investment and its relationship with the intellectual property rights. With respect to the goal of our research, it is clear that foreign direct investment (FDI) has been a crucial component in restructuring the firms and their making of profits.

The effect of intellectual property rights (IPR) protection on the composition of FDI is in itself quite ambiguous – too weak IPR protection will discourage foreign firms to invest at all, while too strong protection may endeavour them to take up licensing forms of sales, which are both not very advantageous outcomes for the „developing“ country. Smarzynska (2002) examines in her paper the relationship between the IPR protection and the composition of FDI in technology-intensive sectors such as cosmetics, drugs and health care products. She finds that foreign investors respond significantly positively both to IPR protection by the law and its enforcement.

The channels through which IPR and FDI influence economic growth are of many kinds: the first one being that foreign innovations may be imported so that the local entrepreneurs can benefit from them. Schneider (2005) poses in her paper the question whether the level of IPR protection has different effect in developed and developing countries and to what extent the international trade (FDI) facilitates the economic growth. She comes to an interesting conclusion, namely that IPRs have a stronger impact on domestic innovation for developed countries and their effect on innovation in developing countries may even be negative, which she attributes to the „imitative“ nature of the developing economies. This means that better protection of trademarks and patents will result in the vanishing of firms which imitate the original idea and so „free-ride“ on the innovation of others. Therefore, all improvements these firms may have done to the patent-protected good or service will all disappear, which is what could probably cause the negative impact of better IPR protection in developing countries. Another option is that the imitating firms will have to license the good they were previously selling illegally and these additional costs will prevent them from running their own innovative projects.

As we already mentioned, economic growth is also affected by the degree of property rights security. The channel through which the influence could go with is the link between financial development and the economic growth in a country, examined by Rajan & Zingales (1996). They test the long-known positive correlation between the level of finance and the country's economic growth by scrutinizing one of the rationales of such an influence: that the level of development in the financial sector lowers the costs for firms' external finance. We can assume that in the level of financial developments there are many hidden factors that drive economic growth, including property rights quality, the degree of contract enforcement, regarding the costs of getting external finance also transaction costs when dealing with the bureaucracy and so on, and therefore of importance to our research.

Johnson, McMillan and Woodruff (2002) further investigate the relationship between property rights security and reinvestment rate of profits in small, newly formed manufacturing firms in former Soviet Union countries. They seek an answer to the question if the property rights security alone (given no respect to the quality of the financial system) are both a necessary and sufficient condition for the firms to reinvest their profits. That is, if the firms will decide their investment allocation according to their perception of property rights irrespective of the quality of the financial system. The authors find that the access to external finance does not affect investment decisions that much, they are much more dependent on the insecurity of property rights and limited incentive to invest. A similar negative relationship is found between the corruption level in a country and the limitations on private investment (see Mauro, 1995).

Chong & Gradstein (2009) examine the relationship between the institutional quality of a country, firm-level characteristics and the degree to which firms comply with the law in that country (as represented by „sales off the books“). Their null hypothesis states that the differences in law compliance by the firms is independent of the level of institutions in the country and is driven by firm characteristics only. Based on their probit model which uses a sample of several hundred countries and thousands of firms, they reject this hypothesis and find that the informality is driven mainly by the institutional quality, although firm characteristics and GDP growth do play a role as well.

A similar relationship has been found in the work of Doidge et al. (2007), who discovered that country characteristics are one of the significant factors (apart from firm-level characteristics) that influence corporate governance of a firm and therefore also the firm's access to finance and its growth. Countries' specifics affect the circumstances under which the firms may take up credit and also help determine the costs of employing effective governance and so are one of the driving forces behind the firms' doing.

The institutional quality and law tradition is apparently linked also to the indebtedness and investment choices of the firms. As shown by Demirgüç-Kunt & Maksimovic (1998), legal systems that are perceived to be effective allow firms to take up more long-term debt, whereas developing legal systems influence the firm's investment choice such that the investor only accepts short-term debt. This follows from the fact that long-term debt in developing countries makes it easier for the firms to expropriate the outside investor.

The last research paper we are going to describe is closely connected to our own research hypotheses. Du et al. (2012) show on a sample of Chinese manufacturing firms that apart from asset specificity and contractual incompleteness, the institutions are a major factor in firms' decision to integrate vertically – so as to avoid excessive transaction costs, the firms merge with their suppliers. This result documents the existence of large, integrated firms in countries with poor institutions such as India and China.

### **3. The theoretical framework**

This paper aims to study the direct effect of property rights protection on firms in countries from the Central and Eastern Europe and Asia. While the positive effect of institutions on the functioning of economies has been examined extensively both in developed and least developed countries, in this study we are interested in the comparison with countries that are neither developed nor least developed but only developing. The research has shown that sometimes the influence of institutions can differ significantly between developed and least developed countries - in Schneider's (2005) study, better institutions have a negative effect on innovation in least developed countries, while in the developed countries this influence is positive. Similarly, there is

apparently a difference between these two types of countries in the matter of economic growth, as tested by Lewer & Saenz (2005). The authors conclude that the positive effect of institutions is greater in least developed countries.

Based on the evidence above, we propose our own hypothesis concerning property rights protection and countries between „developedness“ and „emergence“. To estimate the exact effect the institutions have on firms in general, we have devised several models which estimate the impact of the institutional environment on several firm characteristics. These were picked purposely so that they would express very different firm qualities and so would allow us to draw the most general conclusion from the results as possible. Partly, we draw our choice from the selection of Doidge et al. (2007) who studied the influence of country and firm characteristics on corporate governance. Out of the five firm characteristics they use, we have chosen three which we found most important for describing firms in connection with economic theory and which were also expected to be observable in various data. While Doidge’s definitions of these three characteristics are not identical to ours, we find it appropriate to give the authors credit for the inspiration. To be concrete, we employ sales growth (our version: marginal product), the capital-labor ratio and ownership characteristics from their study. Other variables we designed in connection with general economic theory and notions about what is important in business. In line with this concept which is largely based on common knowledge, we chose four another characteristics which we aim to examine: investment, investment in research and development, age of the firm and the number of employees it has. The following chapters will concisely sum up the economical knowledge about these economic characteristics of firms, together with a final review of the expected influence of institutions on them.

### *3.1 Innovation and its connection to R&D*

The first firm characteristic we are going to examine with respect to institutions is the firm innovation. Recent studies have shown that the institutional environment of a country has a significant effect on economic growth of the country and generally influences also the financial market and the well-being of the people who live there. The underlying theory of endogenous growth (Barro 1997) states that all countries tend to their steady economic state, which may vary significantly across the different states. However, such a concept will only be valid as long as we assume that there exists no

hidden factor affecting the economic growth and is affected by it, either. In the neoclassical growth model, economic growth is presumed to be related only to technological progress, which is by its nature supposedly exogenous. But is this assumption valid? This question will be central to the research goal of this paper which aims to show that the smallest microeconomic units – firms – are significantly affected by the level of property rights protection and generally by the institutional environment quality in the particular country. And since the firms are the essential origin of technological progress, proving our hypothesis could significantly change some expectations about economic growth and its determinants.

Economic growth in itself is something many people talk about – politicians and economists are those concerned with it the most. The reason for this is simple: Greater economic growth raises the politicians' chances for re-election but at the same time it is rather unpredictable. This is the reason why sometimes growth is considered something similar to a mythical creature – it just comes and goes according to its unfathomable purpose. However, in this paper we aim to show that economic growth is not just some abstract concept but rather a very concrete measure which is closely connected to firms' prosperity. If we think closely about technological progress as the drive behind economic growth, on the microeconomic level we must immediately realize that the assumption of exogeneity is one which cannot be sustained. Technological progress, i.e. the invention of new methods, is the result of the firms' operating and labor work. An invention is not cast upon the humanity by gods but is rather invented at high cost in the firms. Thus, if firms' propensity to function properly, and in the most advanced stage, to invest in new technologies, can be somehow influenced (that is, if we assume that firms' decisions are not exogenous with respect to the general conditions of business), it would ultimately mean that economic growth is also influenced by this „hidden“ factor in a similar way as the firms' decisions.

This hidden factor are, among many others, the property rights. Transparent, transferable and enforceable property rights are a precondition for any business success. If the government, for example, acts as a „grabbing hand“, taking away firms' intangible assets, what is the incentive for such a firm to invest in new technologies the next time? It is straightforward that under such conditions firms will tend to invest very little so as to avoid the high cost of possible expropriation of their property rights. It would therefore make sense for us to expect a negative influence of bad institutions on

firm innovation, assuming the firms will undertake nothing to avoid them in another way, the possibility of which is described in the next paragraph.

Since less secure property rights mean greater transaction costs for firms, other areas of firms' decisions will be affected, too. By transaction costs we mean for example administrative barriers to free trade, unofficial payments or bribes to the country's bureaucracy officers. These additional payments influence the cost of undertaking a business and are particularly harmful for smaller firms which cannot afford to cover all these restricting conditions. We therefore expect that generally, in countries with less property rights protection and/or more corruption firms will tend to be bigger, if they exist at all (Du et al. 2012). The reason for it is the bureaucracy costs minimization and greater effectivity than in smaller firms.

There is, however, an ongoing debate (Schumpeter 1909; 1942; The Economist 2011) on whether bigger firms create more innovation or the smaller ones. Since family firms and small entrepreneurs are favoured by many governments today, it would seem that more hopes are given into small, creative and non-rigid firms. This is in accordance with Schumpeter's (1909) earlier views which state that smaller firms are the origin of business innovation because bigger concerns are non-flexible and rigid due to complex inner processes of decision. Even though he changed the sides of the argument in 1942 – in his book *Capitalism, Socialism and Democracy* he argues that bigger firms are leaders of innovation – both sides' arguments are still valid. The pros of big firms are above all that they have the talent – fresh talented graduates are not likely to risk their chances in a small business, they would most likely to join an existing, established company in order to make profit respective of their abilities. The Economist from December the 17th, 2011 argues that neither big firms nor small ones are the key to success but rather high-growth companies and illustrates this on the example of Facebook. The magazine also offers a view that bigger firms may create more „evolutionary“ innovation but not so much „revolutionary“ innovation – smaller firms are apparently better at this „disruptive kind“ of innovation.

In our countries of interest we are, however, confronted with no regular firms. These East-European and Asian firms have a mean „age“ of 32 years in our dataset which means that they have been mostly founded about ten or twenty years before the fall of Soviet regime. As we know, firms under the Soviet reign had to be defined by law in

order to make them exist at all – the profits went all into the state budget. We cannot therefore expect these firms to have the same structure or similar innovation skill as firms in developed parts of the world, especially given that some of the post-Soviet states still do not protect property rights in a satisfactory way. The wide disparity in the numbers of small and big entrepreneurships corresponds with The Economist's observation about the size of firms worldwide nowadays: apparently, there is a general tendency towards smaller entrepreneurship, probably partly powered by states' endorsement of often worshipped „family firms“. However, such form of business will never be more effective than doing business on a large scale – economies of scale will prevent small firms from lowering marginal costs in the same way as great businesses do. Therefore our sample of firms shows that business in our countries of choice is far from effective, even though we do not know whether the degree of innovation is higher in small or large firms.

### *3.2 Firm performance*

In our discussion about innovation and property rights protection we have stressed the importance of firm research activity for economic growth. It makes also sense, however, to examine the effect of property rights protection, justice or injustice on firms as such in all its complexity. Innovation is just one element of firm activity and as such it is not sufficient for assessing the complex effect the institutions have on firms. In this bachelor thesis we will try to explain various firm characteristics with the help of institutional variables in order to be able to determine which firm qualities are affected by property rights protection and which not quite as much.

One of the firm characteristics we are going to examine is, how well the firm is doing, or in economic terms its performance measure. As there is no precise definition of how to compute performance measure and standard financial performance assessment is not available to us due to missing detailed data, we were forced to develop our own. The simplest measure of the firm's doing is, of course, its profit. Even though this variable may not be comparable across the sample, it provides a good insight into the goodness of firm decision making (among many other facts that influence the profit). Unfortunately we have not been able to use it due the unavailability of such data in this matter and had to resort to other means of estimating firm performance which will be explained in direct connection to the data we use.



While Johnson, MacMillan & Woodruff (2002) suggest a significant positive correlation between reinvestment of profits and property rights protection, the relationship between firm performance and property rights security remains unclear. If we follow the lines of Coase (1960), better protection of property rights lowers transaction costs of producers, we can therefore expect that property rights would also positively influence for example the time necessary for managers to cope with administrative barriers or losses due to spoiled goods (because of the amount of time required to clear the customs). These are, however, just small parts of the sales variable and we cannot therefore estimate the effect of property rights protection on regular workers' marginal product just by using economic theory. To overcome the ambiguity of the economic theory, we need to use econometric methods which we conduct in the last part of this thesis.

### *3.3 Capital of the firm*

The next firm characteristic we are interested in is the capital. Capital was once seen as the main quality that either makes firms profitable or not, while labour was not paid so much attention to. Nowadays the situation is exactly the opposite due to the influence of modern human resources management, and employees are seen as the greatest asset to the operations of the firm. It is nevertheless clear that without capital the output will be zero no matter how good the employees are. Thus the firm profit optimization follows both over capital and labour as a whole. If we now imagine that we know the production function of a particular firm but face such restrictions that the resulting combination of labour and capital is suboptimal, it will mean potential loss of profit for the firm. In other words, our further research question is: Can the property rights influence the optimization problem of a firm and is this possible influence observable in the amount of capital the firm possesses?

Before we conduct the actual econometric research, we must ask ourselves what kind of effect the property rights could have on capital. As already mentioned above, Claessens & Laeven (2003) find that country characteristics together with the institutional quality of a country influence the efficient allocation of resources in any firm, so that investment and savings of the firm are affected. We may use their findings in our own prediction in which we extend the possible sphere of influence of the institutions also to

the allocation of assets and the general amount of assets the firm has. For simplicity, we will from now on assume that capital is for our purpose equal to the assets of a firm.

There are, from our point of view, two channels through which assets of a firm could be affected by institutional quality, where the second is more or less the logical outcome of the first. If we consider a regular firm with a mean size and contributed capital, the institutional quality will make a difference with respect to different government regulations, administrative barriers to trade and corruption – all these procedures will be costlier if there is low property rights protection present. Thus, the first part of the direct effect will be on cash and receivables- we expect an increasing tendency in corruption and contract enforcement costs, thus lowering in the overall assets. Another part of the assets, fixed assets such as buildings and machinery, could be affected too, from a reason mentioned above (the findings of Claessens & Laeven, 2003) due to lower investment. Here we see another decreasing tendency in the assets. There is, however, a countervailing channel through which the assets could be affected. Since enforcement of property rights is costly in our imagined environment, it would be reasonable for the firm to integrate some activities (which allow integration) into one entrepreneurship. This means that potentially, lower protection of property rights could have positive influence on the size of the firm as bigger players on the market have better bargaining conditions than smaller ones. From this is clear that a bigger integrated firm would probably have more assets than a small one, thus the overall expectation about the influence on firm assets is ambiguous.

### *3.4 General investment/Capital expenditures*

Apart from investment in research and development, we may examine the firms' propensity to invest in the expansion of their operations – such as in new buildings, machinery and land. This next variable of our interest is often measured together with R&D as in Johnson, McMillan & Woodruff (2002) who study the influence of property rights security on the reinvestment of profits. However, as we have no data on profits, we are forced to split this variable in two – R&D and a binary variable *invest* which states whether the firm invested into land, machinery or buildings in last fiscal year or not. The disadvantages of our models are clear – they differ only between „yes“ and „no“, there are no differenced responses. However, even these simple models are

enough to determine whether the property rights have any influence on investment or not, a more detailed analysis will then be left to researchers with more data on firms.

The main determinants of firm investment are, according to the standard economic theory, the profit the firm makes, or in our case, the amount of goods it sells, i.e. sales. We are aware of the fact that sales alone are unfit for measuring firm performance due to different industry qualities and also due to the fact that there are still costs included in them. Therefore we use sales per worker, the variable which we created as a proxy for firm performance in our dataset (see section 2.2). Apart from these determinants research has shown that institutional variables influence investment in a particularly significant way (see Johnson, McMillan & Woodruff 2002), rendering them an important part of economic analysis. Svensson (1995) postulates that low property rights protection makes the capital returns curve discontinuous, thus influencing the way investors appropriate their returns from capital. Including institutional variables in the regression thus seems particularly reasonable.

The channels through which the investment is affected by these variables are rather straightforward and similar to those we have already described in the previous chapters. We assume positive correlation between sales per worker and investment into operations – this follows from standard profit optimization, where the marginal product of capital must equal the marginal product of labour. If the MPL (here: sales per worker) increases, MPK has to increase as well and this can be done by purchasing more land, equipment or buildings (as represented by investment). The institutional variables are expected to be positively correlated with investment for reasons already mentioned above, though an opposite effect is not out of question either. This means that the firm may pursue a strategy of being a „big player“ on the market, thus reaching a more advantageous negotiating position with respect to corruption and the quality of justice. In this sense it is also possible that firms in environments with low property rights protection will tend to invest more so as to get bigger.

### *3.5 Ownership*

One of the last aspects of firm operating we will discuss here is the degree of government ownership of the firm. Why having state officials co-govern or govern the

business fully is almost never the best solution is quite logical – the nature of a collective body and its mostly indirect mandate from the voters does not allow it to make efficient decisions due to the lack of responsibility should any problem arise. The ineffectivity of state has largely been described by libertarian economists – e.g. Rothbard's *Man, Economy and State* (1962) thematized the matter extensively. We will be concerned with the consequences of state ownership in the firm governance, therefore we assume that the state as a owner does actually participate in the decision-making process of the production.

While public ownership may have appealed to the general public in the post-war period due to observed market failures such as monopolies and externalities, recent empirical evidence suggests that private ownership is better for corporate governance. (Shirley & Walsh 2000) The only case where state ownership may be more efficient than private business are the mentioned monopolies where there is insufficient competition to ensure optimal pricing mechanisms.

In our study, we will assume that the firms we are going to study are not in a dominant position on the market, thus we expect an unequivocally negative effect of state ownership on corporate governance. The connection between institutions and state ownership is, however, not quite as clear. Knutsen et al. (2011) find that state-owned enterprises in countries with poor rule of law and high corruption level tend to invest more than private ones. The authors come to the conclusion that the FDI of such firms is unaffected by higher investment risk, thus investing more than would be optimal for private firms. The relationship between institutions and state ownership, however, has not been examined to our knowledge. Common knowledge suggests that a higher institutional quality is connected with less state ownership but the relationship is rather indirect – countries which improve their institutions for whatever reasons usually privatize state-owned enterprises so as to be more effective. This is only a hypothesis and will be left to be tested in the empirical part of this study.

### *3.6 Age of the firm*

The age of the firm presents the next firm characteristic we are going to discuss here. It is directly connected to the entrepreneurial success, which is always a mix of ability, knowledge and capital, and to a certain extent, also luck. It may not be quite so hard to run a firm in times when the economy is growing, but overcoming the bad times as well

is an accomplishment that only the economically sound and the very best firms can reach. Older firms can build on their tradition, creating a pool of loyal customers by the indirect message their age means: „We have managed to stay on the market longer than the others.“ While the age itself must not necessarily mean higher quality of the produced goods or services, there must be a certain persistence present that allowed the firm to operate for such a long time.

At this point, we would like to introduce the possible effect institutions could have on firm age. With better property rights protection, transaction costs of operating a firm are lower which points into the direction of positive correlation between the institutions and firm age. Desai et al. (2003: 2) confirm our opinion: „Greater fairness appears to reduce firm size but increase vintage,<sup>1</sup> suggesting that fairness both makes it easier to start firms, but also makes it easier for firms to graduate into older, *larger* firms.“ We will thus expect that firms in countries with better institutional environments live to a greater age than in lesser developed countries.

### *3.7 Employees*

The number of employees the firm has is an alternative measure of its size. While it may be true that even a small firm can experience big volumes of sales, bigger firms are traditionally associated with more production and generally, with bigger output. The question that the entrepreneur faces, is how many people he should employ. Too few may not be effective with respect to the amount of capital they have on their hands but too many can create inefficiencies as well. This may be illustrated on the example that firms in countries with lesser-developed property rights protection may be inclined to hire more people than would be optimal with respect to their production so as to avoid higher transaction costs that are connected with the enforcement of contracts with external firms. We may imagine this as a case where an industrial firm hires a person or a whole department to deal with law affairs instead of signing a contract with an external barristor. Similarly, it is not out of question that the firm may merge with some of her suppliers to decrease the transaction costs.

Although surprising at the first glance, the negative effect of greater property rights protection on firms' size is not unheard of and has been described before. Desai et al.

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<sup>1</sup> Vintage is defined in this paper as size-weighted measure of age.

(2003: 2) study the institutions' influence on the firms size and come to the conclusion that better institutions raise entry rates, decrease exit rates and lower the average firm size. This is in line with our hypothesis mentioned above and up to a certain level of property rights protection, we may thus expect a negative correlation of the institutions with the number of employees the firm has. On the other hand, in the purely economical sense, better institutions may present the firm with a chance to expand its operations, which may increase the number of employees it has. The overall conclusion is therefore ambiguous and we must resort to empirics to discover the overruling influence.

**Table 1: Summary of institutional influences**

<b>Firm characteristic</b>	<b>Expected influence</b>	<b>Other studies' expected influence</b>
<b>R&amp;D</b>	+/?	
<b>Firm performance</b>	?	+ <sup>2</sup>
<b>Capital-labor ratio</b>	+ / -	+ <sup>3</sup> / <sup>-4</sup>
<b>Capital expenditure</b>	+ / -	+ <sup>5</sup>
<b>Ownership</b>	-	
<b>Age</b>	+	+ <sup>6</sup>
<b>Employees</b>	+ / -	+ <sup>7</sup> / <sup>-8</sup>

## 4. The Empirical Model

This bachelor thesis has been created with the idea of examining the direct effect of property rights security on firms' general performance, their governance and different firm characteristics in countries of former Soviet block. Until now this influence has largely remained unknown due to missing detailed data on firm-level indicators in these countries, whereas in developed countries there have been at least some available firm-level data (e.g. Doidge et al. (2007) draws from such data), which makes it possible for us to compare the results from previous studies in developed countries with our own

<sup>2</sup> Johnson, MacMillan & Woodruff (2002), Coase (1960)

<sup>3</sup> Claessens & Laeven (2003)

<sup>4</sup> Du et al. (2012)

<sup>5</sup> Johnson, MacMillan & Woodruff (2002)

<sup>6</sup> Desai et al. (2003)

<sup>7</sup> Du et al. (2012)

<sup>8</sup> Desai et al. (2003)

empirical results. In our model, we will be estimating the effect of country-level characteristics and different proxies for the property rights protection on various firm-level characteristics such as firm age, sales growth, firm size (as measured by the number of employees) and others. Our aim is to show that the differences in these individual firm characteristics are not just randomly given but rather driven by both country characteristics and property rights protection. From our results we should be able to tell what concrete effect the property rights security has on the smallest production units in the economy – the firms.

#### *4.1 Data description*

The starting point of this research is of course the choice of dataset. Luckily, we find ourselves at hand with a very useful survey conducted jointly by the World Bank and the European Bank for Reconstruction and Development – Business Environment and Enterprise Performance Survey (BEEPS), results of which are available for downloading in the Internet.<sup>9</sup> This survey was conducted in 3 reference years for all countries of interest (2002, 2005, 2008/9), for some countries the year 2007 is also included. The span of countries in which the firms were interviewed is as following: Albania, Armenia, Azerbaijan, Belarus, Bosnia, Bulgaria, Croatia, Czech Republic, Estonia, Former Yugoslav Republic of Macedonia, Georgia, Hungary, Kazakhstan, Kyrgyz, Latvia, Lithuania, Moldova, Montenegro, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Tajikistan, Turkey, Ukraine, Uzbekistan. In these countries, individual enterprises were chosen for interview and this fixed sample was interviewed in three (or four) reference years mentioned above. Unfortunately, most of the firms could not be interviewed in all of these years and we also do not have responses for all questions in the survey, so we are left with a strongly unbalanced dataset.

While the BEEPS dataset contains many pieces of useful information concerning the relationships between the firms and the state (e.g. the number of days it took the goods to clear the customs, do you perceive the legal system to be quick and fair), in our empirical model we find it suitable to enrich it also with variables and values from other datasets which concentrate on macroeconomic indicators and indices of property rights. These include Penn World Table Version 7 (Heston et al. 2011) which is used as the

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<sup>9</sup> <http://www.ebrd.com/pages/research/analysis/surveys/beeps.shtml>

source for country GDP per capita and the World Bank's Worldwide Governance Indicators (2011).

### 4.1.1 The explained variables

In order to extract plausible results from our unbalanced dataset, we have decided to design several models rather than mere one. In this chapter we shall describe the explained variables that represent various firm characteristics, their character and, most importantly, their definition in the data.

The first explained variable of interest is the *marginal product*. Originally, we intended to examine the profits of the firms so as to measure their varying effectivity, but seeing as no firm provided an answer to the survey question about their profit, this option was no possibility for us. An alternative, though not as good at measuring the performance of firms due to different industries the firms engage in, were the sales.<sup>10</sup> We can afford to use this measure because our dataset only comprises production firms – no banks or financial institutions which would create outliers as their sales are irrepresentative of their activity. In order to make the performance measure more reliable we divide it by the number of employees of the firm to obtain a rough estimate of the marginal product of one worker which corresponds with the level of technology the firm uses.

The next response variable to be described is the capital-labor ratio. Seeing as we again lack detailed accounting data on the firms, we defined this variable as assets per worker, where the variable assets includes the net book value of equipment and machinery vehicles and net book value of buildings and land in last fiscal year. From this is clear that we miss important parts of assets such as cash, bank accounts and intangible assets, but this more detailed survey must be left open for future studies. In construing the final response variable, we proceed as follows: divide assets<sup>11</sup> by the number of employees and take natural log of the result.

We attach the corresponding BEEPS survey questions in the appendix of this thesis.

Another model we estimate shows the influence of institutional variables, log of GDP per capita and firm-specific variables on the propensity of the firms to invest. While it may have been more fruitful to examine the direct effect on the amount of investment

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<sup>10</sup> In the original dataset represented by variable d2.

<sup>11</sup> In the original dataset construed as  $n6a + n6b$ .



the firms made, again missing data has prevented us from doing so. Thus we defined the the binary variable *invest* as follows:  $invest = |2 - g7|$ , in which form it only assumes values 0 and 1. Again, the variable from BEEPS we used does not fully satisfy the definition of investment – it only covers acquiring of new land or buildings to expand operations. Other types of investment (including financial investment) have therefore been left aside.

In the BEEPS dataset innovation is represented by the variable *ecao4* which measures the amount invested into research and development in last fiscal year. Unfortunately we cannot use it for regression due to very limited number of observations and we are left with a much rougher variable *ecao3* - a binary variable which states whether the firm invested in R&D in last fiscal year or not. It will therefore require more detailed surveys in order to assess the effect of property rights protection on firm R&D investment properly. The variable *rnd\_invest* we use in the regression is again defined as  $rnd_{invest} = |2 - ecao3|$ .

The next response variable *employees* measures the number of official full-time employees the firm employs. It is an alternative means of observing the size of the firm. While we could have used an existing variable *size* from the dataset, this one allows us to differentiate more subtly – the variable *size* only has 3 values, whereas the number of employees is specific for each firm in the sample.

Another interesting response variable is the percentage to which the firm is owned by the state. This is in our view something worth studying due to ineffectiveness arising from government entrepreneurship in areas that should remain private. We use an existing variable *b2c* from the dataset whose values range from 0 to 100%, the mean value being roughly 6.4% with a standard deviation of  $\pm 23\%$ . We can see that in our firms, the process of privatization has largely been completed.

The last response variable we use is the age of the firm. While it is not common to employ this measure in regressions, we feel that the special conditions of the Soviet regime under which some of the firms have been founded may have influenced them in such a way that is not found elsewhere in the world. Whether this influence was positive or negative will be estimated with the help of institutions and firm-specific variables. The definition of *age* follows:  $age = \text{year in which the survey was taken} - \text{foundation}$

date.<sup>12</sup> With this last model, our research into the influence on firm characteristics is finished.

#### **4.1.2 Description of other datasets used**

If we look at World Bank's Worldwide governance Indicators, our countries of interest range from 5th percentil to the 81st percentil in corruption control worldwide, in the area of government effectiveness we are confronted with a range between the 7th percentil to the 85th percentil, and concerning the rule of law, they range from 4th to 86th percentil. We can see that our sample of countries is very heterogeneous with respect to property rights protection, under which we can assume corruption control and government effectiveness belong. The WG Indicators comprises three more institutional variables, political stability, regulatory quality and voice and accountability. The overall sample takes more than 200 countries into account, starting from year 1996 up till today.

The dataset has been created from numerous other surveys that measure governance, from state but also non-governmental sources. The results of these surveys have then been rescaled and integrated into the overall score which ranges between -2.50 (the worst score possible) and 2.50 (the best score possible). The voice and accountability variable measures the freedom of speech, independency of the media and the degree to which the public are able to choose their representatives democratically. The political stability and absence of violence is defined in the dataset as the perceived probability that the government will be overthrown by some undemocratic means or by terrorists. Government effectiveness, on the other hand, is defined as the perceived quality of the public goods offered by the government. The regulatory quality variable measures the government's ability to create sound laws and regulations that allow the private sector to thrive. The corruption control variable is construed as a measure of how much the public power is influenced by private interests of the state officials and the extent to which a „capture“ of the state by elits occurs. Another institutional variable closely related to our research, rule of law, measures the general abidance by the law, the preserving of order by the police, the property rights and the possibility of contract enforcement.

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<sup>12</sup> b5 in the original dataset

The dataset even provides measurement errors that can be taken into account when needed. A more serious problem is, in our view, that the individual variables are strongly correlated with one another, the correlation coefficient reaching as much as 90%.

The last variable we added from a different data source is tertiary education. Published as well by the World Bank, it measures the number of people who visit a university or college in 100 000 inhabitants across the countries. We added it as an identification test so as to capture the possible effect of „country advancedness“ and to show that the institutional variables are significant for our firm characteristics regardless and do not merely capture the country developedness. We do not assume any relationship between this variable and our studied firm characteristics.

## *4.2 The setup of the model*

Our empirical research is composed of several models in the general form:

1. *firm characteristic* =  $\alpha$   
+  $\beta$  *exogenous variables* +  $\gamma$  *WGI* +  $\delta$  *time dummies* +  $u_{it}$ ,
2. *firm characteristic* =  $\alpha$  +  $\beta$  *exogenous variables* +  $\gamma$  *subjective index* +  
 $\delta$  *time dummies* +  $u_{it}$

where the second model type is estimated in two ways. There will thus be three types of results reported. We assume  $u_{it} \sim N(0, \sigma^2)$ .

### **4.2.1 Methods used**

In the process of finding a correct specification of the linear model, we have come across a few difficulties which we shall describe here. The first was dealing with heteroskedasticity which arose in connection with some variables used, therefore we employed robust standard errors to get rid of it. The second, more serious problem was the fact that due to the nature of the BEEPS dataset, the individual observations represent the answers of one firm to the survey but objective indices used (WGI) are only country-specific and thus for one year and one country, all the observations in them were the same which generated a non-random sample. To deal with this problem, we have tried estimating the models by clusters of the countries to obtain independent

observations of the objective indices. We have used clustering in the second type of model as well as it can be argued about whether the individual perceptions of firms are independent- they are likely to be correlated somewhat but the problem is not as severe as in the first type of model.

The third problem we have accosted was again related to the nature of our data with respect to it being formally a panel data type. Normally we would be forced to use panel data methods because the sample is non-random and observations are dependent on data from previous periods but due to the very limited number of reference years (a maximum of 4 time dimensions for one firm), the time effect was so small that we have decided to ignore it. When compared, the results from regression which we estimated by panel-data methods and by regular OLS (or in two cases, probit method) were almost identical, thus the error we have caused by using cross-section estimators is negligible. To deal with time trends, we have added time dummies to the regression so as to be sure that no time effect affects the results.

The last problem we have come across was the substantial correlation between the individual WGI components. The authors of the data explicitly say that the individual parts do have something in common because essentially, they measure very similar phenomena concerning the protection of property rights. In our regression, this fact influenced the results of the regression substantially, the WGI components „stole“ each other significance and the estimated effect on firm characteristics was often contradictory. Therefore we employed the principal components method on them and used two principal components variables which have zero correlation between them as general representative variables in our regression.

#### **4.2.2 Description of the models**

This section describes the variables used in our seven models and lists briefly the reasons for including them. We only describe the first type of models because the second type includes the same variables and is only estimated in a different way, while in the third type of models we use WGI principal components instead of firms' subjective indices, otherwise the models are the same as well. Tertiary education variable is used in all of the models and serves as a benchmark for the developedness of the countries, therefore we shall not further discuss its use in the following paragraphs.

### *Marginal product*

Marginal product represents the response variable in our first empirical model. Among institutional variables we include only subjective indices of institutional quality which are the same for all models of the first and second type: the firms evaluate the extent to which is the access to external finance an obstacle, how often they make informal payments or gifts in negotiations with the state and how much are the courts obstacle to their business. The last variable which is also included in the subjective indices section but stands aside due to its nature which is not completely institutional – the percent to which is the firm owned by the state. The logic behind the model with marginal product is such that subjective indices mark the certainty involved in firms' expectations about property rights security when challenged at the court and also the costs required to reach a just sentence. We can hypothesize about the institutional effect on marginal product due to its connection to capital-labor ratio (defined as assets divided by the number of workers) and also because of lower transaction costs connected to the production that may allow the management of the firms to spend less time with paperwork and make the production more effective, thus increasing the marginal product of workers. Our expectations are in line with the findings of Johnson, MacMillan & Woodruff (2002) who measure firm performance in a similar way, and generally, with the transaction costs approach advocated by Coase (1960). In this model we use log of GDP per capita and the fact whether the firm has a high-speed, broadband Internet connection on its premises as right-hand side variables as well, we assume a positive relationship between them and the marginal product due to their connection to the business cycle phase and in the case of the second variable, we include it because we think it a kind of proxy for modernity.

### *Capital-labor ratio*

The second model is built up very similarly, the response variable measures the capital-labor ratio which expresses the magnitude of capital available to one worker. Again, we use the four institutional subjective indices (obstacle in the access to external finance, the percentage of state ownership, the frequency. of informal payments the firms make and obstacles to the operations due to corruption) as well as log of GDP per capita because of its direct influence on firms' operations and the binary variable loan to include the effect of borrowing on capital. We expect that the institutions could have

either a positive or a negative influence on the capital-labor ratio. Either the firms in worse institutional environments will integrate more activities and become bigger – this could mean that this bigger firm would have more capital and thus the capital-labor ratio would increase. On the other hand, the simplest way through which this response variable could be affected would be the costlier enforcement of contracts with worse institutions, which could negatively influence investment and thus the overall assets (see Claessens & Laeven 2003).

### *Capital expenditures*

In the third model, we expect a positive institutional influence on the firm investment – that is, the better the property rights protection, the higher the firm investment (as in Johnson, MacMillan & Woodruff 2002) - as well as the possibility of negative institutional influence due to the mentioned effect of merging smaller businesses together so as to minimize transaction costs. This would mean that worse institutions would provide the firms with an incentive to integrate more activities together and so to be more effective. In addition to this, we estimate the effect of log GDP per capita, having a line of credit from the bank and the fact whether the firm invested in research and development on the firms' propensity to invest into expanding operations. GDP per capita is important because it raises the sales, generally, if the firm is successful, while external financing (loan) is sometimes the precondition for any investment and so measures the relationship between taking up credit and investing it afterwards. Investment in research and development is closely related to other investment, thus we included it to find out whether the relationship is negative (that is, if the firm invested in R&D, it cannot afford to invest elsewhere) or positive – the firm invests rather in both.

### *Research and development*

In the fourth model, we expect the institutional influence could be again positive due to the undoubtedly promoting effect of better property rights protection on inventions, if we consider the opposite effect when firms merge together, the influence is uncertain – we do not know whether bigger firms invest more or less than smaller ones. This model measures also the influence of GDP per capita, loan and the size of the firm and of institutional indices on its propensity to invest in R&D. Again, we assume that taking up credit is closely related to inventions and we want to test whether bigger firms are more likely to invest into innovation than smaller ones.

### *Employees*

In the fifth model we want to find out how the institutional indices, the GDP per capita, loan, age of the firm and total labor costs influence the number of employees the firm has, or alternatively, its size. This model aims to show how institutional variables together with firm-costs indicators, the way of financing and other firm characteristics determine the optimal amount of labor for the production. It has been shown that firms tend to get bigger in worse institutional environments (see Desai et al. 2003) and so we expect a negative institutional influence on the number of employees. This may be caused for example by the fact that with better institutions, possibly less paperwork and government regulations need to be overcome, therefore there is no need for these „excessive“ employees, or alternatively, small business does not thrive in countries with bad institutions.

### *State ownership*

The sixth model with the response variable state ownership examines the way in which the institutional indices, GDP per capita, size and age of the firm determine the percentage to which it is public-owned. Although there exists to our knowledge no literature that would describe the relationship between institutions and state-governance in firms, we expect that generally, firms in countries with lesser institutional quality will tend to be more public-owned than those in countries with better property rights protection. We expect GDP to be important for state ownership of the firm because a generally observable declining tendency in the public ownership in developing countries, while size is expected to be positively correlated with state ownership due to the upward tendency of privatization – the only state enterprises left in our countries of

interest should be the bigger ones in key industrial sectors. Age is used from historical reasons – an older firm is likely to have been founded in the Soviet era in some of the countries, thus the level of public ownership is expected to be higher than in those countries from the BEEPS dataset that did not experience communism.

#### *Age of the firm*

The last model we estimate assumes a relationship between the age of the firm, institutional variables and several firm indicators which we shall describe here. In accordance with Desai et al. (2003), we assume a positive relationship between the property rights protection and firm age due to reduced entry costs and general better conditions for business. Again, we use log GDP per capita in connection with the developedness of the country and the likelihood that the firm will be forced to leave the market from financial reasons, second, we employ firm age to possibly show that bigger firms are more likely to survive longer on the market (as in the notion of „older and larger firms“, Desai et al. 2003: 2), third, we use marginal product and investment measure because we expect that more effective firms and those who expand operations grow older than ineffective and rigid ones.

### *4.3 The results*

In this section we shall present the results of the regressions described above. First we report the results of the WGI principal components model (see page 28) estimated with clustering by the country, next we report the subjective indices models estimated first with heteroskedasticity-robust standard errors, and then we present the results of the same model clustered with respect to the country. In the appendix we report the WGI principal components model estimated with heteroskedasticity-robust standard errors just for the information of the reader. We believe the latest specification is not correct and so we only mention it aside from the core research.



### **4.3.1 Interpretation – Marginal product**

In the WGI model, the influence of institutional factors is different in the two corresponding principal components variables. The principal components from the Worldwide Governance Indicators have contradictory signs, thus the concrete influence would be obtained by employing the average values of the index variables and summing up the both principal components' effect. The statistical influence of institutions is not directly observable partly because there is too little variance in the institutional variables and we have to look at the subjective indices models to find out more concrete results.

The influence of the subjective institutional variables is much more interesting. From the subjective indices model it is clear that the bigger the obstacle the access to external finance is, the lower the marginal product. This makes sense because with limited access to bank credit, firms are less likely to introduce new products or expand operations, thus it is hard to imagine that their sales will grow under such conditions. When clustered, the influence of this variable lost all significance perhaps due to bigger standard errors and insufficient variance of the institutional variables. Alternatively, there might not be this influence present in the data. The same goes for the other three institutional variables in this model.

Both the influence of the frequency of informal payments and of the obstacle to the operations the courts mean is significantly positive in the first model type. This goes in line with our theoretical argument that firms in countries with weaker institutional environment may integrate more activities into them so as to minimize the transaction costs. Concretely, this means that generally, the marginal product in countries with worse institutions will tend to be higher than in those where the firms optimize their size without these institutional restrictions. State ownership reflects on marginal product negatively, as expected. Due to ineffectivities in the firm's management, sales in public-owned firms are generally lower. Alternatively, the number of employees in these firms may be higher and the sales the same, which is confirmed by the effect of state ownership in model (5) which we will discuss later in detail. The subjective models' results suggest that indeed, a higher GDP per capita affects the marginal product of the workers significantly positively. In all three model types, this relationship has been

**Table 2: WGI model estimated by clustering with respect to the country**

	(1) Marginal product	(2) Capital-labor ratio	(3) Investment	(4) R&D	(5) Employees	(6) State ownership	(7) Age
<b>Principal component 1</b>	-6.63e+08 (7.70e+08)	-2.51e-01 (2.29e-01)	4.25e-02 <sup>^^</sup> (2.68e-02)	-2.06e-02 (2.92e-02)	-1.12e+01 <sup>***</sup> (2.73e+00)	-1.37e-01 (2.55e-01)	-3.10e-01 (5.71e-01)
<b>Principal component 2</b>	5.62e+07 (1.07e+09)	4.54e-01 (3.70e-01)	3.45e-02 (4.84e-02)	-2.24e-01 <sup>***</sup> (6.35e-02)	-4.02e+01 <sup>***</sup> (1.04e+01)	1.15e+00 <sup>^</sup> (8.09e-01)	3.15e+00 <sup>^^</sup> (1.93e+00)
<b>log(GDP per capita)</b>	3.07e+09 (3.41e+09)	6.67e-01 (8.23e-01)	-1.67e-01 <sup>^</sup> (1.23e-01)	9.75e-02 (1.07e-01)	3.72e+01 <sup>***</sup> (1.17e+01)	-1.55e+00 <sup>^</sup> (1.06e+00)	6.78e+00 <sup>***</sup> (2.39e+00)
<b>Tertiary education</b>	-3.04e+06 (3.05e+06)	-3.82e-04 (3.45e-04)	8.96e-05 <sup>**</sup> (3.61e-05)	4.76e-05 (4.56e-05)	8.37e-03 <sup>*</sup> (4.14e-03)	3.11e-04 (3.24e-04)	-2.35e-03 <sup>**</sup> (1.01e-03)
<b>Internet</b>	-1.37e+09 (1.43e+09)						
<b>Loan</b>		5.93e-01 <sup>***</sup> (1.68e-01)	6.16e-01 <sup>***</sup> (6.11e-02)	3.01e-01 <sup>***</sup> (4.28e-02)	6.32e+01 <sup>***</sup> (1.80e+01)		
<b>R&amp;D</b>			4.72e-01 <sup>***</sup> (7.34e-02)				
<b>Size</b>				2.61e-01 <sup>***</sup> (2.66e-02)		6.75e+00 <sup>***</sup> (7.36e-01)	1.01e+01 <sup>***</sup> (1.97e+00)
<b>Age</b>					2.19e-02 (1.71e-02)	5.55e-03 <sup>***</sup> (1.27e-03)	
<b>Total labor cost</b>					1.77e-07 <sup>**</sup> (7.69e-08)		

**Table 2 (cont'd)**

	(1) Marginal product	(2) Capital-labor ratio	(3) Investment	(4) R&D	(5) Employees	(6) State ownership	(7) Age
<b>Marginal product</b>							-1.16e-11* (6.35e-12)
<b>Investment</b>							-6.55e+00*** (1.71e+00)
<i>d</i> 2002	5.48e+09 (5.49e+09)					1.43e+01*** (1.29e+00)	-2.84e+01*** (9.46e+00)
<i>d</i> 2005	2.28e+08 (9.86e+08)	-8.96e-02 (7.35e-01)			-8.83e+01*** (1.52e+01)	8.22e+00*** (8.24e-01)	-2.65e+01** (9.55e+00)
<i>d</i> 2007	-3.38e+09 (3.55e+09)	-2.42e+00** (1.14e+00)			1.31e+01 (1.07e+01)	5.83e-01 (9.59e-01)	-2.12e+01 (2.04e+01)
<i>d</i> 2008	-2.59e+09 (3.23e+09)	-9.04e-01 (6.92e-01)	3.51e-02 (1.02e-01)	-2.98e-01** (1.19e-01)	-1.05e+01 (1.72e+01)	1.64e+00 (1.33e+00)	
<i>d</i> 2009							2.83e+00 (1.17e+01)

Observations	13970	4104	3291	10128	12671	26599	13844
R <sup>2</sup>	0.028	0.102	0.065	0.061	0.039	0.099	0.016

Standard errors in parentheses

<sup>^</sup>  $p < 0.20$ , <sup>^^</sup>  $p < 0.15$ , \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 3: Subjective indices model estimated with heteroskedasticity-robust standard errors**

	(1) Marginal product	(2) Capital-labor ratio	(3) Investment	(4) R&D	(5) Employees	(6) State ownership	(7) Age
<b>Obstacle: Access to finance</b>	-9.69e+08*** (2.62e+08)	2.13e-03 (3.90e-02)	2.05e-02 (2.17e-02)	1.59e-02^ (1.24e-02)	-8.66e+00*** (2.46e+00)	3.51e-01*** (1.36e-01)	-9.69e+08*** (2.62e+08)
<b>State ownership</b>	-1.91e+07* (1.06e+07)	1.13e-02** (5.62e-03)	-4.85e-03^^ (3.04e-03)	9.65e-05 (1.39e-03)	2.98e+00*** (7.54e-01)		-1.91e+07* (1.06e+07)
<b>Informal gifts</b>	5.32e+08** (2.71e+08)	4.34e-02*** (1.55e-02)	6.07e-02*** (2.20e-02)	-1.55e-02 (1.28e-02)	-1.15e+00 (2.74e+00)	-1.76e+00*** (1.23e-01)	5.32e+08** (2.71e+08)
<b>Obstacle: Courts</b>	1.42e+09*** (3.06e+08)	7.98e-02*** (1.69e-02)	5.39e-02** (2.16e-02)	5.30e-02*** (1.25e-02)	1.20e+00 (2.59e+00)	-2.96e-01** (1.30e-01)	1.42e+09*** (3.06e+08)
<b>log(GDP per capita)</b>	8.61e+08*** (2.54e+08)	-1.98e-01** (8.57e-02)	-3.69e-02 (5.10e-02)	9.39e-02*** (3.03e-02)	1.62e+01** (6.85e+00)	-2.36e+00*** (3.01e-01)	8.61e+08*** (2.54e+08)
<b>Tertiary education</b>	-2.70e+06*** (3.41e+05)	-1.88e-04*** (4.10e-05)	8.16e-05*** (2.07e-05)	1.48e-05 (1.17e-05)	8.48e-03*** (3.13e-03)	4.03e-04*** (1.31e-04)	-2.70e+06*** (3.41e+05)
<b>Internet</b>	-1.56e+09*** (6.05e+08)						-1.56e+09*** (6.05e+08)
<b>Loan</b>		3.31e-01*** (1.07e-01)	6.31e-01*** (5.69e-02)	3.13e-01*** (3.20e-02)	7.19e+01*** (9.46e+00)		
<b>R&amp;D</b>			4.60e-01*** (6.80e-02)				
<b>Size</b>				2.65e-01*** (2.01e-02)		6.75e+00*** (2.45e-01)	8.54e+00*** (1.60e+00)

**Table 3 (cont'd)**

	(1) Marginal product	(2) Capital-labor ratio	(3) Investment	(4) R&D	(5) Employees	(6) State ownership	(7) Age
Age					2.05e-02 <sup>^</sup> (1.54e-02)	4.84e-03 <sup>***</sup> (9.04e-04)	
Total labor cost					1.61e-07 <sup>***</sup> (4.19e-08)		
Marginal product							-1.07e-11 <sup>^^</sup> (6.76e-12)
Investment							-5.59e+00 <sup>***</sup> (1.96e+00)
<i>d</i> 2002	5.28e+09 <sup>***</sup> (6.60e+08)					1.50e+01 <sup>***</sup> (5.65e-01)	5.28e+09 <sup>***</sup> (6.60e+08)
<i>d</i> 2005	-5.72e+07 (1.80e+08)					8.76e+00 <sup>***</sup> (3.83e-01)	-5.72e+07 (1.80e+08)
<i>d</i> 2008	-1.84e+09 <sup>***</sup> (3.39e+08)	-1.08e+00 <sup>***</sup> (1.05e-01)	2.67e-02 (6.95e-02)	-1.93e-01 <sup>***</sup> (3.69e-02)	5.94e+00 (1.27e+01)	1.15e+00 <sup>***</sup> (3.37e-01)	-1.84e+09 <sup>***</sup> (3.39e+08)
Observations	11173	2926	2774	8596	8486	19553	11681
R <sup>2</sup>	0.030	0.046	0.072	0.053	0.050	0.105	0.017

Standard errors in parentheses

<sup>^</sup>  $p < 0.20$ , <sup>^^</sup>  $p < 0.15$ , \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 4: Subjective indices model estimated by clustering with respect to the country**

	(1) Marginal product	(2) Capital-labor ratio	(3) Investment	(4) R&D	(5) Employees	(6) State ownership	(7) Age
<b>Obstacle: Access to finance</b>	-9.69e+08 (9.55e+08)	2.13e-03 (7.77e-02)	2.05e-02 (3.33e-02)	1.59e-02 (1.40e-02)	-8.66e+00*** (2.52e+00)	3.51e-01** (1.63e-01)	1.06e+00 (1.09e+00)
<b>State ownership</b>	-1.91e+07 (1.87e+07)	1.13e-02 (1.11e-02)	-4.85e-03^^ (3.27e-03)	9.65e-05 (1.95e-03)	2.98e+00** (1.37e+00)		1.81e-01*** (3.27e-02)
<b>Informal gifts</b>	5.32e+08 (5.21e+08)	4.34e-02 (3.53e-02)	6.07e-02*** (1.94e-02)	-1.55e-02 (1.84e-02)	-1.15e+00 (2.02e+00)	-1.76e+00*** (1.94e-01)	-2.55e-01 (6.51e-01)
<b>Obstacle: Courts</b>	1.42e+09 (1.40e+09)	7.98e-02** (3.76e-02)	5.39e-02** (2.20e-02)	5.30e-02** (2.10e-02)	1.20e+00 (3.28e+00)	-2.96e-01* (1.46e-01)	2.03e+00^^ (1.23e+00)
<b>log(GDP per capita)</b>	8.61e+08 (1.63e+09)	-1.98e-01 (5.25e-01)	-3.69e-02 (1.11e-01)	9.39e-02 (9.87e-02)	1.62e+01 (1.34e+01)	-2.36e+00*** (8.15e-01)	6.25e+00*** (1.54e+00)
<b>Tertiary education</b>	-2.70e+06 (2.70e+06)	-1.88e-04 (2.38e-04)	8.16e-05** (3.82e-05)	1.48e-05 (4.69e-05)	8.48e-03 (8.66e-03)	4.03e-04 (3.30e-04)	-2.13e-03* (1.13e-03)
<b>Internet</b>	-1.56e+09 (1.56e+09)						
<b>Loan</b>		3.31e-01^^ (1.99e-01)	6.31e-01*** (6.58e-02)	3.13e-01*** (5.60e-02)	7.19e+01*** (1.72e+01)		
<b>R&amp;D</b>			4.60e-01*** (7.01e-02)				
<b>Size</b>				2.65e-01*** (2.92e-02)		6.75e+00*** (7.26e-01)	8.54e+00*** (2.43e+00)

**Table 4 (cont'd)**

	(1) Marginal product	(2) Capital-labor ratio	(3) Investment	(4) R&D	(5) Employees	(6) State ownership	(7) Age
<b>Age</b>					2.05e-02 <sup>^^</sup> (1.36e-02)	4.84e-03 <sup>***</sup> (1.31e-03)	
<b>Total labor cost</b>					1.61e-07 <sup>**</sup> (7.47e-08)		
<b>Marginal product</b>							-1.07e-11 <sup>^^</sup> (7.03e-12)
<b>Investment</b>							-5.59e+00 <sup>***</sup> (1.74e+00)
<b><i>d</i> 2002</b>	5.28e+09 (5.34e+09)					1.50e+01 <sup>***</sup> (1.35e+00)	-2.96e+01 <sup>***</sup> (9.38e+00)
<b><i>d</i> 2005</b>	-5.72e+07 (9.73e+08)					8.76e+00 <sup>***</sup> (6.97e-01)	-2.73e+01 <sup>**</sup> (1.01e+01)
<b><i>d</i> 2008</b>	-1.84e+09 (2.59e+09)	-1.08e+00 <sup>^^</sup> (6.39e-01)	2.67e-02 (1.08e-01)	-1.93e-01 (1.51e-01)	5.94e+00 (2.63e+01)	1.15e+00 (1.60e+00)	
<b><i>d</i> 2009</b>							3.01e+00 (1.23e+01)
Observations	11173	2926	2621	8229	8486	19553	11076
$R^2$	0.030	0.046	0.082	0.054	0.050	0.108	0.017

Standard errors in parentheses

<sup>^</sup>  $p < 0.20$ , <sup>^^</sup>  $p < 0.15$ , \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

confirmed unambiguously – with higher GDP per capita, the sales are generally higher and thus the marginal product rises. A little bit harder to grasp is why the influence of tertiary education is so negative but as we only included it to capture the effect of developedness of the country and as such we did not expect any direct relationship to the marginal product, it is entirely possible that some „random“ statistical relation arose and brought about this confusing result. The negative influence of the presence of high-speed broadband Internet connection on the firm’s premises is likely to be caused by some sectoral disparity: most probably, firms that do have Internet come from an industry which has naturally a lower marginal product level than those who don’t – we can imagine this as a disparity between administrative business and industrial firms.

### **4.3.2 Interpretation – Capital-labor ratio**

In the WGI model, we observe again a statistically insignificant institutional influence on the capital-labor ratio. The signs of the two components are contradictory, meaning that on the country level, the effect would be obtained by plugging average values. At the first glance, there is thus no clear result from the country perspective.

The institutional influence of the access to external finance obstacles is not very pronounced due to its statistical insignificance. The informal gifts variable and the courts’ obstacle to the operations are, however, important for the level of capital-labor ratio – the positive sign suggests that again, firms in less developed institutional environments will tend to have a slightly bigger capital-labor ratio, meaning that they may either hire less people than would be optimal with better property rights protection because of higher transaction costs while the level of capital remains the same for their activity, or that the capital will be a bigger amount in such firms, while the number of employees remains the same. Compared with the principal components model, where the composite effect is essentially the opposite but not statistically significant, we can observe that the variable courts’ obstacle remains significant even with the clustering method. This points towards the interpretation that indeed the corrupt justice imposes such transaction costs on the firms so that they hire less people to avoid them and thus the capital-labor ratio is bigger. The state ownership has a slightly positive effect on the capital-labor ratio which may simply mean that with more state ownership of the firm, there will generally be more capital with respect to the labor *ceteris paribus*. One of the reasons



why this might be so is that government typically owns strategic enterprises (such as transport companies) which have a bigger amount of capital per worker than firms in other industries.

In this model, the effect of GDP per capita on capital-labor ratio is slightly negative. This either means that, *ceteris paribus*, the amount of capital per worker is lower in countries with higher GDP or that the number of employees in these firms is generally higher. Both alternatives are rather confusing, especially given that in the last model type, the influence of GDP per capita is positive, although not statistically significant (with heteroskedasticity-robust standard errors instead of clustering, the positive influence is significant – see the Appendix for reference). All in all, these two contradictory results probably mean that there is some problem with our definition of capital in the data.

The interpretation of the coefficient with loan is unproblematic in comparison. As expected, loan enables the firms to buy new machinery or vehicles, thus the overall tendency is positive. This variable is significant even when we used the clustering method (model type 2) which means that this relationship is reliable in any case. In the model with WGI principal components, the coefficient is almost the same and significant as well.

### **4.3.3 Interpretation – Propensity to invest**

The WGI principal components both have a positive influence on investment, the first one being significant on the 15% level. This means that an improved situation in the country's institutions is likely to be accompanied by higher firm investment, a result which is entirely plausible (see Johnson, MacMillan & Woodruff, 2002 for reference).

The subjective institutional influence on firm investment is clearer than in the last model. While the obstacles in the access to external finance do not appear to be significantly correlated on the decision to invest, the other three property rights indices imply that they are one of the important factors in the firms' operations. The first one is the state ownership of the firm. Apparently, firms that have a higher degree of public ownership generally invest less, which either means that they are already large (as confirmed in the model (5) where higher state ownership implies a larger number of employees) or alternatively, they are less efficient than others and cannot therefore afford to expand operations. The next two institutional variables both indicate the same kind of effect: the bigger the corruption in the country, the greater the probability that the firms will invest there. This again confirms our hypothesis that in worse institutional environments, firm will tend to merge more activities so as to avoid the

high cost of enforcing the contracts. The disparity between the subjective and objective indices is likely given by the fact that country-level property rights observations can substantially differ from those experienced by firms. We can generally say that a higher property rights protection on the country level can be one of the factors that influence the investment positively due to lower transaction costs but that also a worse institutional environment on the firm level may give the firms reason to merge and thus to increase investment as well.

The impact of GDP per capita on firms' decision to invest or not is slightly negative in the subjective indices model but not statistically significant, in the WGI model type it is also negative and significant. This most likely means that in good times, firms invest rather into other things than land and buildings which comprises our definition of investment in our dataset. This hypothesis can be partially confirmed by the positive influence of GDP in the next model, concerning the R&D. Another alternative is that firms' decision to acquire new room to expand operations depends on other factors than the current GDP level, such as long-term lookout for the industry branch etc. However, taking up credit is clearly a positive factor for investment; in the subjective indices model type, it is connected with a higher probability of firm investing into land and buildings by 63% and is significant on the 1% level. This probably means that firms wishing to invest who lack internal sources take up credit to do so, so the explaining value is not as great as would seem on the first glance. In the WGI model, the influence is positive as well, though not as pronounced.

The variable R&D is both positive and significant in all three model types which means that firms that invest in R&D are typically more likely to invest into expanding operations either. This is just to confirm that these two types of investment are not mutually exclusive but rather occur jointly.

#### **4.3.4 Interpretation – R&D**

In the WGI model type, the influence of both principal components is negative and significant with the second one. As we know with reasonable certainty that bigger firms innovate more than the small ones (the results of this model suggest that bigger firms are generally more active in this area), we can say that better institutions in this case mean that firms will generally tend to be smaller and will therefore be less likely to invest in R&D than the bigger ones.

The subjective institutional variables do not seem to have any pronounced effect on the propensity to innovate with the exception of corrupt justice. Here we can observe a slightly positive effect, if the obstacle the justice presents grows by one point, the propensity of the firms to innovate grows *ceteris paribus* by about 5%. This is not surprising because as we have observed in the first models already, the pressure on firms to minimize their costs regarding the enforcement of contracts, the tendency to merge more businesses together is strong and is confirmed even in the subjective indices model estimated by clustering, the relationship is still significant. A similar relationship is shown in the sign of the variable obstacle in the access to external finance, meaning that these two transaction costs' determinants are a vital factor for the firms to consider joining more activities in one firm. The sign of the frequency of informal payments is albeit negative but not significant – this means that the influence is not very strong and almost nil at top of that. State ownership has almost zero effect on R&D investment which might mean that in the internal innovation, the firms are typically relatively free to decide as it pleases them irrespectively of the level of government ownership. This means that in this model, both the subjective and objective indices indicate the same outcome – worse institutions are correlated with greater R&D investment which may be caused by merged firms.

This model has a slightly bigger number of observations, which may be the cause why the influence of GDP per capita is positive in this model when it was negative with respect to general investment, even though these two types of investment are mutually correlated. The reason why it is so is easily understandable – in good times, firms' sales are growing and thus the costly investment in innovation is more affordable than in periods of smaller economic growth. Loan is positively correlated with R&D on the 1% significance level, meaning that again, firms that have external credit are more likely to use it to partially finance their investments. We included the additional variable size to determine whether bigger firms are more likely to innovate than the small ones and from the results we can see that the size of the firm influences this investment in a significant way. This may be partially because of the fact that smaller firms generally do not have such financial reserves as the big ones and the continuing of their operations often relies on a timely payment from the customers. Bigger firms have more certainty about their future finance and can therefore afford to innovate more.

### **4.3.5 Interpretation – Employees**

According to the WGI principal components, better institutions have a great negative influence on the number of employees. This goes in line with our previously mentioned argument that with worse institutions, firms are likely to get bigger. Both obstacles in the access to external finance and the frequency of informal payments have a negative effect on the number of employees, where the latter relationship is not significant. The state ownership and corrupt justice have a positive influence on employees but statistically, only state ownership is significant. This means that we have two contradictory tendencies which we have already discussed in the previous sections whose effects clash in the data against each other. This contradiction is confirmed by the observation we can make from the WGI model type – here, the effect of merging firms is the prevalent one. The only information we can incur from these results is that we cannot say in general what the resulting effect would be – whether the firms would merge to minimize transaction costs (that means a rising number of employees) or whether they would be smaller due to the general negative effect of worse institutions on their functioning (a falling number of employees). Most likely these effects will differ from country to country and we may obtain them by putting average values for countries into the models to estimate the true effect of institutions.

This model has a relatively high number of observations, meaning that its results are more likely to be reliable than those that operate with under 5000 observations. The next rather believable fact the results suggest is that higher GDP per capita means the firm will hire a lot more workers than in the opposite case. This is quite straightforward, the evidence suggests that during a recession, employees are usually the first factor the firms try to save on. The fact that loan has such a big coefficient probably means that generally, firms with few workers are not as likely to get external credit as the big ones. Thus the results simply tell us that firms that do have a line of credit usually have about 72 more workers than those who do not. Age of the firm is apparently not such a big factor when deciding about the number of workers the firm should hire – the suggested relationship is nearly insignificant. This was just to test whether older firms are generally bigger than younger ones but apparently there is no such relationship present in the data. Total labor costs are apparently a very significant factor for the firms' hiring policy, it seems, with the coefficient being significant on the 5% or 1% level depending on the estimating method. Due to the fact that we have simultaneous data for these

costs and the number of employees, it is only logical that the influence is positive – firms that hire more workers are generally more likely to have greater total labor costs.

#### **4.3.6 Interpretation – State ownership**

The relationship between institutions and state ownership, which, as we have mentioned above, has not been examined extensively, seems to be more complicated than a mere one-way influence. The signs of principal components in the WGI model type suggest that indeed, the tendencies in state ownership regarding the institutions are contradictory. Generally we cannot draw any conclusion from them, we may plug average values to obtain the institutional effect but due to its insignificance, its telling value would be low. Obstacles in the access to external finance are connected with a rising percentage of state ownership, while a growing frequency of informal payments and corrupt justice are negatively correlated with it. This disparity may be explained in the sense that even though the access to external finance belongs to the institutional indices, it is not directly connected with government activity. The two other variables express the general level of corruption and the protection of property rights and we may state the hypothesis that if the government is some sort of a „grabbing hand“, it will have no incentive to own the firms if it can effectively steal from them with the help of bribes and not enforcing their contracts. To summarize, in the data we can observe a significant relationship between the institutions and the state ownership of the firms but none which we could interpret under the present conditions of the research.

The next important conclusion we can draw from this model is that higher GDP per capita is connected with a lower percentage to which the firm is owned publicly - by about 2.3 p.p. This is notionsworthy because it could partially reflect a commonly observable phenomenon – the state rescue of firms in problems during an economical crisis. While it is true that during last recessions, state rescue plans only concerned major banks and perhaps key industrial enterprises, the results of this regression suggest that the relationship is much more common, even though maybe not directly observable. Unfortunately we do not have evidence of such a state „rescue plan“ in the data as we only have observations up to the year 2009. Therefore we must resort to milder interpretation which may be led in the sense that higher GDP is generally correlated with better institutions and better corporate governance, so a smaller government ownership percentage would not be out of question. However, we have no means of confirming this argument. The size of the firm coefficient confirms the above mentioned notion that usually, small firms are not publicly owned as often and as much as the bigger

ones. The effect of firm age is significant as well but given the units of the observed variables, the coefficient is very small – we can therefore conclude that the final change in state ownership would be negligible. We can therefore say that state ownership is spread somewhat uniformly over all of the firms, whether they are old or young. Their size is apparently connected with the extent of public ownership more often than their age.

#### **4.3.7 Interpretation – Age of the firm**

The institutional influence on the age of firms is, again, rather complicated. The WGI model's results have again contradictory signs, where the principal components with a positive sign is significant on the 15% level. This is quite logical from our point of view – better institutions are apparently linked to a longer firm „life“. In the subjective indices model, the expected sign can be found only with the variable informal payments' frequency (a higher frequency of bribes is connected with smaller firm age) but it is not statistically significant. With a greater obstacle due to corrupt justice, the age of the firms apparently grows as well. This would be explainable from the point of view that firms get bigger under worse institutions as hinted at by previous models and that bigger firms survive longer on the market. State ownership has a positive significant effect on age too, suggesting that the „getting bigger“- tendency may be the overruling one regarding this model. Obstacle in access to external finance has a positive sign as well, though it is not significant. The state ownership and corrupt justice influence is confirmed even with the clustering method, whereas the country-level indices have again contradictory signs. Both of them are significant only on the 20% level, which suggests that there are some tendencies in the property rights influence that go against each other. To us, the hypothesis connected with firms merging is at this time the most plausible due to our general findings in other models.

Our expectation about the effect of GDP per capita on age has been confirmed by the results – with a GDP per capita higher by  $\Delta$ , the firms typically stay on the market about  $6*\Delta$  years longer *ceteris paribus*. This relationship was confirmed in all three model types and due to the high number of observations we may perceive it as plausible. The fact that the size is also significantly positively correlated with firm age confirms that from the non-institutional point of view, these results are trustworthy and we may therefore expect to draw the right conclusion from the institutional part of it as well. Bigger firms are typically connected with a higher firm age than others – this observation is in line with the above mentioned study by Desai et al. (2003). The effect of marginal product, though slightly negative and statistically significant, is probably so confusing again because of a some problem with the definition of the marginal product in the dataset. The firms' propensity to invest, on the other hand, shows a negative influence on the firms age. This either means that firms that invest are on average younger than those who do not or the alternative that firms which invest make mistakes in their investment (for example in assessing the goodness of their financial situation) which forces them off the market afterwards. We believe that the first hypothesis is directly connected to our dataset, while the second one cannot be verified in our data – the survey only encompasses firms that are still in business.

## 5. Conclusion

In our empirical research, we have seen that the institutions are undoubtedly one of the most important business environment qualities and that they are directly connected to various faculties of the firms' functioning. Throughout the theoretical part, we have observed two countervailing tendencies in the institutional influence on firm characteristics which were present even in the existing literature. The first one was built along the lines of Coase (1960) and stated that a worse institutional environment has above all impact on the transaction costs the firms face. Higher costs of bureaucratic procedures, corruption or courts incapable of enforcing the contracts the firms have should be logically connected with less effective, smaller and not as competitive firms due to the negative effect bad institutions should have on their functioning. We have expected, along the line of this argument, that the degree of innovation should be lower too because of insufficient protection of inventions and generally, that firm investment to expand operations would be smaller. The paperwork connected with hiring new employees should be, according to this hypothesis, negatively correlated with the size of the firms as well. But was this hypothesis the only one possible?

The other theoretical hypothesis has shown to be in fact the prevalent one in our data. It goes from the transaction costs' point of view as well, though it predicts other type of rational behavior amongst the firms: If the firms face higher transaction costs as we have described them above, the argument states, there should be a tendency to minimize these costs by the means of merging more businesses together and so avoiding the need of contracts in the first place. This can be seen as a strategic behavior where the firms act rationally and independently, while the first point of view somewhat counts with some kind of „stationarity“ of the firms' behavior when looking at their costs *ceteris paribus*. Du et al. (2012) support this hypothesis with their findings that worse institutions may indeed be connected with a higher level of vertical firm integration.

In this thesis we have worked with firm-level panel data from the countries of Central and Eastern Europe and Asia with collected information from the firms in the years 2002, 2005, 2007 and 2008/9. We have devised seven empirical models which document the institutional influence on several firm characteristics and used two types of institutional indices, the subjective and objective ones, to determine the prevailing institutional influence – either in line with the first hypothesis mentioned, or with the second one. If we look at the empirical evidence in our data, the second channel of influence is clearly the most prominent one. Out of seven firm characteristics' models, we have confirmed this hypothesis with respect to the marginal product, general firm investment, R&D and the age of the firm, while in other three models, the influence is either very unclear (as in employees and state ownership percentage) or confirms the first hypothesis (capital-labor ratio). Even in the data, these two contradictory tendencies go against each other in the individual models and so we cannot dismiss either hypothesis completely. We would merely like to emphasize the importance of the second institutional channel which has been not granted as much attention as the first one to our knowledge. Especially in future scientific research in this area, we feel it is important to consider firms' strategic behavior on the market with respect to the institutional environment as well in order to be able to find out the reasons why the firms in developing economies - like those we have studied in this thesis - are less effective and what would be the way to improve them.



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## Appendix

Table 5 - Unreported results – WGI model estimated with heteroskedasticity-robust standard errors, no clustering:

	(1) Marginal product	(2) Capital-labor ratio	(3) Investment	(4) R&D	(5) Employees	(6) State ownership	(7) Age
<b>Principal component 1</b>	-6.63e+08*** (8.07e+07)	-2.51e-01*** (4.16e-02)	4.25e-02** (1.99e-02)	-2.06e-02** (9.89e-03)	-1.12e+01*** (3.08e+00)	-1.37e-01^ (1.04e-01)	-3.10e-01 (6.57e-01)
<b>Principal component 2</b>	5.62e+07 (8.00e+07)	4.54e-01*** (8.20e-02)	3.45e-02 (4.37e-02)	-2.24e-01*** (2.28e-02)	-4.02e+01*** (8.43e+00)	1.15e+00*** (2.33e-01)	3.15e+00^^ (2.15e+00)
<b>log(GDP per capita)</b>	3.07e+09*** (3.78e+08)	6.67e-01*** (1.31e-01)	-1.67e-01** (6.52e-02)	9.75e-02** (3.82e-02)	3.72e+01*** (8.83e+00)	-1.55e+00*** (3.96e-01)	6.78e+00*** (2.53e+00)
<b>Tertiary education</b>	-3.04e+06*** (3.46e+05)	-3.82e-04*** (4.68e-05)	8.96e-05*** (2.17e-05)	4.76e-05*** (1.21e-05)	8.37e-03*** (3.24e-03)	3.11e-04** (1.30e-04)	-2.35e-03** (9.36e-04)
<b>Internet</b>	-1.37e+09*** (4.81e+08)						
<b>Loan</b>		5.93e-01*** (8.62e-02)	6.16e-01*** (5.68e-02)	3.01e-01*** (3.22e-02)	6.32e+01*** (7.98e+00)		
<b>R&amp;D</b>			4.72e-01*** (6.77e-02)				
<b>Size</b>				2.61e-01*** (2.01e-02)		6.75e+00*** (2.23e-01)	1.01e+01*** (1.34e+00)

**Table 5 (cont'd)**

	(1) Marginal product	(2) Capital-labor ratio	(3) Investment	(4) R&D	(5) Employees	(6) State ownership	(7) Age
<b>Age</b>					2.19e-02 <sup>^^</sup> (1.50e-02)	5.55e-03 <sup>***</sup> (9.04e-04)	
<b>Total labor cost</b>					1.77e-07 <sup>***</sup> (4.50e-08)		
<b>Marginal product</b>							-1.16e-11 <sup>**</sup> (5.78e-12)
<b>Investment</b>							-6.55e+00 <sup>***</sup> (1.66e+00)
<i>d 2002</i>	5.48e+09 <sup>***</sup> (6.43e+08)					1.43e+01 <sup>***</sup> (5.24e-01)	-2.84e+01 <sup>***</sup> (9.00e+00)
<i>d 2005</i>	2.28e+08 <sup>**</sup> (1.08e+08)	-8.96e-02 (1.48e-01)			-8.83e+01 <sup>***</sup> (1.09e+01)	8.22e+00 <sup>***</sup> (3.35e-01)	-2.65e+01 <sup>***</sup> (8.86e+00)
<i>d 2007</i>	-3.38e+09 <sup>***</sup> (3.99e+08)	-2.42e+00 <sup>***</sup> (1.38e-01)			1.31e+01 <sup>^^</sup> (8.94e+00)	5.83e-01 <sup>*</sup> (3.42e-01)	-2.12e+01 <sup>*</sup> (1.27e+01)
<i>d 2008</i>	-2.59e+09 <sup>***</sup> (3.66e+08)	-9.04e-01 <sup>***</sup> (1.19e-01)	3.51e-02 (7.26e-02)	-2.98e-01 <sup>***</sup> (3.99e-02)	-1.05e+01 (1.31e+01)	1.64e+00 <sup>***</sup> (3.51e-01)	
<i>d 2009</i>							2.83e+00 (1.07e+01)
Observations	13244	4020	2621	8229	10636	24535	13149
R <sup>2</sup>	0.029	0.106	0.075	0.063	0.055	0.099	0.018

Standard errors in parentheses

<sup>^</sup>  $p < 0.20$ , <sup>^^</sup>  $p < 0.15$ , <sup>\*</sup>  $p < 0.10$ , <sup>\*\*</sup>  $p < 0.05$ , <sup>\*\*\*</sup>  $p < 0.01$

**Table 6: Summary – variables used**

<b>Variable name</b>	<b>Label/Source</b>	<b>Mean</b>	<b>Std. deviation</b>
<b>access_external_finance</b>	How much of an obstacle is: Access to finance	1.431404	1.271415
<b>age</b>	Year of survey – foundation date	32.2707	181.8521
<b>comp1</b>	Principal components variable/WGI	-2.14e-09	2.277474
<b>comp2</b>	Principal components variable/WGI	1.02e-09	.6605375
<b>courts_obstacle</b>	Obstacle to the current operations : Courts	1.211275	1.24403
<b>employees</b>	No. permanent, full-time employees of this firm at end of last fiscal year	117.6389	752.3869
<b>informal_payments</b>	How often do firms like you pay additional payments/informal gifts?	2.335896	1.436075
<b>internet</b>	Does the firm have a high-speed, broadband Internet connection on its premises?	.6166934	.5082547
<b>invest</b>	Acquired additional land or buildings to expand operations in the last 3 years?	.3565916	.4790051
<b>lassetswrk</b>	$\log((\text{assets})/\text{employees})$	10.88784	2.806868
<b>lcgdp</b>	$\log(\text{GDP per capita})/\text{Penn World}$ Table Version 7.0	9.050133	.6804184
<b>loan</b>	Does this establishment have a line of credit or loan from a financial inst.?	.4851257	.4997962
<b>marginal_product</b>	sales/employees	1.17e+09	2.15e+10
<b>rnd_invest</b>	Invested in research and development (in-house or outsourced) in last 3 years?	.2797399	.4488837
<b>size</b>	-	1.760747	.792765
<b>stateownership_percent</b>	Government/State ownership	6.369566	23.0007

<b>tertiary_educ</b>	No. of people in tertiary education per 100.000/World Bank	4115.946	1461.095
<b>total_labor_cost</b>	Total labor cost (incl. wages, salaries, bonuses, etc) in last fiscal year	6.74e+07	2.54e+09
<b>d2002, d2005, d2007, d2008, d2009</b>	Dummy variables for respective years	-	-

**Table 7: Relevant BEEPS survey questions**

A.6a Size	Sampling size a6a
Less than 5 (only panel)	0
Small $\geq 5$ and $\leq 19$	1
Medium $\geq 20$ and $\leq 99$	2
Large $\geq 100$	3

<b>B.2</b>	
What percent of this firm is owned by each of the following:	
Private domestic individuals, companies or organizations	b2a %
Private foreign individuals, companies or organizations	b2b %
Government/State	b2c %
Other	b2d %

<b>K.8</b>	
At this time, does this establishment have a line of credit or a loan from a financial institution?	
YES	1
NO	2
Don't know (spontaneous)	-9

<b>O.3</b>	
In fiscal year <b>2007</b> , did this establishment spend on research and development activities, either in-house or contracted with other companies (outsourced)?	
YES	1
NO	2
Don't know (spontaneous)	-9

<b>K.30</b>						
Is <b>access to finance</b> , which includes availability and cost, interest rates, fees and collateral requirements, No Obstacle, a Minor Obstacle, a Moderate Obstacle, a Major Obstacle, or a Very Severe Obstacle to the current operations of this establishment?						
	No obstacle	Minor obstacle	Moderate obstacle	Major obstacle	Very severe obstacle	Don't know
<b>Access to finance</b>	0	1	2	3	4	-9

<b>J.30</b>						
As I list some factors that can affect the current operations of a business, please look at this card and tell me if you think that each factor is No Obstacle, a Minor Obstacle, a Moderate Obstacle, a Major Obstacle, or a Very Severe Obstacle to the current operations of this establishment.						
	No obstacle	Minor obstacle	Moderate obstacle	Major obstacle	Very severe obstacle	Don't know
Tax rates	0	1	2	3	4	-9
Tax admin.	0	1	2	3	4	-9



Business licensing and permits	0	1	2	3	4	-9
Political instability	0	1	2	3	4	-9
Corruption	0	1	2	3	4	-9
<b>Courts h30</b>	0	1	2	3	4	-9

**Q.39**

Thinking about officials, would you say the following statement is always, usually, frequently, sometimes, seldom or never true?

It is common for firms in my line of business to have to pay some irregular “additional payments or gifts” to get things done with regard to customs, taxes, licenses, regulations, services etc. <b>ECAq39</b>	Never	Seldom	Sometimes	Frequently	Usually	Always
	1	2	3	4	5	6

**L.1**

At the end of fiscal year **2007**, how many permanent, full-time employees did this establishment employ? Please include all employees and managers.

<b>Permanent, full-time employees end of last fiscal year</b>	11
Don't know (spontaneous)	-9

**N.2**

For fiscal year **2007**, please provide the following information about this establishment:

<b>Total annual cost of labor (including wages, salaries, bonuses, social security payments)</b>	n2a
Total annual cost of raw materials and intermediate goods used in production	n2e
Total annual costs of fuel	n2f
Total annual costs of electricity	n2b
Total annual costs of communications services	n2c
Total annual costs of water	n2h

**N.6**

At the end of fiscal year **2007**, what was the net book value, that

is the value of assets after depreciation, of the following:	
<b>Machinery, vehicles, and equipment</b>	n6a
<b>Land and buildings</b>	n6b