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The 2002 Business Environment and Enterprise Performance Survey: Results from a survey of 6,100 firms

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Abstract

This paper provides an overview and discusses key findings of the 2002 Business Environment and Enterprise Performance Survey (BEEPS), implemented jointly by the EBRD and the World Bank.¹ (The first round of the BEEPS was implemented in 1999.) Four important conclusions arise from the analysis. First, qualitative measures of the business environment in the BEEPS appear to provide reasonably accurate measures, both across various business environment dimensions and countries and over time. These qualitative measures are compared with both objective statistical measures, where possible, and quantitative business environment measures from the BEEPS. Second, qualitative measures of the business environment show that in virtually all transition economies the business environment has improved significantly between 1999 and 2002. Third, the analysis of quantitative measures of the business environment shows a strong association between business obstacles, added costs and constraints on business, such as corruption, private security protection or reliance on internal sources of finance. However, evidence suggests that the nature of corruption in tax administration, which tends to be centralised, is less costly to firms than is corruption in business regulation, which is decentralised. Fourth, the analysis of firm investment and growth shows that the quality of the business environment in 1999 (based on qualitative measures) is significantly and positively associated with investment by firms in the period 1999 to 2001. It also shows that state capture significantly boosts the investment and real revenue growth rates of firms that engage in this activity, but holds back the growth performance of other firms.

Keywords: Transition economies, rent seeking, bureaucracy and corruption

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The working paper series has been produced to stimulate debate on the economic transformation of central and eastern Europe and the CIS. Views presented are those of the authors and not necessarily of the EBRD.

INTRODUCTION

The Business Environment and Enterprise Performance Survey (BEEPS) is an initiative of the European Bank for Reconstruction and Development (EBRD) and the World Bank to investigate the extent to which government policies and practices facilitate or impede business activity and investment in central and eastern Europe and the Commonwealth of the Independent States. The purpose of the BEEPS is to alert both policy makers and business people to the opportunities and obstacles in the business environment of the region. MEMRB Custom Research Worldwide implemented the 2002 BEEPS on behalf of the EBRD and the World Bank, covering 6,153 firms in 26 countries of the region. The first round of the survey was implemented in 1999 and covered 4,104 firms (excluding farms) in 25 countries. This paper describes the methodology used in the second round of the survey and provides an overview of its key findings. EBRD (2002) provides a preliminary summary of the survey results. EBRD (1999), Hellman, Jones, Kaufmann and Schankerman (2000), Carlin, Fries, Schaffer and Seabright (2001) and World Bank (2000) summarise and describe the 1999 survey and its key findings.

The BEEPS is a large dataset in terms of both the sample size and the measures it provides about the business environment and the performance of enterprises. The business environment is multi-dimensional and includes key aspects of governance provided by the state, such as business regulation and taxation, law and order and the judiciary, as well as infrastructure and financial services. The survey also examines closely the issue of corruption – both administrative corruption that is often associated with arbitrary application of existing laws and regulations and “state capture” through which firms seek to influence the content and application of specific laws and regulations to the benefit of a narrow private interest rather than the broad public interest. The behaviour and performance of firms also has many dimensions. The BEEPS focuses in particular on the growth of firms, including the decisions to invest and to innovate, and the growth of revenues and productivity.

Since the survey is large and complex, an overview of its key results must be carefully structured to avoid becoming bogged down in detail. We, therefore, adopt a structure for this paper that summarises much – but not all – of the survey data and that at the same time highlights key relationships among various measures included in the dataset. The data produced by the survey are based on perceptions of managers and are, therefore, subjective. Because they are subjective, the survey data are inherently “noisy” in the sense of being subject to measurement errors.

In addition, the specific measures produced by the survey are both qualitative (measurement using words) and quantitative (measurement using numbers), since each type has advantages and disadvantages. Qualitative measures of the business environment benefit from a uniform measurement scale in terms of the extent to which each of its broad dimensions creates an obstacle to the operation and growth of firms (ranging from minor obstacle to major obstacle). However, these measures lack precision. Quantitative measures of the business environment offer a greater degree of precision, but they often focus narrowly on aspects of the business environment that are amenable to quantitative measurement (often proxy measures for transactions costs). It is, therefore, informative to consider both types of measures.

The second section of the paper describes the 2002 BEEPS dataset, including the survey instrument, sampling strategy and firm characteristics of the survey respondents. Section 3 investigates the accuracy of the qualitative measures of the business environment derived from the BEEPS, both over time and across countries. There are tests for country perception biases as well as for consistency between qualitative and quantitative business environment measures. The fourth section describes the qualitative measures of the business environment and their variation across countries and dimensions and over time. Section 5 describes selected quantitative measures of the business environment in a way that allows for cross-

country comparisons within each dimension of the business environment. It also associates obstacles in the business environment to specific types of firm behaviour, such as corruption, recourse to private alternatives to public services (such as private security protection) or reliance on internally generated funds to finance investment.

Section 6 examines the issue of state capture. It identifies the incidence of state capture across countries and sectors, as well as the incidence of firms that are affected by state capture. Section 7 of the paper examines the dynamic performance and investment behaviour of firms. In particular, we identify the marginal contributions to revenue growth from investment, increases in employment and skills, absorption of excess capacity and gains in productivity. Factors that are associated with investment, productivity and revenue growth are identified, including the quality of the business environment, economy-wide output growth, state capture (both the private benefits and external costs), market structures, and firm ownership and origin.

Four important conclusions arise from the analysis in this paper. First, the qualitative measures of the business environment in the BEEPS appear to provide reasonably accurate measures of the quality of the business environment. Second, these measures show significant improvement in the region's business environment between 1999 and 2002. Third, the analysis of the quantitative measures of the business environment shows a strong association between business obstacles and added costs and constraints of businesses, such as corruption, private security protection or reliance on internal sources of finance on the other. However, the evidence suggests that corruption in tax administration, which tends to be centralised, is less costly to firms than is corruption in business regulation. Fourth, the analysis of firm growth shows that the quality of the business environment in 1999 (based on qualitative measures) is significantly and positively associated with investment by firms in the period 1999 to 2001. It also shows that state capture significantly boosts the investment and real revenue growth rates of firms that engage in such activities, but impedes the productivity growth of other firms.

1. DESCRIPTION OF THE 2002 BEEPS DATASET

This section describes the survey instrument, sampling strategy and firm characteristics of the survey respondents. Each aspect of the survey is considered in turn.

1.1 SURVEY INSTRUMENT

The survey instrument consists of nine parts. They are (though not in the sequential order of the instrument):

1. Firm characteristics
2. Sales of the firm and its suppliers
3. Investment and innovation
4. Employees of the firm
5. Access to infrastructure services
6. Access to financing
7. Government policies and practices, including corruption
8. Laws, business regulation and taxation and their enforcement, and
9. Qualitative perceptions of the business environment.

The first section of the survey covers the basic characteristics of the firms that may be considered as exogenous to their operational activities and the decisions made by these firms over the past three years. These characteristics include geographical location (by country), economic sector of operation, ownership structure and origin of the firm, and characteristics of the general manager. Sections two, three and four of the survey focus on the performance and behaviour of the firm over the past three years (1999 to 2002), placing particular emphasis on sales and productivity growth, on market structures, investment and other decisions to develop new products and production processes, and changes in the firm's organisation. There are also questions relating to the firm's employees, their skills and their education.

Sections five to nine of the survey focus on the business environment, which is the institutional framework for enterprise created by the state and the private sector. This framework includes access to infrastructure and financial services, business regulation and taxation, functioning of the judiciary, law and order, and corruption. Corruption includes not only "administrative" corruption aimed at influencing the enforcement of laws, regulations and taxes, but also "grand" corruption aimed at manipulating laws, regulations and taxes to the advantage of a particular firm or group of firms. The questions on the business environment are both quantitative and qualitative in their nature. Both types of measures are subjective since they are based on perceptions of firm managers.

The survey instrument was piloted with ten enterprises in each of the 26 countries where the survey was implemented. The final version of the instrument reflects the results of the pilot.

1.2 SAMPLE

The survey sample was designed to be broadly representative of the population of firms according to their economic significance, sector, size and geographical location within each

country. The sectoral composition of the total sample in each country, in terms of industry versus services, was determined by their relative contribution to GDP, after allowing for certain excluded sectors. Firms that operated in sectors subject to government price regulation and prudential supervisions, such as banking, electric power, rail transport, water and waste water were excluded from the sample, as were agricultural enterprises (farms). These exclusions reflect two considerations. First, because the survey focuses significantly on interactions between the state and firms, those that are subject to regulation by the state are likely to interact differently than are unregulated firms. Second, the experience of the 1999 BEEPS showed that the survey was not suited to agricultural enterprises.

Enterprises eligible for the 2002 BEEPS were, therefore, in the following sectors (the International Standard Industrial Classification (ISIC) codes for each sector are reported in the parentheses):

Industry

1. Mining and quarrying (ISIC Section C: 10 – 14)
2. Construction (ISIC Section F: 45)
3. Manufacturing (ISIC Section D: 15 – 37)

Services

4. Transportation, storage and communications (ISIC Section I: 60 – 64)
5. Wholesale and retail trade and repairs (ISIC Section G: 50 – 52)
6. Real estate and business services (ISIC Section K: 70 – 74)
7. Hotels and restaurants (ISIC Section H: 55)
8. Other community, social and personal services (ISIC Section O: 92.1 – 92.4 and 93)

Within the industry and service sectors, the sample was designed to be as representative as possible of the population of firms, subject to various minimum quotas for the total sample in each country. This approach sought to achieve a representative cross-section of firms while ensuring sufficient weight in the tails of the distribution of firms for key control parameters (size, geographical location, exports and ownership). The minimum quotas of the samples for each country were:

1. At least 10 per cent of the total businesses in the sample should be small in size (2 to 49 employees), 10 per cent medium-sized (50 to 249 employees) and 10 per cent large (250 to 9,999 employees). Firms with only one employee and 10,000 or more employees were excluded from the sample.
2. At least 10 per cent of the firms should have foreign control and 10 per cent state control, where control is defined as an ownership share of more than 50 per cent.
3. At least 10 per cent of the firms should be exporters, meaning that at least 20 per cent of their total sales are from exports.
4. At least 10 per cent of the firms should be located in a small city (population under 50,000) or the countryside.

In addition, enterprises established after 1999 were excluded from the sample because the questions on business performance covered the period 1999 to 2001. The quotas were fulfilled in the final sample in all but the following cases: state-owned enterprises in FYR Macedonia, Hungary and Slovenia and foreign-owned firms in Tajikistan.

The 2002 BEEPS was implemented in 26 of the 27 countries in which the EBRD operates. Table A.1 in Appendix A lists the countries together with their target and completed sample sizes. The completed samples in most countries are larger than the target samples because additional firms were surveyed in order to satisfy the sampling quotas for exporters and ownership. In Turkmenistan, however, there were no completed surveys because the local manager of the firm implementing the survey on behalf of the EBRD and the World Bank was invited to the headquarters of the secret police to explain the purpose of the survey and to leave copies of the questionnaire with the authorities. In view of this incident, the EBRD and World Bank staff responsible for managing the project decided to discontinue the survey in this country.

Excluding Turkmenistan, MEMRB and its agents contacted a total of 18,052 firms and completed 6,153 interviews, yielding a survey completion rate of 36.9 per cent. Respondents who either refused outright to participate or were unavailable to be interviewed accounted for 38.3 per cent of all contacts. Establishments that were contacted but not eligible, because of the need to fulfil quotas for certain types of firms, accounted for the remainder of the contacts.

MEMRB was selected to implement the survey on behalf of the EBRD and the World Bank through an open competitive tender that conformed to the procurement rules of both institutions. MEMRB follows the ICC/ESOMAR International Code of Marketing and Social Research Practice (for more details, see the Website www.esomar.org, and click on codes and guidelines), including those pertaining to the rights of respondents. These rights provide for the confidentiality and anonymity of the respondents. The interviewers working on behalf of MEMRB assured the survey respondents that their identities would not be disclosed to either the sponsoring institutions or government authorities and that their anonymity would be protected. The respondents were not paid for answering the survey.

1.3 FIRM CHARACTERISTICS

Table 1 reports the firm characteristics of the whole sample. The sectoral composition of the sample was 39 per cent industry and 61 per cent services, reflecting the relative contribution of these two sectors to the region's GDP. Within the industrial sector, 25 per cent of the total sample was in manufacturing, 13 per cent in construction and one per cent in mining. Within the services sector, retail and wholesale trade accounted for 31 per cent of the total sample, real estate and business services for ten per cent, transport storage and communication eight per cent, hotels and restaurants for six per cent and other services for six per cent. The distribution of firms within the industry and service sectors reflects their relative contribution to the population of firms within the two sectors. Table A.2 in Appendix A provides a detailed sectoral breakdown of the sample for each country.

The composition of the sample with respect to firm size reflects the population of firms in the region. About two-thirds of the firms surveyed were small (two to 49 employees), 19 per cent were medium-sized (50 to 249 employees) and 14 per cent were large (250 to 9,999 employees). Regarding geographical location with each country, 32 per cent were in the capital city, 20 per cent in large cities other than the capital, 23 per cent were in small cities and 25 per cent in rural areas. Table A.3 provides a detailed breakdown of the sample by firm size and geographical location within countries.

Table 1: Basic firm characteristics of the sample

Characteristic	Sample share (in per cent)
Sector	
Industry	38.7
Services	61.3
Size (Number of employees)	
Small (2 to 49)	67.6
Medium (50 to 249)	18.5
Large (250 to 9,999)	13.9
Ownership	
New private	68.0
Privatised	17.7
State owned	14.3
Foreign owned	13.5
Location	
Capital	31.9
Large cities (not capital)	19.6
Small cities	23.4
Rural areas	25.1

The composition of the sample with respect to firm ownership varies along two main dimensions. The first is whether firms are majority owned by private investors or by the state. Among majority private-owned firms, a further distinction is drawn between those that have been privatised or spun-off from state-owned enterprise and those that were newly established as private enterprises. Of the firms in the sample, 68 per cent are originally established private firms with no state-owned antecedents, 18 per cent are privatised and 14 per cent are state-owned. The second dimension is whether private firms are majority owned by domestic or foreign investors. Of the sample, 14 per cent are majority owned by foreign investors. Table A.4 provides a detailed breakdown of the sample by these ownership dimensions.

2. TRANSITION, THE BUSINESS ENVIRONMENT AND ITS MEASUREMENT

Developing an institutional framework that supports competitive markets, entrepreneurship and private enterprise is central to the post-communist transition to an open market economy. This involved abandoning administrative controls on prices, trade and access to foreign exchange, transferring state-owned enterprises into private ownership and transforming both private and state institutions so that they establish and enforce market-oriented laws and regulations and provide essential business services. The business environment focuses on this latter – and perhaps most difficult – aspect of transition. It is particularly difficult because it requires not only an extensive overhaul of formal institutions, but also fundamental change in the way bureaucrats, judges, law enforcement officers and businessmen and women actually behave. In other words, social norms and values must become aligned with new formal laws and regulations.

In view of the particular importance of institutional change for a successful transition (and for enterprise performance in general), the BEEPS asks firms to assess how the functioning of state institutions, physical infrastructure and financial institutions affect their business operations. Seven broad areas are assessed. These are taxation, business regulation, corruption, crime, the judiciary, infrastructure and finance. In a series of qualitative questions (evaluation using words), firms were asked to assess how problematic these factors were for the operation and growth of their business on a scale of one to four. A score of one indicates a minor obstacle and a score of four a major obstacle. In addition to these qualitative assessments, the BEEPS also asked respondents to indicate the quality of specific institutions using quantitative indicators (numerical evaluation).

A concern with any survey, however, is that any one respondent may rate a problem more or less critically than would an objective observer, assuming that a survey question corresponds to an objectively measurable concept. The potential for such biases is greater with qualitative questions, which allow respondents more flexibility and greater subjectivity when forming judgements. In general, individual perception biases contribute only to the standard error of estimates obtained from the survey responses. However, this assumes that perceptions biases are uncorrelated among groups of respondents. In cross-country surveys, such as the BEEPS, there is always the concern that individual biases could be correlated among respondents in a particular country.

There are a number of factors that could create perception biases at the country level. For example, different cultural norms and degrees of political freedom across countries may influence the choice of specific ratings and the willingness of business people to criticise state institutions. Assessments could also be influenced by the prevailing sense of economic optimism or pessimism related to the country's stage in the business cycle. These factors could generate a systematic perception bias when the survey results are analysed at the country level.

One way to check for such country perception biases across countries and over time is to compare statistically the qualitative measures to related objective measures. This is possible with respect to macroeconomic stability, since the 1999 and 2002 BEEPS ask firms the extent to which instability is an obstacle to the operation and growth of their firms. Consistency in the qualitative perceptions across countries and over time would require that firms operating in countries with high growth and low inflation perceive macroeconomic instability as being less of a business obstacle.

To assess this, the statistical relationship is estimated among the average inflation rate (in per cent) over the five years before and including the year in which the survey was implemented, the five-year average real output growth rate (in per cent) and the country-average qualitative

measures of macroeconomic instability for the 1999 and 2002 surveys.² From this estimated relationship, it is possible to identify whether qualitative measures of macroeconomic instability for a particular country and year (1999 or 2002) are significant outliers above or below the value predicted by the estimated statistical relationship (by calculating a so-called studentised residual for each observation).³ Only the Kyrgyz Republic in 1999 and Azerbaijan in 2002 are statistically significant outliers to this estimated relationship and the estimated size of the prediction errors for the two observations are 0.81 (overly negative) and -0.87 (overly positive), respectively.

While the consistency-check on qualitative assessments of macroeconomic instability points to only two significant country perception biases with respect to this measure, it may still be the case that short run macroeconomic developments create country biases in perceptions of other dimensions of the business environment. For example, qualitative assessments of the business environment may be more positive, other factors being equal, when output growth is relatively high. However, care is required in assessing whether there is a bias in perceptions related to short term economic performance because of the cause and effect relationships that exist between the business environment and growth. The approach taken here is, therefore, to benchmark the association between contemporaneous growth and perceptions of the business environment against the association between medium-term rates of growth and business environment.

Over the medium to long term, a favourable business environment can support higher rates of output growth by improving incentives for investment in physical and human capital and for technological (and organisational) innovation. At the same time, sustained high output growth can support improvement in the business environment by increasing the amount of resources available to the state. If these feedback effects in both directions operate over relatively long periods of time, measures of the business environment and level of economic development are likely to be closely associated. It is also possible that these feedback effects operate over short time horizons, albeit with a greater degree of noise because of the aggregate demand and supply shocks that affect short-run macroeconomic performance. One indication of country biases in perceptions would be a stronger statistical association of the business environment with contemporaneous growth than with a medium-term trend rate of growth.

² The regression equation is $MI_t = \alpha + \beta \cdot Avg_Inf_{t-5,t} + \gamma \cdot Avg_Growth_{t-5,t} + \varepsilon_t$, where MI is macroeconomic instability, $t = 1999$ and 2002 . $Avg_Inf_{t-5,t}$ denotes average inflation rate over the five year period before and including the year when survey was conducted and $Avg_Growth_{t-5,t}$ denotes the five year average rate of real GDP growth. Average inflation and real GDP growth were calculated for the period 1995 to 1999 for the 1999 observations and for the period 1998 to 2002 for the 2002 observations. The estimated equation is $MI = 2.86 + 0.001 \cdot Avg_Inf_{t-5,t} - 0.04 \cdot Avg_Growth_{t-5,t}$. The estimated coefficient on the average growth rate and the constant term are statistically significant at the five per cent level, but the estimated coefficient on the average inflation rate is not significant. The adjusted R-squared of the equation is 0.23. Serbia and Montenegro, Tajikistan and Turkmenistan are omitted from the regression because the BEEPS was not implemented in these countries in 1999 (and not in Turkmenistan in 2002).

³ The test for whether an observation is an outlier is run by including in the above regression a single dummy variable for a country and year observation and examining whether the dummy variable is statistically significant. This procedure is repeated for each possible country and year observation. The t-statistic for the dummy variable is a normalised prediction error that is sometimes called the studentised residual.

Appendix B reports the statistical associations between economic development, medium-term and contemporaneous rates of output growth and the business environment measures. These associations are consistent with the view that there are significant feedback effects between business environment and growth and that these effects are stronger over the long and medium terms than in the short term. One indication of the presence of a significant perception bias would have been a stronger and more statistically significant association between short-term growth and the business environment measures than between medium-term growth and these measures. However, no such effect is observed.

In addition, the BEEPS contains a number of questions that ask firms about quantitative measures of the business obstacles they faced. Examples of such measures are the proportion of sales paid in bribes (bribe tax), the proportion of senior management working time spent dealing with public officials on regulatory matters (time tax), the proportion of sales reported to tax authorities, the amount of time needed on average to resolve an overdue payment, the amount of losses due to crime as a share of sales, and the number of working days lost because of interruption of infrastructure services. These measures can provide a useful crosscheck to the qualitative measures. For example, firms that pay a greater proportion of their sales in bribes are likely to perceive corruption as a greater business obstacle.

Table 2 reports the simple correlation coefficients between these quantitative measures and their qualitative counterparts from the 2002 survey. For example, the correlation coefficient between the bribe tax as a quantitative measure of corruption and the qualitative assessment of corruption as an obstacle to operations as subjective measure is 0.51, which is correctly signed and statistically significant at the one per cent significance level. Correctly signed and statistically significant correlations are also found between the quantitative and qualitative measures of the quality of regulatory environment, finance and infrastructure. Correlations among the other measures are correctly signed but statistically insignificant. This evidence from the 2002 survey, therefore, points to a significant degree of consistency between the quantitative and qualitative business environment measures. The 1999 survey did not contain a number of the quantitative measures, so such crosschecks are not possible for those results.

Table 2: Correlation coefficients between quantitative and qualitative measures of the business environment in 2002

Quantitative measure	Qualitative measure	Correlation coefficient (p-value)
Bribe tax in per cent of total sales	Corruption	0.51 (0.01)
Time tax in per cent of senior management working time	Regulation	0.45 (0.02)
Proportion of total sales reported for tax purposes	Tax administration	-0.23 (0.25)
Average number of days to resolve overdue payments	Judiciary	0.31 (0.12)
Losses due to theft in per cent of total sales	Crime	-0.26 (0.19)
Average number of working days lost due to infrastructure faults	Infrastructure	0.56 (0.00)
Index of time to obtain "hard" bank loan adjusted for maturity	Finance	-0.49 (0.01)

Notes:

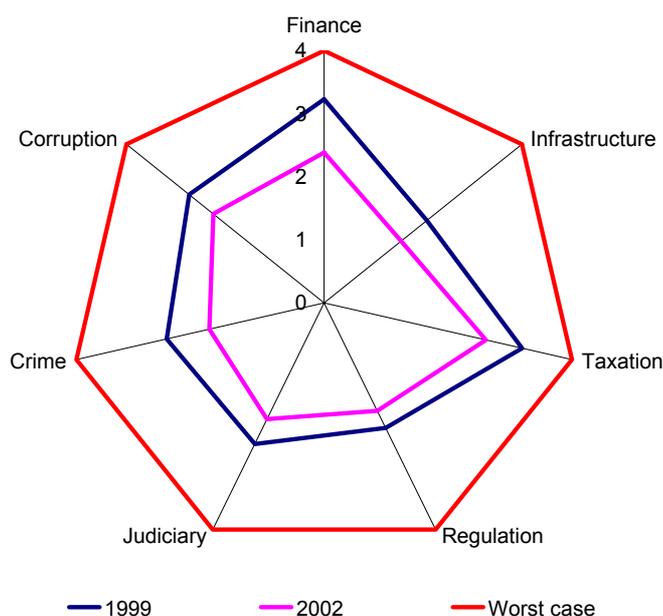
- 1) Calculations of correlation coefficients between quantitative and qualitative measures are made using country averages of the respective measures.
- 2) Country averages for the quantitative and qualitative measures are calculated as unweighted averages of firm responses from that country.

3. OVERVIEW OF COUNTRIES' BUSINESS ENVIRONMENTS: QUALITATIVE INDICATORS

The summary qualitative measures of the business environment reported in this section are on a uniform scale across dimensions and countries. As discussed in the preceding section, consistency checks on these qualitative measures reveal few significant country biases in these perceptions and significant consistency over time. There is also evidence that the qualitative measures are significantly correlated with related quantitative measures of the business environment along specific dimensions. The qualitative measures, therefore, may provide a reasonably accurate overview of the prevailing business environment in transition economies.

A significant finding from the two rounds of the BEEPS is the overall improvement in the business environment of 0.56 (on an un-weighted average basis across countries and dimensions) on the one-to-four scale to 2.08 in 2002 from 2.64 in 1999. To make the comparison consistent over time, only of those countries for which the survey data were available for both 1999 and 2002 surveys are used. Therefore, the comparison excludes Serbia and Montenegro, Tajikistan and Turkmenistan for which, as noted earlier, no data are available from the 1999 survey and, in the case of Turkmenistan, for the 2002 survey as well.

Chart 1: The qualitative assessments of the business environment in 1999 and 2002 for the region

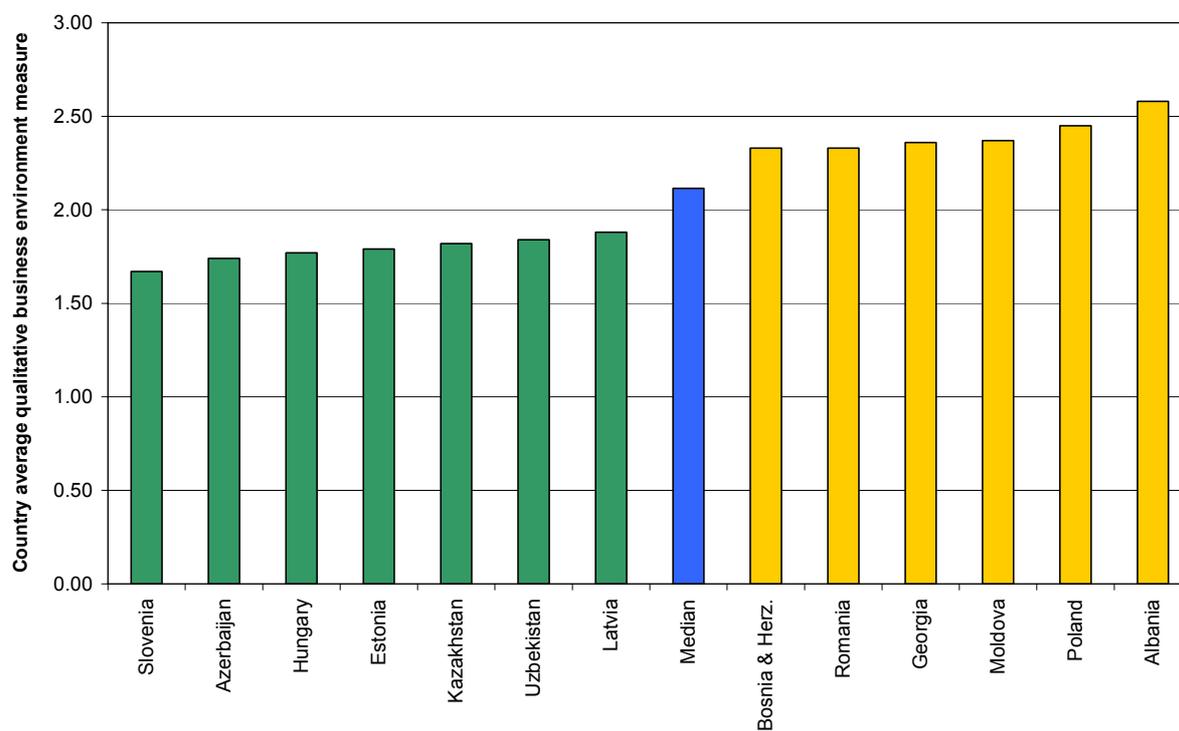


Notes:

1) The responses on specific questions aiming to identify particular aspects of the business environment are aggregated into seven dimensions: finance, infrastructure, taxation, regulation, judiciary, crime and corruption. The finance measure combines two aspects with equal weights: the interest rate and ease of access to long-term financing in both 1999 and 2002; infrastructure combines a general question on infrastructure in 1999 and two questions with equal weights in 2002, one on electricity supply and the other on telecommunications services; taxation combines two aspects with equal weights: tax rates and tax administration both in 1999 and 2002; regulation combines three aspects with equal weights: customs and trade regulations, business licensing and labour regulations both in 1999 and 2002; judiciary and corruption are assessed in one question each in both the 1999 and 2002 survey; crime combines two aspects: street and organised crime in both 1999 and 2002.

2) The calculation procedure: (1) calculation of grouped categories, e.g. finance, for each firm, (2) calculation of unweighted averages of seven dimensions for each country and (3) calculation of averages for each dimension across countries.

Chart 2: Selected country average qualitative business environment measures in 2002



Notes:

1) As per note 1 to Chart 1.

2) The calculation procedure: (1) calculation of grouped categories, e.g. finance, for each firm, and (2) calculation of unweighted averages of seven dimensions for each country. The median value is a simple average of the measures for the Kyrgyz Republic and Serbia and Montenegro.

4. QUANTITATIVE BUSINESS ENVIRONMENT MEASURES AND RESPONSES OF FIRMS TO BUSINESS OBSTACLES

While qualitative indicators of the business environment from the BEEPS make possible broad comparisons, based on a uniform measurement scale, across countries and dimensions of the business environment, the survey also allows a closer look at each of the seven dimensions of the business environment using quantitative indicators. The benefit from using quantitative indicators is greater precision in measurement. However, a drawback to the use of quantitative measures is that they focus on relatively narrow aspects of the business environment that are amenable to quantitative measurement. The potential gain in measurement precision from use of quantitative measures may, therefore, be at least partially offset by omitting aspects of the business environment that cannot be measured quantitatively.

This section focuses separately on taxation, business regulation, judiciary, crime, corruption, infrastructure and finance. The quantitative measures used in this analysis are correlated (in most cases significantly) with corresponding quantitative measures as discussed in Section 2. Moreover, in this section, quantitative measures of the business environment are correlated with measures of added business costs or constraints such as corruption, payments for private security protection and recourse to informal sources of finance. These additional comparisons serve to show some of the key inter-relationships among business environment dimensions, for example, between poorly functioning state institutions and administrative corruption. They also illustrate the costs associated with business obstacles and ways to overcome them, such as payment for private protection.

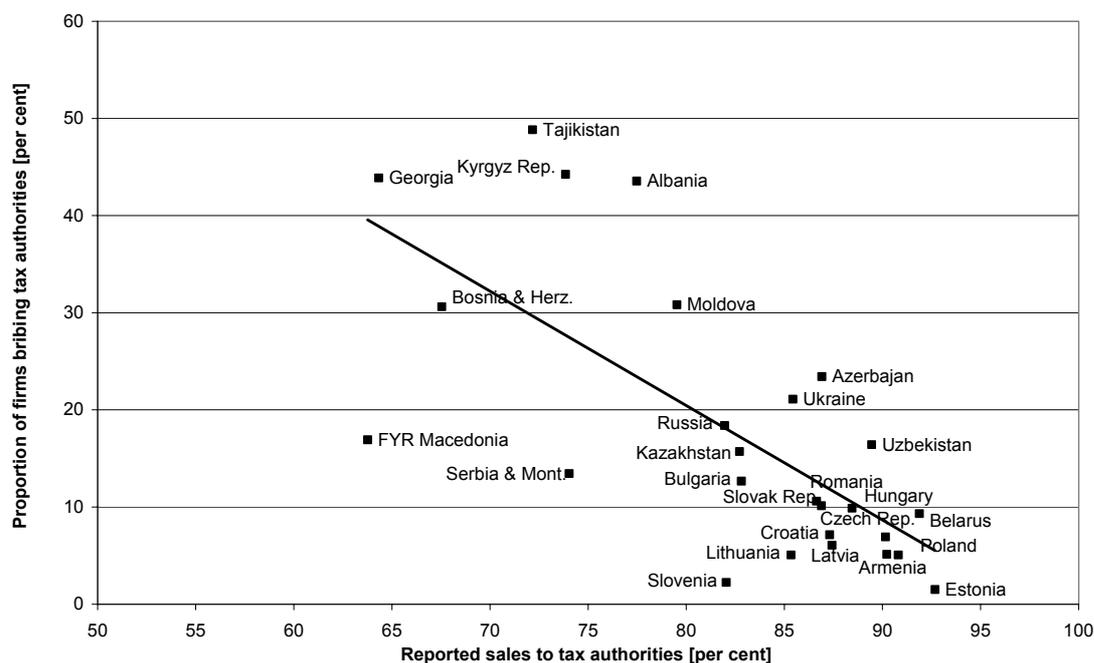
Taxation

One indication that tax rates and tax administration create a business obstacle is the extent to which firms avoid paying taxes. The BEEPS asked the respondents to what extent firms like theirs under-reported sales revenue for tax purposes, recognising the difficulty that many firms face in complying with taxes. A high proportion of reported sales could indicate a low level of tax evasion and high degree of tax compliance. The survey also asked respondents to indicate how frequently firms like theirs paid bribes to deal with taxes and tax collection. A high perceived incidence of corruption associated with taxation is consistent with a high level of tax evasion.

Chart 3 shows for the 2002 survey the relationship between the proportion of sales reported for tax purposes on a country average basis and the proportion of firms in each country that pay bribes frequently or more to deal with taxes and tax collection.⁴ The strong negative correlation between reported sales and bribery of tax authorities (correlation coefficient of -0.70, statistically significant at the one per cent level) suggests that firms both under-report actual sales to tax authorities and bribe tax authorities. In other words, firms are able to reduce their tax burden by bribing tax authorities. While tax evasion is not detrimental to the firms that reduce their tax burden net of any bribes paid, it is clearly detrimental to the government's tax base. The countries facing the most severe problem of tax evasion are Albania, Georgia, the Kyrgyz Republic and Tajikistan, while countries with relatively strong tax discipline are Estonia, Slovenia, Lithuania, Armenia and Poland.

⁴ The question asked firms to report how often they resort to bribery of tax authorities on a six level scale, ranging from never for 1 to always for 6. The calculated statistic for each country is a share of firms that reported that they at least frequently (a score of 4 or higher) bribe tax authorities.

Chart 3: Proportion of total sales reported to tax authorities and proportion of firms that are perceived to pay bribes to tax authorities



Notes:

1) Proportion of firms bribing tax authorities is calculated for each country as an unweighted share of those firms that bribed tax authorities at least frequently (answers 4 to 6 on a scale of 1 to 6).

2) Reported sales are calculated for each country as an unweighted average of the individual firms' responses.

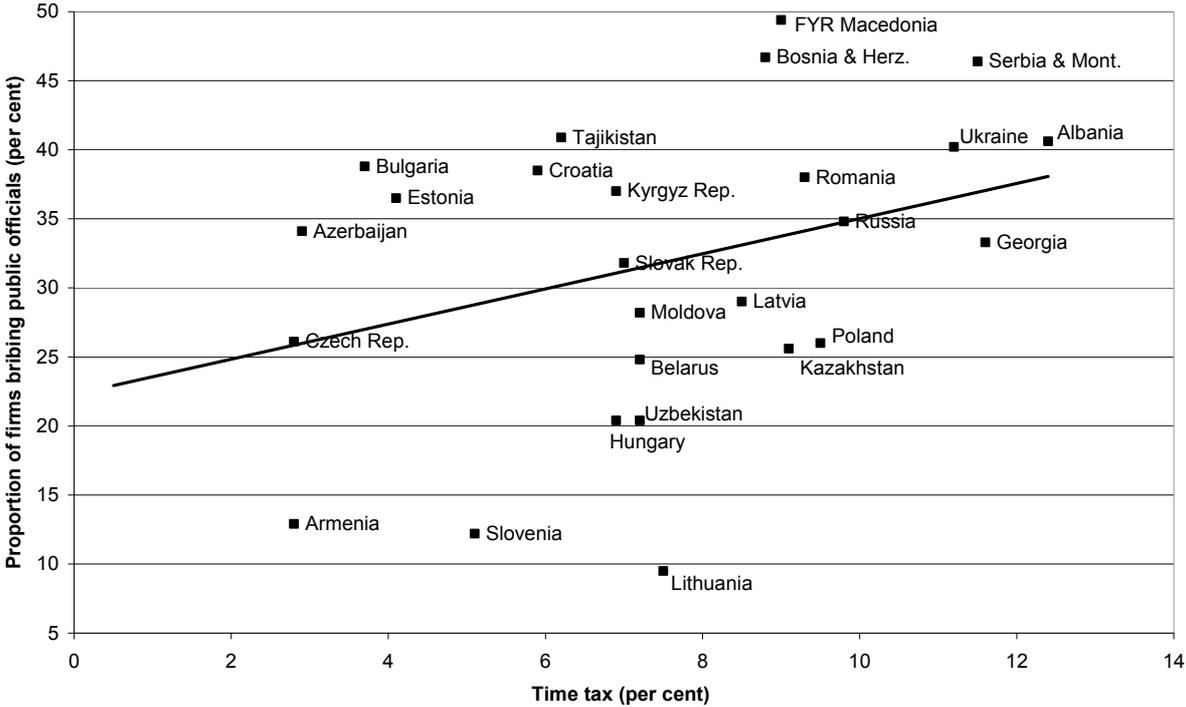
Business regulation

One indication of the extent of business regulation that firms undergo is the amount of working time that senior managers spend dealing with public officials regarding the application of laws and regulations. The greater the amount of time spent by managers – the so-called “time tax” – the greater is the opportunity cost of complying with laws and regulations. The BEEPS asked the respondents what proportion of their senior managements' time was spent dealing with public officials about the application and interpretation of laws and regulations. The survey also asked respondents to indicate how frequently firms like theirs paid bribes to deal with various aspects of business regulation, including business licenses and permits, health and safety inspections, fire and building inspections and environmental inspections.

Chart 4 shows the relation between the time tax on a country average basis and the proportion of firms in each country that are perceived to pay bribes frequently or more to deal with various aspects of business regulation. The index includes four types of administrative corruption and bribery: (1) to obtain business licences and permits and to deal with (2) occupational health and safety inspections, (3) fire and building inspections and (4) environmental inspections. The index has a value 1 if it is perceived that firms pay bribes frequently or more (4 or higher on the scale of 1 to 6) in at least one of these dimensions and 0 otherwise. Country averages of the firm index values are then calculated to compare it with the average time tax. The chart shows that the time tax is significantly correlated with the

perceived frequency of administrative corruption in this area, with a correlation coefficient between the two of 0.37 (significant at the six per cent level). The countries with the highest time taxes are Albania, Georgia and Serbia and Montenegro, and those with the lowest time taxes are the Czech Republic, Armenia and Azerbaijan.

Chart 4: Regulatory “time tax” and proportion of firms that are perceived to pay bribes to public officials, by country



Notes:

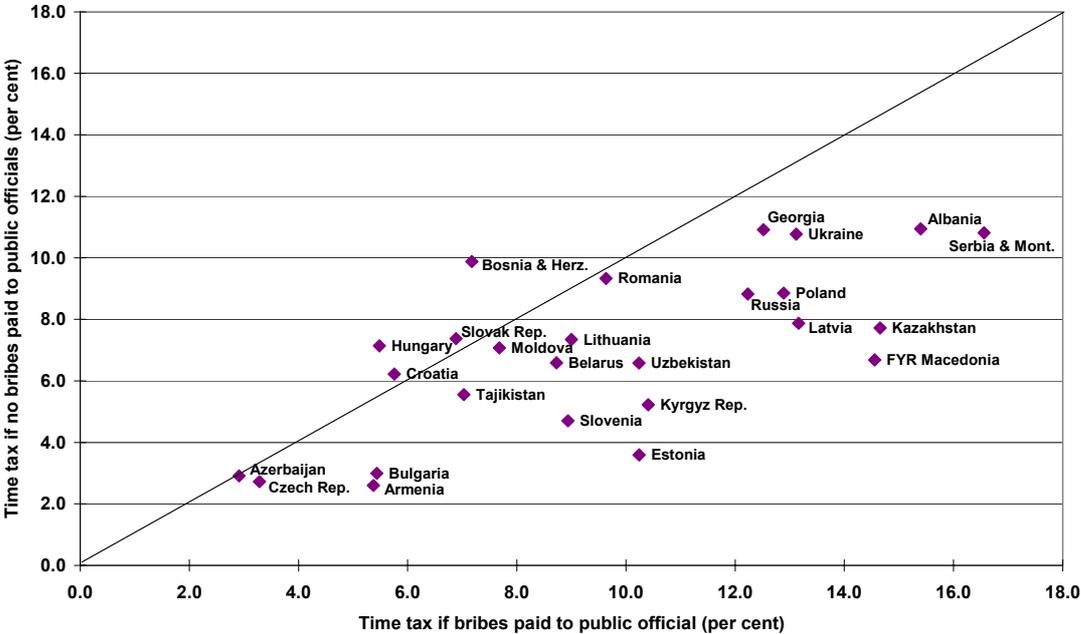
1) Proportion of firms bribing regulatory public officials is calculated for each country as an unweighted share of those firms that bribed customs authorities at least frequently (answers 4 to 6 on a scale of 1 to 6) in at least one of the four dimensions (business licenses and permits, occupational safety, fire and building inspections and environment inspections).

2) Time tax is calculated for each country as an unweighted average of individual firms’ responses on the proportion of senior managements’ working time spent dealing with public officials.

The significant correlation at the country average level between the regulatory time tax and the proportion of firms that bribe public officials, however, says little about the specific nature of corruption and its impact on businesses. There are at least two possible explanations for the association between corruption and regulatory intervention, which focus on alternative roles of government in promoting or stifling private activity (see Shleifer and Vishny, 1993, and Fry and Shleifer, 1997). In the first, corruption is part of an exchange between firms and bureaucrats in which a firm pays bribes in return for less intrusive regulation. In this view, corruption is organised within the state so that it promotes selected private sector activity. In the second, corruption is disorganised and associated with predatory regulatory practices. In this view, the government consists of a large number of independent bureaucrats pursuing their own interests, such as taking bribes, with no regard for the impact of their actions on private sector activity. This is sometimes referred to as the “grabbing hand” view of the state.

Chart 5 shows the country average time tax for those firms paying bribes related to business regulation to public officials and for those not paying such bribes. The 45-degree line shows the points of equality between the two average time taxes by country. In most countries, firms that pay bribes to such officials also incur a higher time tax than do those firms that do not pay bribes. This finding, therefore, lends some partial empirical support to the “grabbing hand” view of the state in transition economies, even though the evidence reported above on tax avoidance suggests the role of the state is less detrimental to business activity. One explanation for the different findings on the effects of corruption in tax administration and in business regulation is that the former is more centralised and coordinated than the latter and that decentralised and uncoordinated business regulation results in “over-grazing of the commons” by public officials.

Chart 5: Average time tax for firms paying bribes to public officials and for firms not paying bribes, by country



Note:

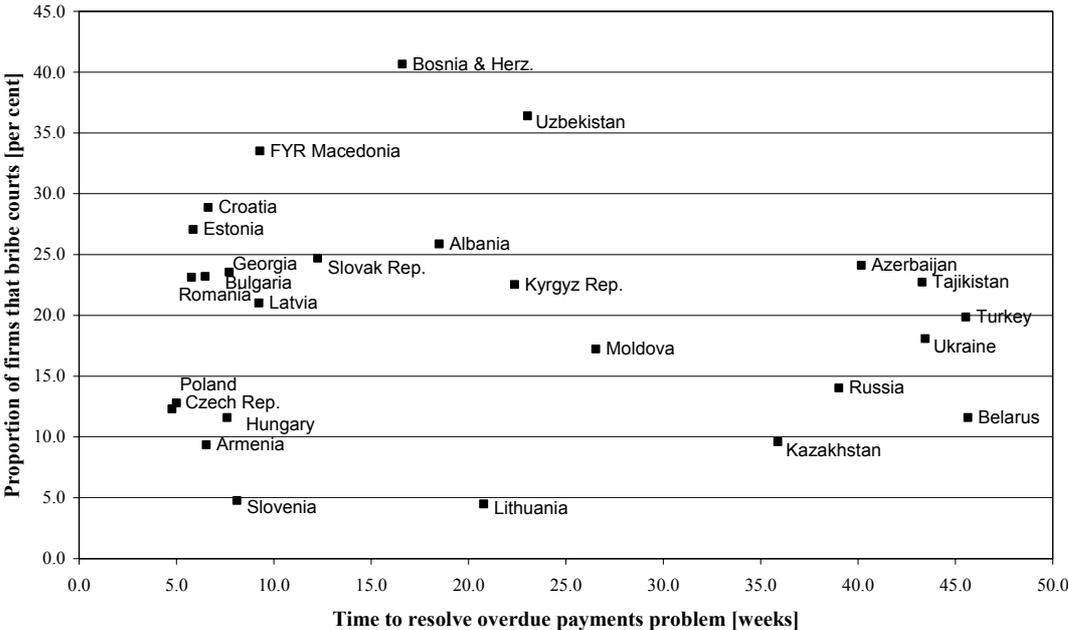
1) Time tax is calculated for each country as an unweighted average of individual firms’ responses on the proportion of senior managements’ working time spent dealing with public officials. The averages are calculated separately for those firms that bribe frequently or more to deal with public officials in areas of business regulation and those that do not.

Judiciary and crime

One measure that reflects the functioning of the judiciary is the average time needed to resolve overdue payments (delays in contract enforcement). This measure reflects both the time of pursuing a claim through the courts as well as through alternative collection procedures. Because of the time value of money, this measure serves as a proxy for enforcement costs that are associated with these collection procedures. The BEEPS asked respondents how long on average it takes to collect on overdue payments and how frequently firms like theirs paid bribes to deal with the courts.

Chart 6 shows for the 2002 survey the relationship between time needed to resolve overdue payments and the proportion of firms in each country that pay bribes to deal with courts at least frequently. The correlation coefficient of -0.18 is correctly signed but statistically insignificant, implying that on average there is little association between the average time required to resolve overdue payments and the proportion of firms that bribe court officials.

Chart 6: Average time required to resolve overdue payments and proportion of firms that are perceived to pay bribes to court officials



Notes:

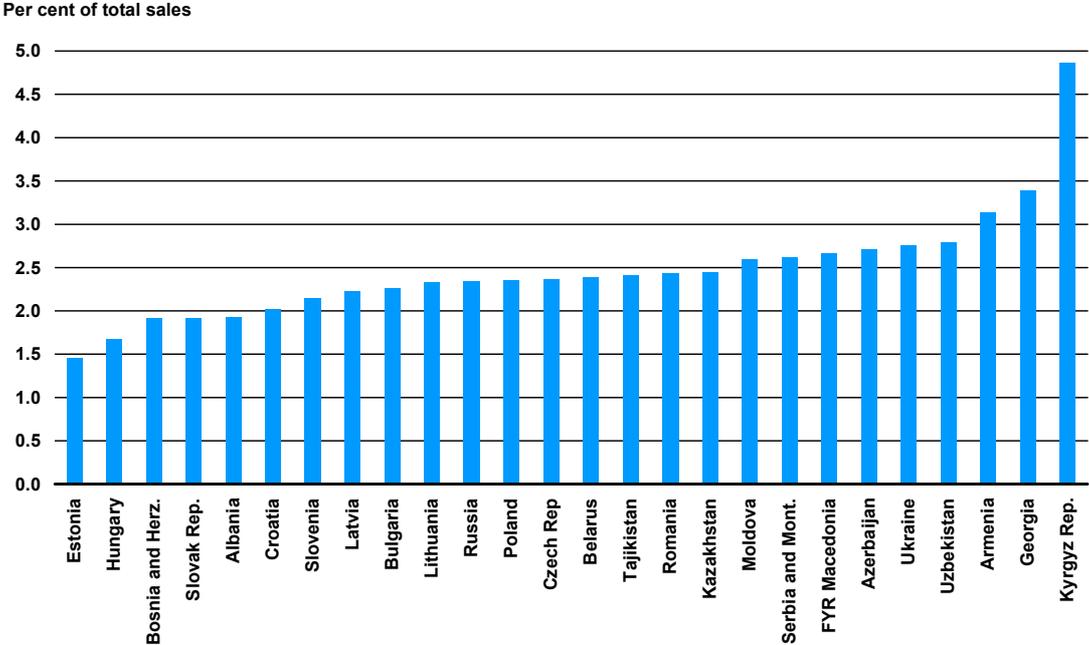
- 1) Proportion of firms perceived to bribe courts officials is calculated for each country as an unweighted share of those firms that bribed customs authorities at least frequently (answers 4 to 6 on a scale of 1 to 6) in at least one of the four dimensions (business licenses and permits, occupational safety, fire and building inspections and environment inspections).
- 2) Time to resolve overdue payments problem is calculated for each country as an unweighted average of individual firms' responses.

Several measures of confidence in the courts were also examined to see whether they were correlated with either qualitative assessments of the courts as a business obstacle (discussed above) or the proportion of firms in a country that are perceived to pay bribes to court officials. These measures included the proportion of sales that are pre-paid (preference for cash-in-advance over credit) and a qualitative question on whether respondents were confident that the legal system would uphold their contracts and property rights in business disputes. However, no significant correlations were observed between these measures of confidence in contracts (or more generally, in the legal system) and the proportion of firms in country that are perceived to pay bribes to deal with the courts. There was also no correlation between these measures and qualitative assessments of the courts as a business obstacle.

One measure of the cost of crime on businesses is the amount of losses incurred due to certain crimes. The BEEPS asked respondents to express the losses to their firms due to theft, robbery, vandalism or arson as a per cent of total sales, as well as whether firms paid for private security and protection to secure their property. Chart 7 shows, by country, the

average losses incurred by firms due to crime. Those countries with the highest losses are Armenia, Azerbaijan, Georgia, the Kyrgyz Republic, Ukraine and Uzbekistan. Those countries with the lowest average losses are Estonia and Hungary.

Chart 7: Average losses due to crime, by country

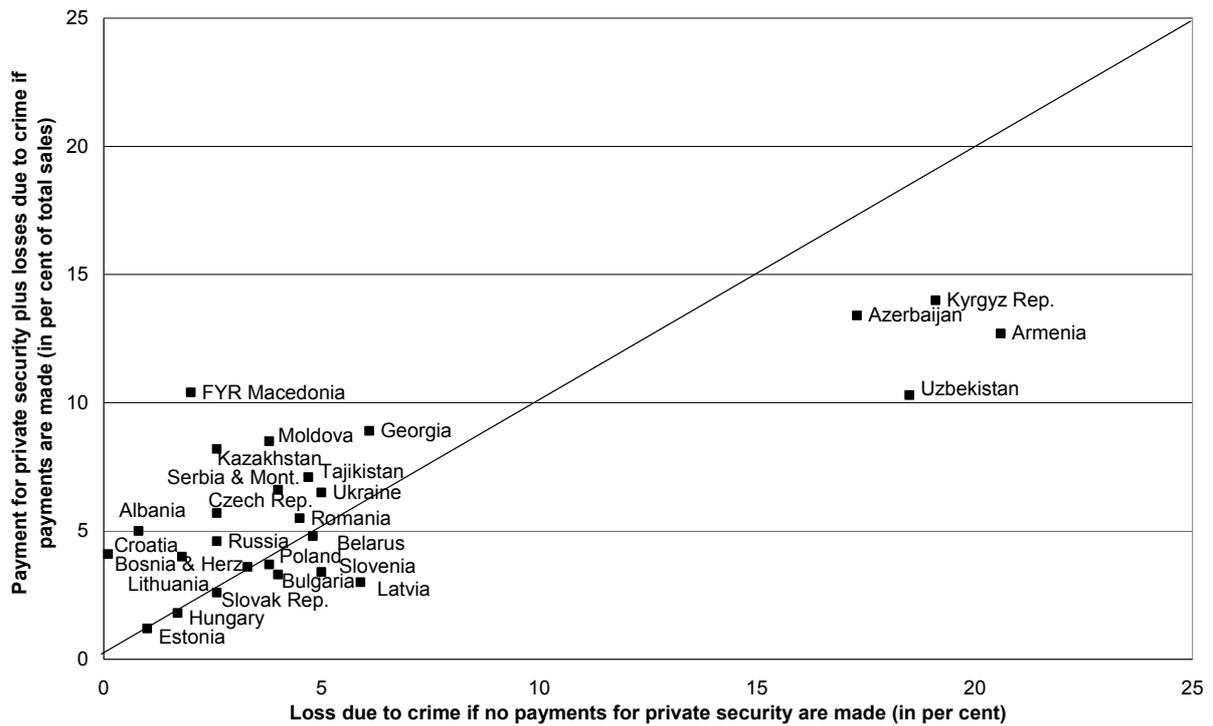


Note:

1) Losses due to crime as a per cent of total sales are calculated for each country as un-weighted averages of individual firm’s responses.

Chart 8 shows the average losses caused by crime and the net effect of paying for private security and protection by comparing these losses, averaged by country, for those firms that do not make such payments to the average payment plus losses for those that do pay for these services. The calculation excludes all firms in a country that neither incur losses due to crime nor make payments for private security and protection. The 45-degree line equates the two averages. For most countries the difference between the two averages is not statistically different from zero. Only in Kazakhstan and Russia are the net savings from making these payments significantly different from zero and in these countries the avoided losses due to crime do not exceed the value of the payment made.

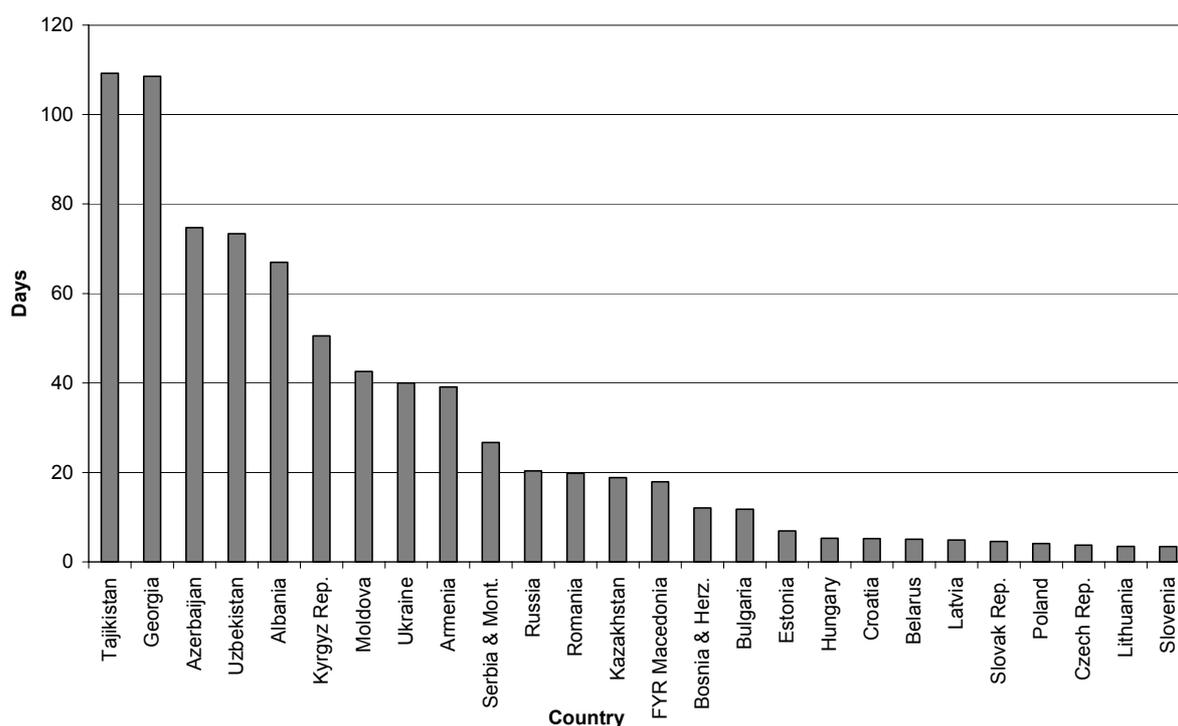
Chart 8: Average losses due to crime and the net effect of paying for private security and protection



Notes:

- 1) Average cost of private security and protection plus losses due to crime is the unweighted average by country of those firms that make such payments expressed in per cent of total sales.
- 2) Average losses due to crime for those firms that do not pay for private security and protection is the unweighted average by country for those firms that do pay for these services and that incur positive losses due to crime.

**Chart 9: Total number of working days lost due to failures
in provision of infrastructure services**

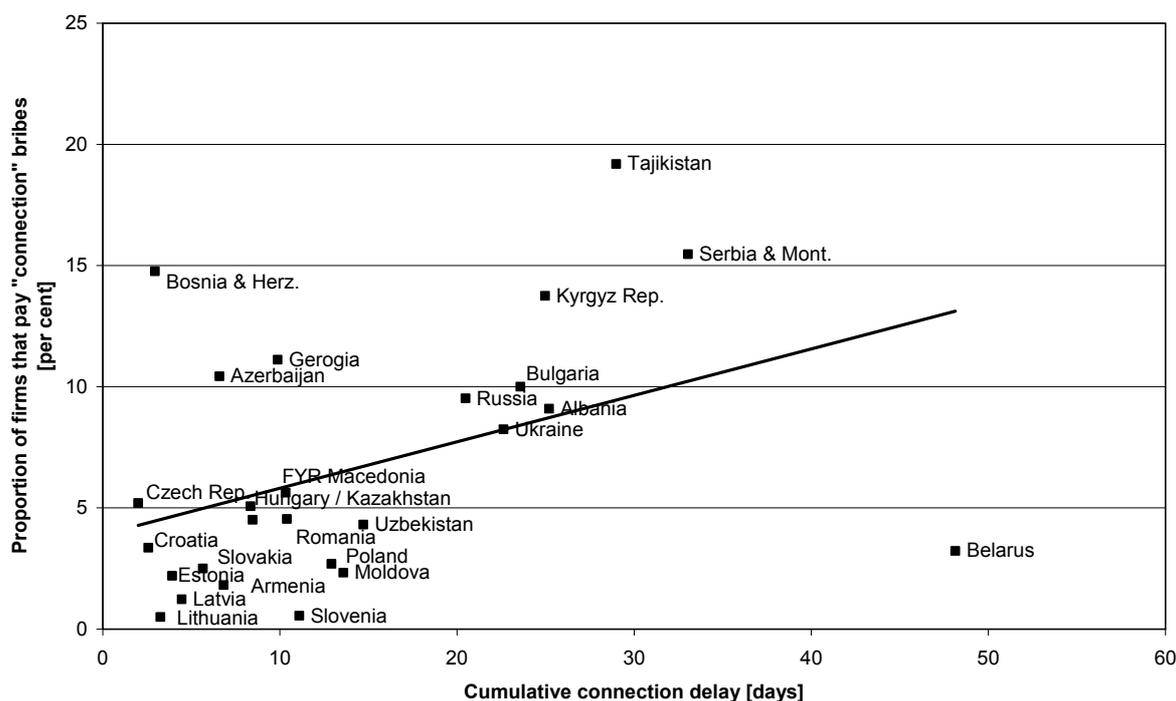


Note:

1) Total number of working days lost due to failures in provision of infrastructure services is calculated for each country as an unweighted average of firm-level sums of days lost due to power outages or surges from the public grid, insufficient water supply and unavailable mainline telephone service.

Additional measures of the extent to which infrastructure services create business obstacles are: the delays encountered in obtaining connections to electricity and telephone services, and the proportion of firms that are perceived to pay bribes frequently or more to obtain such connections. As Chart 10 shows, the two measures are significantly correlated with a correlation coefficient of 0.41 (statistically significant at the 5 per cent level). Countries with the longest connection delays are Belarus, Serbia and Montenegro, Tajikistan and the Kyrgyz Republic and the countries with shortest delays are the Czech Republic, Croatia, Bosnia and Herzegovina and Lithuania.

Chart 10: Cumulative connection delay and proportion of firms that are perceived to pay infrastructure connection bribes by country



Notes:

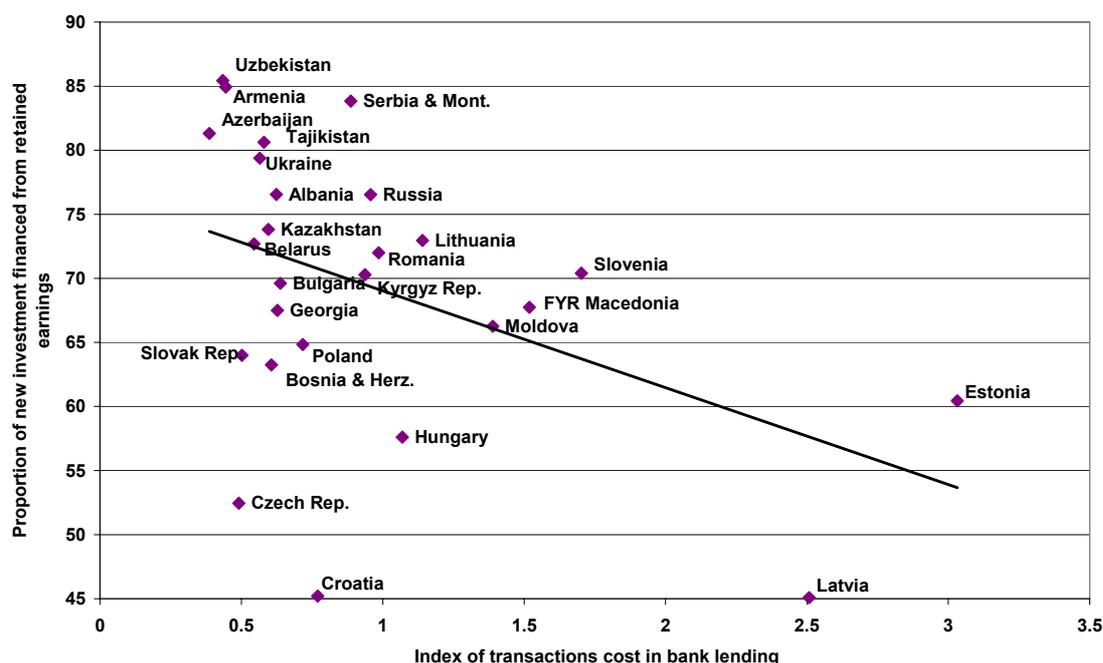
- 1) Cumulative connection delay is calculated for each country as an unweighted average of the sum of connection delays to fixed telephone line and electricity.
- 2) Proportion of firms making infrastructure connection bribes is calculated for each country as an unweighted share of those firms that paid bribes to get connected to fixed telephone line or electricity at least frequently (answers 4 to 6 on a scale of 1 to 6).

Finance

One measure of the extent to which finance represents a business obstacle is the length of time between the submission of a successful loan application and the time at which the loan is granted. This is a measure of the transactions costs involved in this process. However, one should take into account the type of loan that is being sought, in particular whether it is a short-term loan for working capital or a long-term loan for new investment. The measure should also take into account whether the loan is “soft” or “hard” in terms of the collection effort that banks are anticipated to mount in the event that the loan is not serviced in full.

Chart 11 reports the ratio of loan maturity in months and the time required to obtain the loan in days. The country average is unweighted across those firms that perceive that banks would take strong loan collection efforts if loan payments were to be missed. This is a proxy measure for the transactions costs incurred in obtaining a bank loan that is expected to be repaid. The chart also shows, for each country, the average proportion of financing needs for new investments that firms obtained from retained earnings. The two measures are significantly and inversely related (correlation coefficient of -0.44, which is significant at the 5 per cent level). That is, countries with less efficient banks tend to have greater proportions of internal financing for new investment. Countries with the lowest transactions costs in bank lending are Estonia, Latvia and Slovenia while the highest are Armenia, Azerbaijan and Uzbekistan.

**Chart 11: Index of transactions cost in banking lending
and proportion of informal finance**



Notes:

- 1) Index of transactions costs is calculated for each country as the average ratio between average country-level loan duration in months and average number of days to grant loans upon application. The average is calculated for only those borrowers that expect their banks to take strong collection measures if loan interest and principle payments were missed.
- 2) Proportion of retained earnings in the financing of new investment is calculated as unweighted averages across firms in each country.

Corruption and kickbacks

Preceding parts of this section show that obstacles in the business environment are often associated with corrupt practices in the public administration, including access to infrastructure services. While in some cases paying bribes may reduce taxes or improve access to public services, this is not always the case as shown with the analysis of business regulation. The costs associated with administrative corruption can, therefore, impose a significant burden on firms and one measure of this cost is the proportion of sales that are paid in the form of unofficial payments to public officials – the so-called “bribe tax”. Table 3 reports the proportion of firms responding to the BEEPS in each country that report paying at least some bribes and the average proportion of sales that firms like theirs paid in bribes. The table also reports the average bribe tax paid by all firms, including those that paid no bribes.

Countries in which more than one-half of firms reported paying at least some bribes include Albania, Azerbaijan, Bulgaria, FYR Macedonia, Georgia, Kazakhstan, the Kyrgyz Republic, Moldova, Romania, Russia, Serbia and Montenegro, the Slovak Republic, Tajikistan and Ukraine. Among those firms in these countries that paid bribes, the average bribe tax rate centred on 5 per cent, except in FYR Macedonia where it was significantly lower. Armenia, Croatia and Slovenia appeared to have the lowest incidence of administrative corruption.

Table 3 also allows for a similar analysis of the kickbacks paid to receive government contracts. It reports the proportion of firms responding to the BEEPS in each country that report paying at least some kickbacks and the average proportion of government contract

values that these firms paid in kickbacks. The table also reports the average kickback tax paid by all firms, including those that made no such payments. Countries in which more than one-third of firms reported paying at least some kickbacks include Albania, Azerbaijan, Bosnia and Herzegovina, Bulgaria, Estonia, FYR Macedonia, Georgia, the Kyrgyz Republic, Serbia and Montenegro, the Slovak Republic, Tajikistan and Ukraine. Among those firms in these countries that paid bribes, the average bribe tax rate ranged between 5 and 10 per cent, except in Azerbaijan where it was significantly higher. Armenia, Croatia, Moldova and Slovenia appeared to have the lowest incidence of corruption in government procurement.

Table 3: Bribes and kickbacks paid in 2002 by country
(in per cent)

Country	Share of firms paying bribe tax	Average bribe tax rate	Average bribe tax	Share of firms paying kickbacks	Average kickback tax rate	Average kickback tax
Albania	77.1	4.6	3.3	68.8	9.6	6.0
Armenia	21.6	4.8	0.9	11.7	5.8	0.5
Azerbaijan	52.9	6.0	2.7	33.5	18.3	4.8
Belarus	44.8	3.4	1.5	24.4	4.9	1.1
Bosnia and Herzegovina	42.3	3.0	0.9	35.7	7.8	1.2
Bulgaria	51.2	4.2	1.9	37.2	8.5	2.5
Croatia	24.6	2.6	0.6	11.2	7.9	0.9
Czech Republic	36.6	2.9	0.9	31.7	5.2	1.2
Estonia	42.9	1.1	0.3	37.6	5.0	1.0
FYR Macedonia	61.2	1.5	0.8	44.1	10.2	2.9
Georgia	65.5	4.4	2.7	41.4	8.6	3.0
Hungary	47.6	2.4	1.0	27.6	7.6	2.1
Kazakhstan	58.4	3.8	2.1	28.4	6.2	1.5
Kyrgyz Republic	64.7	6.3	3.7	36.4	7.6	2.4
Latvia	46.6	2.3	0.9	23.3	7.3	1.3
Lithuania	44.0	1.9	0.7	30.5	4.7	1.0
Moldova	53.4	4.0	2.1	14.9	5.0	0.7
Poland	40.6	3.4	1.2	30.2	10.4	2.2
Romania	54.9	4.7	2.6	26.3	8.1	2.1
Russia	64.6	2.3	1.4	29.8	5.9	1.5
Serbia and Montenegro	54.0	4.0	1.5	52.0	6.8	1.8
Slovak Republic	62.9	2.6	1.4	56.5	6.8	3.3
Slovenia	14.9	5.4	0.8	12.8	5.2	0.7
Tajikistan	65.3	4.0	2.6	37.5	5.0	1.8
Ukraine	52.1	4.4	2.2	38.2	8.4	2.1
Uzbekistan	48.1	3.2	1.5	22.7	5.3	1.1

Notes:

- 1) Share of firms in each country paying at least some bribes and kickbacks in per cent of responding firms.
- 2) Bribe and kickback tax rates are the proportions of sales and of government contracts, respectively, paid in bribes and kickbacks averaged for all firms that made such payments.
- 3) Average bribe and kickback tax are calculated as unweighted averages of all responses, whether or not bribes and kickbacks were paid.

5. INFLUENCE AND STATE CAPTURE

State capture refers to actions of individuals, groups or firms to influence the formulation of laws, regulations, decrees and other government policies (that is, the basic rules of the economic “game”) to their own advantage though illicit or non-transparent means. So-called captors can be individuals, groups or firms from the private sector that seek market rents, low cost assets or other advantages from the state. This has been a concern about the functioning of a market economy at least since time of Adam Smith, who expressed concern in the *Wealth of Nations* (Book 4) about the propensity of merchants and manufacturers to pursue their interests through political influence on the commercial system, particularly in the form of import restrictions. Public officials themselves can also capture the state if they abuse their authority to shape institutions to further their private interests at the expense of the broader public interest.

While the influence of private interests on state institutions is a normal and desirable aspect of political processes, state capture goes beyond legitimate forms of influence. These legitimate forms include transparent lobbying through interest groups that are exposed to open debate and to pressures from counter-veiling interests such as consumers or competitors. State capture is a form of influence that is illicit and non-transparent and operates through preferential access of private individuals and groups to state officials. It can also occur through undisclosed (or not widely understood) business interests of public officials, their relatives and close associates. The potential for both forms of state capture is greater where there are constraints on the contestability of political power.

The BEEPS seeks to identify state capture and its impact in two ways. One set of questions asks firms whether they sought to influence the content of laws and regulations affecting it and whether firms like theirs make unofficial payments or gifts for this purpose. Those firms that answered positively to both questions are identified as captor firms (laws and regulations). Firms that are expending resources to influence laws and regulations can be expected to benefit in some way from these expenditures, for example, by obtaining competitive advantages in the market place. A second BEEPS question asks whether firms have been directly affected by unofficial payments or gifts to various types of state officials, including parliamentarians and government officials. Firms that identify themselves as having experienced such effects of influence and are not themselves engaged in state capture may be expected to incur costs from such practices, such as competitive disadvantages. This is referred to as the external cost of state capture and reflects the redistributive nature of this activity. The extent of the private benefits and external costs associated with state capture are examined empirically in Section 7.

Table 4 reports for the 2002 survey the proportion of firms in each country that are identified as captor firms (laws and regulations) and the external effect of state capture (laws and regulations) associated with influence payments to parliamentarians and government officials. Together with the external effect of capture (laws and regulations), the table also reports the proportion of firms that have been directly affected by unofficial payments or gifts to court officials. The table shows that the incidence of state capture and its perceived costs are significantly correlated (correlation coefficient of 0.68, which is statistically significant at the five per cent level). In other words, those countries that have a higher proportion of firms that report as having engaged in state capture also have a higher proportion of firms that report as having been affected by this activity.

Table 4: Proportion of captor firms (laws and regulations) and the external costs of capture (both laws and regulations and the courts) by country (in per cent)

Country	Proportion of captor firms (laws and regulations)	Proportion of firms affected by capture (laws and regulations)	Proportion of firms affected by capture (courts)
Albania	12.4	34.1	44.7
Armenia	3.5	9.2	11.1
Azerbaijan	1.2	23.2	17.1
Belarus	3.6	7.2	20.0
Bosnia and Herzegovina	7.8	35.9	38.5
Bulgaria	10.0	38.8	45.6
Croatia	11.2	18.2	22.5
Czech Republic	2.6	17.3	22.8
Estonia	6.5	13.6	8.2
FYR Macedonia	13.5	33.6	36.5
Georgia	12.1	31.0	33.3
Hungary	6.0	12.9	11.2
Kazakhstan	2.0	13.0	15.2
Kyrgyz Republic	8.1	27.3	31.8
Latvia	8.5	29.3	25.6
Lithuania	5.1	18.6	21.0
Moldova	8.6	28.8	43.7
Poland	3.6	15.5	16.6
Romania	4.7	21.4	24.3
Russia	4.8	11.8	17.4
Serbia and Montenegro	11.2	25.7	25.2
Slovak Republic	4.7	23.0	27.1
Slovenia	6.4	20.7	20.7
Tajikistan	7.5	35.3	55.1
Ukraine	4.8	16.3	25.3
Uzbekistan	2.3	27.2	29.2

Notes:

1) Proportion of captor firms was calculated as interaction of two questions: (a) one that asks firms to report if they attempted to influence the government and (b) a second that asks whether firms like theirs make any unofficial payments in attempt to influence the content of laws and regulations.

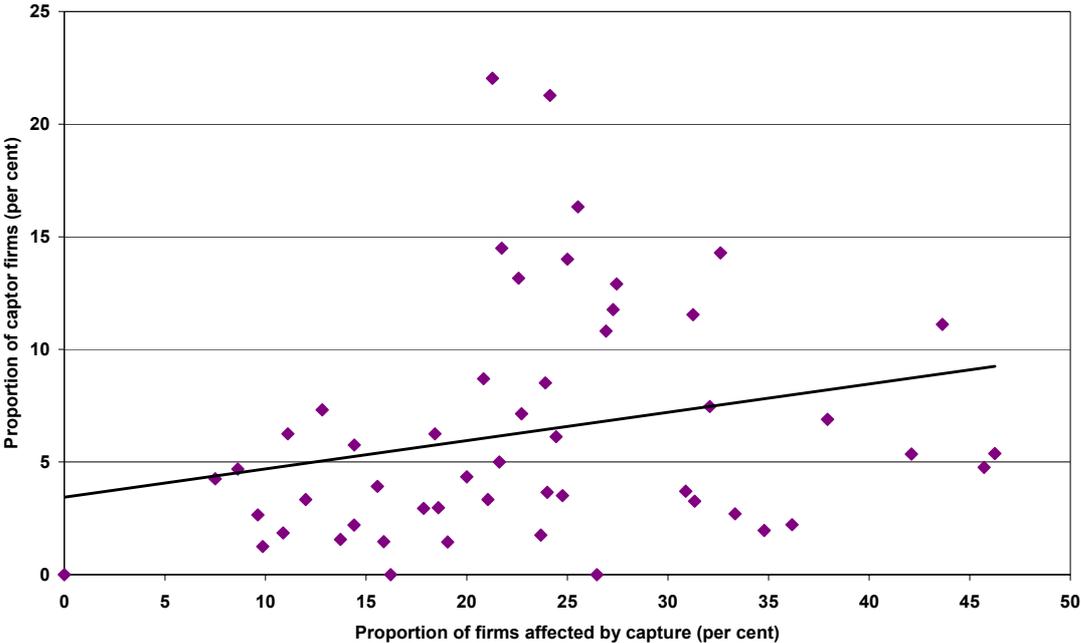
2) Proportion of firms affected by capture (laws and regulations) is measured by a proportion of firms that perceive at least minor impact by unofficial payments to affect either parliamentarians or government officials and that are not themselves captor firms.

3) Proportion of firms affected by capture (courts) is measured by a proportion of firms that perceive at least minor impact by private payments to affect decisions of either criminal or commercial courts.

Chart 12 shows the correlation, both for all countries and for two sectors (manufacturing and wholesale and retail trade), between the proportion of captor firms and the proportion of firms that experience the costs associated with this activity. The two chosen sectors account for between 17 and 46 per cent of the samples in each country and so there are a minimum of 30

observations in each possible country and sector for calculating the proportions of firms that are captor firms and that are affected by capture. The chart shows that countries and sectors in which captor firms operate also tend to be the sectors in which the effects of state capture are experienced by other firms. This correlation suggests that captor firms are seeking competitive advantages through these actions in the markets and sectors where they operate. This preliminary conclusion is investigated further in the next section. The ratio of the proportion of firms affected by capture to that of captor firms is about four to one.

Chart 12: Incidence of state capture and of the affects of capture by sector and country in 2002



Note:

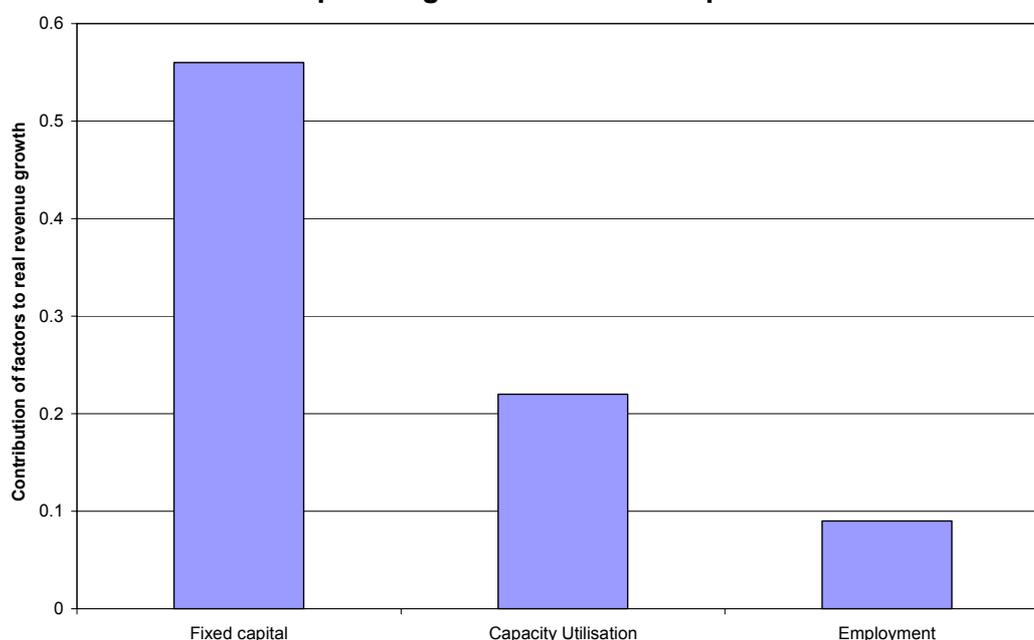
1) The proportion of captor firms (laws and regulations) and the proportion of firms affected by capture (laws and regulations) are defined as in Table 5. The firm level data are aggregated for two sectors (manufacturing and wholesale and retail trade) and for all sectors. The other sectors are excluded from the analysis because the number observations in other sectors are small and the proportions of captor firms and of firms affected by capture tend toward either zero or one.

6. ENTERPRISE PERFORMANCE AND THE BUSINESS ENVIRONMENT

It is often asserted – but infrequently shown – that the quality of the business environment and of state institutions, infrastructure and finance has a significant impact on the operation and growth of firms. The primary channels through which the business environment is thought to influence enterprise performance are the incentives for investment and innovation. In fact, cross-country empirical studies identify a positive association between long-run growth of GDP per capita and measures of institutional quality at the beginning of the period over which the growth rate is measured. Early examples of this literature are Knack and Keefer (1995) and Mauro (1995), while recent contributions are Acemoglu and Thaicharoen (2003), Easterly and Levine (2003) and Rodrik, Subramanian and Trebbi (2002).

This section examines the relationship between the business environment and investment and innovation at the firm level. This analysis involves two steps. The first is to estimate at the firm level the marginal contributions that the growth in inputs (capital, labour and skills) makes to the real growth in revenues. This analysis also allows us to calculate at the firm level the contribution of total factor productivity growth to the real growth in revenues. The second is to identify those factors not directly under the control of individual firms that are correlated with investment, productivity gains and real revenue growth at the firm level, such as real GDP growth, quality of the business environment and state capture, as well as market structures and ownership at the firm level. Appendix D contains the detailed statistical analysis, while the key results are summarised forthwith.

Chart 13: Estimated elasticity of real revenue growth with respect to growth in factors of production



Note:

1) The chart shows the estimated elasticities averaged across for eight economic sectors. Each sector receives an equal weight in calculating the average. See Appendix D for the estimated parameter values for each sector.

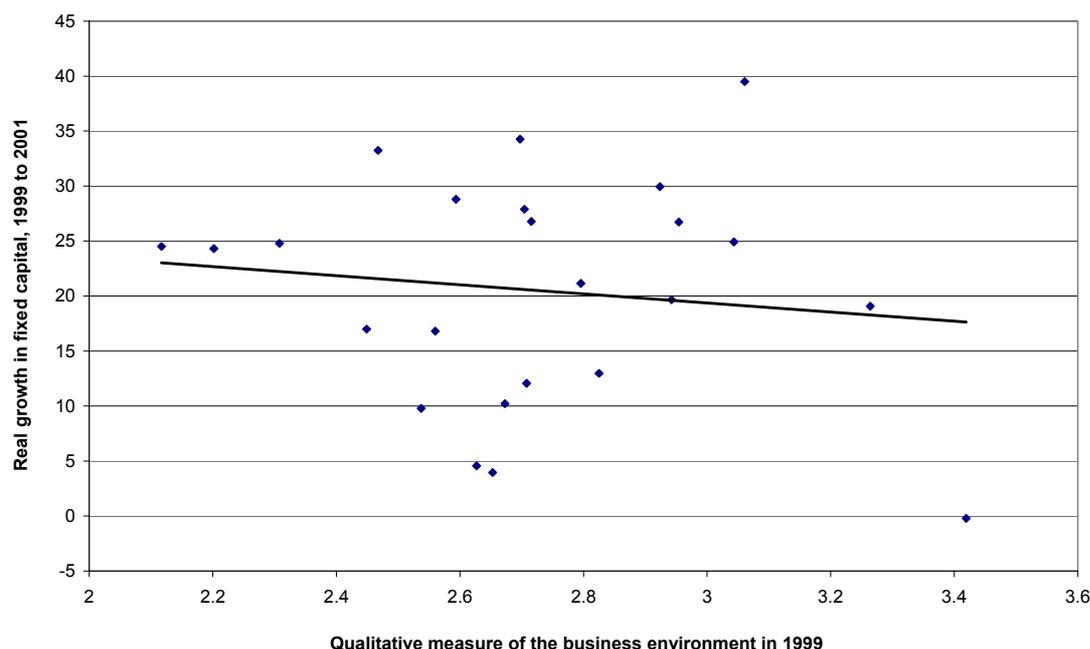
Chart 13 reports for each sector the estimated marginal contribution, measured as elasticities, of the growth in capital, labour, skills and capacity utilisation to the real revenue (output) growth of firms. A surprising finding is the high marginal contribution to output growth made by the growth of fixed assets. The elasticities range across sectors from 0.33 in the retail and wholesale sector to 0.75 in the sector that includes transport, storage and communication services. In most industrialised countries, the estimated elasticity of production in industry with respect to capital is around 0.33, the lower bound of the estimates based on the BEEPS sample. Increases in capacity utilisation also contribute significantly to real revenue growth. Taken together, growth in fixed assets and capacity utilisation account for between one-half to three-quarters of real revenue growth in the seven sectors.

Another significant finding is that real revenue growth is only weakly related to employment growth in most sectors. This result may reflect labour hoarding, which is thought to be widespread in the region. Consistent with this interpretation is the significant impact of changes in capacity utilisation on growth. However, while changes in employment are not significant, an upgrading of firms' skills does make a significant marginal contribution to output growth.

Given the significant marginal contribution of investment to the real revenue growth of firms, we now investigate what factors beyond the short-run control of individual firms are associated with investment (and productivity growth) at the firm level and with the real revenue growth. Some of the potential explanatory variables are derived from the theory of investment and they are proxies for the marginal return to capital (acceleration of growth in aggregate demand), the risks to that return (business environment and state capture), potential to earn market rents (market structures), and firm incentives and skills (ownership and origin of firms). While these factors may be systematically related to investment, factors associated with changes in productivity are more difficult to identify because they are in part related to characteristics of firms that are not well measured by the BEEPS.

Chart 14 shows the significant relationship on a country average basis, between the quality of the business environment in 1999 and the rate of investment in the period 1999 to 2001. Those countries that had a more favourable business environment in 1999 saw significantly higher investment rates in the following three years. The statistical estimates reported in Appendix C based on firm level regressions finds that a 0.5 improvement on the business environment (the average improvement in the business environment for all countries between 1999 and 2000) would be associated with a 4.9 per cent increase in the investment rate (ratio of investment to existing capital stock). However, the quality of the business environment is correlated with acceleration in growth of aggregate demand and this term may be capturing some of the effects of changes in aggregate demand that are unrelated to the business environment.

Chart 14: The business environment in 1999 and real growth in fixed capital between 1999 and 2001 by country



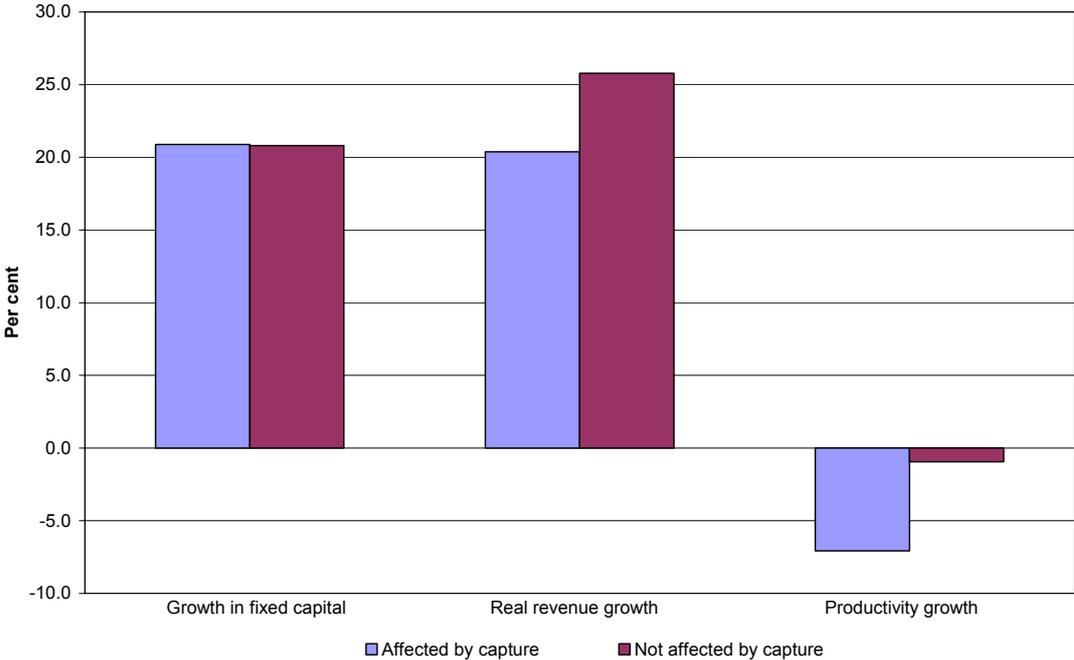
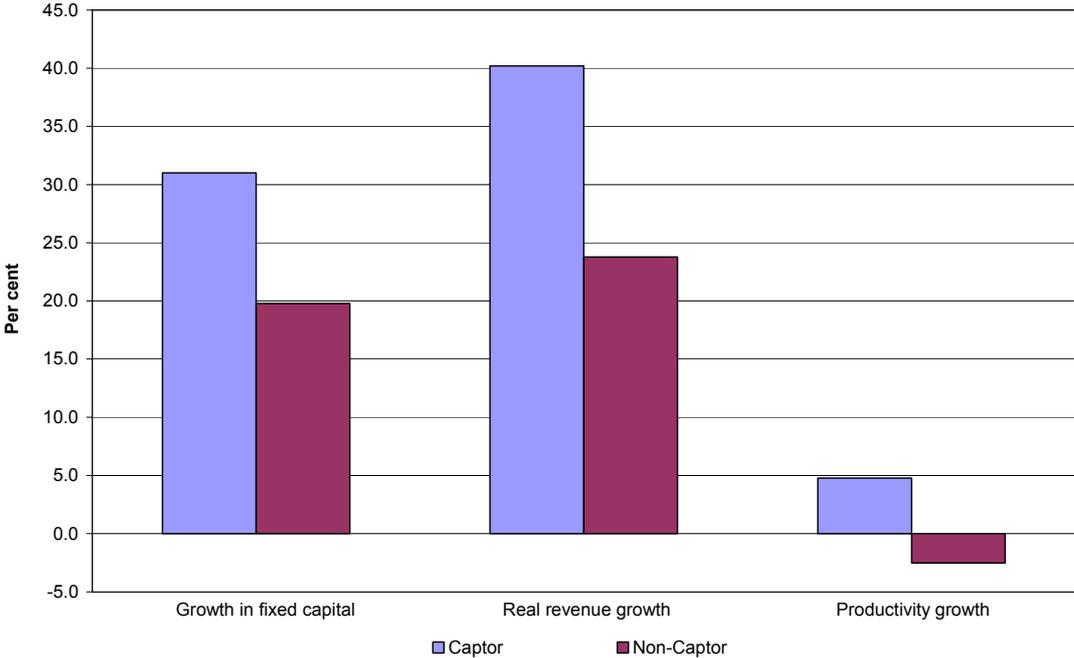
Note:

1) See Appendix D for the econometric estimation of the slope of the fitted line using firm level data.

Chart 15 shows the significant positive association between firms that engage in state capture and their average investment and real revenue growth rates. The chart also shows that those firms that engage in state capture have significantly higher investment rates than those that do not. The statistical estimates reported in Appendix C based on firm-level regressions find that those firms engaged in state capture have investment rates about 10 per cent higher and real revenue growth rates about 15 per cent higher than do other firms. At the same time, those firms that report being affected by state capture have slightly lower rates of productivity and sales growth than do other firms. This finding suggests that state capture is associated with high rates of growth and investment by those firms that engage in it, but is associated with unexpected reductions in real revenue growth and productivity of other firms. In other words, state capture appears to be aimed at strengthening the market position of those firms that engage in it at the expense of other firms.

In addition to country-level factors such as growth in aggregate demand, quality of the business environment and extent of state capture, several firm-level factors are associated with enterprise performance. Consistent with existing empirical evidence on enterprise performance in transition economies, firm origin and ownership appear to play a significant role. In particular, the statistical estimates reported in Appendix D based on firm-level regressions find that new private firms have investment rates about 18 per cent higher and real revenue growth rates about 21 per cent higher than privatised firms, while state-owned firms have rates 9 per cent and 11 per cent lower, respectively. At the same time, those firms that report having little or no market power have significantly lower rates of investment and real revenue growth than do those firms with significant market power as measured by the perceived elasticity of demand.

Chart 15: State capture and its effects on firm investment, growth and productivity



Notes:

- 1) The charts show the sample averages of the percentage change in fixed capital, real revenues and productivity over the period 1999 to 2001 for captor and non-captor firms and for firms affected by capture and those not affected.
- 2) See notes 1 and 2 in Table 4 for the definitions of captor firms and of firms affected by capture.
- 3) See Appendix D for the econometric estimation of the parameter values using firm level data.

7. CONCLUSION

This paper provides an overview of the 2002 round of the BEEPS, describing many of the key findings from the survey aggregated at the country level. The richness of the data and measures – both qualitative and quantitative – shows the variation in the business environment across its various dimensions and countries, as well as changes in the business environment over time using qualitative measures of business obstacles from the 1999 and 2002 rounds of the survey. The effect of the business environment and state capture on costs and on real revenue growth, investment and productivities are also examined.

Four important conclusions arise from the analysis in this paper. First, the qualitative measures of the business environment in the BEEPS appear to provide reasonably accurate measures of the quality of the business environment across both its various dimensions and countries and over time. Second, these measures show that the business environment in many transition economies has improved significantly between 1999 and 2001. Third, the analysis of the quantitative measures of the business environment shows a strong association between business obstacles on the one hand and corruption, private security protection or reliance on internal sources of finance (retained earnings) on the other. These associations highlight some of the costs and constraints imposed on businesses by an inadequate business environment; however, the nature of corruption in tax administration, which tends to be centralised, appears to be less costly to firms than from that in business regulation, which is decentralised.

Fourth, the analysis of firm investment and growth shows that the quality of the business environment in 1999 (based on qualitative measures) is significant and positively associated with investment by firms in the period 1999 to 2001. It also shows that state capture significantly boosts the investment and productivity of firms that engage in this activity but holds back the growth performance other firms. The ratio of the proportion of firms affected by capture to that of captor firms is about four to one, while the benefit to captor firms in terms of higher real revenue growth exceeds the lower real revenue growth of firms affected by capture by a factor of four. This suggests that capture is essentially a redistributive game with a few winners and many losers.

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APPENDIX A: SAMPLE STRUCTURE

**Table A.1: Target and completed sample sizes
(Number of interviews)**

Country	Target	Completed
Albania	170	170
Armenia	170	171
Azerbaijan	170	170
Belarus	250	250
Bosnia and Herzegovina	170	182
Bulgaria	250	250
Croatia	170	187
Czech Republic	250	268
Estonia	170	170
FYR Macedonia	170	170
Georgia	170	174
Hungary	250	250
Kazakhstan	250	250
Kyrgyz Republic	170	173
Latvia	170	176
Lithuania	170	200
Moldova	170	174
Poland	445	500
Romania	250	255
Russia	445	506
Serbia and Montenegro	250	250
Slovak Republic	170	170
Slovenia	170	188
Tajikistan	170	176
Ukraine	445	463
Uzbekistan	250	260

Table A.2: Structure of sample by country and sector of economic activity
(in per cent of the total sample in each country)

Country	Mining & quarrying	Construction	Manufacturing	Transport, storage & comm.	Retail & wholesale trade	Real estate & bus. Services	Hotels & restaurants	Other services
Albania	1.2	11.2	36.5	8.2	24.7	5.3	7.6	5.3
Armenia	1.8	6.4	37.4	5.8	27.5	5.8	9.4	5.8
Azerbaijan	1.8	15.9	28.8	5.9	33.5	4.7	5.3	4.1
Belarus	0.0	27.2	16.8	10.0	32.0	6.0	2.0	6.0
Bosnia & Herz.	1.6	6.6	37.4	6.6	31.3	3.8	8.2	4.4
Bulgaria	1.2	7.6	19.6	10.0	37.2	8.8	8.4	7.2
Croatia	1.6	12.8	20.3	8.0	31.6	15.0	5.3	5.3
Czech Republic	1.1	14.9	25.7	7.8	25.4	11.9	8.6	4.5
Estonia	1.8	12.4	17.6	9.4	28.2	16.5	8.8	5.3
FYR Macedonia	1.2	7.6	27.6	8.2	37.1	6.5	8.2	3.5
Georgia	0.6	5.7	19.5	9.8	33.3	10.9	6.9	13.2
Hungary	1.6	14.4	20.4	6.4	32.0	12.0	6.4	6.8
Kazakhstan	2.4	19.2	21.6	6.0	27.6	14.8	4.4	4.0
Kyrgyz Republic	2.9	12.1	28.3	7.5	30.1	8.1	4.6	6.4
Latvia	0.0	6.8	15.9	8.0	46.0	14.2	5.1	4.0
Lithuania	1.5	14.0	20.5	12.0	24.0	11.5	13.5	3.0
Moldova	0.0	2.9	28.7	6.3	42.5	1.7	5.2	12.6
Poland	0.0	15.2	22.8	10.8	33.6	9.6	3.0	5.0
Romania	0.0	9.4	32.2	7.8	26.7	10.2	6.7	7.1
Russia	1.4	15.8	25.3	7.3	27.1	7.9	3.8	11.5
Serbia & Mont.	1.6	7.2	27.6	8.8	29.6	10.8	7.2	7.2
Slovak Republic	0.0	10.0	17.6	8.8	27.1	22.4	7.1	7.1
Slovenia	1.6	14.9	25.0	8.5	21.3	17.6	8.0	3.2
Tajikistan	2.8	11.4	27.8	6.8	26.7	10.2	5.7	8.5
Ukraine	0.4	12.3	30.0	6.3	24.6	14.0	6.0	6.3
Uzbekistan	1.9	15.8	19.6	7.3	35.4	9.6	6.5	3.8

Table A.3: Structure of sample by geographical location and size (employment)
(in per cent of the total sample in each country)

Country	Location					Size		
	Capital	Over 1 million	250,000-1,000,000	50,000-249,999	Under 50,000	Small	Medium	Large
Albania	28.8	0.0	9.4	42.9	18.8	71.2	18.2	10.6
Armenia	50.3	0.0	0.0	26.3	23.4	72.5	13.5	14.0
Azerbaijan	63.5	0.0	10.0	11.8	14.7	70.0	15.3	14.7
Belarus	29.6	0.0	31.2	24.0	15.2	68.8	16.0	15.2
Bosnia and Herzegovina	34.6	0.0	0.5	48.4	16.5	61.0	23.1	15.9
Bulgaria	23.6	0.0	16.8	22.0	37.6	69.6	15.2	15.2
Croatia	32.1	0.0	0.0	25.1	42.8	66.8	18.2	15.0
Czech Republic	23.1	0.0	13.1	20.1	43.7	66.8	17.2	16.0
Estonia	54.1	0.0	0.0	21.2	24.7	71.8	15.3	12.9
FYR Macedonia	60.0	0.0	0.0	23.5	16.5	70.6	16.5	12.9
Georgia	51.1	0.0	0.0	32.8	16.1	74.7	14.9	10.3
Hungary	36.4	0.0	3.6	38.4	21.6	68.0	15.2	16.8
Kazakhstan	18.0	22.8	30.0	14.4	14.8	69.6	15.2	15.2
Kyrgyz Republic	31.2	0.0	5.2	35.3	28.3	63.0	26.6	10.4
Latvia	56.8	0.0	0.0	11.9	31.3	71.0	14.8	14.2
Lithuania	31.0	0.0	15.5	20.0	33.5	67.0	20.0	13.0
Moldova	41.4	0.0	0.0	23.0	35.6	67.8	20.1	12.1
Poland	13.0	0.8	44.4	17.4	24.4	66.2	21.6	12.2
Romania	20.0	0.0	22.4	25.9	31.8	60.4	24.7	14.9
Russia	25.9	27.9	16.2	12.6	17.4	67.6	19.6	12.8
Serbia and Montenegro	46.4	0.0	19.2	15.6	18.8	62.0	20.4	17.6
Slovak Republic	41.8	0.0	0.0	40.0	18.2	63.5	20.6	15.9
Slovenia	26.6	0.0	0.0	20.7	52.7	76.6	13.3	10.1
Tajikistan	35.8	0.0	1.1	40.9	22.2	59.1	27.3	13.6
Ukraine	15.3	20.1	30.5	16.8	17.3	67.0	18.4	14.7
Uzbekistan	28.5	0.0	16.9	21.9	32.7	70.0	16.5	13.5

Table A.4: Ownership structure of firms
(in per cent of the total sample in each country)

Country	New private	Privatised	State owned	Foreign owned
Albania	80.7	8.1	11.2	10.0
Armenia	49.1	33.3	17.5	9.9
Azerbaijan	70.6	14.1	15.3	7.6
Belarus	77.1	5.2	17.7	15.2
Bosnia and Herzegovina	62.6	24.7	12.6	4.0
Bulgaria	66.4	18.4	15.2	10.4
Croatia	66.5	16.8	16.8	8.8
Czech Republic	74.2	12.4	13.5	10.9
Estonia	75.0	10.7	14.3	14.8
FYR Macedonia	79.3	17.2	3.6	5.7
Georgia	63.3	20.7	16.0	13.9
Hungary	74.0	20.7	5.4	19.8
Kazakhstan	59.4	25.3	15.3	10.6
Kyrgyz Republic	54.7	29.7	15.7	10.7
Latvia	71.7	11.0	17.3	14.3
Lithuania	65.5	18.6	16.0	8.2
Moldova	63.4	20.9	15.7	12.6
Poland	75.8	10.2	14.1	12.5
Romania	69.1	15.7	15.3	9.9
Russia	67.9	18.5	13.5	11.4
Serbia and Montenegro	71.1	11.3	17.6	7.3
Slovak Republic	71.0	13.6	15.4	14.1
Slovenia	69.5	21.9	8.6	10.4
Tajikistan	52.0	26.3	21.6	3.4
Ukraine	72.8	12.7	14.5	10.6
Uzbekistan	45.9	39.3	14.8	14.1

APPENDIX B: QUALITATIVE MEASURES OF THE BUSINESS ENVIRONMENT AND ECONOMIC DEVELOPMENT AND GROWTH

Table B.1 summarises the results of two cross-section regressions for the 1999 and 2002 samples for seven qualitative measures of the business environment on a measure of the level of economic development in the year before the survey was implemented, the previous five years' rate of output growth and the current rate of output growth. The firm-level regressions also control for firm sector, size, ownership and geographical location within country. The measure of development is the level of GDP per capita at purchasing power parity exchange rates. These regressions, therefore, associate the current perception of the business environment with long-term growth (as summarised in the measure of development), medium-term growth and contemporaneous growth.

They indicate a significant, positive association between the quality of the business environment and the level of GDP per capita for most dimensions and both years. The exception is business taxation in 1999. The medium-term trend rate of output growth is also significantly and positively associated with the quality of the business environment for virtually all business environment dimensions and for both years. This is consistent with growth having a positive feedback effect on the business environment and vice versa. There is in addition a significant, positive association between the contemporaneous rate of output growth and perceptions of the business of the business. However, for most dimensions of the business environment and for both years, this association is both weaker in size and noisier (in terms of statistical significance). The exception is business regulation in 2002.

The statistical associations between medium-term and contemporaneous rates of output growth with business environment measures are, therefore, consistent with the view that there are significant feedback effects between business environment and growth and that these effects are stronger over the medium term than in the short term. One indication of the presence of a significant perception bias would have been a stronger and less noisy association between short-term growth and the business environment measures than between medium-term growth and these measures. However, no such effect is observed.

**Table B.1: Regressions of qualitative business environment measures
on a measure of development and on medium-term and current output growth**

Dependent variable	1999			2002		
	GDP per capita at PPP in 1998	Average real GDP growth 1994-98	Real GDP growth in 1999	GDP per capita at PPP in 2001	Average real GDP growth 1997-2001	Real GDP growth in 2002
Finance	-0.022* (-3.80)	-0.024* (-5.96)	-0.013* (-2.15)	-0.019* (-4.83)	-0.044* (-6.09)	-0.022* (-3.64)
Infrastructure	-0.022* (-3.61)	-0.012* (-2.77)	0.002 (0.33)	-0.031* (-10.62)	0.013* (2.42)	-0.002 (-0.42)
Taxes	-0.001 (-0.15)	-0.027* (-8.47)	-0.018* (-3.77)	-0.030* (-7.62)	-0.023* (-3.18)	0.015* (-2.72)
Regulation	0.012* (2.56)	-0.026* (-7.47)	-0.011* (-2.03)	-0.011* (-3.79)	-0.013* (-2.21)	-0.024* (-5.20)
Judiciary	-0.033* (-4.23)	0.001 (0.19)	-0.006 (-0.79)	-0.013* (-3.21)	-0.069* (9.02)	0.044* (7.19)
Crime	-0.051* (-7.39)	-0.013* (-2.7)	-0.009 (-1.21)	-0.038* (-9.86)	-0.064* (-9.16)	-0.050* (-8.82)
Corruption	-0.065* (-8.71)	-0.005 (-0.97)	0.003 (0.43)	-0.050* (-11.32)	-0.063* (-7.73)	-0.031* (-4.74)

Notes:

1) * denotes a significant regression coefficient at the 5 per cent level with the t-statistics given in parentheses.

2) The regressions included dummy variables for firm characteristics (sector, firm size, ownership and geographical location within the country), the coefficients for which are not reported.

APPENDIX C: QUALITATIVE MEASURES OF THE BUSINESS ENVIRONMENT, 1999 AND 2002

Table C.1: Qualitative assessments of the business environment (Part 1)
(Average score by dimension and country on a scale of 1 (best case) to 4 (worst case))

Country	Year	Finance	Infrastructure	Taxation	Regulation	Judiciary	Crime	Corruption	Average
Albania	1999	3.27	3.01	2.86	2.03	2.99	3.35	3.30	2.97
	2002	2.34	2.61	2.74	2.19	2.85	2.23	3.10	2.58
Armenia	1999	2.46	1.79	3.21	1.54	2.34	2.15	2.34	2.26
	2002	2.42	1.86	2.77	1.78	1.66	1.34	1.85	1.95
Azerbaijan	1999	3.38	2.28	2.96	2.22	2.79	2.47	2.88	2.71
	2002	2.19	1.66	2.29	1.57	1.25	1.15	2.07	1.74
Belarus	1999	3.02	1.83	3.41	2.22	2.12	2.30	2.26	2.45
	2002	2.62	1.24	2.95	2.32	1.98	1.73	2.14	2.14
Bosnia & Herz.	1999	3.59	2.10	3.14	2.21	2.05	2.73	2.84	2.66
	2002	2.67	1.64	2.63	2.02	2.52	2.18	2.65	2.33
Bulgaria	1999	3.05	2.30	3.02	2.35	2.37	2.81	2.85	2.68
	2002	2.83	1.51	2.41	1.78	2.23	2.23	2.53	2.22
Croatia	1999	3.56	1.87	3.27	1.94	2.77	2.40	2.79	2.66
	2002	2.23	1.23	2.24	1.81	2.57	1.63	2.29	2.00
Czech Republic	1999	2.88	2.48	3.29	2.40	2.48	2.29	2.52	2.62
	2002	2.49	1.43	2.58	1.86	1.91	1.85	1.95	2.01
Estonia	1999	2.84	1.62	2.70	1.79	2.10	1.99	2.04	2.15
	2002	1.99	1.54	1.99	1.79	1.85	1.70	1.69	1.79
FYR Macedonia	1999	3.67	1.85	3.18	2.48	2.69	2.41	2.90	2.74
	2002	2.24	1.51	2.32	2.06	2.45	2.17	2.45	2.17
Georgia	1999	3.47	2.22	3.40	2.13	2.33	2.58	3.09	2.74
	2002	2.37	1.98	3.10	1.86	1.91	2.42	2.87	2.36
Hungary	1999	2.86	1.64	3.07	2.18	1.96	2.10	2.14	2.28
	2002	2.26	1.26	2.41	1.74	1.51	1.44	1.77	1.77

Table C.1: Qualitative assessments of the business environment (Part 2)
(Average score by dimension and country on a scale of 1 (best case) to 4 (worst case))

Country	Year	Finance	Infrastructure	Taxation	Regulation	Judiciary	Crime	Corruption	Average
Kazakhstan	1999	3.40	2.11	3.31	2.29	2.76	2.69	3.12	2.81
	2002	2.04	1.32	2.33	1.63	1.67	1.73	1.99	1.82
Kyrgyz Republic	1999	3.94	2.20	3.58	2.54	3.29	3.55	3.75	3.26
	2002	2.30	1.59	2.58	1.71	1.98	2.06	2.36	2.08
Latvia	1999	2.84	2.10	3.27	2.19	2.61	2.37	2.64	2.57
	2002	1.91	1.38	2.80	1.95	1.56	1.62	1.94	1.88
Lithuania	1999	3.24	1.87	3.36	2.66	2.71	2.90	2.88	2.80
	2002	1.81	1.55	2.78	1.74	2.16	1.91	2.15	2.01
Moldova	1999	3.53	2.53	3.49	2.44	2.80	3.18	3.11	3.01
	2002	2.72	1.39	3.12	2.22	2.10	2.43	2.65	2.37
Poland	1999	2.86	1.70	3.15	2.17	2.35	2.43	2.52	2.46
	2002	2.91	1.55	3.17	2.32	2.47	2.26	2.50	2.45
Romania	1999	3.71	2.51	3.34	2.41	2.66	2.68	3.00	2.90
	2002	2.67	1.61	2.92	2.03	2.45	1.95	2.70	2.33
Russia	1999	3.32	2.10	3.47	2.29	2.38	2.70	2.83	2.73
	2002	2.26	1.43	2.64	1.77	1.88	1.80	1.99	1.97
Serbia & Mont.	2002	2.60	1.74	2.78	2.02	2.13	1.79	2.02	2.15
Slovak Republic	1999	3.37	1.90	2.96	2.08	2.26	2.59	2.59	2.54
	2002	2.53	1.41	2.43	2.05	2.50	1.93	2.50	2.19
Slovenia	1999	2.73	1.74	2.87	1.92	2.29	1.64	1.71	2.13
	2002	2.00	1.19	1.87	1.60	2.02	1.33	1.67	1.67
Tajikistan	2002	2.65	1.97	2.74	1.97	1.88	1.75	2.27	2.17
Ukraine	1999	3.49	2.21	3.64	2.38	2.38	2.56	2.69	2.77
	2002	2.52	1.46	2.77	2.05	2.13	2.12	2.51	2.22
Uzbekistan	1999	3.04	1.90	2.76	2.07	2.28	2.18	2.76	2.43
	2002	2.41	1.46	2.48	1.66	1.67	1.50	1.71	1.84

APPENDIX D: ESTIMATION OF PRODUCTION, INVESTMENT AND INNOVATION EQUATIONS

The starting point for this analysis is the production functions of firms. A standard specification of the production is the Cobb-Douglas form:

$$(D.1) \quad Y_{it} = A_{it} \cdot K_{it}^{\alpha} L_{it}^{\beta} H_{it}^{1-\alpha-\beta} \varepsilon_{it},$$

where Y_{it} denotes total output of the firm i in period t , A_{it} is a variable that measures total factor productivity or technology, K_{it} is the stock of physical capital, L_{it} is the level of employment of labour and H_{it} is the stock of human capital or skills and α , β and $(1 - \alpha - \beta)$ denote elasticities of output with respect to the factors of production. The multiplicative error term ε_{it} represents all disturbances such as omitted factors of production, efficiency differences among firms, functional form discrepancies and errors in measurement. Taking the logarithm and the first difference of (1) yields a dynamic specification of Cobb-Douglas production:

$$(D.2) \quad \Delta y_{it} = a_{it} + \alpha \cdot \Delta k_{it} + \beta \cdot \Delta l_{it} + (1 - \alpha - \beta) \cdot \Delta h_{it} + \Delta e_{it},$$

where terms are expressed in percentage changes of those in the corresponding levels equation.

The data used to estimate this relationship are from the BEEPS questions that ask firms to report the percentage changes in real terms (that is, after allowing for inflation) over the past three years of sales and fixed assets and the percentage changes in employment of full-time employees. The BEEPS also identifies those firms that increased over the past three years their share of skilled workers, managers and professionals, which serves as a proxy for increases in human capital.

These survey data enable the use of medium-term trends at the firm level in output, physical capital, human capital and employment in the estimations. An advantage of using the data in the form of first differences is that they can reduce the disturbances in the estimated production functions that arise from omitted factors, functional misspecification and errors in measurement to the extent that these factors are relatively constant over time, so-called fixed effects. If this assumption is valid, the error terms in the estimated production function largely reflect firm specific differences in productivity growth. The aim is to identify from the estimates of the production functions the marginal contributions of growth in capital, labour and skills to real revenue growth and to recover from the estimates of the production function firm specific productivity trends.

One methodological issue in estimating production functions is the simultaneity bias that can arise when errors in the estimated production function are correlated with the decisions of firms regarding amount of capital, labour or skills they use or employ. The problem of simultaneity may be reduced by estimating the production in a different form rather than in levels if the estimation errors (essentially productivity surprises) are uncorrelated with the changes in capital, employment and skills over the estimation period. This can arise if there are costs to adjusting the capital stock, employment and skills mix of firms. These unanticipated changes in productivity may of course affect subsequent decisions about the use

of capital, labour and skills. If they are correlated with current decisions, these variables must be instrumented in the regression. However, the survey data do not provide sufficiently powerful instruments.

The empirical specification of the production function allows for variation in its estimated parameters across sectors but not across countries; that is:

$$(D.3) \quad \Delta y_{ijt} = \sum_{j=1}^8 (a_j + \alpha_j \cdot \Delta k_{ijt} + \beta_j \cdot \Delta l_{ijt} + (1 - \alpha - \beta)_j \cdot \Delta h_{ijt}) + \Delta e_{ijt},$$

where j denotes the sector. As discussed above, the BEEPS asks firms to report real growth in sales and fixed assets, as well as growth in employment of permanent employees. Assuming that the share of material inputs in revenues is relatively constant, real growth in sales will correlate closely with that of value added. As a proxy for skills accumulation, the BEEPS asks firms whether they have increased, decreased or left unchanged the proportion of their workforce that are skilled workers or professionals. The estimated coefficient on this term reflects both the elasticity of output with respect to skills and the average change in the proportion of skilled workers. In addition, the survey provides information on changes in capacity utilisation over the last three years with respect to both capital and labour.

Table D.1 reports the estimated parameters of the production function by sector.

Table D.1: Estimates of firms' production functions by sectors

Sector \ Variable	Constant	Capacity utilisation	Fixed assets	Labour	Human capital
Mining and quarrying	6.70 (0.6)	0.24 (1.0)	0.53* (4.1)	0.01 (0.2)	1.60 (0.1)
Construction	-6.90 (-0.6)	0.34* (6.0)	0.51* (13.2)	0.08* (2.7)	13.9* (2.5)
Manufacturing	3.50 (0.3)	0.13* (3.7)	0.50* (17.9)	0.13* (5.5)	10.6* (2.6)
Transport, storage and communication	-7.00 (-0.6)	0.12 (1.5)	0.75* (17.5)	0.08 (1.9)	17.4* (2.4)
Retail and wholesale trade	-1.80 (-0.2)	0.15* (3.8)	0.33* (13.3)	0.03* (2.9)	17.7* (5.0)
Real estate and business services	-4.80 (-0.4)	0.11 (1.7)	0.51* (8.5)	0.28* (7.1)	11.3 (1.7)
Hotels and restaurants	-6.00 (-0.5)	0.34* (2.5)	0.41* (5.0)	0.05 (1.1)	9.20 (1.1)
Other services	-3.90 (-0.3)	0.32* (2.1)	0.90* (16.1)	0.03 (0.8)	7.40 (0.9)

Notes:

- 1) $R^2_{adj} = 0.29$; $F(39, 5146) = 54$; Number of firms = 5,186.
- 2) * denotes statistical significance at 5 per cent level.

In this regard, it is important to note that the estimated coefficients on the skills terms capture both the estimated elasticity of production with respect to skills and the average increase in the proportion of skilled workers and professionals in each sector.

Trend changes in productivity at the firm level are the sum of the relevant sectoral constant term and the residuals from this equation are: $a_j + \Delta e_{it}$. In the second step estimation, only Δe_{it} is used as a measure of technological residual. The reason is that sectoral constants are not statistically significant from zero and can, therefore, be omitted.

The explanatory variables for the real growth in capital stock and growth of productivity are as follows:

1. Capacity utilisation rate in 1999;
2. Acceleration in real GDP growth at the country level, calculated as the ratio of output growth rate in 2001 and average growth between 1999 and 2001;
3. Business environment at the country level in 1999, calculated as the un-weighted average of the seven components of business environment;
4. Captor variable, which is a dummy variable that has value of one if a firm attempted to influence the content of laws and whether firms like theirs make unofficial payments in an attempt to influence the content of laws and regulations;
5. External costs associated with capture (laws and regulations) variable, which is a dummy variable that has a value of one if a firm reported to had been affected by capture of the government or parliament;
6. Price elasticities of demand, which are three dummy variables that have a value of one if the firm would anticipate a low, moderate or high response in demand if it were to increase the price of its primary product price by 10 per cent; the omitted variable is no demand response (monopolist);
7. Dummy variables for state and new private ownership; the omitted ownership category is privatised firms;
8. Log of employment and its squared value as a measure of firm size.

Table D.2 reports the estimated coefficients and significance levels for these variables.

Table D.2: Investment, productivity and real revenue growth equations

Variable	Real growth in fixed assets	Trend growth of productivity	Real revenue growth
Capacity utilisation rate in 1999	-0.15* (-3.06)	-0.09 (-1.75)	-0.39* (-6.95)
Acceleration of real GDP growth in 2001 (relative to 1999-2001 average)	0.88* (2.01)	0.82 (1.80)	1.42* (2.82)
Country business environment in 1999	-10.03* (-2.58)	2.56 (0.63)	1.93 (0.43)
Captor firm (laws and regulations)	10.58* (2.49)	4.99 (1.13)	12.77* (2.59)
External cost of capture (laws and regulations)	2.29 (0.90)	-5.18 (-1.94)	-3.44 (-1.19)
Price elasticity of demand – low	0.32 (0.11)	-3.37 (-1.10)	-0.91 (-0.27)
Price elasticity of demand – moderate	-6.10 (-1.84)	-4.83 (-1.40)	-10.03* (-2.65)
Price elasticity of demand – high	-5.20* (-1.77)	-9.78* (-3.19)	-14.27* (-4.28)
State ownership	-8.86* (-2.39)	-4.99 (-1.29)	-12.00* (-2.83)
New private ownership	18.26* (6.30)	2.64 (0.87)	20.63* (6.23)
Foreign ownership	7.94* (2.50)	1.77 (0.54)	5.98 (1.64)
Log of employment	12.03* (5.24)	3.60 (1.47)	14.21* (5.45)
Log of employment squared	-0.88* (-2.39)	-0.11 (-0.37)	-0.93* (-2.81)
Constant	17.02 (1.08)	1.16 (0.07)	10.62 (0.59)
Number of observations	4,444	4,119	4,549
Adjusted R – squared	0.04	0.02	0.07

A summary and interpretation of the results is as follows:

1. A lower capacity utilisation rate in 1998/99 is significantly associated with a higher investment rate and real revenue growth in the period 1999 to 2001. This suggests that firms with spare capacity have higher returns to investment (complementary with spare capacity) and cost advantages to increase market share.
2. Acceleration in real GDP growth in the country is weakly and positively associated with a higher investment rate and productivity growth and significantly and positively associated with real revenue growth in the period 1999 to 2001. Acceleration in aggregate demand is, therefore, positively associated with an improvement in performance.
3. A better business environment in 1999 (lower score) is significantly and positively associated with higher investment rates, but not with other dimensions of firm performance.
4. Firms that engage in capture have a significantly higher investment and real revenue growth rate than those firms that do not. There are, therefore, clear economic benefits to state capture.
5. Those firms that are affected by state capture (laws and regulations) have significantly lower rates of productivity and weakly lower real revenues growth. One interpretation of this finding is that these firms experience unexpected slow growth in real revenues (that is, a negative demand shock) and that the costs of capture are widely spread.
6. Those firms that face relatively inelastic demand for their primary product invest significantly more and have significantly higher rates of productivity growth. This term may, therefore, reflect the ability of the firm to generate rents and retained earnings.
7. New private firms have significantly higher investment and real revenue growth rates than privatised firms. State-owned firms have significantly lower investment and real revenue growth rates than privatised firms.
8. The majority of foreign-owned firms have significantly higher investment and real revenue growth (weakly) rates than do domestic firms.
9. Larger firms have significantly higher investment and real revenue growth rates than do smaller firms, although there are diminishing returns to size.

These results, therefore, show the importance of a sound business environment to investment rates at the firm level. The lack of significance of the business environment in the real revenue growth equation appears to arise from multi-collinearity with the acceleration in the aggregate output growth term. The results also point to the significant economic benefits obtained from state capture. The economic costs associated with capture appear to be widely dispersed, but weakly significant. This finding suggests that building coalitions to combat state capture may, therefore, prove difficult.