Business Climate, Productivity, and Competitiveness in Armenia: 2002-2005

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Abstract

Armenia's impressive economic performance of the last few years is not sustainable in the long run unless reforms to improve the Investment Climate are implemented. Using data from a survey of 8800 entrepreneurs in East Europe and Central Asia, this paper compares the Investment Climate in Armenia to that of 23 other countries in the region and identifies which features have contributed to the relative decline of Armenia's business climate over the last 3 years. The major business obstacles to private sector development are investigated and their impact on firm performance is established. Evidence is presented that red tape, access to finance and corruption remain the main impediments to productivity growth in Armenia. Finally the paper establishes an order of priority of reforms and investigates Armenia's competitiveness with countries in the region. The analysis shows that red tape is the main Investment Climate constraint affecting firm performance in Armenia and that a better access to long term finance, both in terms of bank lending and trade credit, would help bridge the 40% productivity gap with Turkey.

Section 1. Investment Climate Dynamics in Armenia: 2002-2005

1.1 Introduction

The past few years have witnessed a renewed interest in the micro determinants of economic growth. Recent cross country evidence has found little correlation between capital accumulation and growth. Because of decreasing marginal returns investment rates by themselves are not the drivers of growth. As emphasized by the recent *2005 World Development Report: A Better Investment Climate for Everyone* (World Bank, 2004) it is the quality of the investments, and hence their productivity, that will sustain growth in the long run. Having a good investment climate is key to sustained growth and poverty reduction because the quality of the business environment has an impact on the productivity of the investments.

There is no precise definition of Investment Climate. By many it is seen as the set of "location-specific factors shaping the opportunities and incentives for firms to invest productively, create jobs, and expand."[1] Consequently improving the investment climate in a country translates into enhancing its institutional and physical infrastructure that mold the opportunities and incentives for firms to grow and create jobs.

As firms interact with many aspects of the institutional and physical environment of the host country, improving the investment climate translates into addressing a broad set of issues ranging from macro-economic policies (inflation, interest rates, exchange rates and taxation) to legal and regulatory framework (corruption, security, labor laws, etc.), to the availability and quality of infrastructure services (electricity, transport, telecom, finance and human resources). Therefore, an assessment of the investment climate needs to cover all these factors to be able to provide a broad picture of the binding constraints to private sector development and to help the government identify policies to promote economic growth and poverty reduction.

This paper attempts to highlight what aspects of the Investment Climate (IC) in Armenia would enhance its productivity and competitiveness. Based on a survey of 350 entrepreneurs conducted in 2005 this paper highlights the progress made over the last 3 years in improving the IC and what binding constraints to private sector development in Armenia still remain. It starts with an analysis of the evolution in the IC over the period

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[1] World Development Report 2005, page 20

2002-2005 by building a composite Business Climate index (section 1). Armenia's business climate is compared to 23 countries in East Europe and Central Asia (ECA), with particular emphasis to Azerbaijan, Georgia, and Turkey. In section 2 the paper briefly discusses the major bottlenecks to private sector development in 2005 as perceived by Armenian entrepreneurs. The issue of tax evasion is analyzed more in detail, and a link between evasion and corruption is established. In the final section of the paper we estimate the productivity impact of the top three IC obstacles. The paper concludes with an order of the priority of reforms and with an analysis of the impact of these reforms on Armenian competitiveness with respect to Turkey.

1.2 A composite indicator of the Investment Climate: the Business Climate Index
Because of its broad definition it becomes very hard to identify one or two indicators that could meaningfully characterize the investment climate in any country. Generally researchers resort to identify the most important aspects in any one country and discuss them separately. While this is feasible at one point in time it becomes extremely difficult to follow this approach if the analysis of the IC is conducted over time. Therefore in this paper we decided to build a composite IC index in order to see the evolution of the IC environment in Armenia and the other ECA countries over time. This index will enable us to summarize in one indicator the different features of the IC in Armenia and to gauge the competitiveness of Armenia's investment climate in comparison with its neighbors.

In building such index we start from the assumption that entrepreneurs look at a wide range of features of the business climate in a country, from macroeconomic stance, to rule of law, red tape, accessibility of inputs, and infrastructure services. Therefore our Business Climate Index (BCI) combines both macro and micro indicators grouped in 4 categories: macro, infrastructure, inputs, and institutions. Furthermore, within each of these 4 categories variables are grouped to measure 2 separate dimensions: cost and quality. It is in fact our contention that entrepreneurs often face such a choice in their daily operations. As a result 8 sets of variables come to build the BCI aimed at measuring the cost and the quality of macro stance, the cost and quality of infrastructure services,

Table 1. Variables used in the construction of the composite Business Climate Index (BCI)

MACRO VARIABLES	
COST	**QUALITY**
1 Inflation	1 Coefficient of variation of inflation
2 Exchange rate	2 Coefficient of variation of exchange rate
3 Size of domestic market: population	3 Projection of size dom mkt
4 Size of domestic market: gdp per capita	4 Coefficient of variation of interest rate
5 Interest rate	5 Openness (trade as % gdp)
6 Credit available to private sector	6 Capital flows (FDI)
	7 Perception of macro instability
	8 Corruption Index (Transparency Int'l)
	9 Procedures to start a business (number)
	10 Time to start a business (days)
	11 Cost to start a business (% of income per capita)
	12 Min. capital to start a business (% of income pc)
	13 Credit Information Index
	14 Private credit bureau coverage (% adults)
	15 Procedures to enforce a contract (number)
	16 Time to enforce a contract (days)
	17 Cost to enforce a contract (% of debt)
INFRASTRUCTURE	
COST	**QUALITY**
1 Days of power outages	1 Perception on electricity
2 Days of insufficient water supply	2 Perception on telecom
3 Days of unavailable telephone service	3 Perception on transport
4 Percentage of sales lost in transit	4 Perception on land
	5 Perception on land

the cost and quality of input markets, and the cost and quality of the institutions. (Table 1)

Table 1(cont'd). Variables used in the construction of the composite Business Climate Index (BCI)

INPUTS

COST	QUALITY
1 Training provided to skilled workers	1 Education of workforce
2 Excess labor	2 Availability of managers
3 Cost of finance	3 Availability of professionals
4 Cost of finance	4 Availability of skilled wkrs
5 Proximity to raw materials (domest)	5 Access to short term finance
6 Proximity to customers (domestic)	6 Access to long term finance
7 Trade credit (net)	7 Loan duration
8 Access to foreign inputs	8 Time to approve loan
9 Access to foreign customers	9 Informality of supplier network
10 Technology (dummy)	10 Perception on access to finance
	11 Perception on cost of finance
	12 Perception on labor regulations
	13 Perception on customs
	14 Perception on availability of skills

INSTITUTIONS

| COST	QUALITY
1 Law & order: security cost	1 Perception of law & order: crime
2 Law & order: protection payments	2 Perception of law & order: mafia
3 Law & order: losses due to theft	3 Perception of corruption
4 Bribes	4 Perception of irreg payments to get things done
5 Govnt contract paidback	5 Perception of judicial system: fairness
6 Judicial inefficiency	6 Perception of judicial system: honesty
7 Manager time with officials	7 Perception of judicial system: speed
8 Tax evasion	8 Perception of judicial system: affordability
9 Days to obtain a telephone connection	9 Perception of judicial system: enforsability
10 Days to obtain a electric connection	10 Perception of functioning of judicial system
	11 Perception of political influence of firms
	12 Perception of red tape
	13 Perception of regulatory uncertainty
	14 Value of bus association: resolution of disputes
	15 Value of bus association: info on domestic market
	16 Value of bus association: info on foreign market
	17 Value of bus association: standard accreditation
	18 Value of bus association: info on gvnt regulations
	19 Quality of administration: info easy to obtain
	20 Quality of adm.: consistent interpretation of rules
	21 Quality of administration: appeal to superior
	22 Perception of tax administration: rates
	23 Perception of tax administration: administration
	24 Variability of access to foreign inputs
	25 Variability of access to foreign customers
	26 Degree of competition
	27 Quality of internal management

From a methodological point of view, given the heterogeneous nature of each variable the BCI is constructed using principle component analysis. Even though applying principle component analysis is relatively straightforward, a critical decision in the construction of the BCI index refers to how individual components are aggregated into the composite indicator. Generally individual components are simply summed up to obtain the overall index. This approach, although popular for its simplicity, presents a major drawback. An improvement in one dimension compensates an equal shortcoming in another ("compensability" effect). In other words, a country that performs already well on one dimension of the investment climate can compensate a shortcoming in another dimension by improving further the "best" dimension(s) rather than improving the dimension(s) where it performs worst. Building a BCI in such a way would reduce the policy relevance of our analysis because with such an index a country with a low score on one dimension can increase its overall rating by simply improving dimensions were it already has a better score. We believe that countries with a better business climate are countries that improve all dimensions of their IC. Therefore in our attempt to build an index that "rewards" more countries that improve dimensions in which they perform worst, the BCI aggregates individual components using the following geometric aggregation model:

$$BCI = (MACROindex)^{w_m} * (INPUTindex)^{w_p} * (INFRASTindex)^{w_f} * (INSTITindex)^{w_t} \ [1.1]$$

where w_i = share of variance explained by each retained factor

The BCI index is constructed by means of a series of 3 separate aggregations. First, the variables in each of the 8 sets (macro cost, macro quality, infrastructure cost, infrastructure quality, etc.) are combined into 8 indices of macro cost, macro quality, infrastructure cost, infrastructure quality, etc. Secondly, these 8 indices are aggregated into 4 indices, one for each category: macro, infrastructure, inputs and institutions. Lastly

Figure 1. First step in the BCI construction

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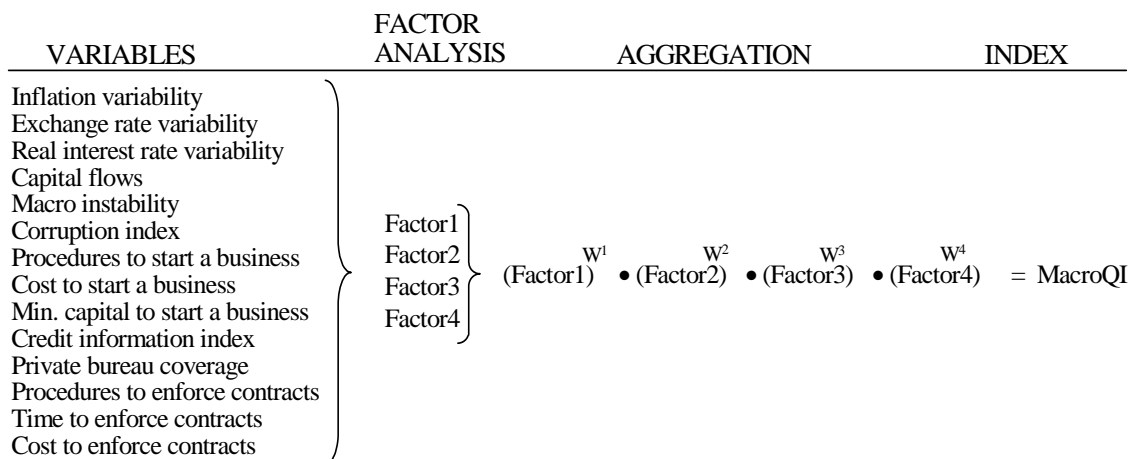
these 4 indices are combined into the BCI, as described in [1.1]. At each stage of the aggregation process principal components and geometric aggregation is employed.

Figure 2 Second and third step in the BCI construction

VARIABLES	FACTOR ANALYSIS	AGGREGATION	INDEX	FACTOR ANALYSIS	AGGREGATION	INDEX
MacroCI MacroQI	Factor1 Factor2	$(Factor1)^{W1} \bullet (Factor2)^{W2}$	Macro Index			
InfraCI InfraQI	Factor1 Factor2	$(Factor1)^{W1} \bullet (Factor2)^{W2}$	Infrastructure Index	Factor1		**BCI** Business Climate Index
InputCI InputQI	Factor1 Factor2	$(Factor1)^{W1} \bullet (Factor2)^{W2}$	Input Index	Factor2	$F1^W \bullet F2^W \bullet F3^W$	
InstitutionsCI InstitutionsQI	Factor1 Factor2	$(Factor1)^{W1} \bullet (Factor2)^{W2}$	Institutions Index	Factor3		

To show the procedure followed in the creation of the BCI let us take the macro variables as an example. We have 6 variables representing the cost dimension and 17 variables characterizing the quality dimension. At the first stage, the first group of variables, say quality of macro stance, is combined into an index of macro quality. Applying principal component analysis to these 17 variables generates 4 factors (Factor1, Factor2, Factor3, Factor4). In order to obtain the Macro Quality Index (MacroQI) we combine these factors using geometric aggregation with weights corresponding to the share of the variance explained by each of the 4 factors[2]. (Figure 1). The same process is repeated for all other 7 groups of variables. Similarly in the second stage we combine, for each category, the cost and quality indices into 4 indices of macro, infrastructure, inputs and institutions. Within each category we have 2 factors aggregated geometrically as described above. Finally the 4 indices are again combined together to form the BCI as described in figure 2.

Table 2. Sample composition of micro data

|	Country	2002	2005
1	Albania	170	204
2	Armenia	171	351
3	Azerbaijan	170	350
4	Belarus	250	325
5	Bosnia-Herz.	182	200
6	Bulgaria	250	300
7	Croatia	187	236
8	Czech Rep.	268	343
9	Estonia	170	219
10	Macedonia	170	200
11	Georgia	174	200
12	Hungary	250	610
13	Kazakhstan	250	585
14	Kyrgyzstan	173	202
15	Latvia	176	205
16	Lithuania	200	205
17	Moldova	174	350
18	Poland	500	975
19	Romania	255	600
20	Russia	506	601
21	Slovakia	170	220
22	Slovenia	188	223
23	Turkey	514	557
24	Ukraine	463	594

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[2] The weights are normalized to 1.

The data used in the construction of the BCI comes from different sources. The macro data used in the estimation comes mainly from the World Bank[3] while the micro data comes from a recently collected firm level survey conducted in East Europe and Central Asia by the EBRD in collaboration with the World Bank. This micro data set, BEEPS III, is based on a face-to-face survey of 8800 entrepreneurs in 24 countries (table 2).[4] The strength of this micro data is that the same questions have been asked across countries and in two separate years, 2002 and 2005, hence enabling a meaningful international comparison of the business environment in Armenia with respect to its neighbors and competitors.

1.3. Evolution of the Business Climate in Armenia

We start our analysis by looking at how the business environment in Armenia has changed over the last 3 years. We calculate the BCI for 2 periods, 2002 and 2005 and examine the evolution of the BCI over this time period to see what factors have determined an improvement or deterioration of the investment climate in Armenia with respect to the other countries in East Europe and Central Asia.

Before going ahead with this analysis, however, we wanted to test how good our indicator of BCI is. We first compare the

Figure 3. Business Climate Index and GDP growth in ECA, 2002-2005

level of BCI in 2002 with the average growth rate of GDP in the following 3 years.[5] Under the assumption that a better business climate is conducive to higher growth we expect a negative association between BCI index in 2002 and the growth rate of GDP in

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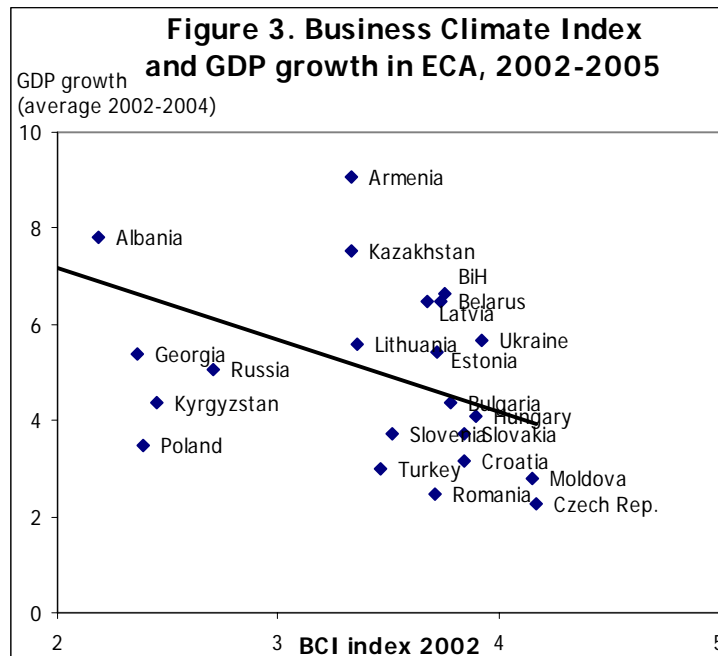
[3] The main source is the World Bank's World Development Indicators and the Doing Business project. One variable, corruption, is from Transparency International. Few data points were collected from the individual countries' Central Bank web pages.

[4] The BEEPS III data include also Tajikistan, Uzbekistan and Yugoslavia. In our calculations we had to exclude them because of missing macro data.

[5] Average GDP growth rate in 2002-2004.

the following 3-year period. Figure 3 shows a clear and significant association between BCI in 2002 and subsequent GDP growth rate in our 23 ECA countries.[6] Because the BCI is build in such a way that a higher value represents a worse investment climate, the negative and significant association between BCI-2002 and growth rate of GDP gives us confidence that out BCI is a good indicator of the investment climate in the ECA region.

Furthermore, to test the predictive power of the BCI at the micro level, we estimate the BCI in 2002 at the individual firm level only for Armenia[7]and compare it with the productivity level of the same firms in 2005.[8] The assumption in this case is that firms that perceive a better IC in terms of quality and costs should be more productive, as measured by their level of total factor productivity (TFP). Although the sample size is small, the data confirms that there is a significant relation between our BCI and firm productivity in Armenia. (figure 4) Firms that experienced a

better business climate in 2002 are more productive in 2005.[9] Given these results we gain a certain degree of confidence in the BCI and we start our analysis of the dynamics of the Business Climate in Armenia over the 2002-2005 period.

Figure 4. Business Climate Index and Total Factor Producvity in Armenia, 2002-2005

Figure 5 reports the values of BCI in 2002 on the x-axis and the values of BCI in 2005 in the y-axis. The chart is divided into 4 quadrants by 2 lines corresponding to the average value of the BCI in each of the 2 years. For visual aid the axis are reversed, so that the top right quadrant of the chart indicates a better business climate.[10] The scatter plot reports the values for all 24 ECA countries in our sample.

Countries falling in the first quadrant (upper right) are those that show a good business climate in both periods since they are above the average values in both years. Similarly

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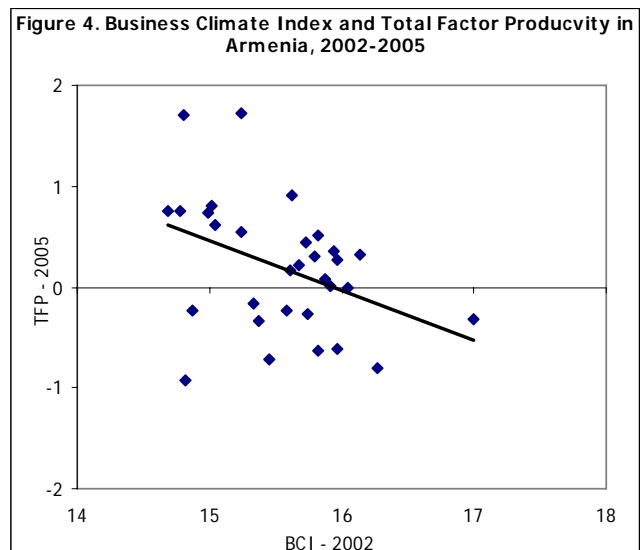
[6] In this figure one country, Macedonia, was an outlier. The relation is significant at the 5% level.
[7] In this case the macro variables are excluded from the calculation of the BCI. Furthermore, in order to avoid loss of observations and to account for endogeneity a number of variables have been imputed by using the mean value of the whole sample.
[8] The BEEPS III has a small portion of the firms as panel.
[9] Similar results are obtained when the level of the BCI is compared to same year productivity.
[10] We need to recall that a lower value of BCI represents a better business climate.

countries falling in the third quadrant have a bad business climate. Countries in the second quadrant show a deteriorating business climate, since in 2002 they were above the mean while in 2005 they fall below the mean. And finally the 4th quadrant identifies countries that have experienced an improvement in the business climate over the last 3 years.

Figure 5. Change in Business Climate 2002-2005
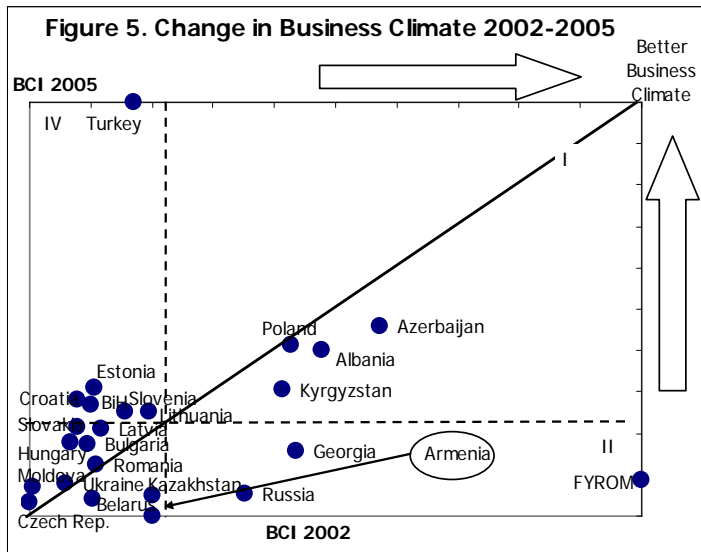
We add a 45° degree line to this chart in order to identify the change in IC stance of each country over the 2002-2005 period. Countries below the 45° line experience a deteriorating business climate while the opposite is true for countries above the line.

From figure 5 we can see that Armenia falls into the 3rd quadrant. This implies that Armenia, notwithstanding its good performance in terms of GPD growth in the last 3 years, shows a bad business climate in both periods. Furthermore, since Armenia is situated below the 45° degree line, its business climate is deteriorating. We should note at this point that the analysis we are conducting is a relative analysis. In other words our index is constructed with

Table 3. BCI index and ranking of ECA countries: 2002-2005

| Country	BCI 2002	Rank 2002	Country	BCI 2005	Rank 2005
FYROM	0.00	1	Turkey	0.00	1
Azerbaijan	1.79	2	Azerbaijan	2.24	2
Albania	2.19	3	Poland	2.43	3
Georgia	2.36	4	Albania	2.49	4
Poland	2.38	5	Estonia	2.86	5
Kyrgyzstan	2.45	6	Kyrgyzstan	2.87	6
Russia	2.71	7	Croatia	2.99	7
Kazakhstan	3.33	8	BiH	3.03	8
Armenia	3.33	9	Slovenia	3.09	9
Lithuania	3.36	10	Lithuania	3.10	10
Turkey	3.46	11	Slovakia	3.25	11
Slovenia	3.52	12	Latvia	3.27	12
Latvia	3.68	13	Hungary	3.40	13
Romania	3.71	14	Bulgaria	3.42	14
Estonia	3.72	15	Georgia	3.49	15
Belarus	3.74	16	Romania	3.63	16
BiH	3.76	17	FYROM	3.78	17
Bulgaria	3.78	18	Ukraine	3.83	18
Croatia	3.84	19	Moldova	3.85	19
Slovakia	3.85	20	Russia	3.93	20
Hungary	3.89	21	Kazakhstan	3.94	21
Ukraine	3.92	22	Belarus	3.98	22
Moldova	4.15	23	Czech Rep.	4.00	23
Czech Rep.	4.17	24	**Armenia**	4.14	24

respect to all the ECA countries in the sample, hence a worsening of the business climate means a deterioration with respect to all others countries in the sample. It is possible that in absolute terms Armenia has improved its business climate over time, but what our index tells us is that Armenia has improved less than the other countries in ECA.

Table 3 reports the values of the BCI in both periods with the countries ranked accordingly in each period. From this table we can see that Armenia drops down to the last position in 2005 from a relatively good position in 2002. In our sample only one country (Macedonia, FYROM) has dropped as much over the last 3 years. Even Georgia experienced a less significant decline. Azerbaijan remains at the same level and Turkey actually records a 10 position gain. (Figure 6)

Figure 6. Change in rank 2002-2005
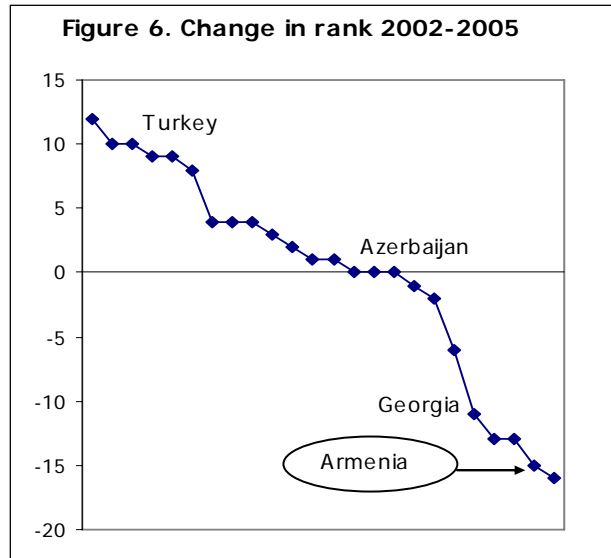
Given the dramatic drop in ranking in Armenia we next analyze the individual components of the BCI in order to determine which factors represent the main source of such a plunge.

Figure 7 shows each of the 4 components of the BCI for Armenia in the 2 periods. From this figure we can see that while macro stance has actually improved over time and the infrastructure index has remained virtually unchanged, the other 2 components, institutions and inputs,

Figure 7. Components of BCI, 2002-2005
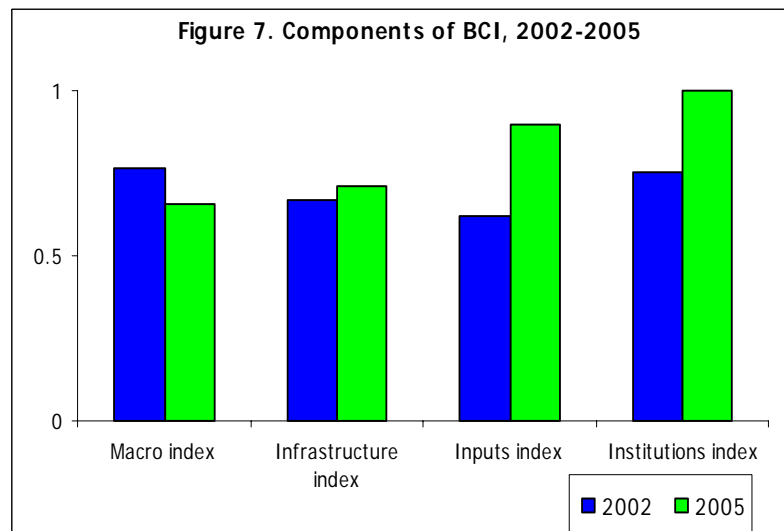
have both deteriorated. Thus we focus our attention on these 2 categories.

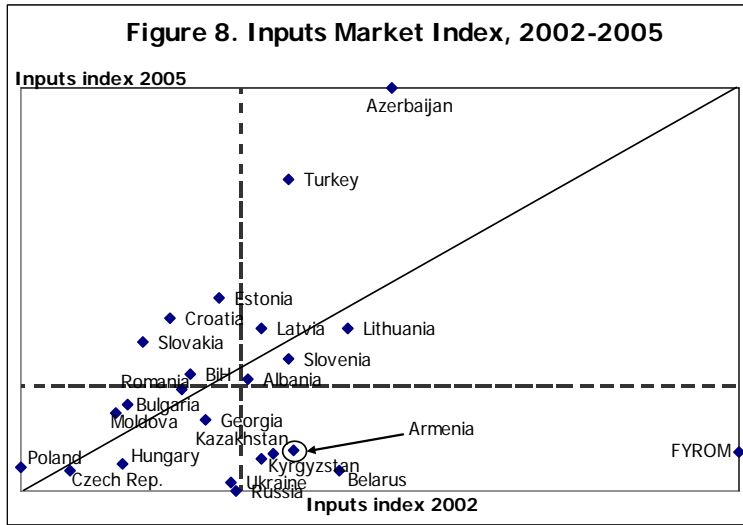**Figure 8. Inputs Market Index, 2002-2005**

Figure 8 shows the relative position of Armenia with respect to the inputs market index in 2002 and 2005.

Now Armenia falls into the 2nd quadrant, indicating that the country is loosing competitiveness in terms of inputs markets within the ECA region. While in 2002 Armenia

was above the mean, in 2005 Armenia fell below average. Note that Turkey and Azerbaijan both registered an improvement of their inputs markets during the same time period, while Georgia is in an even worse position than Armenia. An even worse picture comes out if we look at the evolution of the institution index.

Figure 9 shows in fact that Armenia is not performing well in terms of its institutional environment in both periods, with a deteriorating trend. Armenia once again falls to the last rank in 2005 from an already not encouraging position (20th) in 2002. Georgia and Azerbaijan also

Figure 9. Institutions Index, 2002-2005

show a deteriorating institutional environment, while Turkey appears to be on a positive trend.

Figure 10. Institutions and Input indices in Armenia: 2002-2005
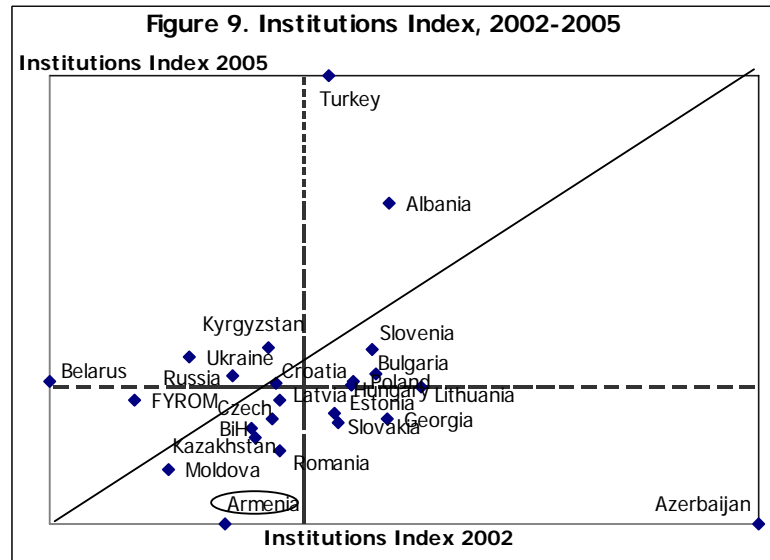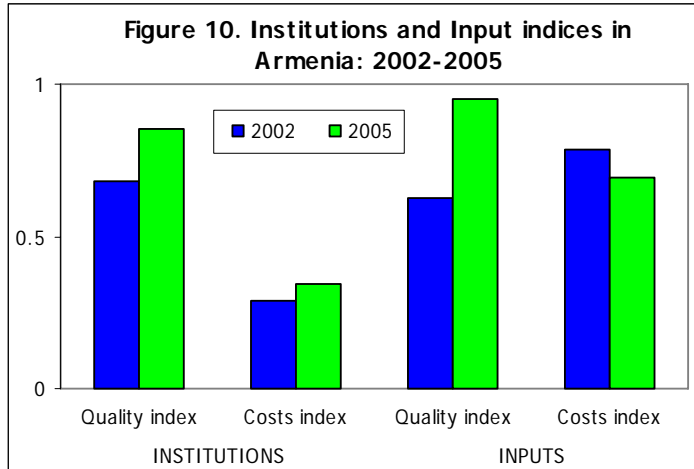
At this stage of the analysis we need to assess which dimension, cost and/or quality, of the 2 indices, inputs and institutions, has deteriorated most in Armenia.

Figure 10 shows interestingly that while for the inputs markets the decline in the index is mainly attributable to quality considerations, both quality and costs indices for institutions have deteriorated in Armenia in the last 3 years.

To be able to determine the underlying causes of such a change we need to identify, first, which principal component factors have changed most during this time period in Armenia, and, second, which variables are linked to these factors. We start with the input quality index. Four principal component factors make up this index. Figure 11 reports on the x-axis the change in each factor over the 2002-2005 period, and on the y-axis the weight associated to each factor.[11]

Figure 11. Principal component factors in the Inputs Quality Index

weight — Change 2002-2005

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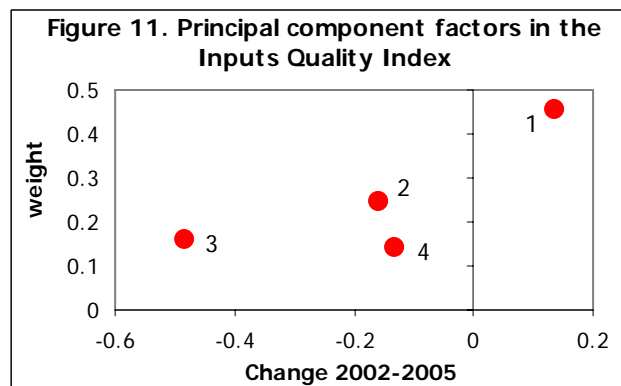
[11] As discussed earlier in the creation of the index each principal component has a different weight.

Figure 12. Main variables underlying Factors 1 & 3 of the Input Quality Index
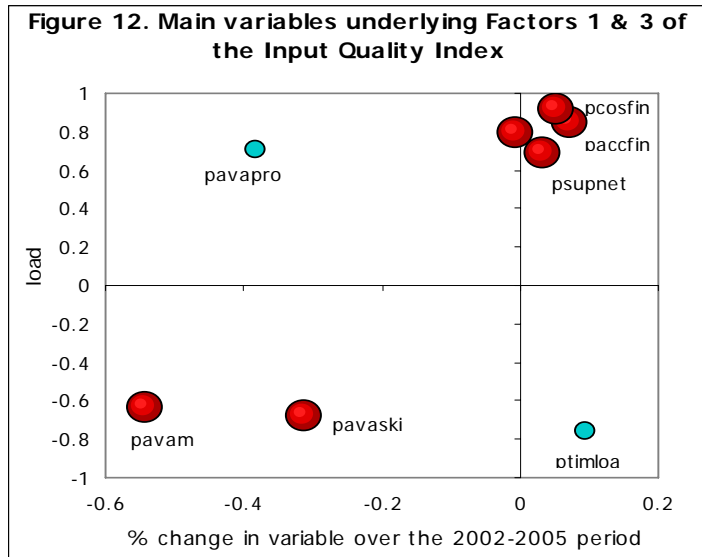
From this figure it is clear that factor 1 is the only source of the overall deterioration of the inputs quality index, while factor 3 has improved over time, although with a much smaller weight.

The underlying variables that most contributed to the change in the inputs quality index, that is the variables underlying factor 1 and, to a lesser extent, factor 3 are presented in figure 12.[12]

This chart shows that over the 2002-2005 period while access to labor (skilled and managerial) has improved in Armenia, there has been a deterioration in the perception 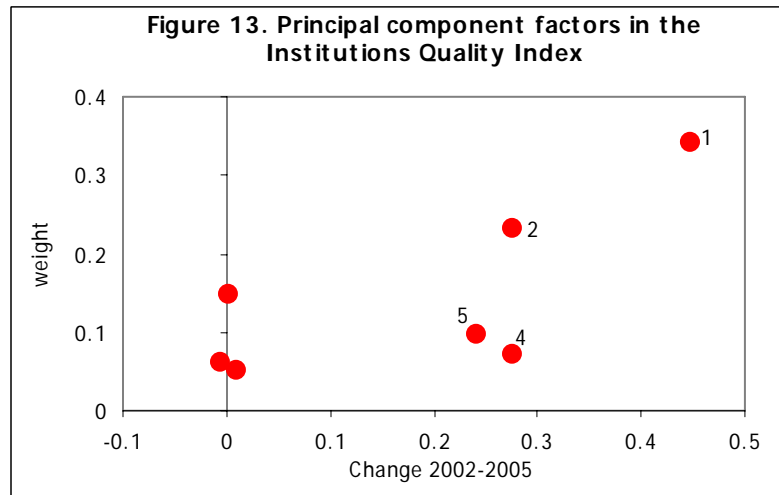of access and cost of finance. At the same time, while the time necessary to process a loan request has improved, the availability of professional workers

Figure 13. Principal component factors in the Institutions Quality Index

has deteriorated. In conclusion the major factors contributing to the deterioration of the quality index for the inputs markets have been the perception of access and cost of finance.

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[12] We recall that variables with a positive change indicate a negative contribution to the investment climate, while those with a negative change indicate a positive contribution. Furthermore variables that fall in the I and III quadrant have a positive impact on the value of the index, because of the interaction between the sign of the change and the sign of the loading factor of the principal component analysis. Furthermore in order to give a sense of the importance of each variable in the index aggregation, the size of the bullet in the figure corresponds to its weight in the aggregation.

More interesting is to assess the change in the position of Armenia with respect to its institutions. Institution in fact is the major component of the BCI that has deteriorated over the last 3 years. Fig 13 highlights the 7 principal factors that make up the institution quality index. Factor 1 and 2 appear to be the factors that mainly contribute to the

deterioration of this quality index in Armenia. The underlying variables with their weights are presented in figure 14a. From this picture it appears very clearly that one variable is explaining most of the deterioration of the index: political influence. Over the past 3

Figure 14a. Main variables underlying Factors 1 & 2 of the Institutions Quality Index
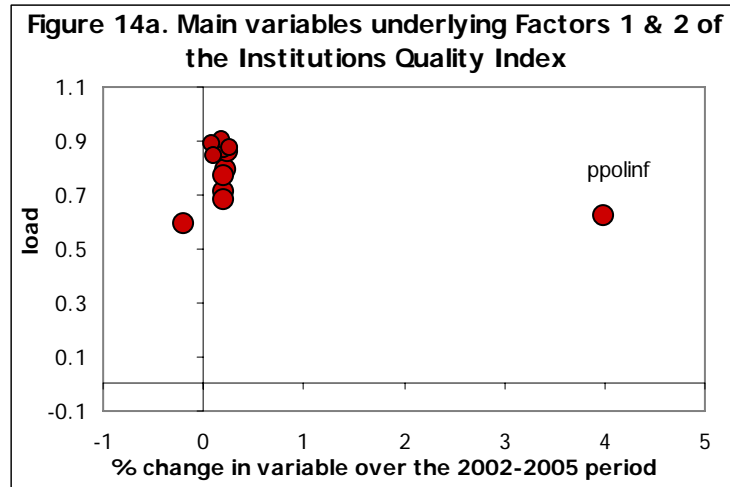
years there has been an enormous increase in the amount of political influence in

Armenia. Apart from this main source, figure 14b shows that also important are issues of corruption, crime, judicial inefficiency and red tape. Only regulatory uncertainty has improved.
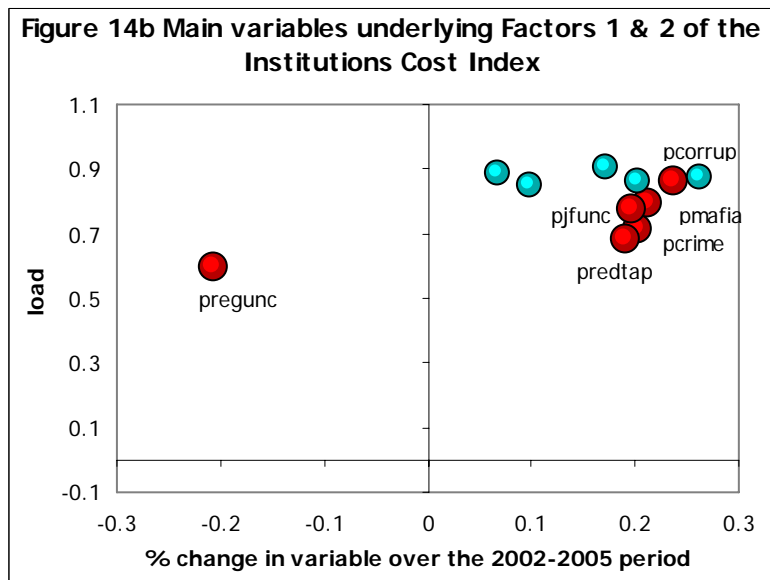
The issue of corruption is even more evident when we look at the cost dimension of institutions.

Figure 14b Main variables underlying Factors 1 & 2 of the Institutions Cost Index

Figure 15 identifies factor 1 as the single major driver of the deteriorating institutions in Armenia (from a cost perspective). Within factor 1 corruption, represented by percentage of contract value that needs to be paid in order to secure the

contract and bribes in general to get things done, is the major factor contributing to the deterioration of the index. (Figure 16)

In conclusion, our analysis of the investment climate in Armenia has shown that, over the 2002-2005 period, Armenia has experienced a deterioration of its business climate. The major reason of such a phenomenon is the decline of its institutions. Both the quality (perceptions) of Armenian's

Figure 15. Principal component factors in the Institutions Cost Index

Figure 16. Main variables underlying Factors 1 & 2 of the Institutions Cost Index

institutions and the costs associated with its institutional environment have worsen. In particular, political influence, corruption, red tape and inefficiency of judicial system are the main culprits. The negative perception on access and cost of finance also remain a further weakening feature of Armenia's IC in 2005.
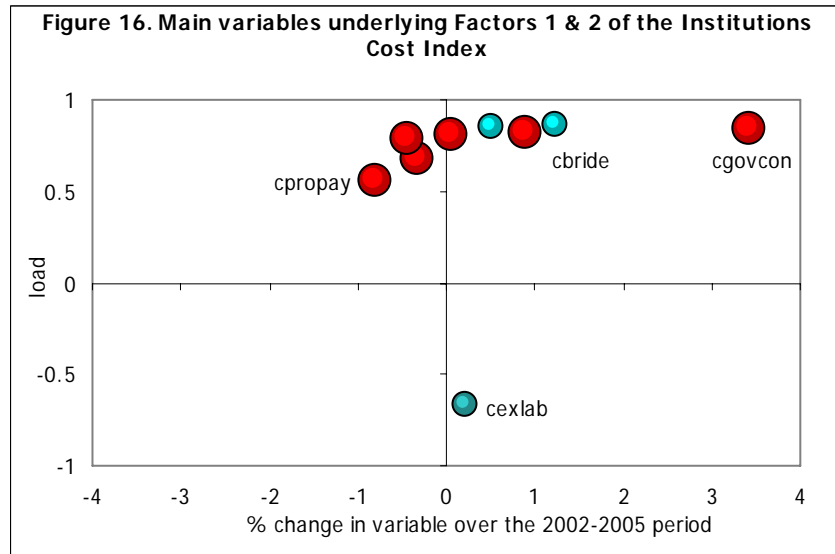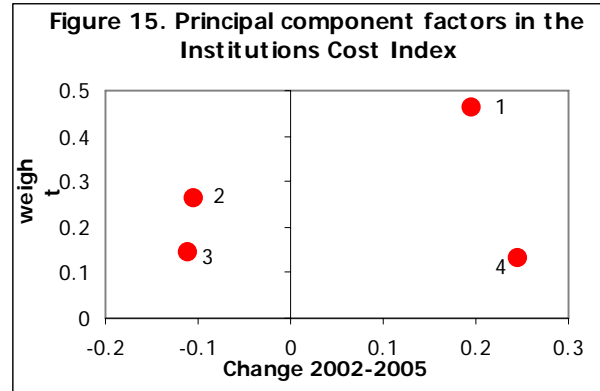
Section 2. Major Business Obstacles in Armenia in 2005

2.1 Main Investment Climate impediments perceived by Armenians' entrepreneurs

The BEEPS 2005 survey in Armenia asks managers to rate a list of constraints to the operations and growth of their businesses. We start the analysis of the Business constraints in Armenia by looking at these perceptions. Figure 2.1 ranks 18 potential bottlenecks as perceived by our sample of firms in Armenia. If we look only at the constraints that at least half of the managers considered binding, 3 areas of policy intervention stand out: (i) Tax (rates and administration); (ii) Macroeconomic instability; and (iii) Finance (more cost than access).

Figure 2.1 Armenia's Percpetion of Investment Climate Constraints

Constraint	
Tax adm	
Macroeconomic instability	
Tax rates	
Cost of finance	
Access to finance	
Anti-competitive/informal practices	
Customs and trade regulations	
Corruption	
Economic & regulatory policy uncertainty	
Licensing and operating permits	
Access to land	
Legal system/conflict res.	
Transport	
Telecommunications	
Skills of avail. workers	
Labor regulations	
Electricity	
Crime, theft,disorder	

Source: BEEPS 2005

Percentage of firms rating each contraint a major obstacle

Figure 2.2 shows how Armenia compares to neighboring countries with respect to these three constraints. From the chart it is clear that a greater percentage of firms in Armenia view finance and macro instability as a problem than in the other countries, while the perceptions on taxes seem quite similar.

In the rest of this section we focus on two of these top constraints: Tax and Finance. Our analysis is based mainly on the results of the BEEPS 2005 surveys, although additional

sources are also used, such as the World Bank Doing Business indicators and Transparency International.

Figure 2.2 Percentage of firms considering each contraint a major obstacle to their operations
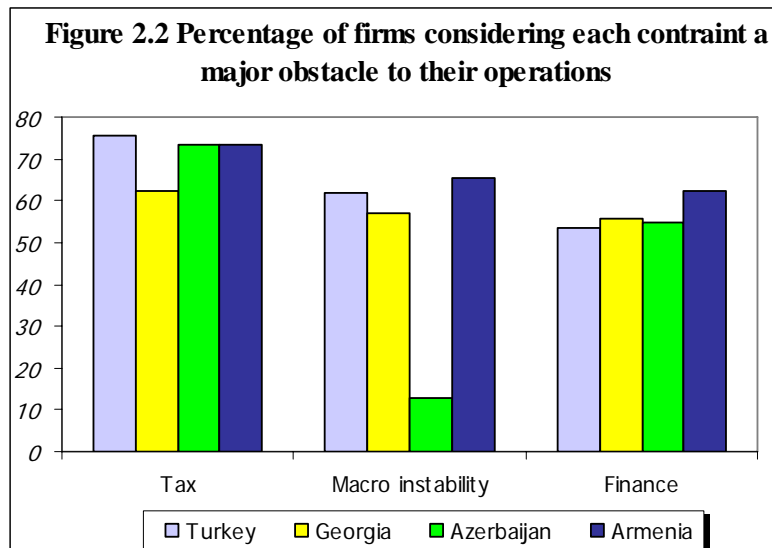
2.2 Tax rates and tax administration

Tax administration and tax rates are among the top constraints to Armenian businesses as reported by the BEEPS 2005 survey. The perception of taxes as constraints is not equally distributed among firms in Armenia. Domestic, non exporters and small firms perceive such issues more as a constraint. The difference in perceptions between exporters and non exporter and domestic and foreign is due to the fact that Armenia currently offers incentives for exporters (no export duty, VAT refund on goods and services exported) and foreign investors (income tax holidays, and the ability to indefinitely carry forward losses).[13] Also, in accordance

Figure 2.3 Tax rate (% gross profit)

Source: Doing Business
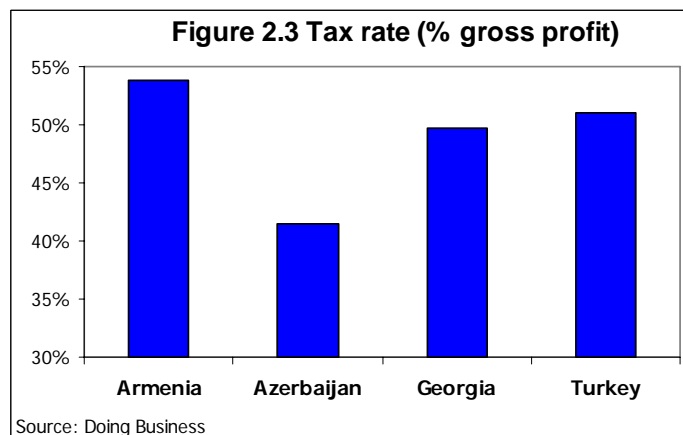
with the Law on Foreign Investment, several ad hoc incentives may be negotiated on a case-by-case basis for investments targeted at certain sectors of the economy and/or of strategic importance to the economy.

Although many would think that no matter how low tax rates are managers will always complain, results from the Doing Business indicators seem to confirm this negative

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[13] There are eight kinds of taxes which private corporations operating in Armenia may be subject to under the Armenian tax system: a. Profit Tax ("corporate income tax"), b. Income Tax ("personal income tax"), c. Value-Added Tax (hereafter VAT), d. Custom Duties and Excise, e. Property Tax, f. Land Tax, g. Simplified Tax, h. Presumptive Tax (Fixed Tax).

perception in Armenia. The tax rate on gross profit is in fact higher in Armenia when compared to its neighbors (figure 2.3). Furthermore, a White Paper on the Armenian Tax System from the American and European Union Chambers of Commerce in Armenia while conceding that Armenia's rates are higher than in many other countries, it points out that the overwhelming problem with the Armenian tax system is difficulty of compliance and unpredictability. Data from the Doing Business substantiate this allegation by showing that it takes almost 10 times longer and requires almost 3 times more payments to comply with tax provisions in Armenia than in Turkey. (figure 2.4). Furthermore,
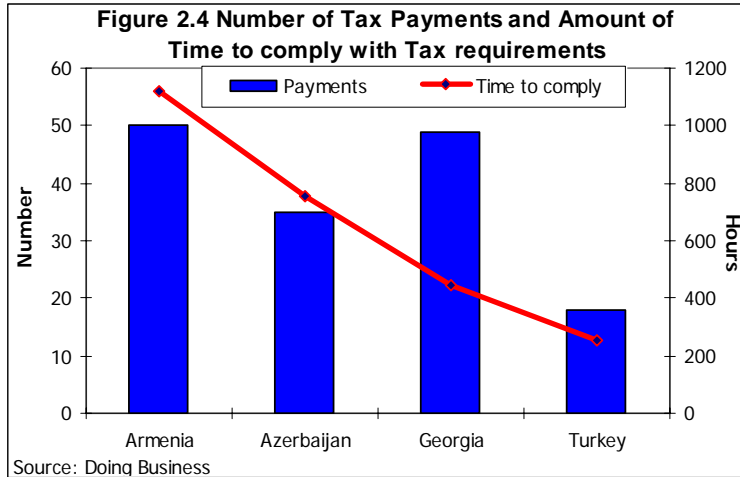
Figure 2.4 Number of Tax Payments and Amount of Time to comply with Tax requirements

Source: Doing Business

according to the BEEPS 2005 survey over half of the firms interviewed consider the interpretations of laws and regulations affecting their activity inconsistent and unpredictable.

Tax administration seems therefore to be a problem in Armenia, not only for its unpredictability but also for its inefficiency. As a matter of fact despite an acceleration of real GDP growth in recent years the amount of taxes over GDP collected in Armenia has declined from 18.8% in the first half of 2005 to just 15.9% toward the end of the year. Tax collection has been

week in Armenia for quite some time, avaraging 14.3% of GDP over the period 2000-2004, well below the rate of countries in the region and at similar level of development. (figure 2.5)[14] The weak tax/GDP ratio has in the past been partly attributed to the fact that many of the most dynamic sectors of the economy were not subject to taxation. However, in 2005 the volume of non-taxed activities has declined. The fact that the increase in the tax/GDP ratio has not kept pace with real GDP growth suggests that tax evasion among Armenia's businesses is still high (Economist Intelligence Unit, 2005b).
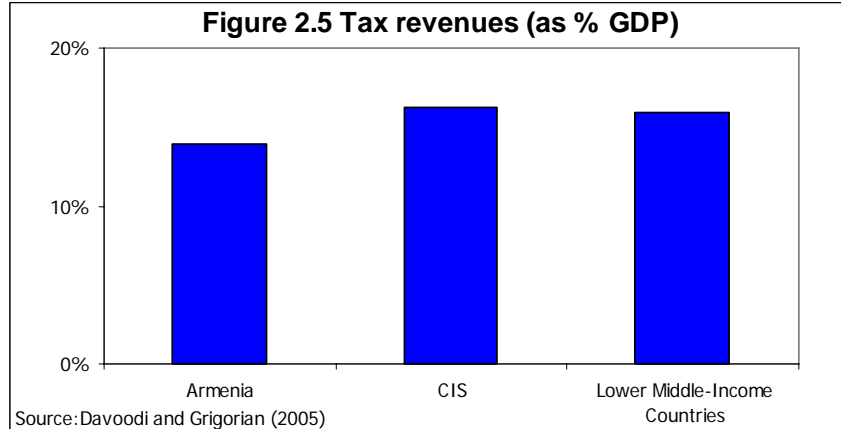
Figure 2.5 Tax revenues (as % GDP)

Source: Davoodi and Grigorian (2005)

2.3 – Tax Administration, Inspections and Corruption: a Further Look

In this part of the paper we go one step further in the analysis of the link between tax administration and tax evasion. Fist we attempt to corroborate the existence of a relation between perception on tax system and other perceptions. We achieve this through the following Probit model:[15]

$$TAX = \Phi(Gifttax, InformalPay, Inspections, X) \ [2.1]$$

We fit the model for tax rate and tax administration separately (TAX).[16] Explanatory variables include: the "Payment of gift for taxes purposes" (Gifttax); the "Payment of informal gifts to get things done (with regard to customs, taxes, licenses, regulations, services etc)" (InformalPay); and the number of inspections for tax purposes (Inspections). A set of controls variables, X, is also included, such as number of employees, export status and ownership.

Results show a strong and significant association between corruption and both perceptions. The more managers perceive corruption as a problem the more likely they

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[14] CIS includes Azerbaijan, Belarus, Moldova, Kazakhstan, Kyrgyz Republic, Russia, Tajikistan, Ukraine, and Uzbekistan

[15] We estimate the probit model for two levels of perception: tax as minor/no vs. tax as major problem.

[16] We obtain similar results if we estimate the model for both perceptions jointly.

consider also tax rates and tax administration as a constraint. On average, firms that pay gift for taxes purposes are 40% more likely to consider tax rate as a problem and almost 60% more likely to consider tax administration as a bottleneck. Similarly managers that admit to pay bribes to get things done are 20% more likely to consider tax (both rates and administrations) as a problem. Results are robust even if a number of controls (size, export status, and ownership) are included.[17]

A peculiar result here is related to the number of inspections for tax purposes and the presence of informal payments. We found that in Armenia a greater number of inspections increase the probability of informal payments by 15%, while in Georgia, and Turkey there is no evidence of such a relationship, while in Azerbaijan this relationship was reversed.[18] (Table 2.1).

Table 2.1. Impact of Red Tape on Corruption
(robust t-statistics in parenthesis)

	Armenia	Azerbaijan	Georgia	Turkey
Number of inspections	0.438	-0.625	0.014	0.112
	(2.97)**	(2.55)*	(0.05)	(0.59)
Constant	-0.218	0.297	-0.809	-1.031
	(1.86)	(2.55)*	(3.75)**	(7.36)**
Observations	317	155	118	253
Pseudo R2	0.0202	0.0311	0.0000	0.0073

* significant at 5%; ** significant at 1%

These results made us think of the existence of some unobserved link between tax administrations (and hence inspections), corruption, and tax rates (and hence tax evasion). We attempted to investigate the existence of such a link starting with a simple linear model between tax evasion and number of inspections:

$$\overline{Evasion_i = \beta_0 + \beta_1 Inspections_i + e} \qquad [2.2]$$

We would expect that as the number of inspections increase the amount of tax evasion would decrease. Surprisingly in Armenia we find no statistically significant relation between number of inspections and the amount of taxes paid. Results are robust even if a number of controls (size, export orientation, and ownership) are included. (Table 2.2)

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[17] Results are even stronger if we include only bribes to tax officials. See tables Annex 2.1-2.4 in Appendix.
[18] A complete set of results are presented in Annex 2.5-2.7 in the Appendix.

Table 2.2. Impact of Red Tape on Tax Evasion
(robust t-statistics in parenthesis)

Investment Climate variable	Tax evasion	Tax evasion	Tax evasion	Tax evasion	Tax evasion
	(1)	(2)	(3)	(4)	(5)
Number of inspections	0.044	0.040	0.057	0.044	0.047
	(0.24)	(0.21)	(0.31)	(0.24)	(0.25)
Medium (dummy)		1.580			1.621
		(1.32)			(1.33)
Large (dummy)		-1.512			-1.361
		(1.02)			(0.76)
Exporter (dummy)			-1.497		-0.919
			(1.15)		(0.61)
Foreign ownership (dummy)				-0.245	1.044
				(0.14)	(0.54)
State ownership (dummy)				-0.187	0.393
				(0.08)	(0.16)
Constant	4.437	4.045	4.720	4.472	4.046
	(6.03)**	(4.05)**	(6.09)**	(5.80)**	(4.02)**
Observations	344	344	344	344	344
R-squared	0.00	0.01	0.00	0.00	0.02

* significant at 5%; ** significant at 1%

This unexpected result led us believe the presence of an unobserved variable in this relationship: corruption. This belief was fuelled by our earlier results showing that managers that face corruption as a problem more likely view also tax administration as a bottleneck, as well as by the significant association between inspections and 'gifts'. This led us to believe that the marginal effect of inspections on tax evasion ($\partial Evasion / \partial Inspection = \beta_1$) is a function of corruption (gift paid to tax officials). Hence, following Klein and Morgan (1951), we assumed:

$$\beta_1 = \alpha_0 + \alpha_1 * Gifttax + u \qquad [2.3]$$

Substituting [2.3] into [2.2] and simplifying we obtain:

$$Evasion_i = \beta_0 + \alpha_0 Inspections + \alpha_1 * Gifttax * Inspections + \varepsilon \qquad [2.4]$$

where the new error term $\varepsilon = e + u * Inspections$ is by construction heteroskedastic, hence we estimated the model [2.4] with robust error.[19] The results show that the coefficient on the interaction term, α_1, is significant and positive. We interpret this as

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[19] White correction for heteroskedasticity.

evidence that the payment of unofficial gifts at the time of inspections has a significant negative impact on reported tax. At the same time, after controlling for corruption, the coefficient on inspections becomes significantly positive and of the expected sign. Results remain robust even if a number of controls (size, export orientation, and ownership) are included. (table 2.3). We conclude that the problem of tax evasion in Armenia is not in the inefficiency of the inspections, but rather on the pervasive impact of corruption.

Table 2.3. Impact of Corruption on Tax Evasion
(robust t-statistics in parenthesis)

Investment Climate variable	Tax evasion	Tax evasion	Tax evasion	Tax evasion	Tax evasion
	(1)	(2)	(3)	(4)	(5)
Number of inspections	-0.754	-0.720	-0.732	-0.766	-0.726
	(2.60)**	(2.47)*	(2.52)*	(2.62)**	(2.47)*
Number of inspections*Gift Tax	0.403	0.385	0.396	0.408	0.388
	(3.38)**	(3.13)**	(3.34)**	(3.40)**	(3.12)**
Medium (dummy)		1.713			1.772
		(1.31)			(1.38)
Large (dummy)		-0.988			-0.638
		(0.87)			(0.36)
Exporter (dummy)			-1.278		-0.761
			(0.89)		(0.40)
Foreign ownership (dummy)				-0.870	-0.001
				(0.54)	(0.00)
State ownership (dummy)				0.717	1.015
				(0.30)	(0.42)
Constant	4.054	3.530	4.322	4.103	3.534
	(4.65)**	(3.99)**	(5.06)**	(4.41)**	(3.98)**
Observations	314	314	314	314	314
R-squared	0.06	0.07	0.06	0.06	0.07

* significant at 5%; ** significant at 1%

Corruption remains a major problem in Armenia even though the overall assessment of the perception questions shown in figure 2.1 seems to indicate that corruption is the 8th problem. This is confirmed not only by the above analysis and by the earlier discussion on the evolution of investment climate presented in the first section of this paper, but also by the fact that BEEPS 2005 shows that informal payments for taxes seem to occur frequently. When asked "How often firms make payments/gifts for taxes and tax collections," more than 50% of firms admitted such a practice. Furthermore, Transparency International reported 79% of businesses considering corruption as problematic in Armenia.

To the credit of the Armenian authorities we should mention that there has been some recent progress in the fight against corruption. This reflects a number of reforms introduced during the last three years, including the simplification of licensing procedures, the introduction of a new criminal code, privatization in the energy sector, and dissemination of laws and regulations. Moreover, since 2002 a reform of the civil service has been under way and an anti-corruption council is in charge of overseeing the government's strategy in this area. Despite these improvements, however, corruption remains a major problem as shown by the BCI index and the recent evidence from BEEPS 2005.

2.4 Cost and Access to Finance

Over half of Armenia's enterprises reported both access and cost of finance as an obstacle for the operation and growth of their business.[20] This negative attitude seems particularly relevant for smaller enterprises, and for non exporters than for exporters.

In order to better understand what drives the negative perceptions on finance, we first look at cost of finance. The fact that cost of finance is perceived as a bottleneck is surprising because over the last few years we have observed a gradual downward trend in the average real lending rate in Armenia. Thanks to an improved macro

Figure 2.6 Real interest rate in Armenia

Source: IMF, International Financial Statistics

environment, interest rates have decreased to approximately 15% in 2004 from as much as 33% in 2000 (Figure 2.6). Therefore, given that Armenian firms enjoy a lower interest rate than in neighboring countries (figure 2.7) and that only a quarter of the firms without a loan cite high interest rates as a reason, this complaint does not find justification in our data.
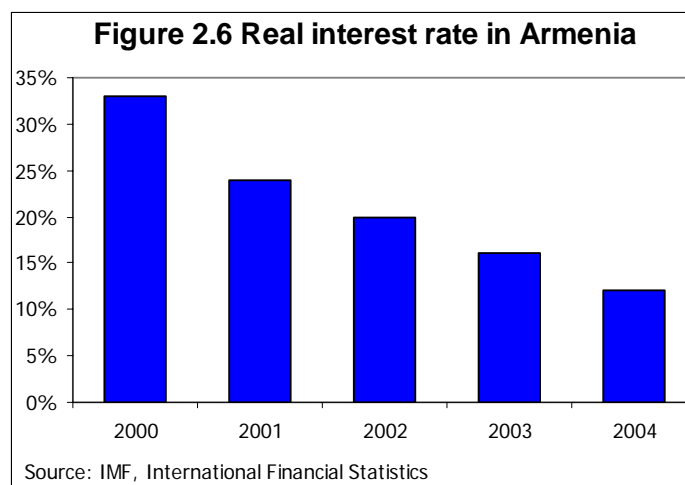
As for access to finance we first consider what sources of finance Armenian firms use

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20 One point that should not go unmentioned is the statistically significant relationship between these two constraints. The chi-squared test of independence between the two ordinal variables shows a test statistic of 361.35 with a p-value of .000, thus we reject the null hypothesis that the two variables are independent.

Figure 2.7. Nominal Interest Rate on firm loans

Source: BEEPS 2005
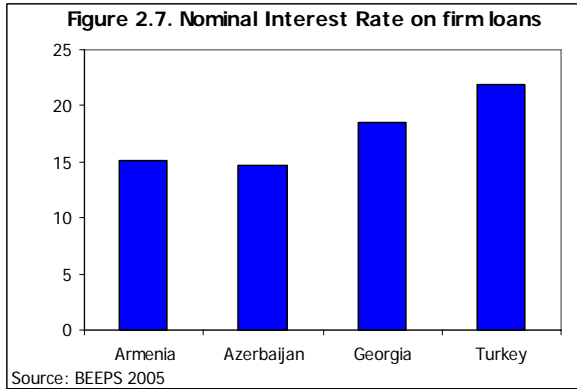
(i.e. short term credit, such as overdrafts versus longer term credit, such as loans). Figure 2.8 shows that the great majority of firms in our sample has no access to the banking system. Over 60% of firms in Armenia does not use banks for short term financing and an even higher share, 65%, cannot rely on long term financing from the banking system.

Figure 2.8. Share of firms with access to bank financing
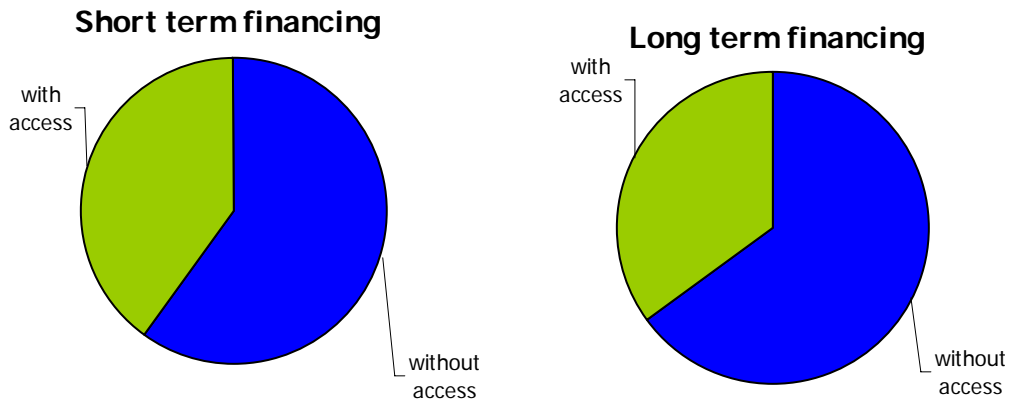
Source: BEEPS 2005

Another factor that has an impact on access to finance, and to some extent to cost of finance, is the amount of required collateral. In our sample the required collateral

Figure 2.9. Amount of Collateral as Percentage loan value

Source: BEEPS 2005
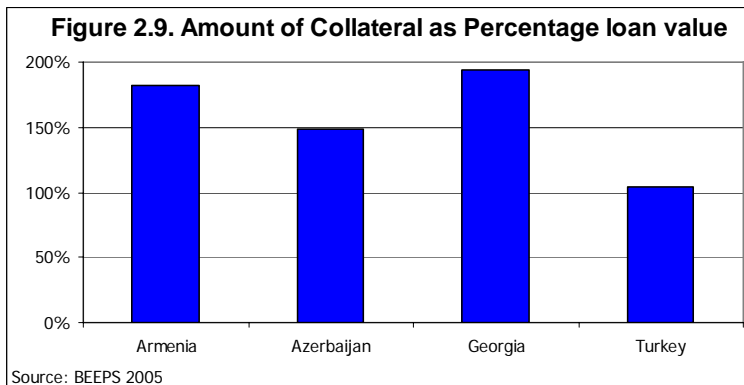
averaged 180% of the loan value, much higher than the value in neighboring countries where the percentage of collateral required is as low as 45% of Armenia's level. (figure 2.9) Being able to provide a guarantee worth

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it almost twice the value of the loan represents a real obstacle to obtaining finance.[21] The fact that access to finance is a problem in Armenia is confirmed also by the World Bank Doing Business indicators. In this survey in fact Armenia ranks below the regional average and most of the neighboring countries on the credit accessibility index,[22] designed to measures the

Figure 2.10 Legal Rights index
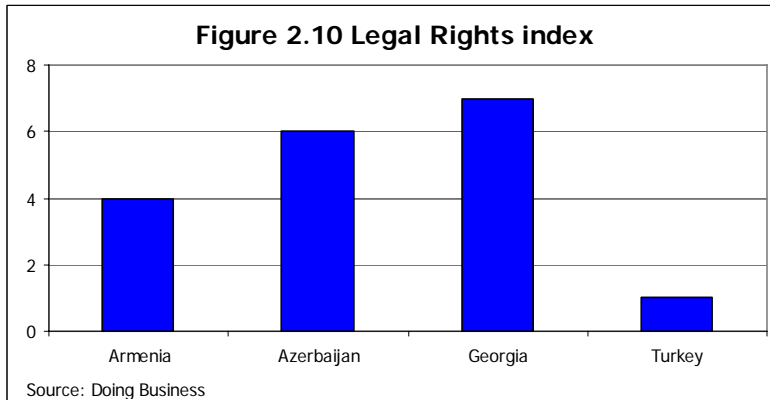
degree to which collateral and bankruptcy laws facilitate lending. (figure 2.10) Lack of finance to business in Armenia is a problem evident even at the aggregate level, as highlighted by a recent paper by Holden and Sahakyan (2005). Figure 2.11 shows how the level of financial development in Armenia, measured by the share of credit provided by the banking sector, is very low not only from a regional perspective but also when compared to countries at the same level of development. In conclusion, access to finance seems more of a problem for Armenian firms than cost even though the result of perception questions seems to indicate otherwise.

Figure 2.11. Credit Provided by the Banking sector (% GDP)

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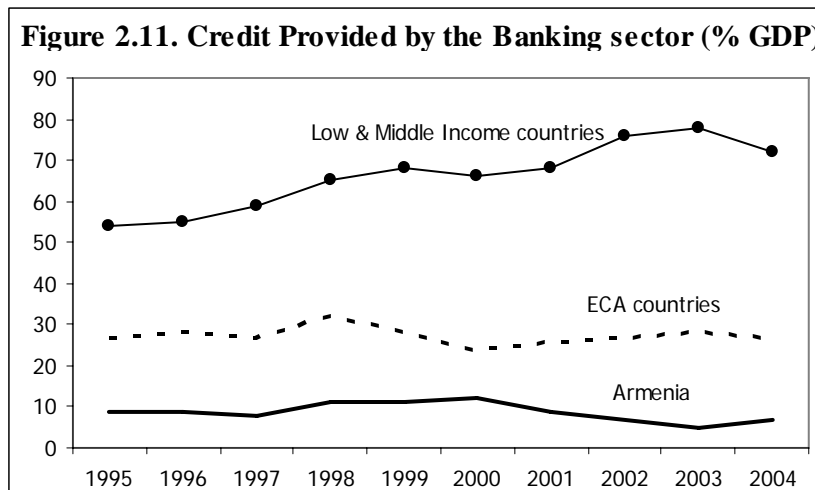
[21] The principal source of collateral in the BEEPS sample is represented by buildings.
[22] "Legal Rights Index" in the Doing Business Data

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Section 3. Investment Climate Impact on Firm performance and Policy Implications

3.1 Productivity impact of major business obstacles

We have so far established that bureaucratic burden, corruption, and finance are the top binding constraints affecting Armenian firms' growth and operations. In this final section of the analysis we attempt to quantify the impact of each of these three investment climate factors on productivity and competitiveness.

Productivity is estimated by fitting the following Escribano-augmented[23] Cobb-Douglass production function:

$$\ln(VA_i) = \beta_0 + \beta_l \ln(L_i) + \beta_k \ln(K_i) + \beta_e Escr_i + \sum_{n=1}^{n-1} \beta_n D_n + \varepsilon_i \qquad [3.1]$$

where VA_i is the value added (in log) for firm i; L_i is the total cost of labor (in log); K_i is the capital stock, proxied by the estimated total replacement value of machinery, equipment, land, and buildings (in log); $Escr_i$ is a vector of firm-level control variables and includes a dummy variable for the age of the firm (0 if less than 5 years old;1 otherwise), a dummy variable for accounts externally audited; and a dummy variable for competition in the domestic market; D_n is a set of industry dummies for each of the 19 industries sampled.

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[23] We follow the methodology suggested by Escribano and Guasch (2004). For robustness check we fit two different formulations of the same production function, one with total manpower cost and the other with total number of workers as proxies for labor. We also estimate the traditional OLS Cobb-Douglass production function. The estimates of the production function are reported in the appendix, annex 3.1.

Total Factor Productivity (TFP) is constructed as the estimate of ε_i, the part of value added not explained by the cost of labor and capital, after controlling for industries fixed effects and addressing endogeneity concerns through the Escribano methodology..

The impact on our proxy of firm's performance (TFP) of each of the investment climate variables identified in our earlier analysis is estimated through the following equation using ordinary least squares with robust standard errors:

$$TFP_i = \alpha_0 + \alpha_1 IC_i + \alpha_2 FC_i + \eta_i \qquad [3.2]$$

where TFP_i is the total factor productivity (in log) for firm i; IC_i is the vector of the investment climate variables (i.e. bureaucratic burden, corruption, and finance); FC_i is a vector of firm-level control variables such as size, export orientation and ownership status.

The equations are estimated first separately for each measure of investment climate and then jointly. While multiple variables can be used for each of the 3 areas of interest, the estimation does not include all the investment climate measures simultaneously for two reasons. First, to minimize the loss of observations. Not all firms provided answers to all questions. Therefore the more variables included at one time, the smaller the available sample. Secondly, investment climate variables addressing the same issue tend to be highly correlated, causing collinearity problems.

The results of estimating equation [3.2] are shown below. Each investment climate measure is estimated separately with and without controls for firm characteristics.

RED TAPE

Governance, defined here as number of inspections with public officials, has a direct impact on firms through the regulatory and administrative procedures affecting day-to-day operations. An excessive bureaucracy increases the cost of doing business and dampens firms' performance.

To explore the effect of government visits on firms' productivity in Armenia, we regressed our measure of performance (TFP) against the total number of days spent by

entrepreneurs in inspections and required meeting with public officials in the last 12 months[24] The results are shown in table 3.1.

Table 3.1. Impact of Red Tape on Firm Productivity in Armenia
(robust t-statistics in parenthesis)

Investment Climate Variable	TFP Escribano (manpower costs)	TFP Escribano (total workers)	TFP OLS	TFP Escribano (manpower costs)	TFP Escribano (total workers)	TFP OLS
Inspections/Meetings with public officials (log)	-0.154	-0.103	-0.108	-0.149	-0.125	-0.119
	(4.54)***	(4.77)***	(2.75)**	(3.61)***	(6.44)***	(2.56)**
Medium (dummy)				0.063	0.033	-0.006
				(1.31)	(0.40)	(0.12)
Large (dummy)				-0.110	-0.184	-0.159
				(0.063)	(0.033)	(0.006)
Exporter (dummy)				0.316	0.259	0.341
				(3.67)***	(5.55)***	(3.62)***
Foreign Ownership (dummy)				-0.000	-0.028	-0.026
				(0.00)	(0.39)	(0.23)
State Ownership (dummy)				0.342	0.384	0.318
				(1.60)	(2.82)**	(1.30)
Observations	204	201	206	202	202	206
R-squared	0.08	0.04	0.04	0.13	0.10	0.10

* significant at 10%; ** significant at 5%; *** significant at 1%

Inspections show a significant and negative association with firm productivity. The BEEPS 2005 data shows that a 1% increase in the number of inspections by public officials is associated with an approximately 10% decrease in total factor productivity, even when controlling for a number of firm specific characteristics. A business environment characterized by less bureaucracy in Armenia is beneficial to firms and helps improve their productivity.

CORRUPTION

A large regulatory burden is often associated with high levels of corruption, involving payments to inspectors who visit the firm or to public officials granting permits.
Taking into account that gathering reliable information on corruption is difficult because of the sensitive nature of such data, we tried to assess the impact of corruption on firm

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[24] The BEEPS 2005 question refers to meetings with Tax Inspectorate, Labor and Social Security, Fire and Building Safety, Sanitation/Epidemiology, Municipal Police, Environmental and Protection Agency, Custom Agency.

level productivity in Armenia by using the average amount of unofficial payments made to public officials to "speed up" bureaucratic procedures[25] as proxy for corruption.

The analysis shows a significant and positive correlation between the average amount of informal payments made to public officials to get things done and total factor productivity (table 3.2).

<div align="center">

Table 3.2. Impact of Corruption on Firm Productivity in Armenia
(robust t-statistics in parenthesis)

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Investment Climate Variable	TFP Escribano (manpower costs)	TFP Escribano (total workers)	TFP OLS	TFP Escribano (manpower costs)	TFP Escribano (total workers)	TFP OLS
Informal payments to public officials to get things done	0.026	0.020	0.033	0.035	0.024	0.044
	(4.45)***	(3.85)***	(5.12)***	(6.13)***	(4.85)***	(7.00)***
Medium (dummy)				0.007	0.001	-0.029
				(0.10)	(0.01)	(0.38)
Large (dummy)				-0.096	-0.174	-0.115
				(0.81)	(1.14)	(0.84)
Exporter (dummy)				0.266	0.198	0.300
				(3.74)***	(7.78)***	(3.66)***
Foreign Ownership (dummy)				0.039	0.003	0.028
				(0.40)	(0.05)	(0.26)
State Ownership (dummy)				0.501	0.512	0.455
				(2.86)**	(4.24)***	(2.27)**
Observations	205	202	206	203	200	206
R-squared	0.02	0.01	0.03	0.09	0.07	0.10

* significant at 10%; ** significant at 5%; *** significant at 1%

How can we interpret this result? Our interpretation is that firms that make "informal payments" gain a competitive advantage with respect to those that do not. A greater regulatory burden implies more onerous procedures to fully comply with laws and regulations. In this scenario, firms that manage to "ease" bureaucratic hassles better than others by making "gifts" to public officials outperform, on average by 2-3%, those that do not. The positive sign of the coefficient, however, should not lead to the conclusion that firms that pay bribes are more productive than those who do not make informal payments. Our data asserts the existence of a positive relationship between our proxy for corruption and performance. It does not imply that bribes guarantee higher productivity. In fact, bribes could be positively correlated with better firm performance if bribe-seekers

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[25] In percent of total annual sales.

are attracted to firms that are more productive, as these firms may be more willing and able to provide bribes. It is our interpretation that firms that pay bribes gain an unfair competitive advantage, in the order of 2-3% higher TFP, by reducing their bureaucratic burden and by avoiding unwanted competition.

FINANCE

Finance is yet another constraint identified by entrepreneurs in Armenia as binding. Although both access and cost of finance are among the top bottlenecks, we have seen that access to long term financing seems more of a bottleneck. As a matter of fact, only 45 percent of the firms surveyed reported to have had recently a loan from a bank.

Do firms with a bank loan are more productive than those that did not or could not borrow money from the banking system? Our analysis (table 3.3a) seems to suggest that they do. By regressing a dummy for having a bank loan against our measure of productivity, we find that firms with a bank loan are on average 10% more productive than those that can only rely on internal sources of capital to finance their business.

Table 3.3a. Impact of Access to Finance on Firm Productivity in Armenia
(robust t-statistics in parenthesis)

Investment Climate Variable	TFP Escribano (manpower costs)	TFP Escribano (total workers)	TFP OLS	TFP Escribano (manpower costs)	TFP Escribano (total workers)	TFP OLS
Bank loan (dummy)	0.112	0.114	0.136	0.057	0.090	0.096
	(2.78)**	(1.98)*	(2.47)**	(0.88)	(2.32)**	(1.87)*
Medium (dummy)				0.004	-0.063	-0.015
				(0.11)	(0.91)	(0.32)
Large (dummy)				-0.058	-0.235	-0.116
				(0.44)	(1.44)	(0.77)
Exporter (dummy)				0.229	0.196	0.294
				(2.37)**	(4.35)***	(2.72)**
Foreign Ownership (dummy)				-0.015	-0.010	-0.045
				(0.16)	(0.19)	(0.45)
Observations	197	194	200	196	195	199
R-squared	0.01	0.01	0.01	0.03	0.03	0.05

* significant at 10%; ** significant at 5%; *** significant at 1%

Furthermore, as a robustness check and to capture more broadly the extent to which the firm has access to formal finance, we also constructed a composite index of finance based on the share of a firm's short-term and long-term financing from the banking system, plus the share of trade credit, both short and long term.[26] A higher value of the index corresponds to a higher degree of access to formal finance. Our regressions show that the index is positively and significantly correlated with total factor productivity, confirming the earlier results that firms with better access to credit are more productive than firms relying more on internal sources of financing, even controlling for firms' characteristics. (Table 3.3b)

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[26] We used principal component analysis to create this index.

Table 3.3b. Impact of Access to Finance on Firm Productivity in Armenia
(robust t-statistics in parenthesis)

Investment Climate Variable	TFP Escribano (manpower costs)	TFP Escribano (total workers)	TFP OLS	TFP Escribano (manpower costs)	TFP Escribano (total workers)	TFP OLS
Finance Index	0.072	0.049	0.102	0.056	0.044	0.079
	(3.09)***	(1.78)*	(4.70)***	(1.91)*	(1.83)*	(2.95)***
Medium (dummy)				0.008	-0.041	0.009
				(0.14)	(0.78)	(0.11)
Large (dummy)				-0.006	-0.193	-0.023
				(0.04)	(0.97)	(0.12)
Exporter (dummy)				0.254	0.287	0.338
				(3.69)***	(4.22)***	(5.99)***
Foreign Ownership (dummy)				-0.149	-0.125	-0.194
				(1.36)	(1.60)	(1.79)*
State Ownership (dummy)				0.478	0.556	0.469
				(2.21)**	(3.37)***	(1.87)*
Observations	199	200	201	199	200	201
R-squared	0.01	0.01	0.02	0.05	0.05	0.08

* significant at 10%; ** significant at 5%; *** significant at 1%

While access to finance is an issue in Armenia, as also highlighted in the previous section, borrowing from the banking system is even more difficult for small firms than it is for medium and large businesses. Our index of finance in fact shows that firms with less than 10 employees have a much lower access to formal finance than medium and large firms. (figure 3.1)

Figure 3.1 Access to formal finance in Armenia, by firm size

3.2 Policy reform prioritization for productivity and competitiveness

So far we have seen that red tape, corruption and lack of credit have a negative impact on Armenian firms' productivity. In this last part of the paper we attempt to answer two final questions: should policy intervention prioritize one constraint over the others? And, will an enhanced business climate also generate a resurgence of Armenian competitiveness?

To determine the priority of reforms we first estimate the productivity impact of all three IC variables jointly. Then we estimate the average contribution of each of the three variables to Armenia's TFP. This will allow us to identify which of the 3 areas of intervention will have the highest impact on firm performance in Armenia and hence provide an order of importance for policy reform. The results of the joint analysis are presented in table 3.4. It is interesting to note that all 3 coefficients remain significant at the 1% or 5% level and have the expected sign.
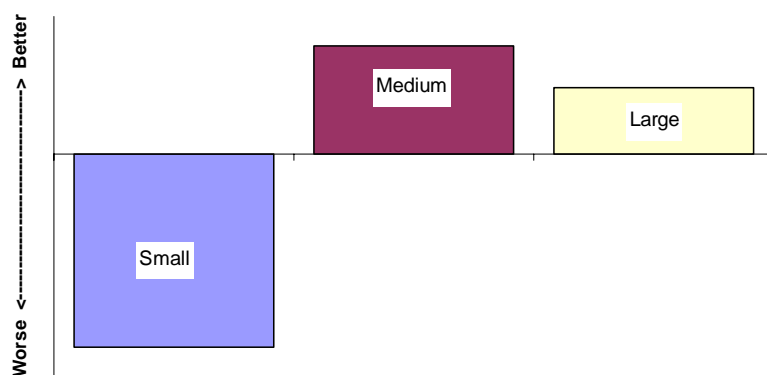
Table 3.4. Impact of all 3 IC constraints on Firm Productivity in Armenia
(robust t-statistics in parenthesis)

Investment Climate Variable	TFP Escribano (manpower costs)	TFP Escribano (total workers)	TFP OLS	TFP Escribano (manpower costs)	TFP Escribano (total workers)	TFP OLS
Inspections/Meetings with public officials (log)	-0.151	-0.106	-0.109	-0.165	-0.114	-0.127
	(4.74)***	(5.57)***	(3.00)***	(4.35)***	(8.09)***	(2.97)***
Informal payments to public officials to get things done	0.024	0.017	0.030	0.036	0.024	0.041
	(3.51)***	(2.52)**	(3.55)***	(5.48)***	(3.42)***	(5.36)***
Bank loan (dummy)	0.119	0.101	0.118	0.080	0.099	0.095
	(2.70)**	(1.67)	(1.94)*	(2.21)**	(2.87)**	(1.78)*
Medium (dummy)				0.027	-0.014	-0.014
				(0.59)	(0.17)	(0.22)
Large (dummy)				-0.099	-0.190	-0.057
				(0.85)	(1.17)	(0.34)
Exporter (dummy)				0.320	0.232	0.299
				(3.67)***	(4.31)***	(3.13)***
Foreign Ownership (dummy)				0.022	-0.010	-0.022
				(0.26)	(0.14)	(0.21)
State Ownership (dummy)				0.413	0.472	0.393
				(1.91)*	(3.58)***	(1.65)
Observations	204	201	205	202	201	205

| R-squared | 0.09 | 0.05 | 0.07 | 0.18 | 0.12 | 0.15 |

* significant at 10%; ** significant at 5%; *** significant at 1%

Figure 3.2 Priority of Reforms
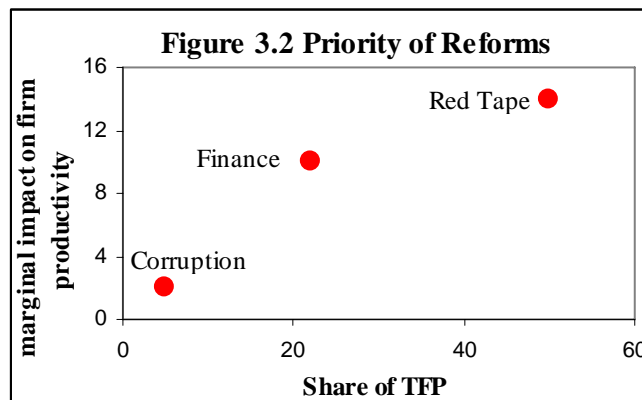
Figure 3.2 shows the results of the TFP decomposition. It is clear that red tape exerts the highest contribution to productivity in Armenia, both in terms of marginal impact and as share of total TFP, followed by access to finance and corruption. Far from implying that red tape is the only policy reform Armenia should adopt, our analysis has shown that all 3 areas of intervention should be put at the forefront of the policy debate in the country, with bureaucratic burden being the first.

So far we have seen clear evidence that reforms on red tape, access to finance, and corruption will improve the Armenian productivity. But will they also foster Armenia's competitiveness? In order to address this question we need to look at how Armenia performs in terms of productivity from an international perspective, and then we need to assess the impact of these policy reforms on its competitiveness.

Figure 3.3 reports Armenia's productivity gap compared to a number of countries in the region.[27] Armenia appears as productive as Georgia and 40% less productive than Turkey. At the same time Armenia is more productive than the Central Asian countries in the sample and about 60% more productive than Moldova. Finally Armenia, not surprisingly, is less productive than the EU members in the Baltic, although the productivity gap with Lithuania is smaller than the gap with Turkey.

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[27] The productivity gap is estimated by pooling individual country data sets and fitting equation [3.1] with country dummies. The results are presented in the appendix, annex 3.2.

Figure 3.3. Armenia's Productivity Gap with Selected Countries in the Region: 2005
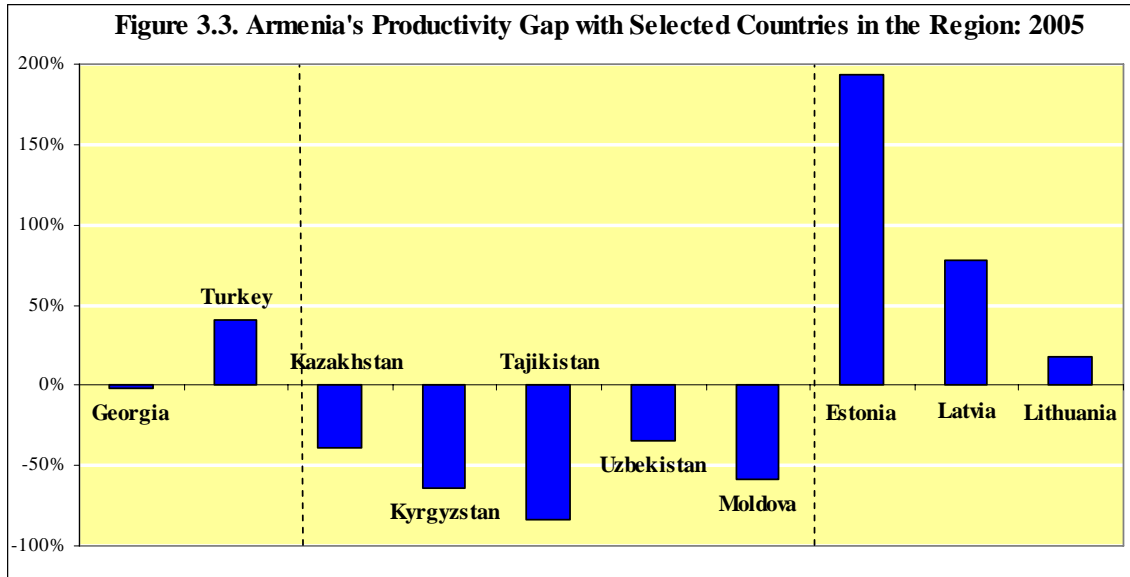
Will the policy interventions highlighted earlier bridge the 40% productivity gap between Armenia and Turkey? To answer this question we fit the following model:

$$TFP_i = \gamma_0 + \gamma_1 * IC_i + \gamma_2 * CountryD_i + \gamma_3 * IC_i * CountryD + \varepsilon \qquad [3.3]$$

We estimated this model on a pooled data set with Turkey as omitted category. The significance of the coefficient on the interaction term ($ArmeniaD * IC$) will determine if the change in the IC variable has an incremental impact on Armenia over the base country (Turkey).

The results are presented in table 3.5. The first 3 columns report the productivity impact of the 3 IC variables, red tape, finance (loans), and corruption. None of the interaction terms are significant leading to the conclusion that none of the three policy interventions will help reduce Armenia's productivity gap with Turkey.

Earlier we saw that the results of the impact on access to finance on productivity were even stronger when we used the index rather than the dummy for loans. Again we suspected that our proxy for finance (loan dummy) was not the best indicator for access to finance. Therefore we decided to re-estimate model [3.3] but this time using as proxy for access to finance the actual components of the previous index, that is the share of financing from the banking system and from trade credit.

Table 3.5. Impact of IC variables on Armenia's Competitiveness compared to Turkey (robust t-statistics in parenthesis)

	TFP	TFP	TFP	TFP	TFP	TFP	TFP
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Armenia (dummy)	-0.698	-0.795	-0.622	-0.653	-0.822	-0.590	-0.523
	(1.70)*	(1.09)	(2.29)**	(2.49)**	(3.37)***	(2.53)**	(2.31)**
Red tape	-0.005						
	(0.06)						
Armenia*Red tape	0.030						
	(0.40)						
Loan		-0.760					
		(1.05)					
Armenia*loan		0.394					
		(0.51)					
Corruption			-0.097				
			(0.94)				
Armenia*Corrupt			0.047				
			(0.44)				
Banks short term (Bks)				0.010			
				(1.68)*			
Armenia*Bks				-0.000			
				(0.04)			
Banks long term (Bkl)					-0.008		
					(1.67)*		
Armenia *Bkl					0.017		
					(2.89)***		
Trade credit (short)						0.001	
						(0.19)	
Armenia*Tcs						0.053	
						(1.85)*	
Trade credit (long)							0.017
							(2.12)**
Armenia *Tcl							0.044
							(4.65)***
Constant	3.496	4.289	3.717	3.450	3.646	3.598	3.549
	(9.20)***	(6.21)***	(15.17)***	(15.08) ***	(17.40)***	(17.15)***	(17.60)***
Observations	250	160	282	282	282	282	282
R-squared	0.03	0.04	0.04	0.06	0.05	0.04	0.04

* significant at 10%; ** significant at 5%; *** significant at 1%

The results are shown on columns (4)-(7) of table 3.5. From this set of results it is clear that better access to finance will in fact improve Armenia's competitiveness compared to Turkey. However not all forms of financing will have this impact. Short-term loans from banks will *not*, while long term financing from the banking system will help bridge the gap in productivity with Turkey. Furthermore, trade finance, both short term and long term will have an even greater impact. Increasing the share of long term financing from

bank loans by 40% on average, or increasing access to trade credit by approximately 10% of total financing will help bridge Armenia's productivity gap with Turkey.

Appendix

Annex 2.1. Probit results of Corruption on Tax Rate perception
(robust t-statistics in parenthesis)

Investment Climate variable	Tax Rate	Tax Rate	Tax Rate	Tax Rate
	(1)	(2)	(3)	(4)
Gift for tax (dummy)	0.168	0.443	0.424	0.444
	(2.43)*	(2.33)*	(2.23)*	(2.33)*
Gift to get things done (dummy)	0.089	0.23	0.234	0.271
	(2.67)**	(2.55)*	(2.58)**	(1.64)
Number of inspections	0.112	0.273	0.341	0.225
	(1.83)	(1.67)	(2.09)*	(2.46)*
Medium (dummy)		0.141		
		(0.79)		
Large (dummy)		-0.127		
		(0.6)		
Exporter (dummy)			-0.498	
			(2.69)**	
Foreign Ownership (dummy)				-0.497
				(2.07)*
State Ownership (dummy)				-0.409
				(1.31)
Constant	-0.604	-0.596	0.49	-0.463
	(3.08)**	(2.72)**	(2.42)*	(2.20)*
Observations	303	303	303	303
Pseudo R2	0.0982	0.1028	0.1164	0.1120

* significant at 5%; ** significant at 1%

Annex 2.2. Probit results of Corruption on Tax Administration perception
(robust t-statistics in parenthesis)

Investment Climate variable	Tax Administration	Tax Administration	Tax Administration	Tax Administration
	(1)	(2)	(3)	(4)
Gift for tax (dummy)	0.588	0.546	0.556	0.595
	(3.05)**	(2.79)**	(2.85)**	(3.02)**
Gift to get things done (dummy)	0.194	0.181	0.19	0.185
	(2.10)*	(1.95)	(2.04)*	(1.95)
Number of inspections	0.355	0.363	0.422	0.353
	(2.17)*	(2.16)*	(2.50)*	(2.06)*
Medium (dummy)		-0.054		
		(0.29)		
Large (dummy)		-0.543		
		(2.50)*		
Exporter (dummy)			-0.717	
			(3.83)**	

Foreign Ownership (dummy)				-0.924
				(3.77)**
State Ownership (dummy)				-0.345
				(1.11)
Constant	-0.409	-0.22	0.254	-0.249
	(2.05)*	(0.98)	(1.22)	(1.14)
Observations	306	306	306	306
Pseudo R2	0.1101	0.1297	0.1164	0.1499
* significant at 5%; ** significant at 1%				

Annex 2.3. Probit results of Corruption on perception on Tax Administration, excluding payments to get things done.
(robust t-statistics in parenthesis)

Investment Climate variable	Tax Rate	Tax Rate	Tax Rate	Tax Rate
	(1)	(2)	(3)	(4)
Gift for tax (dummy)	0.757	0.735	0.722	0.724
	(4.98)**	(4.76)**	(4.70)**	(4.70)**
Number of inspections	0.305	0.276	0.344	0.272
	(1.95)	(1.74)	(2.17)*	(1.7)
Medium (dummy)		0.168		
		(0.97)		
Large (dummy)		-0.146		
		(0.7)		
Exporter (dummy)			-0.493	
			(2.71)**	
Foreign Ownership (dummy)				-0.511
				(2.15)*
State Ownership (dummy)				-0.515
				(1.66)
Constant	-0.228	-0.241	-0.124	-0.098
	(1.69)	(1.45)	(0.87)	(0.66)
Observations	311	311	311	311
Pseudo R2	0.0812	0.0876	0.0992	0.0978
* significant at 5%; ** significant at 1%				

Annex 2.4. Probit results of Corruption on perception on Tax Administration, excluding payments to get things done.
(robust t-statistics in parenthesis)

Investment Climate variable	Tax Administration	Tax Administration	Tax Administration	Tax Administration
	(1)	(2)	(3)	(4)
Gift for tax (dummy)	0.857	0.795	0.821	0.846
	(5.42)**	(4.93)**	(5.09)**	(5.19)**
Number of inspections	0.324	0.333	0.385	0.316

	(2.02)*	(2.01)*	(2.33)*	(1.88)
Medium (dummy)		-0.032		
		(0.18)		
Large (dummy)		-0.563		
		(2.63)**		
Exporter (dummy)			-0.711	
			(3.85)**	
Foreign Ownership (dummy)				-0.938
				(3.86)**
State Ownership (dummy)				-0.448
				(1.45)
Constant	-0.085	0.079	0.066	0.074
	(0.63)	(0.47)	(0.46)	(0.5)
Observations	315	315	315	315
Pseudo R2	0.1019	0.1239	0.1405	0.1443

* significant at 5%; ** significant at 1%

Annex 2.5. Impact of Red Tape on Corruption in Armenia
(robust t-statistics in parenthesis)

Investment Climate variable	Tax Administration	Tax Administration	Tax Administration	Tax Administration
	(1)	(2)	(3)	(4)
Number of inspections	0.438	0.465	0.462	0.374
	(2.97)**	(3.05)**	(3.10)**	(2.48)*
Medium (dummy)		-0.177		
		(1.08)		
Large (dummy)		-0.67		
		(3.28)**		
Exporter (dummy)			-0.374	
			(2.14)*	
Foreign Ownership (dummy)				-0.226
				(0.97)
State Ownership (dummy)				-0.861
				(2.53)*
Constant	-0.218	-0.024	-0.153	-0.106
	(1.86)	(0.17)	(1.25)	(0.84)
Observations	317	317	317	317
Pseudo R2	0.0202	0.1239	0.0307	0.0376

* significant at 5%; ** significant at 1%

Annex 2.6. Impact of Red Tape on Corruption in Azerbaijan
(robust t-statistics in parenthesis)

Investment Climate variable	Informal Payments	Informal Payments	Informal Payments	Informal Payments
	(1)	(2)	(3)	(4)
Number of inspections	-0.625	-0.624	-0.651	-0.555
	(2.55)*	(2.51)*	(2.64)**	(2.21)*
Medium (dummy)		0.224		
		(0.91)		
Large (dummy)		-0.137		
		(0.51)		
Exporter (dummy)			-0.275	
			(0.9)	
Foreign Ownership (dummy)				0.254
				(0.88)
State Ownership (dummy)				-1.021
				(2.33)*
Constant	0.297	0.246	0.339	0.316
	(2.55)*	(1.24)	(2.70)**	(2.47)*
Observations	155	155	155	155
Pseudo R2	0.0311	0.0413	0.0349	0.0668

* significant at 5%; ** significant at 1%

Annex 2.7. Impact of Red Tape on Corruption in Turkey
(robust t-statistics in parenthesis)

Investment Climate variable	Informal Payments	Informal Payments	Informal Payments	Informal Payments
	(1)	(2)	(3)	(4)
Number of inspections	0.112	0.056	0.171	0.112
	(0.59)	(0.29)	(0.89)	(2.21)*
Medium (dummy)		0.648		
		(2.78)**		
Large (dummy)		0.768		
		(3.21)**		
Exporter (dummy)			0.412	
			(2.08)*	
Foreign Ownership (dummy)				-0.59
				(0.178)
State Ownership (dummy)				-0.62
				(0.34)
Constant	-1.031	-1.424	-1.211	-1.029
	(7.36)**	(7.50)**	(7.19)**	(6.96)**
Observations	253	253	253	253
Pseudo R2	0.0016	0.0586	0.0205	0.0073

* significant at 5%; ** significant at 1%

Annex 2.8. Impact of Red Tape on Corruption in Georgia
(robust t-statistics in parenthesis)

Investment Climate variable	Informal Payments	Informal Payments	Informal Payments	Informal Payments
	(1)	(2)	(3)	(4)
Number of inspections	0.014	0.025	0.013	0.025
	(0.05)	(0.09)	(0.05)	(0.09)
Medium (dummy)		-0.313		
		(1.02)		
Large (dummy)		-0.286		
		(0.88)		
Exporter (dummy)			-0.05	
			(0.14)	
Foreign Ownership (dummy)				-0.216
				(0.56)
State Ownership (dummy)				-0.718
				(1.34)
Constant	-0.809	-0.639	-0.8	-0.727
	(3.75)**	(2.44)*	(3.57)**	(3.16)**
Observations	118	118	118	118
Pseudo R2	0.0000	0.0107	0.0002	0.0187

* significant at 5%; ** significant at 1%

Annex 3.1 Production functions estimates
(robust t-statistics in parenthesis)

	Value Added Escribano (log)	Value Added Escribano (log)	Value Added OLS (log)
Fixed Capital (log)	0.265	0.265	0.294
	(7.94)***	(4.97)***	(6.29)***
Manpower costs (log)	0.697		0.749
	(13.36)***		(15.73)***
Total workers (log)		0.770	
		(21.72)***	
Industry dummies			
Garments	0.754	0.257	0.547
	(12.92)***	(3.56)***	(15.89)***
Food	1.052	0.429	0.890
	(17.68)***	(4.23)***	(20.68)***
Metals and Machinery	0.990	0.404	0.876
	(18.60)***	(3.47)***	(17.94)***
Electronics	0.965	0.212	0.671
	(6.42)***	(1.16)	(6.03)***
Chemicals and Pharmaceuticals	0.624	0.051	0.534
	(7.65)***	(0.31)	(6.48)***
Construction	1.553	0.921	1.469
	(21.83)***	(8.73)***	(24.27)***
Wood and Furniture	1.590	1.004	1.314
	(27.01)***	(16.51)***	(95.96)***
Plastic	0.611	0.008	0.269
	(8.29)***	(0.07)	(3.69)***
Paper	0.663	-0.011	0.563
	(16.78)***	(0.10)	(16.36)***
Advertising and Marketing	1.254	1.122	0.996
	(15.25)***	(22.38)***	(60.42)***
Other Services	1.180	0.448	1.057
	(16.86)***	(3.85)***	(23.99)***
Retail and Wholesale	1.357	0.864	1.071
	(18.12)***	(13.40)***	(51.60)***
Hotels and Restaurants	1.600	0.834	1.219
	(19.48)***	(13.24)***	(100.14)***
Transport	0.344	-0.364	0.109
	(5.32)***	(2.42)**	(1.46)
Real Estate and Rental Services	2.683	1.976	2.526
	(47.19)***	(40.83)***	(143.55)***
Mining and Quarrying	0.859	0.275	0.778
	(17.19)***	(4.55)***	(20.83)***
Firm's control variables			

Age dummy	0.199	0.196	
	(2.60)**	(2.94)***	
Audit dummy	0.260	0.299	
	(4.13)***	(4.21)***	
National competition dummy	0.291	0.127	
	(4.51)***	(2.23)**	
Observations	212	213	214
R-squared	0.79	0.79	0.77

* significant at 10%; ** significant at 5%; *** significant at 1%

Annex 3.2 Production functions estimates, pooled country data
(robust t-statistics in parenthesis)

	Value Added Escribano (log)
Fixed Capital (log)	0.115
	(4.84)**
Manpower costs (log)	0.901
	(32.13)**
Country dummies	
Turkey	0.416
	(3.29)**
Moldova	-0.750
	(6.00)**
Latvia	0.698
	(5.93)**
Lithuania	0.259
	(2.31)*
Estonia	1.188
	(10.20)**
Georgia	-0.118
	(0.93)
Kazakhstan	-0.404
	(3.59)**
Uzbekistan	-0.342
	(2.33)*
Tajikistan	-1.726
	(10.78)**
Kyrgyzstan	-0.945
	(8.32)**
Firm's control variables	
Not audited financial statements (dummy)	-0.194
	(3.17)**
Corruption (% sales)	0.025

	(1.99)*
Observations	1095
R-squared	0.78

*Significant at 10%; ** significant at 5%; *** significant at 1%.*
Industries dummies were included but not reported.

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