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Skill deficits in developing countries: A review of empirical evidence from enterprise surveys

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Working Paper

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1. INTRODUCTION

1. A skills mismatch indicates a situation where individuals, employed or not, are not well matched in terms of skills to the job they perform or where individuals are unemployed because the skills they have do not match that of the open vacancies or, more in general, those required in the labour market. Skills mismatch can have serious consequences for the employability of youth and take many forms. The following table presents a non-exhaustive taxonomy of types of skills mismatches. Each of the different forms has potentially different consequences and calls for specific policy interventions.

Table 1. **Skills mismatches in the labour market: a summary**

Overeducation	To have completed more years of education than the current job requires.
Undereducation	To have completed fewer years of education than the current job requires.
Overqualification	To hold a higher qualification than the current job requires.
Underqualification	To hold a lower qualification than the current job requires.
Overskilling	To be unable to fully use one's skills and abilities in the current job.
Underskilling	To lack the skills and abilities necessary to perform the current job to acceptable standards.
Skill deficit	Demand for a particular type of skill exceeds the supply of available people with that skill.
Skill surplus	The supply of people with a particular skill exceeds the demand for it.
Skill gap	The level of skills of the person employed is less than that required to perform the job adequately or the type of skill does not match the requirements of the job.
Economic skills obsolescence	Skills previously used in a job are no longer required or are less important.
Physical (technical) obsolescence	Physical or mental skills and abilities deteriorate due to atrophy or wear and tear.
Vertical mismatch	The level of education or skills is less or more than the required level of education or skills.
Horizontal mismatch	The level of education or skills matches job requirements, but the type of education or skills is inappropriate for the current job.
Crowding out/ bumping down	Better qualified workers are hired to do jobs that less qualified workers could also do, thus replacing (crowding out) less qualified workers from traditional employment possibilities for their level of skill. Bumping down refers to this process working from top to bottom, pushing less qualified workers to even lower level jobs. At the extreme some lower level workers may become unemployed.

2. Of course skills mismatches depend on both labour supply and demand characteristics and call for interventions on both sides of the labour market. One crucial point in trying to identify policies to address skill mismatches is to effectively measure them. This is an especially challenging task and different approaches have been used, mainly with reference to developed countries.[1]

3. The concept of skills deficit refers to the inability of an employer to recruit people with the appropriate skills from the labor market.[2] Skills deficits are usually measured on the basis of responses from employers using a questionnaire approach. But what do employers mean when they indicate that there is a skills

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[1] See Desjardins, R. and K. Rubenson (2011), "An Analysis of Skill Mismatch Using Direct Measures of Skills", OECD Education Working Papers, No. 63, OECD Publishing.

[2] Watson, D., Johnson, S., and Webb, R. (2006) Employer Perceptions of Skill Deficiencies in the UK Labour Market: A Sub-Regional Analysis., Environment and Planning A, 38(9) 1753 – 1771.

deficit at their establishment? An employer might encounter difficulties in the recruitment of new employees, but this does not necessarily mean there is an absolute shortage of skilled labor. Recruitment difficulties might be due to the employer offering low wages or poor working conditions or using inappropriate recruiting channels. An additional complication derives from the fact that employers might consider a wide range of employees' behavioral characteristics, such as reliability, motivation, independence, etc. The nature and the extent to which such attributes are assessed depend on the organization and on the respondent characteristics.

4. As this discussion makes clear, measuring skills deficits is a challenging task and different approaches have been used,[3] mainly with reference to developed countries. In this paper we use a set of data yielded by the World Bank Enterprise Surveys[4] concerning employers' perceptions of the adequacy of work force qualifications to the needs of the enterprise. It is one of the first studies that attempts to assess the extent of skills deficits in developing countries (mainly low and middle income countries), albeit form the particular point of view of the employers perceptions. It should be also be noted that the Enterprise Surveys refer only to firms operating in the formal sector and hence cover a limited part of the labour market, especially in low income countries.

5. Notwithstanding these limitations, a series of interesting patterns emerge from the analysis of the data. Skills deficits are not perceived as extremely relevant to most firms in the countries covered. Their importance, however, appears to increase with the level of development of the country. This is reasonable, as a higher level of development implies, on the one hand, that more stringent bottlenecks (e.g., access electricity, access to credit, security) have been overcome, and, on the other hand, that skills-intensive production plays a greater role in the economy. The importance of skills deficits also increases with the relative importance of the tertiary sector in the economy. Education levels and the relevance of skills deficits do not necessarily move in opposite directions, hinting at the presence of skills mismatching in addition to skills deficits. The youth unemployment rate appears to be positively correlated with skills deficits, again suggestive of skills mismatches, particularly given that many of the unemployed youth are well educated.

6. The remainder of the paper is structured as follows. Section 2 discusses data sources and the methodology used for assessing skills deficits in the selected countries. Section 3 assesses the relevance of the skills deficit and firm-level characteristics associated with it in a subset of 10 developing countries. Section 4 investigates the relation between skills deficits and the broader national economic and development context in the full sample of 25 countries. Specifically, it reports simple bivariate relations between the skills deficit, on one hand, and per capita income, the structure of production, educational levels and the youth labour market, on the other. Section 5 utilises the same set of firm- and country-level variables discussed in sections 3 and 4 to investigate the correlates of skills deficits in a multivariate setting. Section 6 concludes.

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[3] Desjardins, R. and K. Rubenson (2011), "An Analysis of Skill Mismatch Using Direct Measures of Skills", OECD Education Working Papers, No. 63, OECD Publishing

[4] For further details, see http://www.enterprisesurveys.org/.

2. DATA SOURCES AND METHODOLOGY

7. The analysis is based on data from the World Bank Enterprise Surveys in 25 countries. The surveys cover a representative sample of an economy's non-agricultural private sector [5] and collect information on a number of issues affecting business climate, including access to finance, corruption, crime, workforce composition, infrastructure, competition, and performance measures. The sample is restricted to the most recent years, 2006-2010, in order to match enterprise-level data with information about the educational profile of the workforce from household and individual level data (see Table 2). Of the 25 countries, 11 are located in Latin America, six in Africa, three in East Asia and Pacific region, four in Europe and Central Asia, one country in Middle East and North Africa.

8. The Enterprise Surveys are administered to business owners and top managers;[6] the sample size varies with the economy's size: from 1,200-1,800 interviews in larger economies to 150 in small economies. The manufacturing and services sector are the main sectors of interest, and the surveys use two instruments, a manufacturing questionnaire and a services questionnaire, to collect the information. The manufacturing sector includes textiles, leather, garments, food, metals and machinery, electronics, chemicals and pharmaceuticals, wood and furniture, non-metallic and plastic materials, auto and auto-components, other manufacturing. Services firms include retail and wholesale trade, hotels and restaurants, and other services. Construction and transportation firms are grouped together under the label "others". The Enterprise Surveys target formal firms with five or more employees that are not 100 percent state/government owned.[7]

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[5] Most surveys were administered using the Enterprise Surveys methodology, while some others did not strictly adhere to the Enterprise Surveys methodology. For surveys which did not strictly adhere to the global Enterprise Surveys, any inference from one of these surveys is representative only for the data sample itself, not the country level. In our sample, Jordan and Cambodia did not adhere to the global methodology. Firm-level surveys have been conducted since 2002, but only since 2005/06 has data collection been centralized within the Enterprise Analysis Unit of the World Bank.

[6] The respondent may ask for a human resources manager or firm's accountant help to provide information on sales and labor questions.

[7] For more information please visit www.enterprisesurveys.org.

Table 2. **Enterprise surveys (WB) used in this study by country and survey year**

COUNTRY/YEAR	2006	2007	2008	2009	2010
Albania				V	
Bolivia					V
Brazil				V	
Burkina Faso				V	
Cambodia		V			
Cameroon				V	
Colombia					V
Ecuador					V
El Salvador					V
Guatemala					V
Honduras					V
Jordan	V				
Indonesia				V	
Kosovo				V	
Mali					V
Mexico					V
Mongolia				V	
Nicaragua					V
Niger				V	
Panama					V
Peru					V
Rwanda	V				
Serbia				V	
Turkey			V		
Zambia		V			

Source: UCW on Enterprise Surveys data.

9. A section of the Enterprise Survey instrument collects respondents' opinions on what are the obstacles to firm growth and performance. The analysis in the following sections is based on two questions relating to the adequacy of workforce education levels. The first question refers to 15 different obstacles[8] that might be hindering the operations and growth of the firm and asks respondents to rank the top three constraints. The second question asks respondents to rate the importance of inadequate workforce educational levels as an obstacle to the current operations and growth of the firm on a five-point scale ranging from 0 (no obstacle) to 5 (very severe obstacle).[9]

10. The two questions are used to construct two indicators aimed at measuring the extent of the skill deficit as perceived by employers. The first indicator is the share of firms reporting an inadequately educated workforce as the *main constraint* to current operations and growth. The second indicator of the skills deficit is the

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[8] In Jordan and Cambodia, the survey allows for a higher number of constraints. Precisely, in the case of Jordan the list includes macroeconomic instability, water, and telecommunication in addition to the standard 15 constraints. In the case of Cambodia, the additional obstacles are macroeconomic instability and telecommunications. For the sake of comparability, we drop the additional constraint to compute the share of firms indicating each obstacle as the main one.

[9] 0 indicates no obstacle, 1 a minor obstacle, 2 a moderate obstacle, 3 a major obstacle, and 5 a very severe obstacle

average rating value of the importance of inadequate workforce educational levels as an *obstacle* to operations and growth on the five-point scale.[10]

11. It is worth explaining the difference between the two measures of skills deficit. The first indicator is a relative measure of skill deficit since the interviewer asks the respondent to indicate the top three business climate constraints that affect the current operation and growth of the establishment. Therefore, given a set of constraints, respondents have to pick the most important one, and they do so by comparing the relative importance of the 15 constraints listed by interviewers. The second indicator is an absolute measure of skills shortage: respondents are asked to rate the importance of inadequate workforce educational levels as a constraint on a five point scale regardless of any other constraint. In other words, even if an inadequately educated workforce does not represent the main constraint, respondents have the opportunity to rate it independently of other issues.

12. A number of firms' characteristics are taken into account in the description of the size of skill deficit and in the regression analysis: industry (manufacturing, services, and other services), size (less than 20 employees, 20-99, 100 and over), export orientation (direct exports are 10 percent or more of total sales), and value of sales per employee. Additional variables, namely manufacturing[11] and services[12] value added[13] as a share of GDP, per capita GDP constant 2000US$ are taken from World Bank Development Indicators (WDI), while the average number of years of schooling attained by the population aged 15-64 is from Barro-Lee educational attainment database.[14] For the sake of comparability only standardised questions and skills-related variables are used in the analysis.

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[10] For the sake of simplicity, both graphs and regressions will use the share of firms rating such obstacle with value 3 or 4 on a five point scale (0-4).

[11] Manufacturing refers to industries belonging to ISIC divisions 15-37.

[12] Services correspond to ISIC divisions 50-99 and they include value added in wholesale and retail trade (including hotels and restaurants), transport, and government, financial, professional, and personal services such as education, health care, and real estate services. Also included are imputed bank service charges, import duties, and any statistical discrepancies noted by national compilers as well as discrepancies arising from rescaling.

[13] Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources. The industrial origin of value added is determined by the International Standard Industrial Classification (ISIC), revision 3.

[14] See http://www.barrolee.com.

3. SKILLS DEFICIT AND FIRM CHARACTERISTICS

13. This section presents descriptive evidence of skills deficits across 10 countries making use of the relative and absolute skills deficit indicators described above. It looks first at the overall relevance of skills deficits and then at simple bivariate relations between the skills deficit indicators and selected characteristics of firms.

14. Estimates for the two skills deficit indicators, reported in Figure 1, do not suggest that skills deficits are an extremely relevant constraint for most firms in the 10 countries. The share of firms citing an inadequately educated workforce as the *main constraint* to current operations and growth did not exceed 10 percent in any of the countries and was five percent or less in seven of the 10 countries. Similarly, skills deficits are rated as only a "minor" obstacle to current operations in all but one country. And in the exception, Brazil, skills deficits constitute a "moderate" rather than a "major" or "very severe" obstacle. The division of countries by income categories suggests that the skill deficit is a greater constraint in the more developed countries. This is not surprising, as these countries have overcome other more stringent constraints to growth (e.g., such as access to electricity and credit), and their more sophisticated economies have a greater need for skilled workers. Links between skill deficits and the level development are discussed in more detail in section 25 of this report.

Figure 1. **Skills deficit, by country**

(a) Share of firms citing inadequately educated workforce as the main constraint to operations and growth
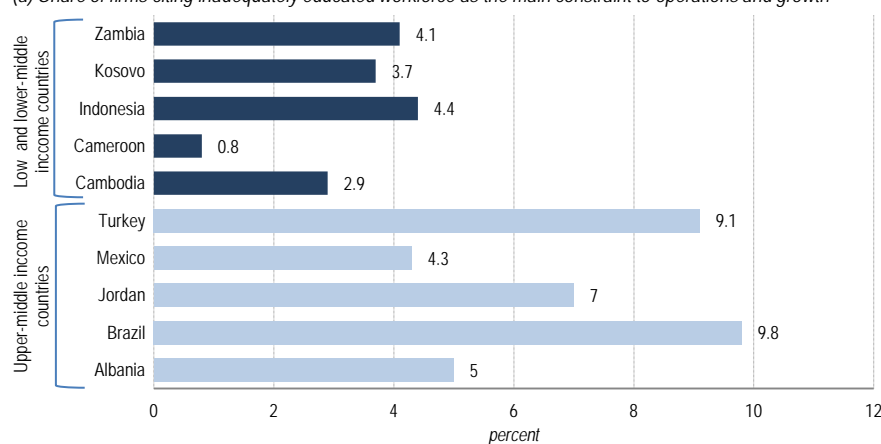
(b) Average value of firms' rating (0-4) of workforce education as an obstacle to operations and growth
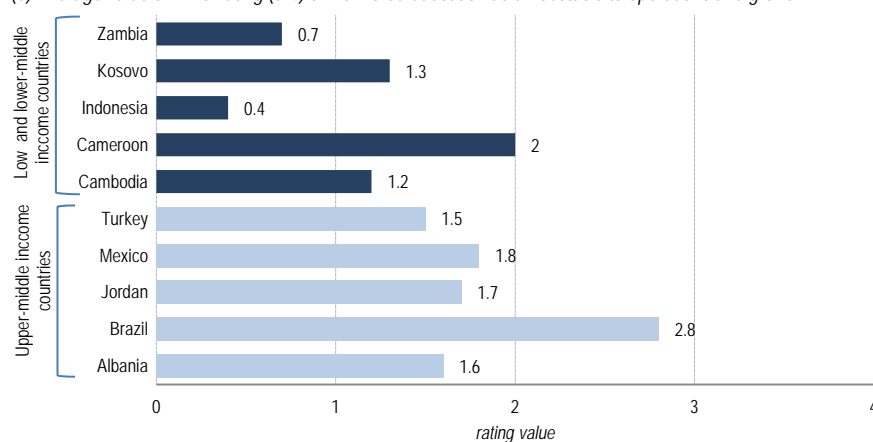
Source: UCW calculations on Enterprise Surveys data.

15. The importance of skills deficits differs not only across countries according to the level of development, but also within countries as a function of firms' sector,

size, export orientation, productivity and competition.[15] Figure 2, Figure 3 and Figure 4 report overall patterns results in this regard.

Figure 2. **Economic sector and the skill deficit, by country**

(a) Share of firms citing inadequately educated workforce as the main constraint to operations and growth

(b) Average value of firms' rating (0-4) of workforce education as an obstacle to operations and growth
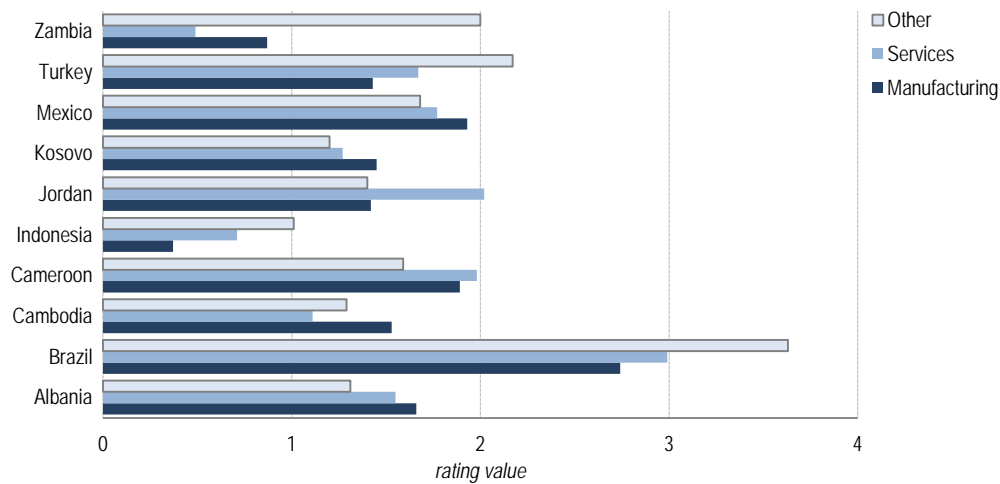
Source: UCW calculations on Enterprise Surveys data.

16. **Sector.** The tertiary sector is typically more skills-intensive than the secondary sector, and, following from this, it might be expected that skills deficits are a more important issue in services than in manufacturing. Evidence in this regard from the 10 countries, however, is not conclusive.[16] In six of the nine countries[17] (i.e., Albania, Brazil, Cambodia, Indonesia, Jordan and Kosovo) the share of services firms citing skill deficits as the *main constraint* to current operation and growth was significantly higher than that of manufacturing firms, but in the three other countries (i.e., Mexico, Turkey, and Zambia) the opposite pattern prevailed. Patterns by sector are even less clear when looking at the absolute indicator of skill

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[15] Caution must be used in interpreting the disaggregated figures of some countries because of the small number of observations (see tables in Appendix).

[16] Caution must be used in interpreting figures about firms operating in other sectors, namely construction and transportation firms, because of the small number of observations. The number of firms is below 50 in any country except Cambodia (119), and they go from 4 firms in Zambia, to 30 in Indonesia and 42 in Jordan (see Appendix).

[17] Data on the services sector were not available for Cameroon.

deficits based on the five-point scale – skill deficits were rated higher in importance by manufacturing firms in five of the countries and higher in importance by services firms in the other five countries.

17. It is worth noting in this context that in four of the countries – Turkey, Albania, Cambodia and Kosovo – patterns by sector differed according to whether the relative or absolute indicator of skill deficits was used. In the latter three countries, for example, while services firms were more likely to cite skill deficits as the main constraint, manufacturing firms rated the importance of skill deficits as higher on the five-point scale. This suggests that while skill constraints were important in the manufacturing sector in the three countries, these countries faced other, even more important, challenges to operations and growth in manufacturing.

Figure 3. **Firm size and the skill deficit, by country**

(a) Share of firms citing inadequately educated workforce as the main constraint to operations and growth
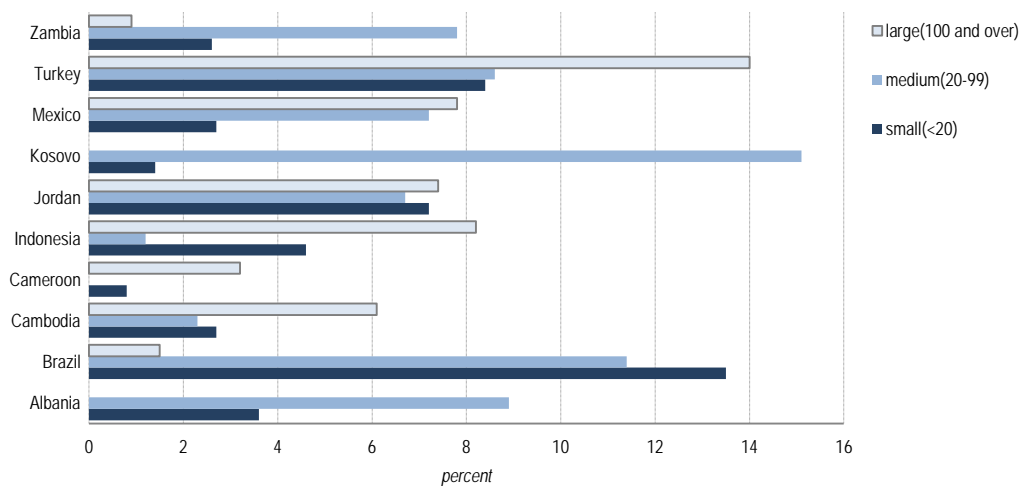
(b) Average value of firms' rating (0-4) of workforce education as an obstacle to operations and growth
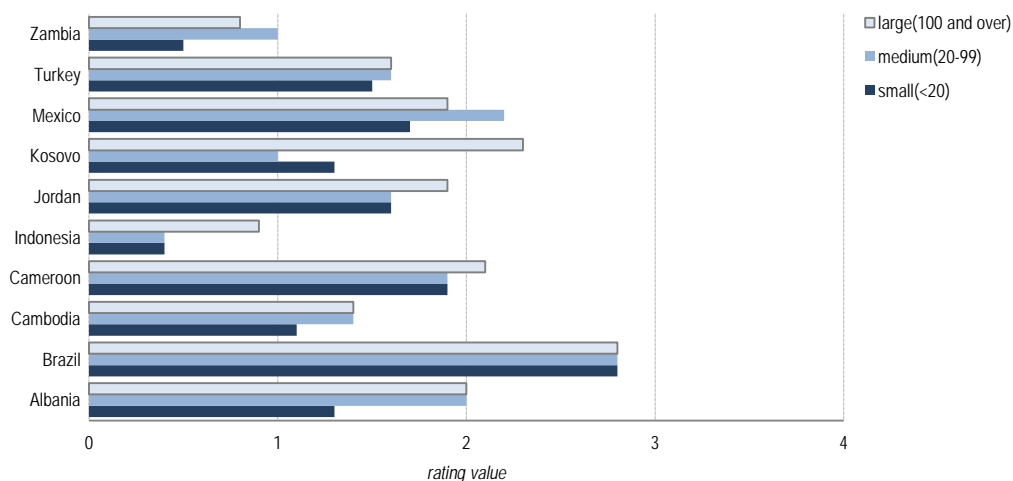
Source: UCW calculations on Enterprise Surveys data.

18. **Firm size.** Skills deficits appear more relevant for larger firms than smaller ones (as measured by number of employees).[18] This pattern holds for most countries applying both the relative and absolute indicators of skill deficits (Figure 3). The largest firms are more likely than the smallest firms to cite skill deficits as the *main constraint* to current operation and growth in eight of the ten countries (Brazil and Zambia are the exceptions). Similarly, the importance of skill deficits as

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[18] In Albania and Kosovo there are only 9 and 14 large firms respectively (see Appendix).

a constraint is rated higher on average by largest firms than by the smallest firms in nine of the 10 countries (Brazil is the exception).

19. **Export orientation.** Firms directly exporting a large share of their sales are more exposed to the global competition and having an adequately skilled workforce can often be critical to ensuring a competitive advantage. Following from this, it might be assumed that skill deficits are a particularly important issue for export-oriented firms. But the relative and absolute measures of skill deficit, reported in Figure 4, do not suggest that this reasoning holds consistently across the 10 countries. Export-oriented firms (defined as firms with direct exports accounting for 10 percent or more of sales) were more likely than non-export firms to cite skills deficits as the main constraint to current operation and growth in six countries (i.e., Brazil, Indonesia, Kosovo, Mexico, Turkey and Zambia), but in the other three countries (i.e., Albania, Cambodia and Jordan)[19] the pattern ran strongly in the opposite direction. Applying the absolute measure of skill deficit, skill deficits were rated as a more important issue for export-oriented firms in only four of the 10 countries (i.e., Brazil, Kosovo, Mexico and Zambia).

Figure 4. **Export orientation and the skill deficit, by country**

(a) Share of firms citing inadequately educated workforce as the main constraint to operations and growth
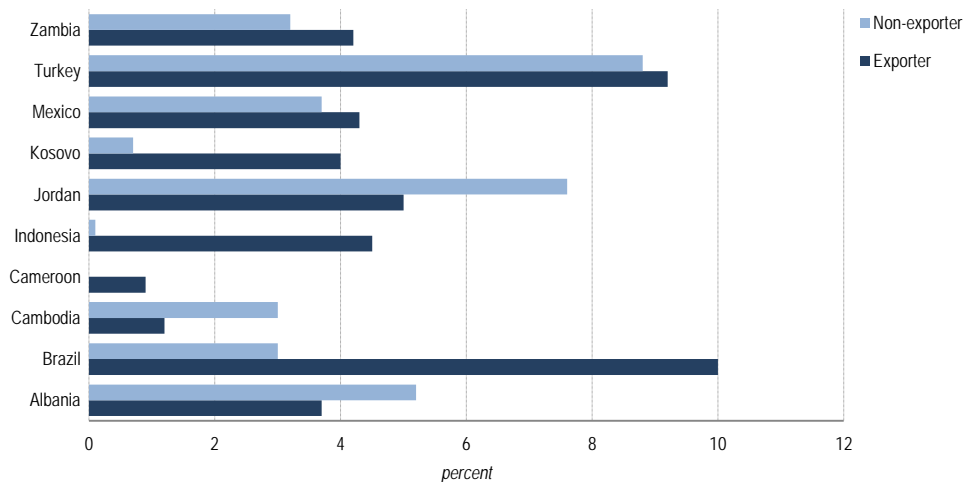
(b) Average value of firms' rating (0-4) of workforce education as an obstacle to operations and growth
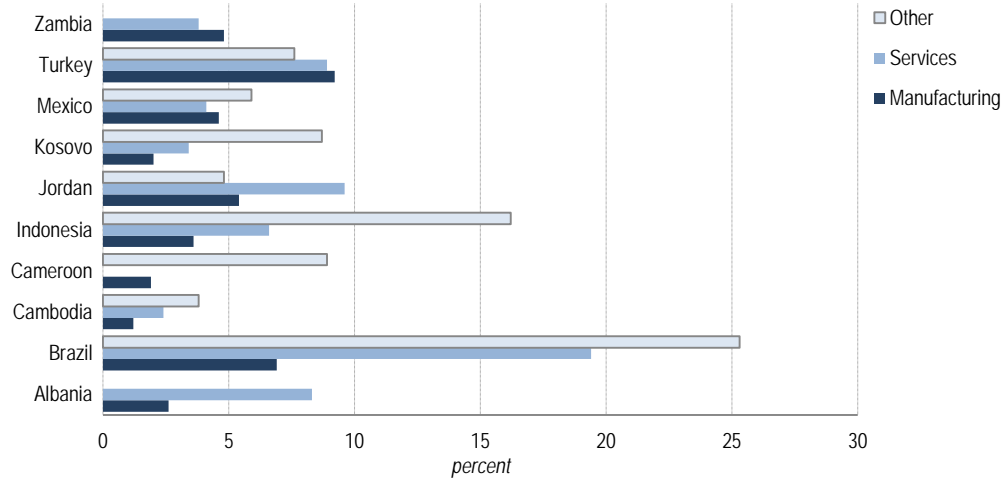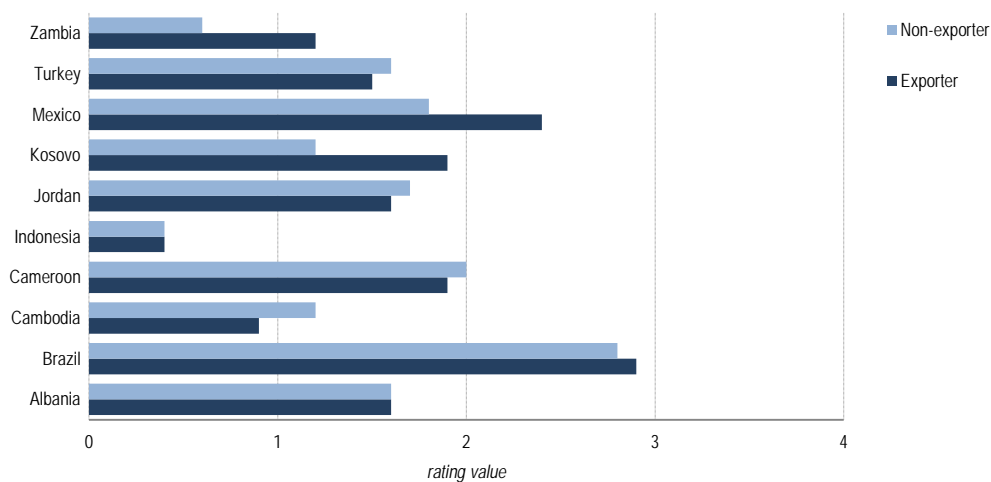

Source: UCW calculations on Enterprise Surveys data.

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[19] Data are not available for non-export firms in Cameroon.

20. **Firm productivity.** No clear pattern is apparent between firm productivity (as measured by quintile of sales per employee) and skills deficits (Table 3 and Table 4). [20] There are countries such as Turkey, Brazil, and Cambodia where the share of firms citing skills deficits as the main constraint decreases as productivity rises, and others such as Zambia and Mexico where the opposite pattern is observed. In the remaining countries there is no clear negative or positive correlation between skills constraints and productivity. Patterns based on the absolute indicator of skills deficit are similarly unclear. If the values of the first quintile that might be biased because of the small number of observations are excluded, the average rating increases with sales per employee quintile in Indonesia, Jordan, and Turkey, while it first increases and then stabilizes in Brazil, Cameroon, and Mexico. In Albania, Cambodia, Kosovo, and Zambia we observe a mixed pattern.

Table 3. **Share of firms indicating an inadequately educated workforce as the main constraint to the operations and growth**

		Albania	Brazil	Cambodia	Cameroon	Indonesia	Jordan	Kosovo	Mexico	Turkey	Zambia
Sales per employee quintile	1	2.8	3.5	0.1	0.0	4.9	7.8	2.3	3.7	15.1	2.7
	2	5.4	11.6	6.4	0.0	7.8	6.2	12.7	3.1	9.1	3.2
	3	3.1	8.7	4.0	4.4	2.9	10.5	0.0	3.3	9.6	2.6
	4	0.0	2.1	3.7	0.0	3.0	3.9	0.0	2.8	7.2	5.3
	5	3.3	1.4	0.7	0.0	4.0	6.0	0.0	9.6	6.7	6.9

Source: UCW calculation on Enterprise Surveys data.

Table 4. **Average value of firms' rating (0-4) of workforce education as an obstacle to the operations and growth**

		Albania	Brazil	Cambodia	Cameroon	Indonesia	Jordan	Kosovo	Mexico	Turkey	Zambia
Sales per employee quintile	1	1.1	2.1	1.2	1.6	0.3	2.1	1.4	1.8	1.5	0.6
	2	1.6	3.0	1.1	1.9	0.4	1.5	1.4	1.3	1.8	0.7
	3	1.3	3.0	1.4	2.2	0.3	1.5	1.4	2.1	1.4	0.4
	4	1.3	2.9	1.2	2.1	0.5	1.7	1.0	1.9	1.5	1.1
	5	1.4	2.8	1.1	2.0	0.7	1.5	1.2	1.9	1.6	0.6

Source: UCW calculation on Enterprise Surveys data.

21. **Competition.** The limited available evidence from the manufacturing sector in Brazil[21] suggests a positive correlation between skills deficits and the amount of competition faced by a firm. Both the relative and absolute indicators of skills deficits in Brazil increased with the number of competitors a firm had to face for its main product. For example, among Brazilian firms with no competitors, the share of those indicating the inadequacy of the workforce educational level as the main constraint was 2.2 percent, but for firms with more than 5 competitors the share rose to 6.2 percent. Similarly, firms' average rating of the importance of skills deficit as an obstacle to current operations and growth rose with the number of competitors firms faced. The explanation is likely that having an adequately skilled workforce is often critical to ensuring a competitive advantage in a competitive environment.

22. Not addressed thus far in the discussion the question of how skills deficits rank relative to *other business constraints* faced by firms in the 10 countries.[22] In order to get a sense of the relative importance of skills deficit, Table 5 reports the share of

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[20] In Albania the number of firms in each quintile is between 22 and 27; in Kosovo there are 24 and 34 firms in the third and fourth quintile respectively (see Appendix).

[21] Information on competition was only available for the manufacturing sector and in only one of the 10 countries – Brazil – were there sufficient observations for this sector for reliable estimates.

[22] See footnote 8.

firms indicating each of the 15 investment climate constraints as the main constraint. In four of the 10 countries, an inadequately educated workforce is among the top five constraints: Brazilian and Jordanian firms rate it as the fourth most important constraint, while Indonesian and Turkish firms rate as the fifth most important. In Albania, Cambodia, Cameroon, Kosovo, Mexico, and Zambia an inadequately educated workforce is further down the list of priority constraints cited by firms.

23. The top business constraint faced by firms differs considerably across countries. In Albania and Kosovo electricity is the top constraint for the majority of firms, in Brazil and Zambia tax rates are most important, in Cambodia the top concern is corruption, in Cameroon and Mexico practices of competitors in the informal sector are the greatest hindrance to current operations and growth, in Indonesia and Turkey access to finance is the main obstacle, and, finally, in Jordan business licensing and permits are the priority concern of firms (see figures in Appendix. These results highlight the very different business climates faced by firms across the 10 countries.

Table 5. **Main constraints to current operations and growth, by country**

Constraint	Albania	Brazil	Cambodia	Cameroon	Indonesia	Jordan	Kosovo	Mexico	Turkey	Zambia
Inadequately educated workforce	**5.0**	**9.6**	**2.9**	**0.8**	**3.8**	**7.0**	**3.7**	**4.3**	**8.7**	**4.1**
Access to finance	5.4	12.5	4.8	16.5	41.3	8.6	2.0	12.4	24.9	14.3
Access to land	2.2	0.4	2.7	1.2	3.4	3.6	0.0	3.3	0.4	10.1
Business licensing and permits	1.5	0.8	2.8	0.0	2.8	24.8	0.0	9.0	2.4	0.8
Corruption	6.8	2.3	23.6	7.4	1.4	5.6	20.6	11.3	1.9	4.5
Courts	0.4	1.1	1.5	0.5	0.2	0.5	0.5	0.8	0.2	0.6
Crime	1.3	2.5	6.1	5.1	2.6	0.4	11.6	12.3	0.9	8.6
Customs and trade regulations	3.0	2.6	2.0	3.4	1.2	3.4	5.4	0.3	1.9	2.7
Electricity	35.9	0.4	16.3	13.6	5.6	1.2	33.5	5.4	2.9	11.9
Labor regulations	1.0	9.0	0.8	0.7	1.1	5.8	0.0	3.3	1.9	0.3
Political instability	7.0	1.7	6.0	2.0	6.0	2.6	7.7	5.2	16.8	0.8
Practices of competitors in the informal sector	14.3	8.4	8.9	24.8	11.9	4.6	12.8	16.0	14.1	15.3
Tax administration	1.3	13.0	1.9	19.3	0.3	6.6	0.0	1.4	0.3	1.1
Tax rates	6.5	32.3	5.0	3.7	1.1	7.1	2.2	14.2	17.5	18.6
Transport	1.7	1.8	2.6	0.6	3.7	1.1	0.0	0.8	1.1	6.3

Source: UCW calculations on Enterprise Surveys.

4. SKILLS DEFICITS AND THE NATIONAL CONTEXT

24. This section investigates the relation between skills deficits and the broader national economic and development context in an expanded sample of 25 countries. Specifically, it reports simple bivariate relations between the skills deficit, on one hand, and per capita income, the structure of production, educational levels and the youth labour market, on the other.

25. **Skills deficits and per capita income.** Skills deficits appear more relevant in more advanced economies. Figure 5 shows the relationship between the absolute and relative indicators of skills deficit and the level of economic development as measured by GDP per capita. The share of firms indicating skills deficits both as the

main constraint and as an important obstacle[23] to current operations and growth increases with the level of GDP per capita. This is particularly the case moving from low to lower-middle income levels. In low-income countries skills deficits are less relevant both because of the predominance of low-skill less formal production methods and because of the presence of other more pressing constraints to the operations of firms.

26. Skills deficits are more relevant in lower-middle income countries. These countries are at a position along the development path where more formal secondary and tertiary sector firms begin to play important roles in the economy, and where, therefore, workforce skills are more important. This reasoning, however, does not necessarily extend to upper-middle income countries, where secondary and tertiary sectors typically account for an even greater share of GDP. Indeed, as also shown in Figure 5, skills deficits can be less important in upper middle-income countries than in lower-middle income economies; this is undoubtedly in large part the product of better education systems, and particularly better technical and vocational schools, in middle-income countries which are able to equip prospective workers with the skills set requested by firms.

Figure 5. **Skills deficits and per capita GDP**

(a) Share of firms reporting workforce education as the main constraint vs. per capita GDP

(b) Share of firms reporting workforce education as an obstacle vs. per capita GDP
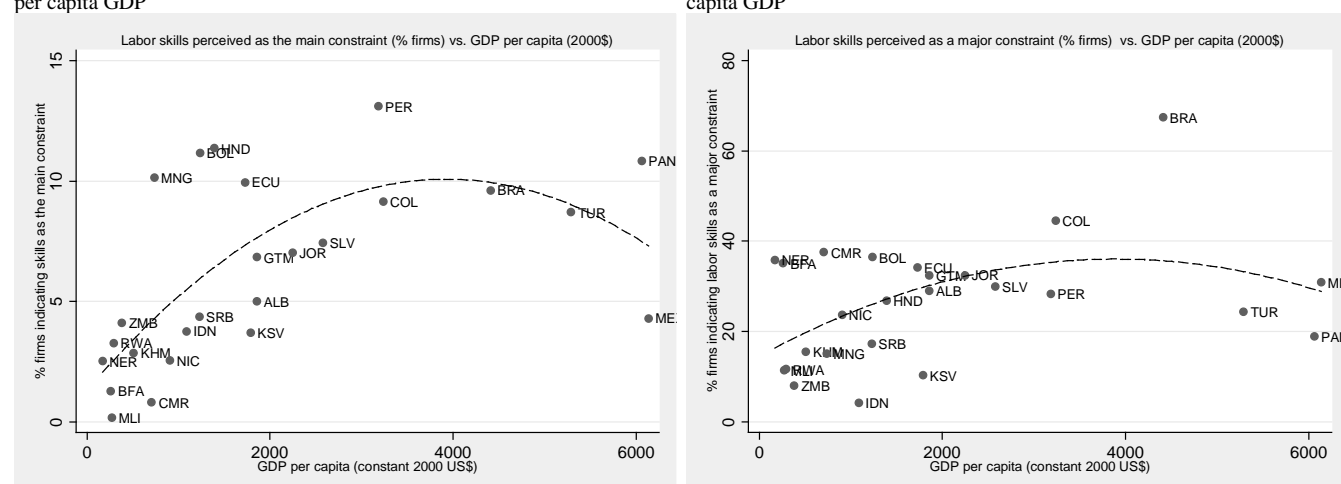
Source: UCW calculations on Enterprise Surveys data and WDI data.

27. Skills deficits and structure of production. The relevance of skills deficits also appears to depend on the structure of production in national economies. Figure 6 plots the relative and absolute indicators of skills deficit against the share of manufacturing and of services sector in total value added. The clearest correlation is between skills deficits and the relative importance of the tertiary services sector in a national economy. The bivariate relation between the relative indicator of skills deficit and the share of service sector in GDP is strictly positive: the skills deficit monotonically increases with the share of services in the economy, pointing to the skills-intensity of work in the tertiary sector. On the other hand, we observe a hump-shaped relation between the perception of skills deficit both as the main constraint and as an obstacle and the relative importance of the manufacturing sector. Skills deficit is not perceived as the main constraint (or as an obstacle) to firms' operation and growth in countries with a low and high share of manufacturing sector over GDP, and it is perceived as a relatively more serious

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[23] Defined for the purposes of this section as a rating 3 or 4 on the five-point scale.

issue by employers in countries where the share of the manufacturing sector is at intermediate levels

Figure 6. **Skills deficits and structure of production**

(a) Share of firms reporting workforce education as the main constraint vs. manufacturing value added (share of GDP)
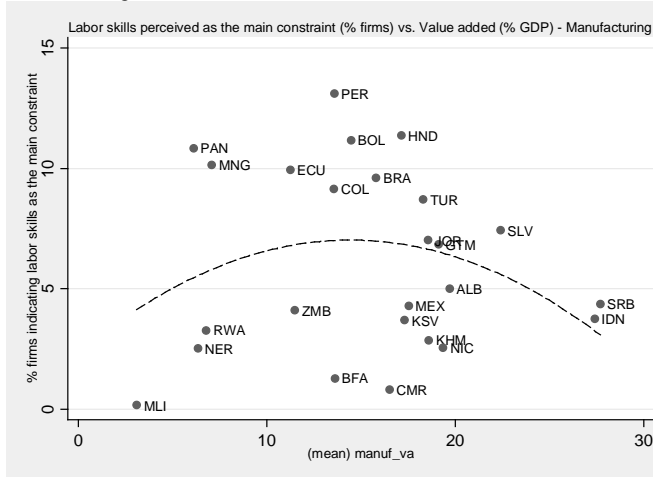
(b) Share of firms reporting workforce education as the main constraint (3+4) vs. services value added (share of GDP)
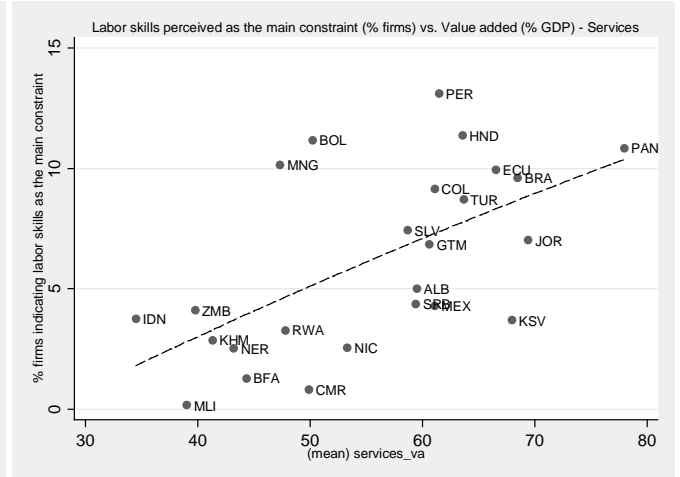
(d) Share of firms reporting workforce education as an obstacle vs. manufacturing value added (share of GDP)
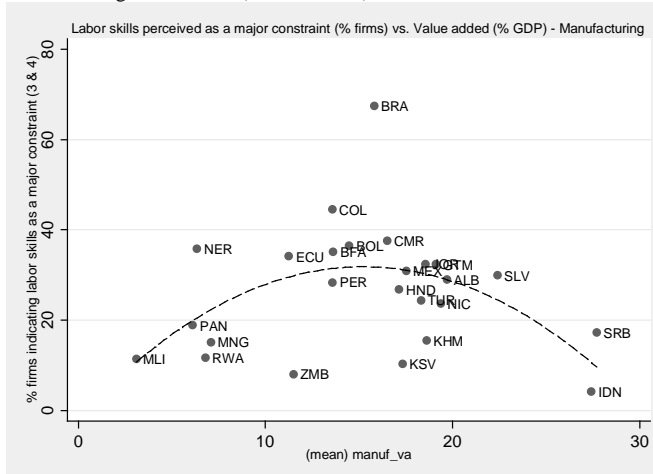
(c) Share of firms reporting workforce education as an obstacle vs. services value added (share of GDP)
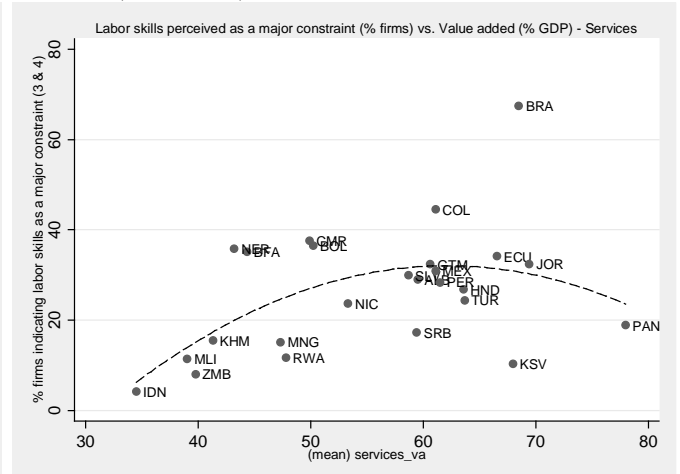
Source: UCW calculations on Enterprise Surveys data and WDI data.

28. **Skills deficit and educational levels.** Skills deficits appear to be more relevant in countries with higher education levels. Using data from the Barro-Lee educational attainment dataset, Figure 7 indicates that the relative measure of the skills deficit in particular *increases* with the average educational attainment of the population aged between 15 and 64 years. This correlation is likely in part spurious: educational levels and economic development levels are closely related, and need for skills is greater in more developed economies. The results also, however, raise the possibility of skills mismatches in national economies. In other words, countries that succeed in retaining children in the education system may not be similarly succeeding in equipping these children with the skills set demanded by employers.

Figure 7. **Skills deficits and educational levels**

(a) Share of firms reporting workforce education as the main constraint vs. average number of years of schooling attained in the country
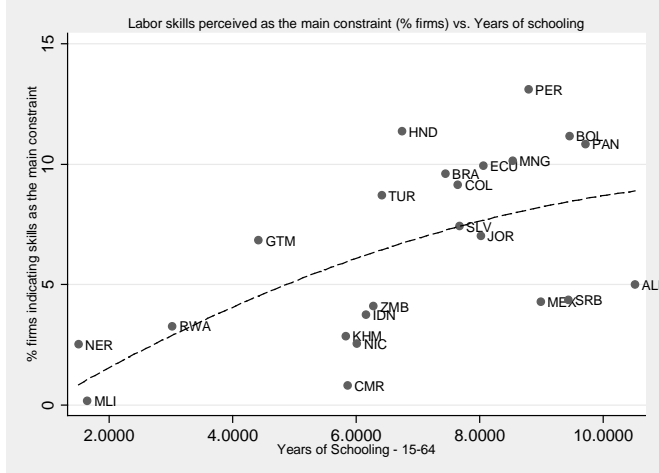
(b) Share of firms reporting workforce education as an obstacle vs. average number of years of schooling attained in the country
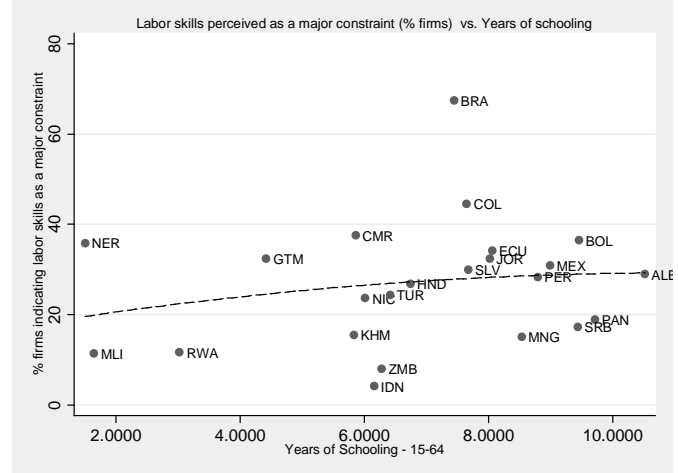
Source: UCW calculations on Enterprise Surveys data and Barro-Lee data.

29. **Skills deficit and youth unemployment.** Skills deficits are positively correlated with levels of youth unemployment. As shown in Figure 8, in economies with higher levels of youth unemployment a larger share of firms report being affected by skills constraints. The bivariate relationship is especially strong when the skill deficit is measured in terms of share of firms indicating workforce education as the main constraint (i.e. the relative measure). This result also hints at an important mismatch between the skills needed by employers and the skills on offer by young job seekers. A breakout of the unemployed youth pool by educational level, reported in the Appendix provides further evidence of possible skills mismatches. In Indonesia, Jordan, Mexico and Zambia, for example, large shares of unemployed youths have high levels of education, suggesting that education systems may not be imparting the skills required employers.[24]

Figure 8. **Skills deficits and youth unemployment rate**

(a) Share of firms reporting workforce education as the main constraint vs. youth unemployment rate
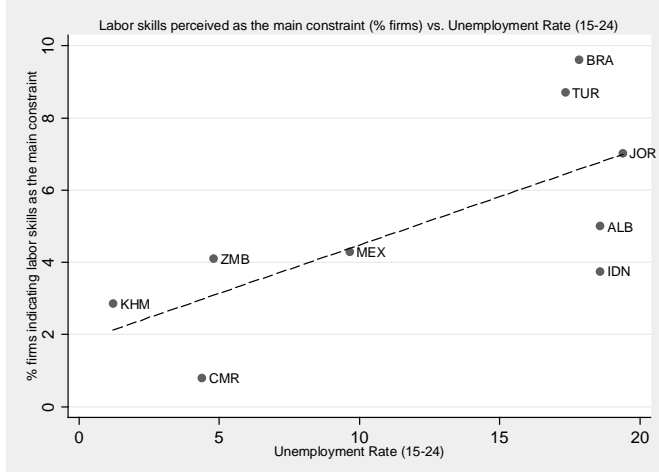
(b) Share of firms reporting workforce education as an obstacle vs. youth unemployment rate
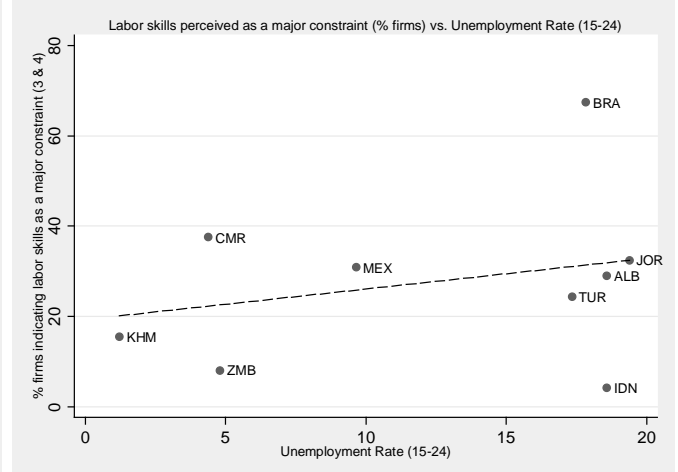
Source: UCW calculations on Enterprise Surveys and LFS/Household Survey/Child Labor Force survey data

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[24] However, this evidence must be considered with caution as youth with higher level of education have also been on the job market for less time than their less educated peers.

30. In summary, the skills deficit appears to increase with the level of GDP and with the expansion of the services sector. While this does not imply that lack of skills is not relevant at low levels of development, it indicates that firm growth is not seriously hampered by the lack of skills of the workforce as long as more pressing issues such as access to electricity, access to finance, and corruption have not been solved. The average number of years of schooling is positively correlated with the skills deficit. Again, this could partly be the outcome of a spurious correlation but it also clearly indicates that a higher average educational attainment does not necessarily decrease the skills shortage. The youth unemployment rate appears to be positively correlated with skill deficit. This might point to the existence of skills mismatches, particularly in light of the fact that many of the unemployed youth are educated.

5. FACTORS ASSOCIATED WITH SKILLS DEFICITS: ECONOMETRIC EVIDENCE

31. This section presents econometric evidence of factors associated with the skills deficit using a sample of 23 countries[25]. It utilises the same set of firm- and country-level variables discussed in sections 3 and 4 to investigate the correlates of skills deficits in a multivariate setting.

32. We estimate a regression that uses firm- and country-level variation for identification. Consider SD_{ic} the outcome of interest (either a dummy for whether a firm indicates an inadequately educated workforce as the main constraint or a dummy for whether a firm rates the workforce's educational level an obstacle to current operations and growth) for firm i in country c, we then estimate the following regression:

$$SD_{ic} = \alpha + \beta X_{ci} + \lambda SM_c + \rho SM_c^2 + \delta SS_c + \kappa EDU_c + \theta GDP_c + \varsigma GDP_c^2 + \varepsilon_{ci}$$

where (X_{ic}) refers to a set of firm-level characteristics, namely the logarithm of a firm's age[26], firm's size[27], the sector in which a firm operates, export-orientation, and quintiles of sales per employee.

33. We also include country-level variables that have shown a correlation with skill deficit in the bivariate plots. A second degree polynomial in the share of manufacturing sector value added in GDP (SM_c) and a linear term for the share of services sector value added (SS_c) in GDP to capture the structure of the economy, the number of years of schooling attained by the population aged between 15 and 64 (EDU_c) to proxy for the average educational level of the labor force, and the logarithm of GDP per capita (GDP_c) to account for the level of economic development[28].

34. An alternative specification of the model includes regional fixed effects that capture differences in firms' perceptions of skills deficits that are common to macro areas, namely Eastern Europe and Central Asia, Latin America and the Caribbean, Africa, Middle East and North Africa, East Asia and Pacific.[29]

35. We begin with the relative indicator of skills deficit (i.e., inadequate workforce educational level cited as the main constraint to current operations and growth). As to firm level characteristics, the estimates largely confirm the descriptive evidence presented earlier in the report. We find that medium and large sized firms are more likely to indicate workforce educational attainment as the main constraint to operations and growth, export-oriented firms have a lower likelihood of reporting workforce educational level as the main constraint, and higher productivity firms[30]

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[25] Burkina Faso and Kosovo are dropped out of the sample because they lack information on the average number of years of schooling.

[26] Defined as the survey year minus the year a firm started its business in the country.

[27] A set of three dummy variables (small if less than 20 employees, medium if the number of employees is between 20 and 99 employees, and large firm if it has 100 employees and over).

[28] We experimented alternative specifications including a second order polynomial in the number of years of schooling and in the services sector share. The results rejected the hypothesis of a non-linear relationship of such variable with the indicators of skills deficit.

[29] Descriptive statistics for the 23 countries used in the empirical analysis are presented in the Appendix (Table 21).

[30] The second quintile of sales per employee turns out significant; excluding quintiles of sales per employee from the two models does not alter the results.

have a greater probability of experiencing skills deficits. Industrial sector does not have a significant effect.

36. The effect of country-level variables is also generally consistent with the descriptive evidence presented earlier: (a) the average number of years of schooling attained by the population between 15 and 64 years of age increases the likelihood of a firm reporting educational level as the main constraint; (b) the sectoral composition of GDP does not play a significant role; and (c) the level of economic development, captured by GDP per capita, confirms its non-linear effect: it increases the probability of a firm indicating an inadequate educational attainment of the workforce as the main constraint, but the rate of increase drops at high of GDP per capita.

Table 6. **Correlates of skill deficit - base model**

(a) Relative indicator of skills deficit (i.e., skills deficit is the main constraint) [No. Obs.=13,488]	Coeff.	t	(b) Absolute indicator of skills deficit (i.e., skills deficit is an obstacle) [No. Obs.=13,706]	Coeff.	t
Log of firm's age	-0.0035	-1.14	Log of firm's age	0.0080	1.61
Firm's size			Firm's size		
Medium size	0.0170	3.04	Medium size	0.0595	6.60
Large size	0.0160	2.39	Large size	0.0415	3.83
Exporter	-0.0180	-2.59	Exporter	-0.0579	-5.12
Industry			Industry		
Services	0.0036	0.66	Services	0.0107	1.21
Other	0.0008	0.06	Other	0.0270	1.31
Sales per employee			Sales per employee		
Q2	0.0247	2.99	Q2	0.0424	3.17
Q3	0.0100	1.23	Q3	0.0349	2.66
Q4	0.0079	0.94	Q4	0.0188	1.40
Q5	0.0028	0.35	Q5	0.0166	1.26
Missing quintile	0.0216	2.36	Missing quintile	-0.0141	-0.95
Country-level variables			Country-level variables		
Average yrs of schooling (15-64)	0.0051	3.19	Average yrs of schooling (15-64)	-0.0156	-6.08
Manufacturing VA (%GDP)	-0.0004	-0.17	Manufacturing VA (%GDP)	0.0301	9.14
Manufacturing VA (%GDP) squared	-0.0001	-0.90	Manufacturing VA (%GDP) squared	-0.0010	-10.81
Services VA (%GDP)	-0.0004	-1.04	Services VA (%GDP)	0.0026	3.73
GDP per capita	0.1290	5.54	GDP per capita	0.5001	13.29
GDP per capita squared	-0.0420	-4.84	GDP per capita squared	-0.1837	-13.12

Source: UCW calculations on Enterprise Surveys, WDI, and Barro-Lee data.

37. Turning to the absolute indicator of skill shortage (i.e., inadequate workforce educational level cited as an obstacle to current operations and growth), the signs of the correlation between firm- and country-level variables on one side and skill deficit on the other side remain unchanged with one exception (i.e., educational attainment). What does change is the magnitude of the effects, which are now greater. For example, a medium and a large sized firm have a 5.9 and 4.1 percentage points higher probability of indicating the workforce educational level as an obstacle which compares with a 1.7 and 1.6 percentage points higher likelihood in the case of the absolute indicator. Firms directly exporting a relatively large share of their sales (exporters) have now a 5.8 percentage points lower probability of indicating skills deficit as an obstacle that compares with a 1.8 lower probability of reporting it as the main constraint.

38. The non-linear effect of the share of manufacturing sector in GDP turns significant in this case: the probability of a firm reporting education as an obstacle rises with it at a decreasing rate. The share of services value added in total GDP is

positively correlated with the likelihood of a firm reporting skills deficit as an obstacle to operations and growth.

39. An additional notable difference is the effect of the average educational attainment of working-age population. The effect is positive on the relative indicator of skills deficit.

Table 7. **Correlates of skill deficit - regional fixed effects model**

(a) Relative indicator of skills deficit (i.e., skills deficit is the main constraint) [No. Obs.=13,706]	Coeff.	T	(b) Absolute indicator of skills deficit (i.e., skills deficit is an obstacle) [No. Obs.=13,706]	Coeff.	t
Log of firm's age	-0.0052	-1.64	Log of firm's age	-0.0001	-0.02
Firm's size			Firm's size		
Medium size	0.0170	3.04	Medium size	0.0612	6.83
Large size	0.0149	2.22	Large size	0.0414	3.85
Exporter	-0.0146	-2.07	Exporter	-0.0312	-2.74
Industry			Industry		
Services	0.0021	0.38	Services	0.0082	0.93
Other	-0.0020	-0.15	Other	0.0493	2.38
Sales per employee			Sales per employee		
Q2	0.0240	2.89	Q2	0.0403	3.03
Q3	0.0088	1.09	Q3	0.0310	2.38
Q4	0.0065	0.78	Q4	0.0192	1.43
Q5	0.0015	0.18	Q5	0.0119	0.90
Missing quintile	0.0190	2.06	Missing quintile	-0.0042	-0.29
Country-level variables			Country-level variables		
Average yrs of schooling (15-64)	0.0027	1.53	Average yrs of schooling (15-64)	-0.0098	-3.51
Manufacturing VA (%GDP)	-0.0007	-0.31	Manufacturing VA (%GDP)	0.0347	10.13
Manufacturing VA (%GDP) squared	-0.0001	-0.79	Manufacturing VA (%GDP) squared	-0.0009	-9.18
Services VA (%GDP)	0.0001	0.23	Services VA (%GDP)	0.0099	9.91
GDP per capita	0.0837	3.26	GDP per capita	0.5281	12.81
GDP per capita squared	-0.0262	-2.76	GDP per capita squared	-0.1987	-13.03
Regional Dummies			Regional Dummies		
EAP	0.0396	3.09	EAP	-0.1133	-5.47
ECA	0.0205	1.07	ECA	-0.3576	-11.60
LAC	0.0391	2.28	LAC	-0.2158	-7.79
MENA	0.0058	0.24	MENA	-0.4406	-11.31

Source: UCW calculations on Enterprise Surveys, WDI, and Barro-Lee data.

40. Table 7 indicates that the effect of the covariates is robust to the inclusion of regional dummies with one exception: average years of schooling is not statistically significant in the case of skill deficit perceived as the main constraint.

41. The table also indicates that the dummy variables for regions have opposing effects on the two different indicators of skills deficit. Being a firm in the Africa region has a positive impact on the probability of reporting skills deficit as *an obstacle* (absolute measure), whereas it has a negative effect on the likelihood of citing skills deficit as the *main constraint* (relative measure) to operations and growth. This highlights the difference between a relative and an absolute indicator. The fact that a firm located in the Africa region is less likely to indicate an inadequate workforce educational level as the main constraint might be explained by the fact that there are other more binding constraints hampering the operations and the growth of African firms relative to firms located in other regions. For example, firms located in Latin America have a 4 percentage points higher probability of reporting workforce education as the main constraint.

42. On the contrary, when firms' manager or owners are asked to evaluate how severe the inadequacy of workforce education is regardless of any other constraint, firms located in the Africa region are more likely to indicate it as an obstacle relative to firms located in other regions. In other words, when managers/owners of firms located in the Africa region are asked to evaluate the educational level of their employees relative to the needs of their firms, *apart from other investment climate issues*, they realize its inadequacy.

6. CONCLUSIONS

43. This study aimed at assessing skills deficits in developing country contexts on the basis of firm data from World Bank Enterprise Surveys. A precise definition of skills deficit was used – employers' perceptions of inadequate workforce educational levels as a relative and absolute constraint to firm growth and performance - to assess the relevance of skills deficits in a set of 25 low- and middle-income countries. Although limited to the formal sector and to employer perceptions, the study nonetheless highlights a number of patterns concerning skills deficits in the development world of relevance for policy.

44. The evidence presented suggests that skills deficits are not perceived as extremely relevant to most firms in the countries covered. The share of firms citing an inadequately educated workforce as the *main constraint* to current operations and growth did not exceed 10 percent in any of the countries and was five percent or less in seven of the 10 countries. Similarly, skills deficits are rated as only a "minor" obstacle to current operations in all but one country. The importance of skills deficits, however, appears to increase with the level of development of the country, particularly moving from low-income to lower middle-income status, as more stringent bottlenecks (e.g., access to electricity, access to credit, security, corruption) are been overcome and skills-intensive production plays a greater role in the economy.

45. The relative importance of skills deficits also varies in accordance with the structure of production, educational levels and the youth labour market conditions. Skills deficits increase in significance with the relative importance of the tertiary sector in the economy. Average number of years of schooling and the skills deficits do not necessarily move in opposite directions. This result raises the possibility of skills mismatches in national economies. In other words, countries that succeed in

retaining children in the education system may not be similarly succeeding in equipping these children with job-relevant skills. In economies with higher levels of youth unemployment a larger share of firms report being affected by skills constraints. This might also point to the existence of skills mismatches, particularly in light of the fact that many of the unemployed youth are educated.

46. Firm profiling shows that skills deficits also vary with firm-level characteristics within countries. Medium and large sized firms are more likely to indicate skills deficits as the main constraint to operations and growth, export-oriented firms have a lower likelihood of reporting workforce educational level as the main constraint, and higher productivity firms have a greater probability of experiencing skills deficits.

Appendix. Additional descriptive statistics

Table 8. **Share of firms indicating an inadequately educated workforce as the main constraint to the operations and growth**

		Albania	Bolivia	Brazil	Burkina Faso	Cambodia	Cameroon	Colombia	Ecuador	El Salvador	Guatemala	Honduras	Indonesia	Jordan	Kosovo	Mali	Mexico	Mongolia	Nicaragua	Niger	Panama	Peru	Rwanda	Serbia	Turkey	Zambia
Total		5	12.1	9.8	1.3	2.9	0.8	9.2	10	7.4	6.8	11.4	4.4	7	3.7	0.2	4.3	10.2	2.6	2.5	13.5	13.4	3.3	4.7	9.1	4.1
Industry	Manufacturing	2.6	19.5	6.9	0.3	1.2	1.9	5.6	12.7	5.7	8.4	14.3	3.6	5.4	2	0	4.6	10.2	3.3	0.7	14.7	10.3	5.1	7.8	9.2	4.8
	Services	8.3	4.8	19.4	1.4	2.4	0	5.3	10.8	8.3	6.6	10.3	6.6	9.6	3.4	0.3	4.1	13.1	1.9	3.1	13.4	15	2.4	3.6	8.9	3.8
	Other	0	8.6	25.3	3.1	3.8	8.9	37.7	0	0.6	0	17.7	16.2	4.8	8.7	0	5.9	4.7	10.7	0	0	34.3	0	0.4	7.6	0
Size	small(<20)	3.6	14.1	13.5	0.2	2.7	0.8	10.3	11.2	9.8	7.9	10.5	4.6	7.2	1.4	0	2.7	7	3	2.4	15	8.4	2.2	4.1	8.4	2.6
	medium(20-99)	8.9	11.3	11.4	3.4	2.3	0	6.6	7.7	4	1.8	11.9	1.2	6.7	15.1	0	7.2	13.9	2	3.1	11.4	20.2	6.9	6.6	8.6	7.8
	large(100+)	0	5.6	1.5	4.3	6.1	3.2	5.5	9.4	5.3	16.2	14.9	8.2	7.4	0	8.3	7.8	7.2	0.7	0	7.3	21	0	3.8	14	0.9
Export orientation	Exporter	3.7	13.1	10	1.3	1.2	0.9	9.4	10.1	6	7.7	11.5	4.5	5	4	0.2	4.3	10.5	2.7	2.3	14.2	14.1	2	4.9	9.2	4.2
	Non-exporter	5.2	0	3	2.2	3	0	5.9	8.5	15.6	1	3.6	0.1	7.6	0.7	0	3.7	3.6	0	9.9	2.1	6.3	16.7	4.3	8.8	3.2
Sales per employee quintile	1	2.8	28.8	3.5	2.3	0.1	0	29	9.3	15.6	10.2	0.5	4.9	7.8	2.3	0	3.7	9.3	0	0	0	0.9	2.6	0	15.1	2.7
	2	5.4	3.9	11.6	1	6.4	0	5.1	12.7	7.5	9.2	23.8	7.8	6.2	12.7	0	3.1	22.7	0	1.7	20.9	27.8	0	10.3	9.1	3.2
	3	3.1	29.6	8.7	0.5	4	4.4	2	3.6	9.6	5.4	24.5	2.9	10.5	0	1.2	3.3	7.4	1.2	0	30.8	23	10.1	11.2	9.6	2.6
	4	0	1.5	2.1	0.4	3.7	0	2.5	28.2	11.1	1.4	15	3	3.9	0	0	2.8	6	2.7	0	21.8	12.3	4	0.3	7.2	5.3
	5	3.3	2.5	1.4	2.6	0.7	0	4.5	2	2.6	2.1	17.3	4	6	0	0	9.6	5.6	3.2	2.6	10.2	11.8	0	2.9	6.7	6.9

Source: UCW calculation on Enterprise Surveys data.

Table 9. **Average value of firms' rating (0-4) of workforce education as an obstacle to the operations and growth**

		Albania	Bolivia	Brazil	Burkina Faso	Cambodia	Cameroon	Colombia	Ecuador	El Salvador	Guatemala	Honduras	Indonesia	Jordan	Kosovo	Mali	Mexico	Mongolia	Nicaragua	Niger	Panama	Peru	Rwanda	Serbia	Turkey	Zambia
Total		1.6	2.1	2.8	2	1.2	2	2.3	2	1.9	1.7	1.7	0.4	1.7	1.3	0.9	1.8	1.4	1.6	1.6	1.3	1.9	0.9	1.2	1.5	0.7
Industry	Manufacturing	1.7	2.3	2.7	2.3	1.5	1.9	2	1.6	1.6	1.9	1.8	0.4	1.4	1.5	1.5	1.9	1.4	1.3	2.3	1.1	2	1	1.2	1.4	0.9
	Services	1.6	1.9	3	2.1	1.1	2	2.4	2	2	1.6	1.7	0.7	2	1.3	0.6	1.8	1.3	1.7	1.4	1.3	1.8	0.7	1.1	1.7	0.5
	Other	1.3	2.9	3.6	1.6	1.3	1.6	2.4	2.6	1.2	1.3	1.7	1	1.4	1.2	0.8	1.7	1.4	0.9	0.6	1.3	2.7	1.6	1.4	2.2	2
Size	small(<20)	1.3	2.2	2.8	2	1.1	1.9	2.4	2	1.8	1.4	1.6	0.4	1.6	1.3	0.8	1.7	1.3	1.5	1.6	1.4	1.7	0.6	1	1.5	0.5
	medium(20-99)	2	2	2.8	2	1.4	1.9	2	1.9	2.1	1.8	2	0.4	1.6	1	1.1	2.2	1.4	1.7	1.9	1.1	2.1	1.3	1.4	1.6	1
	large(100+)	2	2.1	2.8	2.2	1.4	2.1	2.1	2.2	1.6	2.4	1.8	0.9	1.9	2.3	1.5	1.9	1.7	1.6	1.6	1.1	2.1	1.2	1.4	1.6	0.8
Export orientation	Exporter	1.6	2.1	2.9	2	0.9	1.9	2.3	2	1.9	1.7	1.7	0.4	1.6	1.9	0.8	2.4	1.4	1.5	1.6	1.3	1.9	0.8	1.2	1.5	1.2
	Non-exporter	1.6	2.4	2.8	2.4	1.2	2	1.9	1	1.8	1.9	1.5	0.4	1.7	1.2	1.6	1.8	1.2	2.7	1.7	0.2	2	1.6	1.1	1.6	0.6
Sales per employee quintile	1	1.1	2.2	2.1	2.2	1.2	1.6	2.5	1.7	1.3	1	2.1	0.3	2.1	1.4	0.7	1.8	1.3	1.7	1.2	0.7	1.6	0.4	1.5	1.5	0.6
	2	1.6	2.5	3	1.4	1.1	1.9	2.5	2	1.8	2.5	1.7	0.4	1.5	1.4	1.1	1.3	1.7	1.1	1.6	1.8	1.8	0.4	1.3	1.8	0.7
	3	1.3	2.6	3	2.2	1.4	2.2	1.9	2.3	1.8	2.4	1.2	0.3	1.5	1.4	1.2	2.1	1.3	1.3	2.4	1.7	2.3	1.3	1.3	1.4	0.4
	4	1.3	1.9	2.9	2.2	1.2	2.1	2.3	2	2.5	1	2	0.5	1.7	1	1	1.9	1.2	1.5	1.9	1.8	1.7	1.2	0.8	1.5	1.1
	5	1.4	1.6	2.8	2.3	1.1	2	2	2.1	1.9	1.6	1.6	0.7	1.5	1.2	0.7	1.9	1.3	2.2	1.5	1.5	2.3	1	0.8	1.6	0.6

Source: UCW calculation on Enterprise Surveys data.

Table 10. **Share of manufacturing firms indicating an inadequately educated workforce as the main constraint to the operations and growth**

		Albania	Brazil	Cambodia	Cameroon	Indonesia	Jordan	Kosovo	Mexico	Turkey	Zambia
Total		0.0	10.0	0.0	3.9	3.8	0.9	0.0	2.4	9.1	2.1
Industry	Manufacturing	6.5	8.2	0.0	0.0	1.0	6.3	9.0	8.9	9.8	8.4
	Services	0.0	1.2	3.8	0.0	9.2	9.1	0.0	9.4	7.9	1.2
	Other	4.5	7.1	3.9	2.2	3.7	5.5	1.9	4.5	8.7	5.0
Size	small(<20)	2.1	3.5	0.0	0.0	0.1	5.3	3.7	5.8	10.3	3.8
	medium(20-99)	0.0	2.2	-	0.0	3.5	9.1	0.0	3.6	10.8	15.2
	large(100+)	0.0	4.8	-	0.0	7.8	0.0	0.0	2.3	0.0	0.0
Export orientation	Exporter	0.0	5.9	-	0.0	3.1	3.1	8.3	7.3	7.4	6.3
	Non-exporter	3.3	6.2	-	2.9	3.4	4.2	0.0	3.8	7.1	2.6
Sales per employee quintile	1	5.1	3.4	1.3	0.0	3.7	6.4	4.4	1.2	12.0	4.9
	2	12.4	14.9	0.0	0.0	7.3	3.3	0.0	5.5	9.5	7.4
	3	0.0	8.7	5.7	11.3	2.1	7.4	0.0	5.1	6.3	0.0
	4	0.0	2.2	1.1	0.0	3.7	6.9	0.0	3.9	4.2	6.4
	5	0.0	0.9	0	0.0	0.6	3.4	0.0	8.4	10.6	5.6

Source: UCW calculation on Enterprise Surveys data.

Table 11. **Average value of manufacturing firms' rating (0-4) of an inadequately educated workforce as an obstacle to the operations and growth**

		Albania	Brazil	Cambodia	Cameroon	Indonesia	Jordan	Kosovo	Mexico	Turkey	Zambia
Total		1.2	2.7	1.8	1.8	0.4	0.9	1.6	1.8	1.3	0.7
Industry	Manufacturing	2.0	2.7	1.2	2.1	0.4	1.6	1.0	2.2	1.5	1.0
	Services	2.0	2.8	1.3	1.9	0.8	1.6	3.0	2.1	1.5	1.0
	Other	2.0	2.9	1.2	1.8	0.3	1.6	1.6	2.0	1.5	1.2
Size	small(<20)	1.6	2.7	1.7	1.9	0.4	1.3	1.4	1.9	1.4	0.8
	medium(20-99)	2.1	2.4	.	4.0	0.5	2.0	0.0	1.0	1.4	1.1
	large(100+)	1.7	2.6	.	3.6	0.4	1.2	0.0	1.8	1.5	1.1
Export orientation	Exporter	2.2	2.8	.	2.1	0.3	1.8	1.0	1.9	1.3	1.0
	Non-exporter	1.3	2.7	.	1.8	0.3	1.2	1.0	2.0	1.3	0.7
Sales per employee quintile	1	1.3	2.0	1.7	1.5	0.3	1.4	1.5	2.3	1.5	0.8
	2	1.5	3.1	1.8	1.9	0.4	1.2	1.7	1.3	1.6	1.0
	3	1.2	2.9	1.8	1.9	0.4	1.2	2.0	2.1	1.4	0.4
	4	1.9	2.8	1.4	1.9	0.4	1.6	2.1	1.8	1.1	1.3
	5	1.9	2.8	1.0	2.2	0.5	1.6	1.0	2.1	1.3	0.9

Source: UCW calculation on Enterprise Surveys data.

Figure 9. **Share of firms reporting workforce education as the main constraint vs. urban youth unemployment rate**
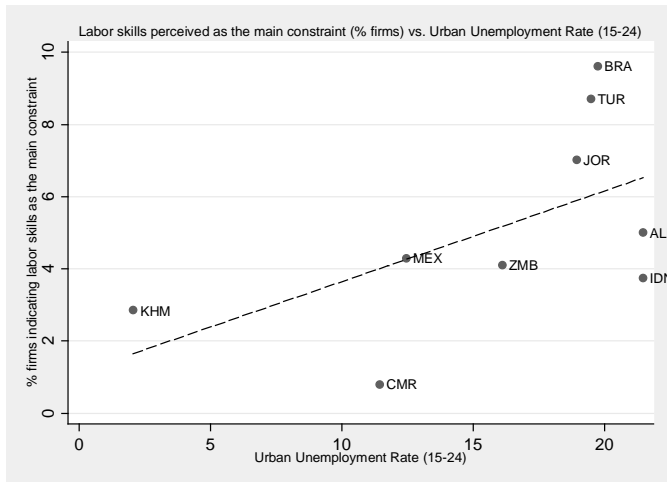
Source: UCW calculations on Enterprise Surveys and LFS/Household Survey/Child Labor Force survey data

Figure 10. **Share of firms reporting workforce education as an obstacle vs. urban youth unemployment rate**
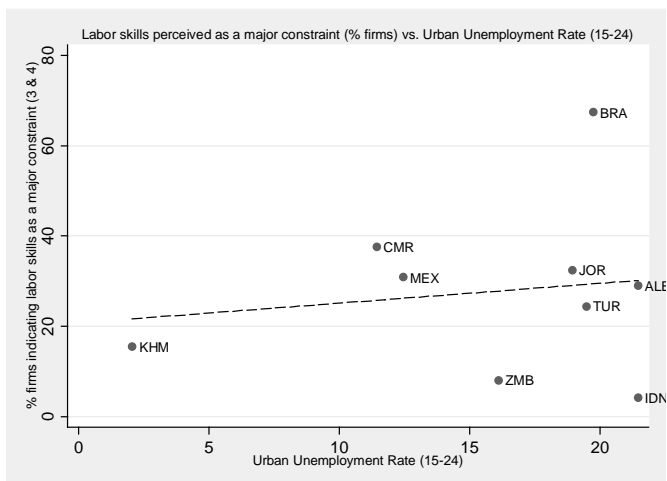
Source: UCW calculations on Enterprise Surveys and LFS/Household Survey/Child Labor Force survey data

Table 12. **Number of observations by country and sector (all firms)**

No. obs.	Manufacturing	Services	Other
Albania	65	90	20
Brazil	1,342	440	20
Cambodia	134	249	119
Cameroon	116	233	14
Indonesia	1,157	249	30
Jordan	353	108	42
Kosovo	103	134	33
Mexico	1,157	303	20
Turkey	903	236	13
Zambia	304	176	4
Bolivia	142	205	15
Burkina Faso	98	250	46
Colombia	706	216	20
Ecuador	119	236	11
El Salvador	125	221	14
Guatemala	355	224	11
Honduras	150	203	7
Mali	125	206	29
Mongolia	130	175	57
Nicaragua	126	200	10
Niger	48	100	2
Panama	115	236	14
Peru	760	238	2
Rwanda	68	135	9
Serbia	136	208	44

Source: UCW calculation on Enterprise Surveys data.

Table 13. **Number of observations by country and firm size (all firms)**

No. obs.	small(<20)	medium(20-99)	large(100 and over)
Albania	105	61	9
Bolivia	124	145	93
Brazil	678	750	374
Burkina Faso	226	108	60
Cambodia	204	146	152
Cameroon	161	131	71
Colombia	349	326	267
Ecuador	128	139	99
El Salvador	121	122	117
Guatemala	221	185	184
Honduras	182	111	67
Indonesia	810	350	284
Jordan	182	200	121
Kosovo	189	67	14
Mali	250	98	12
Mexico	502	472	506
Mongolia	143	148	71
Nicaragua	153	124	59
Niger	87	52	11
Panama	129	161	75
Peru	317	379	304
Rwanda	143	53	16
Serbia	144	125	119
Turkey	354	452	346
Zambia	267	153	64

Source: UCW calculation on Enterprise Surveys data.

Table 14. **Number of observations by country and export orientation (all firms)**

No. obs.	Non-exporter	Exporter
Albania	155	20
Bolivia	327	35
Brazil	1,676	126
Burkina Faso	377	17
Cambodia	399	102
Cameroon	329	34
Colombia	772	170
Ecuador	344	22
El Salvador	283	77
Guatemala	458	132
Honduras	332	28
Indonesia	1,270	174
Jordan	334	169
Kosovo	248	22
Mali	340	20
Mexico	1,252	228
Mongolia	334	28
Nicaragua	314	22
Niger	137	13
Panama	355	10
Peru	770	230
Rwanda	200	12
Serbia	282	106
Turkey	769	383
Zambia	446	38

Source: UCW calculation on Enterprise S

Table 15. **Number of observations by country and quintile of sales per employee (all firms)**

No. obs.	1	2	3	4	5
Albania	23	27	22	22	22
Bolivia	16	34	62	58	41
Brazil	262	410	494	205	288
Burkina Faso	56	76	78	85	77
Cambodia	87	79	91	130	99
Cameroon	68	50	65	73	91
Colombia	197	210	251	89	147
Ecuador	57	67	60	80	73
El Salvador	57	49	70	50	65
Guatemala	86	83	94	80	92
Honduras	43	49	39	61	78
Indonesia	159	161	195	261	467
Jordan	82	90	87	109	110
Kosovo	51	60	24	34	64
Mali	67	40	36	49	56
Mexico	180	229	187	357	442
Mongolia	70	62	72	79	79
Nicaragua	29	44	45	75	98
Niger	19	30	32	27	29
Panama	45	29	51	37	21
Peru	147	168	194	186	221
Rwanda	46	42	36	44	44
Serbia	82	65	83	63	68
Turkey	187	198	209	155	177
Zambia	124	105	74	95	86

Source: UCW calculation on Enterprise Surveys data.

Table 16. **Number of observations by country and firm size (manufacturing sector firms)**

No. obs.	small(<20)	medium(20-99)	large(100 and over)
Albania	28	29	8
Brazil	469	586	287
Cambodia	10	19	105
Cameroon	40	41	35
Indonesia	590	298	269
Jordan	110	143	100
Kosovo	71	31	1
Mexico	396	383	378
Turkey	239	368	296
Zambia	136	114	54

Source: UCW calculation on Enterprise Surveys data.

Table 17. **Number of observations by country and export orientation (manufacturing sector firms)**

No. obs.	Non-exporter	Exporter
Albania	49	16
Brazil	1,239	103
Cambodia	51	83
Cameroon	92	24
Indonesia	991	166
Jordan	189	164
Kosovo	92	11
Mexico	946	211
Turkey	555	348
Zambia	270	34

Source: UCW calculation on Enterprise Survey

Table 18. **Number of observations by country and number of competitors (manufacturing sector firms)**

No. obs.	None	One	2-5	More than 5
Albania	3	2	13	28
Brazil	59	32	390	666
Cameroon	1	2	28	70
Indonesia	75	33	225	645
Jordan	11	6	65	166
Kosovo	1	1	12	40
Mexico	42	22	341	659
Turkey	20	20	127	446
Zambia	29	10	65	189

Source: UCW calculation on Enterprise Surveys data.

Table 19. **Number of observations by country and quintile of sales per employee (manufacturing sector firms)**

No. obs.	1	2	3	4	5
Albania	12	11	9	7	4
Brazil	200	273	363	165	231
Cambodia	24	19	17	45	26
Cameroon	18	13	17	31	31
Indonesia	151	149	167	207	328
Jordan	46	61	54	88	89
Kosovo	26	25	7	12	21
Mexico	143	190	160	291	314
Turkey	175	177	171	101	105
Zambia	94	70	41	57	42

Source: UCW calculation on Enterprise Surveys data.

Table 20. **Group share among youth unemployed (15-24)**

	Albania		Brazil
No schooling	2.4	No regular education	1.2
Primary	66.7	Fundamental	32.3
Secondary	20.1	Media	61.2
Tertiary	10.8	Post-school	5.3
Total	**100.0**	**Total**	**100.0**
	Cambodia		Cameroon
No schooling	11.5	No education	4.9
Primary or less	48.3	Primary	36.7
Lower secondary or less	25.1	Secondary	54.1
Upper secondary or less	11.2	Higher than secondary	4.3
Tertiary or less	3.9	Total	100.0
Total	100.0		
	Indonesia		Kosovo
No schooling	0.1	Primary or less	3.8
Primary	18.6	Lower sec	30.0
Junior	24.4	Upper secondary	36.2
Senior	51.1	Upper secondary general	27.1
Higher	5.8	University or higher	2.8
Total	100.0	Total	100.0
	Jordan		Mexico
None or pre-school	0.5	Primary incomplete	4.4
Basic education	26.7	Primary complete	18.1
Vocational apprenticeship	1.8	Secondary complete	46.7
Secondary	33.8	Higher than secondary	30.8
Intermediate	9.4	Total	100.0
Higher than intermediate	27.7		
Non-standard curriculum	0.0		
Total	100.0		
	Turkey		Zambia
No diploma	8.8	No schooling	2.9
Primary	42.4	Primary or less	18.1
Secondary	35.5	Lower secondary or less	19.0
Higher	13.3	Upper secondary or less	56.2
Total	100.0	Tertiary or less	3.9
		Total	100.0

Source: UCW calculation on Enterprise Surveys data.

Table 21. **Descriptive statistics – 23 countries**

Variable	No. Obs	Mean	Std. Dev.	Min	Max
Average value (0-4 scale) of obstacle	13,886	1.725	1.342	0	4
Firms indicating inadequate workforce as an obstacle	13,886	0.315	0.465	0	1
Firms indicating inadequate workforce as the main constraint	13,661	0.080	0.272	0	1
Firm's age	13,875	20.092	16.060	1	165
Firm's size					
Small	14,058	0.409	0.492	0	1
Medium	14,058	0.347	0.476	0	1
Large	14,058	0.243	0.429	0	1
Exporter	14,057	0.155	0.362	0	1
Industry					
Manufacturing	14,050	0.615	0.487	0	1
Services	14,050	0.348	0.476	0	1
Other	14,050	0.038	0.190	0	1
Sales per employee quintile					
Q1	14,058	0.152	0.359	0	1
Q2	14,058	0.165	0.371	0	1
Q3	14,058	0.181	0.385	0	1
Q4	14,058	0.170	0.375	0	1
Q5	14,058	0.206	0.404	0	1
Missing quintile	14,058	0.126	0.332	0	1
Average yrs of schooling attained (15-64)	14,058	7.174	1.807	1.498	10.506
Manufacturing sector va (%GDP)	14,058	16.760	5.741	3.106	27.698
Services va (%GDP)	14,058	56.856	11.575	34.512	77.992
Per capita GDP (2000$)	14,058	2854.085	1977.169	171.476	6133.446
Region					
AFRICA	14,058	0.112	0.315	0	1
EAST ASIA AND PACIFIC	14,058	0.164	0.370	0	1
EASTERN EUROPE AND CENTRAL ASIA	14,058	0.122	0.327	0	1
LATIN AMERICA AND CARIBBEAN	14,058	0.566	0.496	0	1
MIDDLE EAST AND NORTH AFRICA	14,058	0.036	0.186	0	1

Source: UCW calculations on Enterprise Surveys, WDI, and Barro-Lee data.

Figure 11. **Ranking of top 15 constraints - Albania**

Albania

Constraint	Value
Electricity	36.0
Practices of competitors in the informal sector	14.0
Political instability	7.0
Corruption	6.5
Tax rates	6.0
Access to finance	5.0
Inadequately educated workforce	4.5
Customs and trade regulations	3.0
Access to land	2.0
Transport	1.5
Business licensing and permits	1.5
Crime	1.0
Tax administration	1.0
Labor regulations	1.0
Courts	0.5
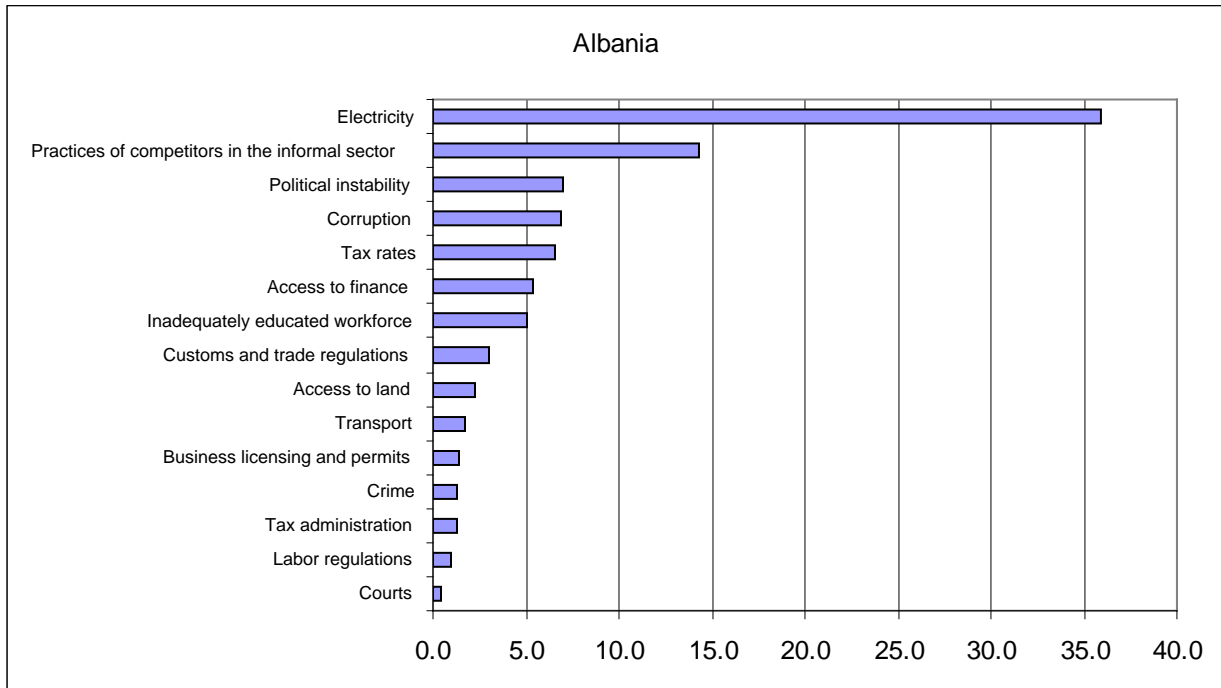
Source: UCW calculations on Enterprise Surveys and WDI data.

Figure 12. **Ranking of top 15 constraints - Brazil**

Brazil

Constraint	Value
Tax rates	32.0
Tax administration	13.5
Access to finance	13.0
Inadequately educated workforce	10.0
Labor regulations	9.0
Practices of competitors in the informal sector	8.5
Customs and trade regulations	3.0
Crime	2.5
Corruption	2.5
Transport	2.0
Political instability	2.0
Courts	1.0
Business licensing and permits	1.0
Electricity	0.5
Access to land	0.5

Source: UCW calculations on Enterprise Surveys and WDI data.

Table 22. **Ranking of top 15 constraints - Cambodia**

Cambodia

Constraint	Value
Corruption	23.5
Electricity	16.2
Practices of competitors in the informal sector	9.0
Crime	6.5
Political instability	6.3
Tax rates	5.3
Access to finance	5.1
Inadequately educated workforce	3.1
Business licensing and permits	3.0
Access to land	2.9
Transport	2.8
Customs and trade regulations	2.1
Tax administration	2.0
Courts	1.6
Labor regulations	0.9

Source: UCW calculations on Enterprise Surveys and WDI data.

Figure 13. **Ranking of top 15 constraints - Cameroon**

Cameroon

Constraint	Value
Practices of competitors in the informal sector	25.0
Tax administration	19.5
Access to finance	16.5
Electricity	13.0
Corruption	7.0
Crime	4.8
Tax rates	3.5
Customs and trade regulations	3.2
Political instability	2.0
Access to land	1.2
Inadequately educated workforce	0.8
Labor regulations	0.8
Transport	0.5
Courts	0.5
Business licensing and permits	

Source: UCW calculations on Enterprise Surveys and WDI data.

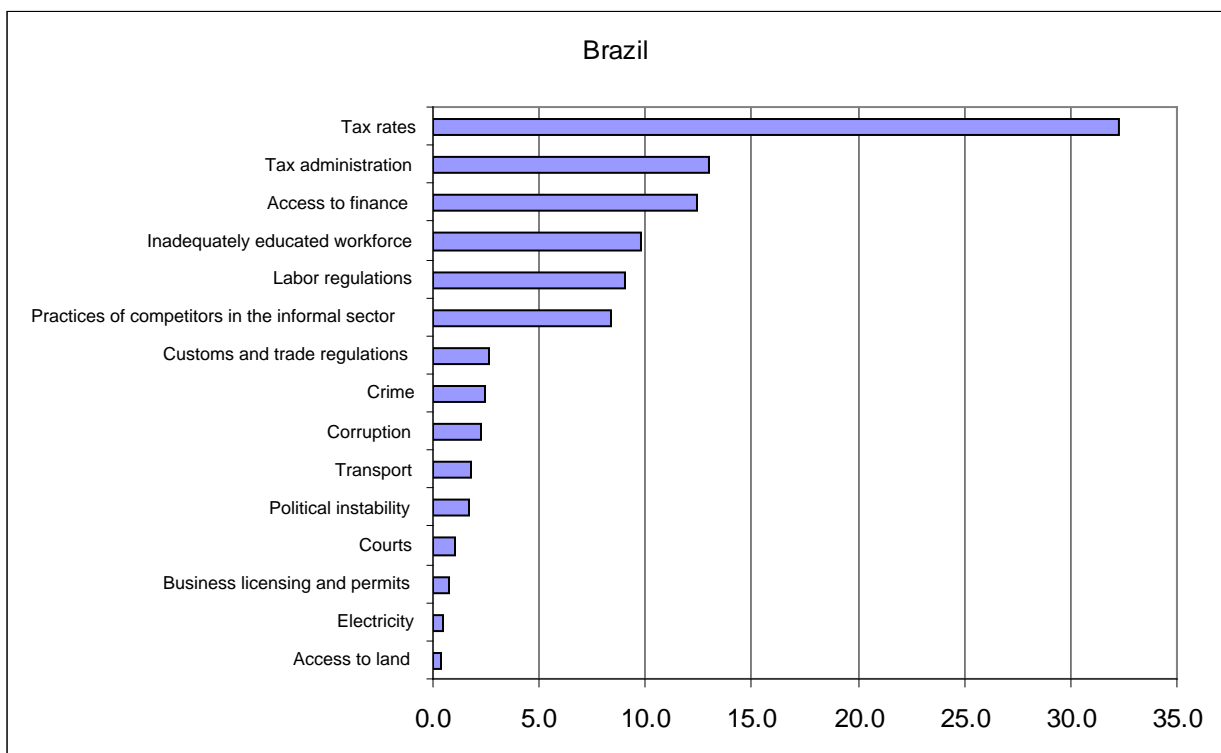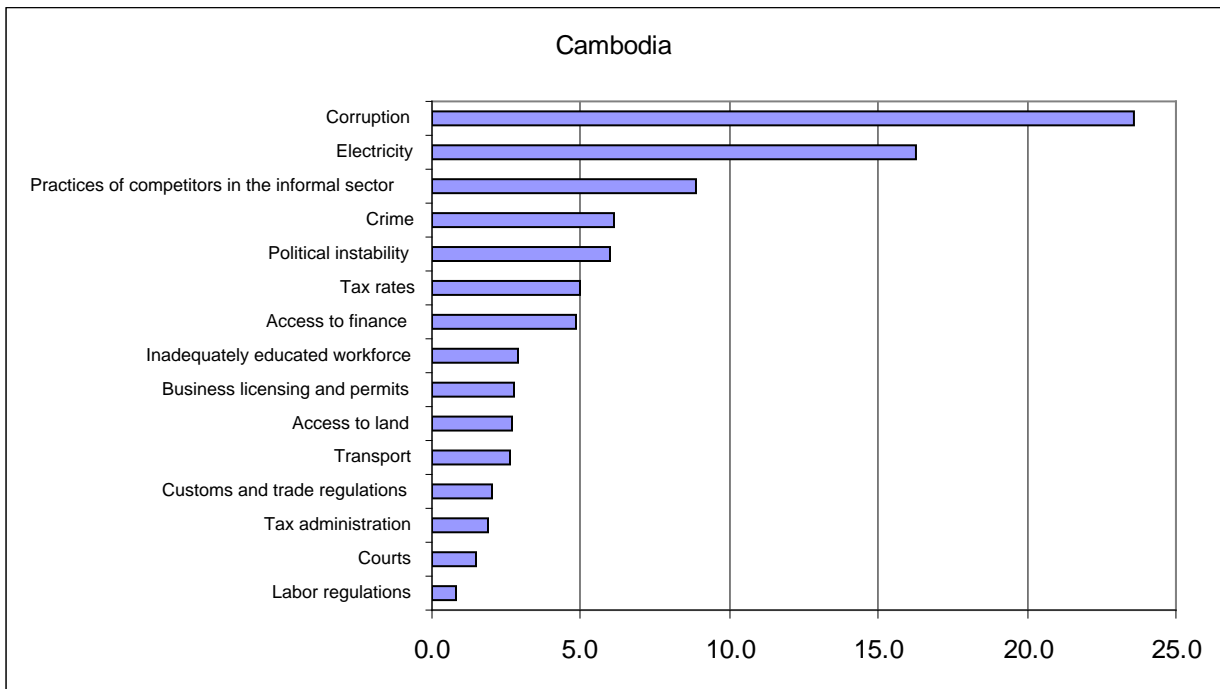*Figure 14.* **Ranking of top 15 constraints - Indonesia**

Source: UCW calculations on Enterprise Surveys and WDI data.

Figure 15. **Ranking of top 15 constraints - Jordan**

Source: UCW calculations on Enterprise Surveys and WDI data.
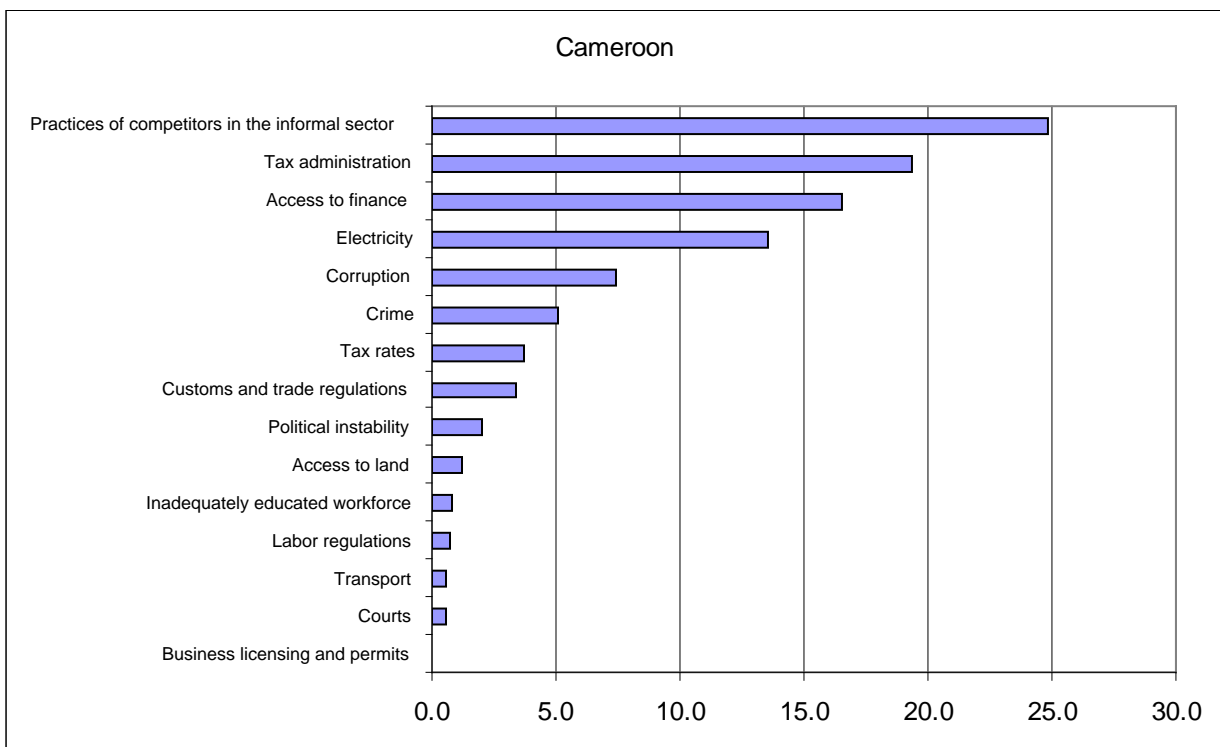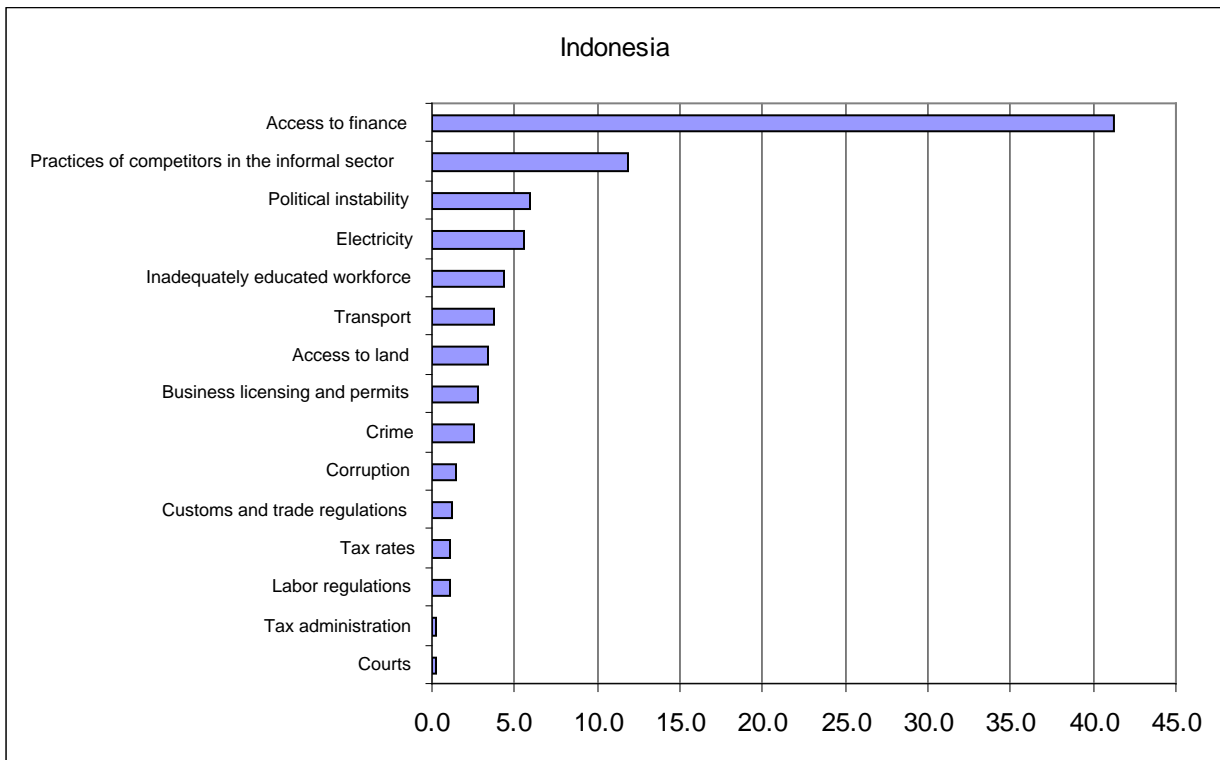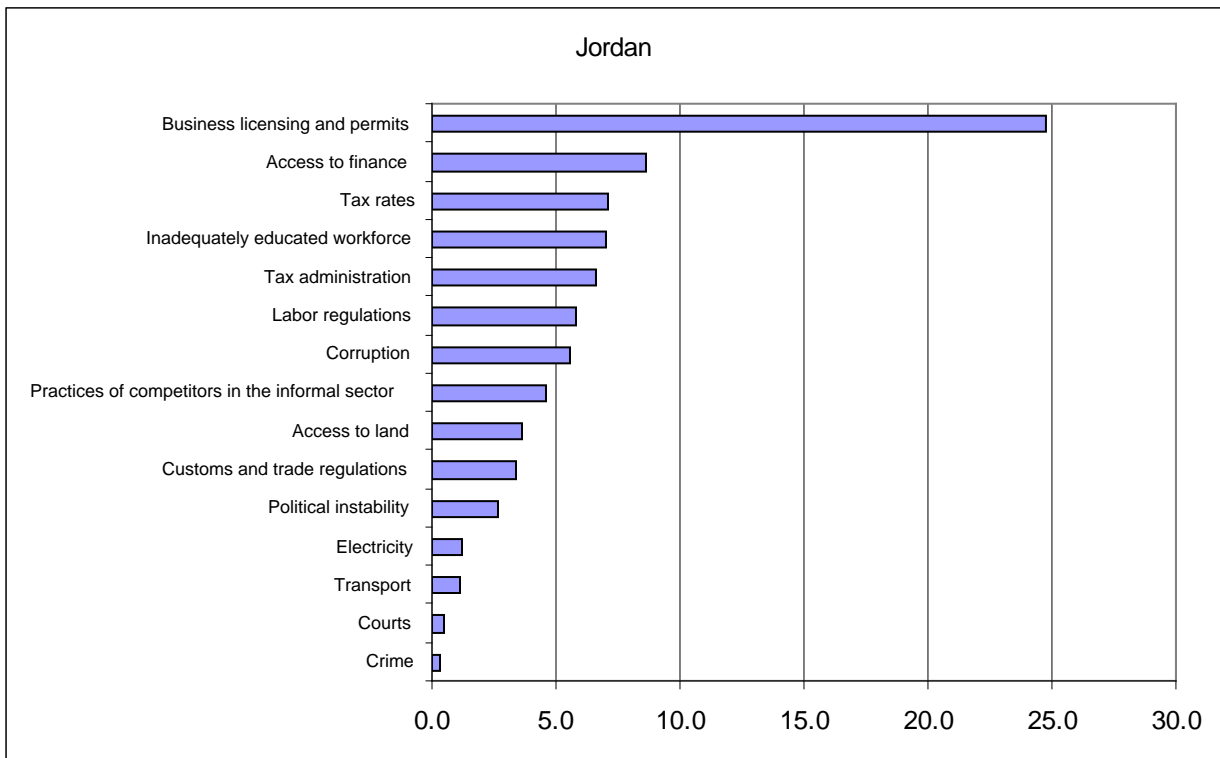
Figure 16. **Ranking of top 15 constraints - Kosovo**

Kosovo

Electricity	
Corruption	
Practices of competitors in the informal sector	
Crime	
Political instability	
Customs and trade regulations	
Inadequately educated workforce	
Tax rates	
Access to finance	
Courts	
Transport	
Tax administration	
Labor regulations	
Business licensing and permits	
Access to land	

0.0   5.0   10.0   15.0   20.0   25.0   30.0   35.0   40.0
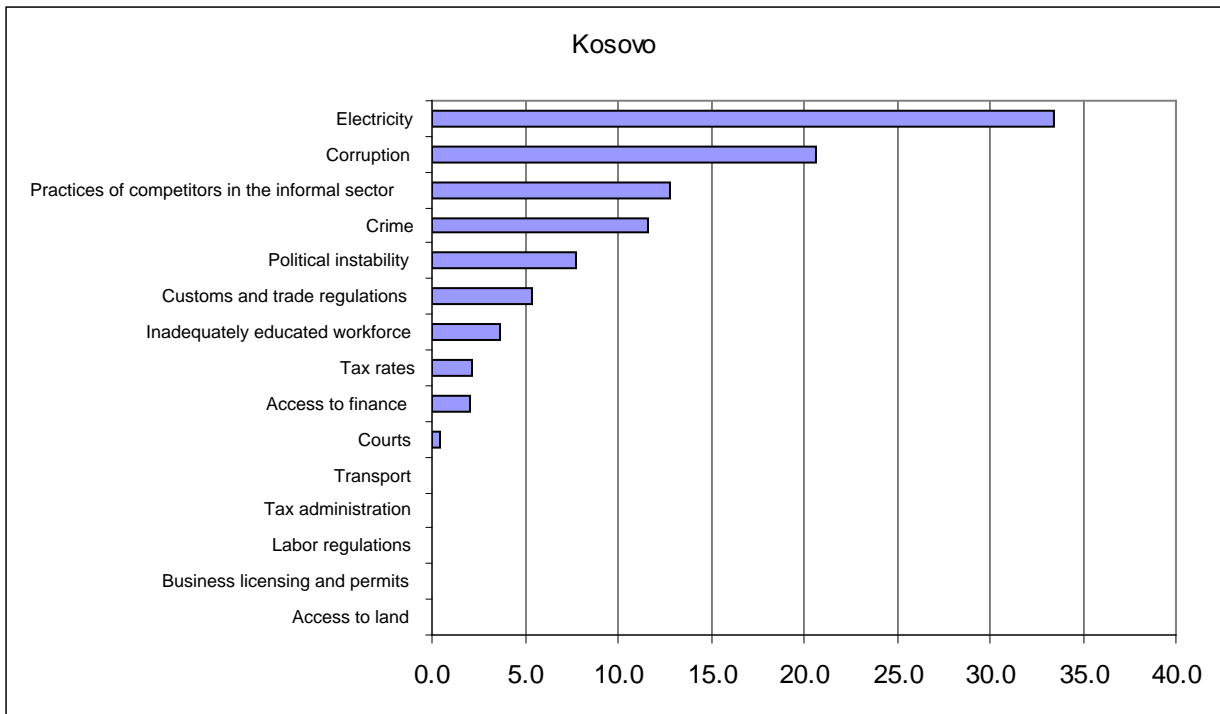
Source: UCW calculations on Enterprise Surveys and WDI data.

Figure 17. **Ranking of top 15 constraints - Mexico**

Mexico

Practices of competitors in the informal sector	
Tax rates	
Access to finance	
Crime	
Corruption	
Business licensing and permits	
Electricity	
Political instability	
Inadequately educated workforce	
Access to land	
Labor regulations	
Tax administration	
Courts	
Transport	
Customs and trade regulations	

0.0   2.0   4.0   6.0   8.0   10.0   12.0   14.0   16.0   18.0
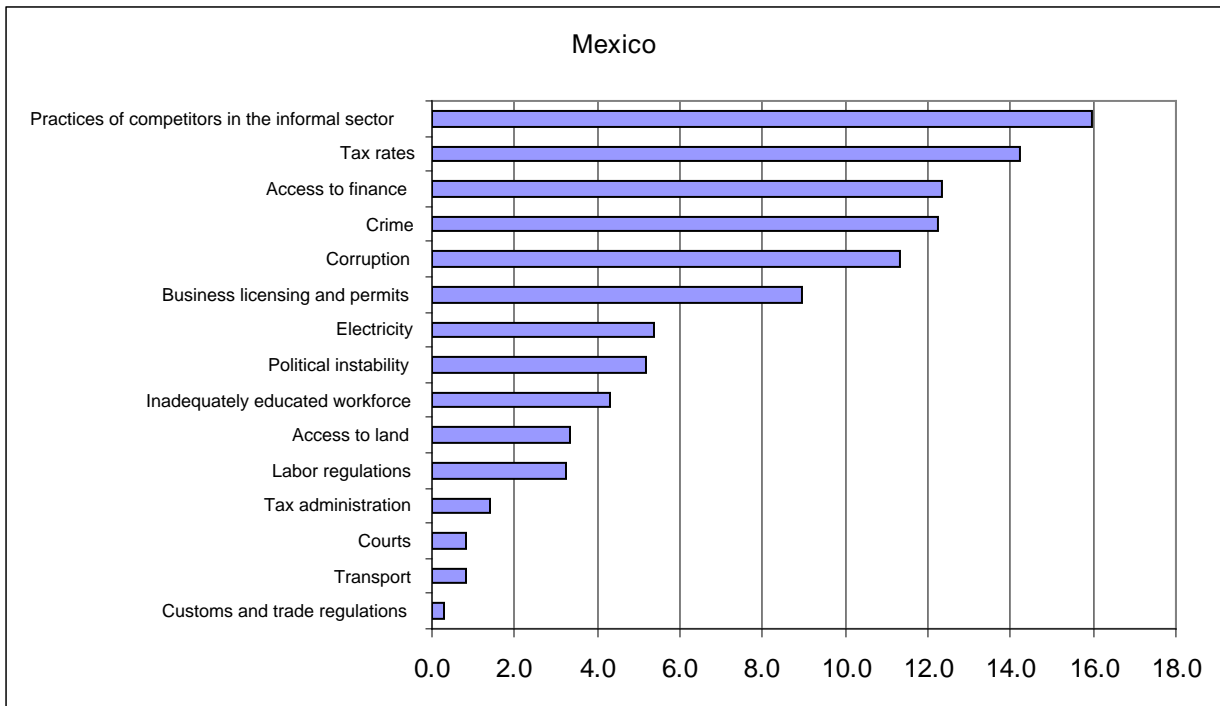
Source: UCW calculations on Enterprise Surveys and WDI data.

Figure 18. **Ranking of top 15 constraints - Turkey**

Turkey

Constraint	Value
Access to finance	~25.0
Tax rates	~17.5
Political instability	~17.0
Practices of competitors in the informal sector	~14.0
Inadequately educated workforce	~9.0
Electricity	~3.0
Business licensing and permits	~2.7
Customs and trade regulations	~2.2
Corruption	~2.1
Labor regulations	~2.0
Transport	~1.3
Crime	~1.0
Access to land	~0.4
Tax administration	~0.3
Courts	~0.2

(horizontal axis: 0.0, 5.0, 10.0, 15.0, 20.0, 25.0, 30.0)
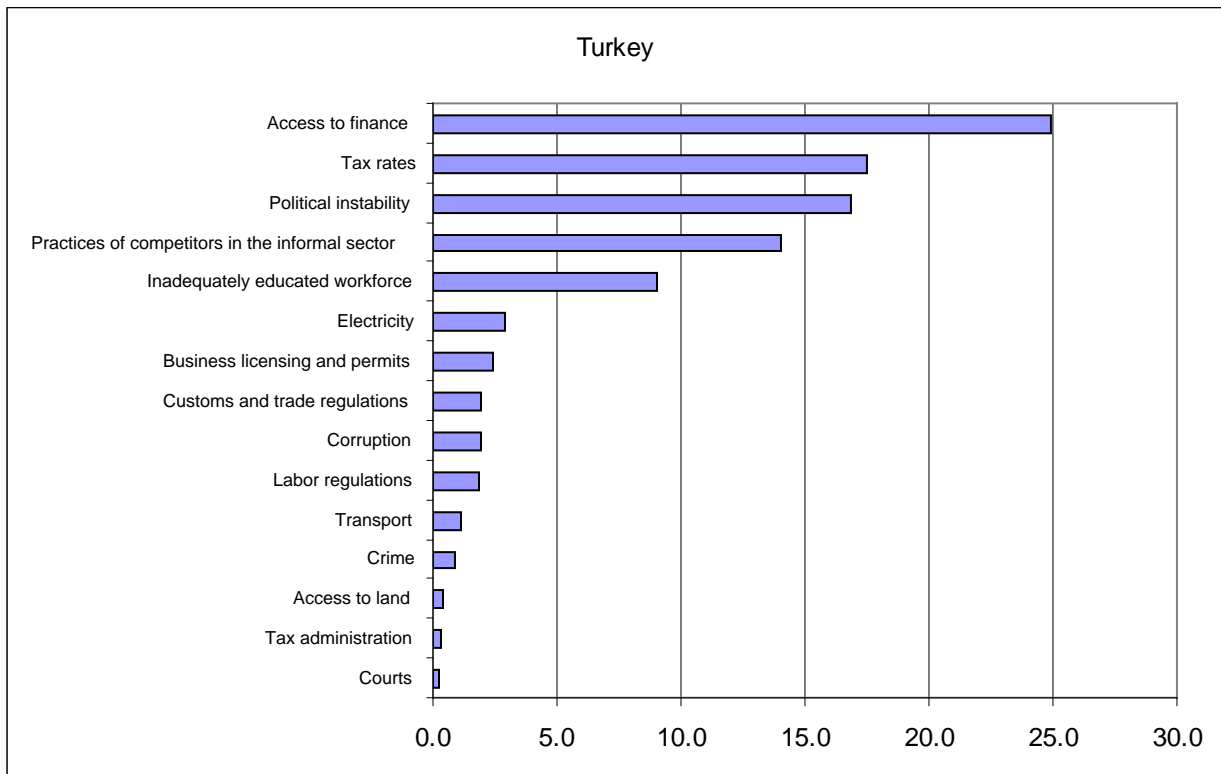
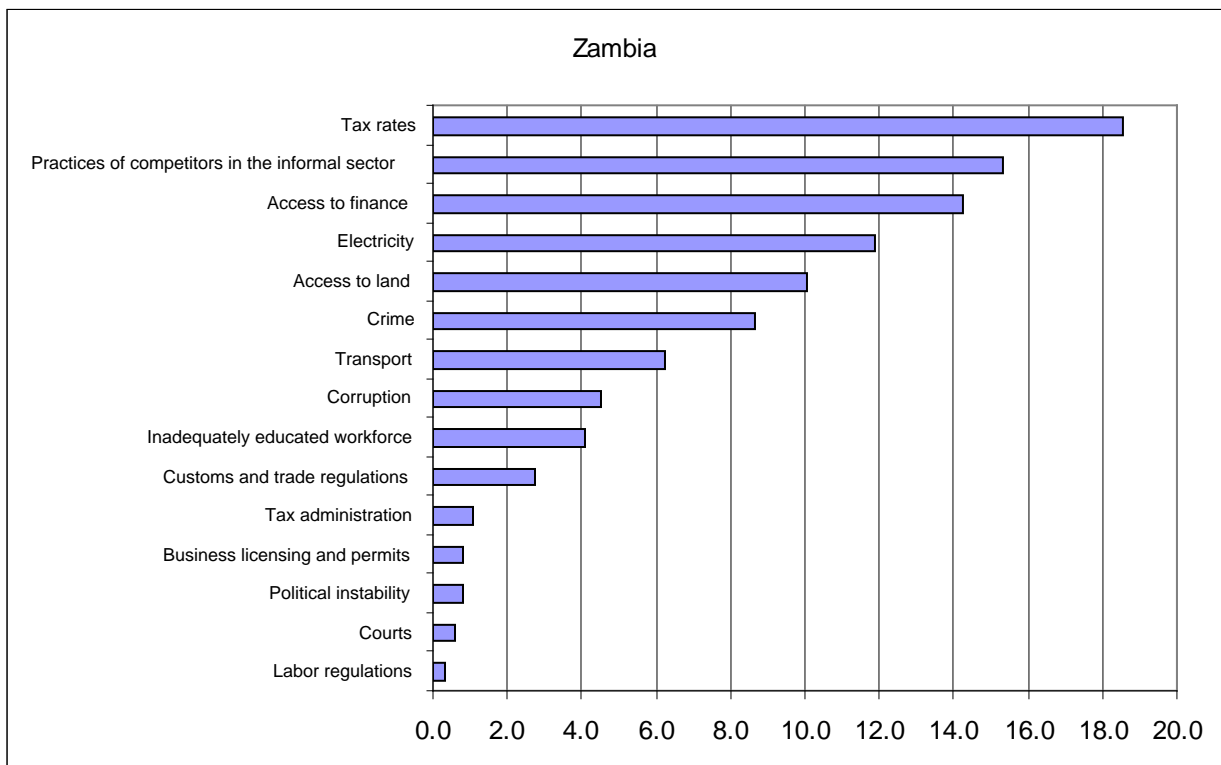Source: UCW calculations on Enterprise Surveys and WDI data.

Figure 19. **Ranking of top 15 constraints - Zambia**

Zambia

Constraint	Value
Tax rates	~18.5
Practices of competitors in the informal sector	~15.0
Access to finance	~14.3
Electricity	~11.7
Access to land	~10.0
Crime	~8.8
Transport	~6.0
Corruption	~4.5
Inadequately educated workforce	~4.3
Customs and trade regulations	~2.8
Tax administration	~1.0
Business licensing and permits	~0.8
Political instability	~0.8
Courts	~0.6
Labor regulations	~0.4

(horizontal axis: 0.0, 2.0, 4.0, 6.0, 8.0, 10.0, 12.0, 14.0, 16.0, 18.0, 20.0)

Source: UCW calculations on Enterprise Surveys and WDI data.

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