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Corporate Performance in Transition: The Role of Business Constrains and Institutions in the South Mediterranean Region

"A. Labor skills, institutions and firm performance in developing countries"

Directed by: Inmaculada Martínez-Zarzoso
(Institute of International Economics, University Jaume I, Spain)

With Contributions by:

Laura Márquez (Institute of International Economics, University Jaume I, Spain)
Maria Parra (Institute of International Economics, University Jaume I, Spain)
Mona Said (American University, Cairo, Egypt)
Charilaos Mertzanis (American University, Cairo, Egypt)

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CORPORATE PERFORMANCE IN TRANSITION: THE ROLE OF BUSINESS CONSTRAINS AND INSTITUTIONS IN THE SOUTH MEDITERRANEAN REGION

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Inmaculada Martínez-Zarzoso[*], Laura Márquez and Maria Parra, Institute of International Economics, University Jaume I, Spain

Mona Said and Charilaos Mertzanis, American University, Cairo, Egypt

Note: The report comprises three single articles. This is the first article entitled:

"A. Labor skills, institutions and firm performance in developing countries"

Executive Summary

This report aims at analyzing the recent trends in corporate performance and economic success in Southern Mediterranean countries at the firm and country level. More specifically, it aims at identifying and evaluating the potential factors that may trigger and foster economic changes in the region, focusing in particular on the role played by skill constraints, the business environment and the institutional setting in explaining economic performance, measured as productivity, sales growth rates and exports, as well as quantifying their relative importance. Firstly, we investigate different sources of economic performance steaming from factors that are internal and external to the firm. At the firm level, the business environment encompasses features relative to the work force, legal, regulatory, financial, and institutional system of a country and therefore it has an impact on the performance of firms and industries.

Secondly, since the business environment affects firms and country performance, then we proceed with an empirical investigation at the country level as well. The common underlying assumption is that firms and countries facing 'better' business environments and institutions can be expected to perform better.

The main novelty of this report is to produce empirical evidence covering the transition period on the conditions that influence private sector performance and country level exports in the South Mediterranean region in comparison to other regions/countries that also went through an economic and institutional transition in the past. As a result, the study provides the tools for designing appropriate development policies.

This report is structured into three parts: the first part focuses on skills and resource characteristics of firms and the role of the main perceived constrains to do business at the firm level. Micro survey data is used to explore the impact of labor skills and other firm-specific characteristics on firm performance, measured as sales growth rates, in 135 developing countries. The analysis uses a consistent and large data set from the World Bank's Enterprise Surveys. The results show that labor skills and firm-specific characteristics are significant predictors of firms' performance. However, the predictive power of labor skills and the firm-specific characteristics is significantly affected by national economic and non-economic factors. Indeed, the national levels of economic, financial and human development as well as income inequality, along with domestic conditions of regulatory governance and other institutions as well as legal and social heterogeneity, all have a role to play in determining firms' performance. The results show that the classification of firms as labor skill-constrained or not in developing countries can be better assessed on the basis of both micro-level and macro-level factors.

The second part of the report specifically focus on the main obstacles that MENA firms, and in particular Egyptian enterprises, face to do business in their country and investigates to what extent the constraints affect firm performance. Firm's performance is measured as Total Factor Productivity (TFP) and labour productivity (LP). Our analysis evaluates the effects of the different business indicators, obtained from the World Bank Enterprise Survey using firm level data from manufacturing firms, on TFP/LP. A number of control variables commonly used in the empirical literature are also included in the model. The main results indicate that access and cost to finance, tax rates, regulatory policy uncertainty, the price of land and basic infrastructures, such as access to water and electricity, are among the most relevant factors for Egypt. These findings have important policy implications, in particular for policy makers and will help them decide what sort of specific actions can be taken to reduce the main obstacles and consequently to pave the way for manufacturing Egyptian firms to become more competitive. The analysis is also extended to other countries in the region, namely Lebanon, Jordan, Morocco and Tunisia and the environmental constrains before and after the Arab Spring are compared. The main findings indicate that regulatory and policy uncertainty, corruption and crime have become more important obstacles after 2011 for most firms in these countries.

The third part focuses on the country-level analysis and investigates the role of the quality of institutions and its different dimensions in the selected countries in explaining export performance. It aims at analysing whether higher quality of economic governance rewards economy performance and facilitates the integration of the MENA region in the world economy. A gravity model of trade augmented with governance indicators is estimated using bilateral exports among 189 trading partners and also for 19 MENA exporters over the period from 1996 to 2013. The main results show that, individually, each of the six governance indicators in the exporting and the importing countries considered has a positive effect on bilateral trade. However, the results for MENA exporters slightly differ. Governance in the importing countries seems to be less relevant for MENA exporters than for the rest of exporters. The effect of country pair similarity in governance indicators indicate similar levels of regulatory quality and the rule of law in exporter and importer countries favours exports of MENA countries. Similarities in voice and accountability also foster exports in the average exporter, but it does not seem relevant for MENA exporters.

Résumé

Ce rapport vise à analyser les tendances récentes de la performance de l'entreprise et le succès économique dans les pays situés au Sud de la Méditerranée au niveau de l'entreprise et du pays. Plus précisément, il vise à identifier et évaluer les facteurs potentiels qui peuvent déclencher et favoriser les changements économiques dans la région, tout en mettant l'accent sur le rôle joué par l'environnement commercial et le cadre institutionnel pour expliquer la performance économique, mesurée par la productivité, la croissance des ventes et les exportations, ainsi que de quantifier leur importance

relative. Tout d'abord, nous étudions les différentes sources de la performance économique à partir des facteurs internes et externes à l'entreprise. Au niveau de l'entreprise, l'environnement commercial englobe les caractéristiques du système juridique, réglementaire, financier et institutionnel d'un pays et, par conséquent, il a un impact sur la performance des entreprises et des industries.

Deuxièmement, étant donné que l'environnement commercial affecte la performance des entreprises et des pays, donc, nous procédons à une enquête empirique de ces conjectures au niveau des pays aussi. L'hypothèse sous-jacente commune est que les entreprises et les pays exposés à de «meilleurs» environnements et institutions commerciaux peuvent être tenus d'accomplir mieux.

La principale nouveauté de ce rapport est de développer des données empiriques portant sur la période de transition sur les conditions qui influent la performance du secteur privé et au niveau des pays exportateurs dans la région sud de la Méditerranée par rapport à d'autres régions/pays qui avaient déjà passé par une transition économique et institutionnelle dans le passé. En conséquence, l'étude fournit les outils pour construire les politiques de développement appropriées.

Ce rapport est structuré en trois parties: la première partie se concentre sur les compétences et les caractéristiques des ressources des entreprises et le rôle des principales contraintes perçues pour faire du commerce au niveau de l'entreprise. Des micro données d'enquête sont utilisées pour explorer l'impact des compétences de la main-d'œuvre et d'autres caractéristiques propres à l'entreprise sur sa performance, mesurée par la croissance des ventes, dans 135 pays en voie de développement. L'analyse utilise un ensemble de données cohérentes et grandes à partir des enquêtes auprès des entreprises de la Banque mondiale. Les résultats montrent que les compétences de la main-d'œuvre et des caractéristiques propres à l'entreprise sont des prédicteurs significatifs de la performance des entreprises. Cependant, le pouvoir prédictif des compétences de la main-d'œuvre et des caractéristiques propres à l'entreprise est affecté de manière significative par des facteurs nationaux économiques et non-économiques. En effet, les niveaux nationaux de développement économique, financier et humain, l'inégalité des revenus, les conditions internes de gouvernance réglementaire et d'autres institutions ainsi que l'hétérogénéité juridique et sociale, ont tous un rôle à jouer dans la détermination de la performance des entreprises. Les résultats montrent que la classification des entreprises par les compétences limitées de la main d'œuvre ou leur absence dans les pays en voie de développement peut être mieux évaluée sur la base de facteurs à la fois aux niveaux micro et macro.

La deuxième partie du rapport se concentrer spécifiquement sur les principaux obstacles les entreprises de la région MENA, et notamment les entreprises égyptiennes face afin de réaliser des activités commerciales dans leur pays et examine dans quelle mesure ces contraintes affectent-elles la performance des entreprises. La performance de la firme est mesurée en productivité totale des facteurs (PTF). Notre analyse évalue les effets des différents indicateurs d'activité, obtenus à partir de l'Enquête sur l'entreprise de la Banque mondiale en utilisant des données au niveau des entreprises d'entreprises manufacturières, sur la PTF. Un certain nombre de variables de contrôle utilisées couramment dans la littérature empirique sont également inclus dans le modèle. Pour vérifier la robustesse de nos résultats, des mesures alternatives de rendement de l'entreprise sont utilisées, tels que les ventes totales et le nombre moyen de travailleurs. Les principaux résultats indiquent que l'accès et le coût de financement, les taux d'imposition, la politique d'incertitude réglementaire, le prix des terrains et des infrastructures de base, comme l'accès à l'eau et l'électricité, sont parmi les facteurs les plus pertinents. Ces résultats ont des implications politiques importantes, en particulier pour les créateurs de politiques et les aideront à décider du type d'actions spécifiques qui pourront être prises afin de réduire les principaux obstacles et par conséquent à encourager les entreprises manufacturières égyptiennes à devenir plus compétitives. L'analyse est également étendue à d'autres pays de la région, à savoir le Liban, la Jordanie, le Maroc et la Tunisie et les contraintes environnementales avant et après le printemps arabe sont comparées. Les principaux résultats indiquent que l'incertitude réglementaire et politique, la

corruption et la criminalité sont devenues des obstacles plus aggravés après 2011 pour la plupart des entreprises de ces pays.

La troisième partie porte sur l'analyse au niveau des pays et étudie le rôle de la qualité des institutions et de ses différentes dimensions dans les pays sélectionnés pour expliquer la performance de l'exportation. Elle vise à analyser si une meilleure qualité de gouvernance économique récompense la performance de l'économie et facilite l'intégration de la région MENA dans l'économie mondiale. Un modèle de gravité du commerce accompagné par des indicateurs de gouvernance est estimé à l'aide des exportations bilatérales entre 189 partenaires commerciaux et également 19 MENA exportateurs au cours de la période de 1996 à 2013. Les principaux résultats montrent que, individuellement, chacun des six indicateurs de gouvernance dans les pays exportateurs et importateurs considérés ont un effet positif sur le commerce bilatéral. Cependant, les résultats pour la région MENA exportateur diffèrent légèrement. La gouvernance dans les pays importateurs semble moins pertinente pour les exportateurs de la région MENA que pour le reste des exportateurs. L'effet de similitude des pays par paire dans les indicateurs de gouvernance indiquent des niveaux similaires dans la qualité de la réglementation et la primauté du droit dans les pays exportateurs et importateurs favorise les exportations des pays de la région MENA. Similitudes dans la voix et la responsabilité de même favorisent des exportations dans les pays exportateurs en moyenne, mais cela ne semble pas pertinent pour les exportateurs de la région MENA.

The report comprises three single articles:

A. Labor skills, institutions and firm performance in developing countries

B. Business environmental constraints in MENA countries with a special focus on Egypt

C. Exports and governance: Is MENA different?

A. Labor skills, institutions and firm performance in developing countries

1.   Introduction

Factors enhancing firms' performance have been widely examined. Strong and stable corporate performance can be the main pillar of economic growth. Ahmed, Kristal, and Pagell (2014) provide evidence that resilient firm performance is dependable even on the aggregate level; particularly operational capability is crucial during economic recessions. Labor skills are also a key issue in determining firm performance. In particular, Nickell and Bell (1995), Machin at al. (1996) and Leuven *at al.* (2004) have argued that the demand for skilled labor has been increasing in recent years. However, the requirements for skilled-labor tend to differ between aggregate economies and between sectors of activity. The differences can be attributed to at least two reasons. First, some skills are useful only in certain industries, in that a shortage of one type of labor will cause difficulties in some firms and sectors but have little or no effect on others. Second, the business cycles are likely to differ in length, phase and amplitude among different industries. Thus, specialized labor hiring in certain industries may be constrained by a lack of skilled labor, while there may be abundance of labor in general or labor skills which are inappropriate for a specific firm or industry. In response, firms could train new workers, but this will be costly and may only occur after efforts at hiring appropriately skilled workers have failed. Firms could alternatively switch to a new technology so as to change the proportions of skilled and unskilled labor deployed in production. However, the aforementioned evidence suggests that this strategy either is not used by firms or is unsuccessful as employment trends are characterized by the increasing hiring of skilled over unskilled labor.

The hiring of skilled labor is affected by the structure and efficiency of the labor market in each country. The cost of hiring depends on the number of job-searchers relative to supply. Job-seekers may not be suitable to fill available vacancies because they lack the skills necessary to perform the associated job tasks. Because of the specificity of skilled labor, understanding the functionality of the labor market would require an analysis at the firm and industry level. Becker (1962, 1964) described this differentiation between general and firm-specific human capital as transferable human capital, which consists of skills that are of use within the industry but not the wider economy. Stevens (1994, 1996) further argues that transferable human capital implies that shortages of skilled labor are likely to affect all firms within the sector in a similar way, but have little effect on other sectors. Thus, there is a mismatch in labor skills demanded and supplied among sectors. Hence, within the dynamic and competitive nature of industrialized economies whereby one industry declines and another expands, a shortage of skilled labor in the expanding industry will be normally observed as workers previously

considered skilled find their skills no-longer of use and become, effectively, unskilled workers. These dynamic shifts between sectors will affect within-sector firm performance. The situation is even more aggravated in developing countries where education-occupation mismatches as well as other labor market issues result in severe skill shortage. An empirical study analyzing the results of the World Bank's Enterprise Surveys (Bhattacharya and Wolde, 2010) shows that reducing the labor skill shortage constraint from the average of the MENA region to the world's average could result in a 4% increase in per capita GDP annually.

This paper aims to examine the determinants of firms' performance in depth by taking a multi-dimensional perspective. More specifically, it considers the role of labor skills in explaining firm performance subject to the influence of a wide range of firm-specific characteristics. The paper's contribution is twofold. First, it focuses on the developing world in a consistent way; by using a large data set comprising 135 countries drawn from the World Bank's Enterprise Surveys that contains rich information of labor skills and second, it considers the role of a wide-range of firm-specific information in affecting firm performance, as well as the impact of national factors that reflect a country's overall development, its institutions and social structures. The paper takes a behavioral perspective by considering firms' perceptions of labor constraints and their role for their performance rather than relying on aggregated reporting information, which may be either inadequate or not credible in many developing countries.

The results show that labor skills are significantly related to firms' performance. The explanatory power of labor skills remains robust after controlling for other firm-specific characteristics (age, size, sector of activity, location, ownership, etc.). The results also show that the interaction between labor market conditions and firm performance is mitigated by national factors, such as the levels of development, inequality, and the quality of institutions and social structures. All of these factors affect the magnitude of the labor skill constraints effect on firms' performance. The policy implications are that the improved functioning of labor markets in developing counties depends not only on the explicit role of labor constraints on firms' performance but also on the consideration of various firm-specific characteristics and national factors in predictable ways, the impact of which that should be properly assessed in each country.

In what follows, section 2 reviews the related literature, section 3 describes the data and the empirical methodology used for the analysis, section 4 explores the power of firm-specific characteristics in predicting firms' access to energy, section 5 extends the analysis to include the

controlling impact of national level factors and section 6 present some robustness checks. Finally, section 7 concludes the paper.

2.   Related literature

Labor skills are a key determinant of firms' ability to operate and expand. Haskel and Martin (1996), Bennett and McGuiness (2009) and Healy at al. (2015) argue that skill shortages can lead to a loss of firm competitiveness due to an excessive wage increase and to lower productivity in industries where skill-related problems exist. A study investigating the Pakistani software industry at a micro level (Rehman, 2015) concludes that skill shortage is one of the major reasons why firms in the industry record relatively low productivity. In addition, Pozzoli, Pytlikova, & Parrotta (2014) argue that homogeneity of labor is also a central factor when it comes to the effect of labor skills on productivity. Their econometric analysis shows that workforce diversity in ethnicity is negatively associated with firm productivity. Mahy, Rycx, and Vermeylen (2015) have used Belgian linked employer–employee panel data for 1999 to 2010 to assess the effect of labor mismatch on firm productivity. They have found a significant positive relationship between high-education and firm productivity. This positive effect is even more evident when firms belong to a technology intensive industry, require a relatively high share of workers with advanced skills, and when firms evolve in an overall uncertain or unattractive economic environment such as the case in most developing countries. On the other hand, the study shows a negative correlation between low-education and firm productivity which is pretty expected. Moreover, Montt (2015) explains using data for 19 OECD countries that higher skill and qualification mismatch is correlated with lower labor productivity, with over-qualification and under-qualification contributing to these influences.

The concept of skill dispersion and its impact of firms' performance have been widely examined in the literature. Bombardini, Gallipoliy, and Pupatoz (2011) find that firms belonging to industries with higher complementarities are more productive in settings of lower skill dispersion. The reasons they propose are that labor supply meets labor demand through labor skills, and industries differ in the extent to which they can substitute workers of different levels of skills across different tasks.. Interestingly, a study conducted on Italian firms (Iranzo, Schivardi, and Tosetti, 2008) reveals that skill dispersion has a positive effect on firm productivity when it exists within the same firm between occupational groups. This could be understood as a finding that is compliant with the strict hierarchy prevailing in these firms with a few highly skilled workers making the managerial decisions, and more low-skilled workers involved in the technical tasks in a fairly stratified manner. Contrastingly, skill

dispersion seems to have a negative impact on firm productivity when it exists between firms (Irzano at al, 2008). Giesing and Laurentsyeva (2014) show that a one standard deviation rise in skill shortages in the European Union results in a 6.1 % decrease in total factor productivity of the firm.

Although there is wide evidence in the literature regarding the existence of a positive relationship between labor skills and firm productivity, the size and significance of the effect largely varies depending on other firm-specific characteristics. For instance, Galindo-Rueda and Haskel (2005) argue that the share of full-time workers, as well as the gender composition of workers in the firm, tends to change the magnitude of the effect of labor skills on firm productivity.

This paper aims to further examine the role of labor skills on firm performance at firm-level in developing countries by controlling for a wide range of firm-specific characteristics and measuring performance using annual sales rate of growth rates. The analysis is based on the use of a comprehensive data set of firms located in 135 developing countries. Furthermore, robustness checks are implemented by taking into account the controlling impact of economic and non-economic national-level factors. It provides new evidence that may have important implications for development policy reform aiming at enhancing firms' performance.

3.   Data and Methodology

The source of data for the analysis is the World Bank's Enterprise Surveys (ES). The ES include objective data based on individual firms' experience and subjective data on the perception of the environment in which they operate. The ES facilitate linking firm performance and other firm characteristics with the business environment while assessing the constraints to private sector growth and job creation faced in a particular country. The ES are composed of representative random samples of firms from the manufacturing and service sectors, the latter including retail, wholesale, IT, construction, transport and communication. The ES use the most updated and complete sampling frames for each economy and efforts are undertaken to purge alien elements from the frame prior to the selection of the sample. A shortcoming of ES data stems from the doubts often expressed regarding the representativeness of firms' true constraints. Indeed, the responses of firms are private unaudited information. However, these concerns could only be addressed by using firm census data, which is not available for most developing countries. Thus, the difficulty of relying on firms' annual reports or other interim information in developing countries due to questionable quality justifies the value of micro-survey data. Indeed, Claessens and Tzioumis (2006) argued that the determinants of various

constraints affecting firms' business operations in developing countries cannot effectively be analyzed on the basis of balance-sheet or other reporting information. The reason is that such reported information is low quality, inconsistent and mostly un-audited. Instead, information based on micro-survey data reflecting directly firms' perceptions regarding obstacles to business operations may be more valuable in providing a classification of firms between constrained and not constraioned, at least in the developing countries, and hence develop effective policy intervention. The benchmark data set used in this analysis includes 135 developing countries and 150,359 firms, covered by the ES between 2002 and 2014. There are three waves of data for each country. An important strength of the data is that it includes small and medium enterprises, which are the blood-line of economic activity in most countries in the sample. The ES stratifies firm size consistently into: small (5-19 employees), medium (20 to 99), and large (100 and more) firms.

The dependent variable for firm performance is GSALES. Based on the ES explanations, the variable GSALES represents the firms' real annual rate of growth of sales reported during the current fiscal year from a previous period. For most countries the difference between the two fiscal year periods is two years. However, for some countries the interval is three years. Hence, an annualized measure is used. All values for GSALES are converted to USD using the exchange rate that corresponds to the fiscal year of the survey. GSALES are then deflated to 2009 using the USD deflator.

The main independent variable is SKILLS. It is a binary variable that reflects the extent to which firms identify labor skill level as a major constraint for their performance. It is the answer of firms to the question: "How problematic is the level of labor skills for the operation and growth of your business?" It takes the value of 1 if the answer is "very problematic or moderately problematic" and 0 otherwise. However, it is possible that the firms' answer may not capture all reality as well as that some firms may report skill constraints while they are not actually constrained by them but only facing temporary skill shortages. Therefore, one must be aware of this behavioral bias and interpret the results carefully. Average values of SKILLS per country are reported in Table 1, the average sample value is 23.3 percent and the standard deviation is 12.6 percent. The data shows a large divergence among countries. Most firms operating in Suriname consider labor skills as the biggest obstacle to their operations (66.4 percent), while a low number of firms operating in Eritrea consider labor skills as an important obstacle (1.7 percent). Interestingly, Table 1 shows that labor skills tend to be a serious obstacle to some of the biggest developing economies, such as Brazil (57.3 percent), Argentina (49.5 percent), and Syria (59.6 percent).

Table 1: Labor skills as a constraint to firms' business operations (percent of firms)

Country (num. of firms)	Mean	Country (num. of firms)	Mean	Country (num. of firms)	Mean
Afghanistan (945)	32.3	Georgia (959)	17.2	Paraguay (974)	41.4
Albania (960)	17.5	Germany (1196)	6.9	Peru (1632)	33.4
Algeria (600)	36.8	Ghana (1214)	9.4	Philippines (1326)	6.0
Angola (785)	23.2	Greece (546)	8.6	Poland (1960)	19.2
Antigua & Barbuda (151)	31.1	Grenada (153)	39.1	Portugal (505)	12.4
Argentina (2117)	49.5	Guatemala (1112)	31.3	Romania (1721)	31.5
Armenia (1128)	11.8	Guinea (223)	12.6	Russia (5953)	27.7
Azerbaijan (1196)	5.1	Guinea-Bissau (159	13.2	Rwanda (453)	19.6
Bahamas (150)	33.3	Guyana (165)	48.8	Samoa (109)	27.8
Bangladesh (2946)	16.8	Honduras (796)	23.6	Senegal (1107)	9.1
Barbados (150)	28.9	Hungary (1218)	10.5	Serbia (1102)	13.2
Belarus (1034)	23.6	India (13515)	11.2	Sierra Leone (150)	17.4
Belize (150)	40.7	Indonesia (1444)	6.1	Slovak Rep. (748)	20.4
Benin (150)	27.9	Iraq (756)	25.8	Slovenia (804)	8.7
Bhutan (503)	13.8	Ireland (501)	15.6	South Africa (937)	9.0
Bolivia (975)	32.9	Israel (483)	12.5	South Korea (598)	6.8
Bosnia & Herzegovina (999)	12.4	Jamaica (376)	21.5	South Sudan (738)	20.5
Botswana (610)	27.6	Jordan (1076)	18.7	Spain (606)	13.8
Brazil (3444)	57.3	Kazakhstan (1768)	24.7	Sri Lanka (610)	19.3
Bulgaria (2500)	25.6	Kenya (1438)	16.3	St. Kitts & Nevis (150)	45.0
Burkina Faso (533)	30.3	Kosovo (472)	17.8	St. Lucia (150)	24.7
Burundi (427)	12.7	Kyrgyz Rep. (877)	22.6	St. Vincent & Gren (154)	32.0
Cabo Verde (254)	39.7	Lao PDR (630)	21.5	Sudan (662)	15.5
Cambodia (974)	22.6	Latvia (836)	29.5	Suriname (152)	66.4
Cameroon (535)	26.8	Lebanon (943)	28.2	Swaziland (307)	13.4
Central African rep. (150)	24.7	Lesotho (151)	17.3	Sweden (600)	23.2

Chad (150)	58.5	Liberia (150)	13.5	Syria (508)	59.6
Chile (2050)	34.5	Lithuania (1057)	29.9	Tajikistan (1099)	18.9
China (2700)	2.9	Madagascar (977)	12.7	Tanzania (1232)	30.4
Colombia (1942)	31.4	Malawi (673)	17.5	Thailand (1043)	38.5
Congo (151)	48.8	Malaysia (1115)	20.2	Timor-Leste (150)	18.0
Congo, Dem. Rep. (1228)	33.7	Mali (850)	9.3	Togo (155)	18.4
Costa Rica (881)	24.7	Mauritania (387)	28.8	Tonga (150)	50.8
Côte d'Ivoire (526)	34.3	Mauritius (398)	46.9	Trinidad & Tobago (370)	40.7
Croatia (1284)	14.9	Mexico (2960)	24.7	Tunisia (592)	31.7
Czech rep. (846)	18.1	Micronesia (68)	44.1	Turkey (4559)	21.4
Djibouti (266)	18.2	Moldova (1238)	27.0	Uganda (1325)	16.4
Dominica (150)	13.3	Mongolia (722)	18.7	Ukraine (2556)	23.2
Dominican Rep. (360)	36.1	Montenegro (266)	6.0	Uruguay (1228)	29.1
Ecuador (1024)	33.1	Morocco (1066)	30.5	Uzbekistan (1251)	12.4
Egypt (5766)	27.1	Mozambique (479)	18.0	Vanuatu (128)	29.4
El Salvador (1053)	27.0	Myanmar (632)	16.0	Venezuela (820)	29.7
Eritrea (179)	1.7	Namibia (909)	13.7	Vietnam (1053)	8.4
Estonia (804)	16.6	Nepal (850)	9.7	West Bank & Gaza (835)	15.4
Ethiopia (1976)	9.6	Nicaragua (814)	18.6	Yemen (830)	30.9
Fiji (164)	15.3	Niger (275)	30.3	Zambia (1204)	11.4
FYR Macedonia (982)	10.2	Nigeria (4567)	8.2	Zimbabwe (599)	5.1
Gabon (179)	42.3	Pakistan (2182)	15.7		
Gambia (174)	11.5	Panama (969)	14.5		

Source: Enterprise Surveys, World Bank. The figures report the percent of firms reporting labor
skill as an important constraint to do business.

The independent variables also include a range of firm-specific characteristics: age, size (size takes the value of 1 for small and medium size firms, zero otherwise), sector of business activity; legal status; ownership structure; location of business operations; and export status. Moreover, country-level dummy variables (country fixed effects) are used to control for the impact of national economic and non-economic factors. These control variables capture unobservable differences between countries and are included to account for any spurious relationships and better measure the impact of any single firm-specific variable beyond the effects of others. Thus, the regression estimates represent within-country variation in the relationship between the various exogenous indicators and firms performance. The categorical nature of independent variables raises complex interpretation problems for the use of any interaction variables, which are therefore not included in the analysis. In other words, each individual firm is not large enough to affect country-level measures of those development indicators. The Appendix describes the variables used.

Summary statistics of the variables are shown in Table 2. The annual rate of growth of sales varies considerably among countries, with an average of 4.73 percent and a standard deviation of 27.8 percent. The perception of firms regarding the severity of labor skills also varies considerably with an average value of 0.21 and a standard deviation of 0.41.

Table 2: Descriptive statistics of variables

Variable	Obs	Mean	S.D.	Min	0.25%	Median	0.75%	Max
GSALES	85191	4.73	27.75	-100	-7.87	3.89	16.19	100
SKILLS	147468	0.21	0.41	0	0	0	0	1
AGE	143689	2.54	0.82	0	2.08	2.56	3.09	5.37
SIZE	151274	0.81	0.4	0	1	1	1	1
SECTR	151707	0.59	0.61	0	0	1	1	3
LEGAL	145892	0.48	0.5	0	0	0	1	1
LOCAT	115165	0.53	0.5	0	0	1	1	1
EXPR	149208	15.5	36.19	0	0	0	0	100
OWNF	148620	10.61	30.8	0	0	0	0	100
OWNG	151707	0.03	0.16	0	0	0	0	1
OWND	151707	0.87	0.33	0	1	1	1	1
RSKILL	73262	33.36	32.22	0	0	25	58.33	100
RPROD	63444	2.14	17.03	0	0.15	0.42	1.33	31
RPERM	120954	0.23	1.06	0	0	0	0.15	80
GDPCPLG	151707	3.48	0.49	2.2	3.11	3.5	3.85	4.77
GINI	139923	39.49	8.36	16.64	33.6	38.47	45.3	65
HDI	149741	0.66	0.13	0.3	0.59	0.68	0.75	0.91
FINDPLG	151063	1.51	0.32	0.31	1.29	1.54	1.71	2.2

VOICC	150859	-0.21	0.79	-2.16	-0.88	-0.18	0.41	1.67
POLSTB	150859	-0.57	0.88	-2.69	-1.19	-0.62	0.07	1.33
GVEFF	150859	-0.24	0.66	-1.73	-0.68	-0.27	0.12	1.89
RGQLT	150859	-0.18	0.69	-2.26	-0.64	-0.28	0.27	1.89
RLLW	150859	-0.35	0.68	-1.95	-0.82	-0.46	-0.03	1.95
CNTCR	150859	-0.4	0.67	-1.64	-0.9	-0.56	-0.12	2.29
FRCTHN	149892	0.45	0.23	0	0.25	0.42	0.63	0.93
FRCLNG	150819	0.41	0.31	0	0.13	0.37	0.72	0.92
FRCRLG	150969	0.41	0.22	0	0.21	0.38	0.61	0.86

Source: World Development Indicators, Enterprise Surveys,World Bank.

An ordinary least squares (OLS) model with country fixed effects is used for estimating the regression. The disturbance parameter is assumed to follow a normal distribution and the standard maximum likelihood estimator is therefore used (Greene, 2012). Since omitted country characteristics might cause error terms to be correlated for firms within countries, clustered standard errors are reported. In a second step, economic, financial, institutional and human development indicators are introduced in the analysis to obtain more robust results regarding the impact of firm-specific characteristics on firms' GSALES constraints. In general, the model assumes that the firm's underlying response can be described by the following equation:

$$Y_{isj} = \alpha + SKILLS'_{isj}\beta_1 + X'_{isj}\beta_2 + \gamma_j + \delta_s + \varepsilon_{isj} \tag{1}$$

where $Y_{is,j}$ (GSALES) is the annual rate of growth of sales reported by firm i in sector s and country j, SKILLS is the binary variable that reflects firms' perception of labor skills as constraints for their performance; $X_{isj}'\beta_2$ is the vector of firm-specific variables; γ_j are country dummy variables (fixed effects) that capture unobservable differences between countries and δ_s are sectoral dummy variables that reflect unobservable factors that are sector specific and affect firm performance; and ε_{isj} is a disturbance parameter that is assumed to follow a normal distribution.

Table 3 presents the pairwise correlations between the firm-specific control variables. The results show small pairwise correlations (considerably lower than 0.5) and therefore do not document severe multicollinearity between the firm-specific variables. Therefore, all of these firm-specific variables are included in regression analysis.

Table 3: Correlation among firm-specific variables

Pairwise correlation	GSALES	SKILLS	AGE	SIZE	SECTR	LEGAL	LOCAT	EXPR	OWNF	OWNG	OWND	RSKILL	RPROD	RPERM
GSALES	1													
SKILLS	0.041*	1												
AGE	-0.082*	0.041*	1											
SIZE	-0.028*	-0.038*	0.205*	1										
SECTR	0.033*	0.045*	0.123*	-0.131*	1									
LEGAL	0.078*	0.112*	0.113*	0.192*	0.059*	1								
LOCAT	0.045*	0.024*	0.026*	-0.042*	0.030*	-0.022*	1							
EXPR	0.018*	0.028*	-0.111*	-0.296*	0.189*	0.147*	0.020*	1						
OWNF	0.035*	0.013*	0.022*	-0.181*	0.007*	0.118*	0.042*	0.195*	1					
OWNG	0.021*	-0.027*	-0.038*	0.058*	0.012*	0.036*	0.024*	-0.002	-0.005	1				
OWND	0.007	0.019*	0.101*	0.121*	0.034*	0.143*	0.013*	0.081*	0.025*	0.038*	1			
RSKILL	0.029*	0.051*	0.041*	-0.087*	0.046*	0.104*	0.068*	0.048*	0.026*	0.010*	0.046*	1		
RPROD	0.014*	0.011*	0.039*	0.154*	-0.001	0.046*	0.007	0.054*	0.055*	0.046*	-0.011*	0.015*	1	
RPERM	0.0041	0.006*	0.031*	0.018*	0.009*	0.027*	-0.002	0.002	-0.002	0.008*	-0.005	0.018*	0.013*	1

Note: Variables definitions are given in the Appendix.

4.   Analysis of Results

The regression results report the estimated impact of the labor skill constraints on firms' performance controlling for firms' characteristics. In order to obtain a better perspective of the relevant impact, the total sample of countries was divided between high-income (above-average income) and low-income (below-average income) countries based on the sample mean level of GDP per capita. The results are reported in Table 4. Several regression models are sequentially estimated and the outcomes are shown in columns 1 to 11. In the benchmark model (in column 1), labor skills constraints are positively correlated with firms' performance. Firms that experience higher annual sales rate of growth report higher labor skill constraints and the corresponding estimated coefficient is statistically significant. It is expected that labor skills constraints are more binding as the firms realize higher sales growth. The statistical significance of labor skill constraints remains robust after the successive addition of firm-specific characteristics in the analysis. The latter are shown to be significant predictors of firms' sales growth. For example, younger firms show stronger sales growth, whilst larger firms are associated with higher sales growth (notice that the variable SIZE takes the value of 1 if firms are small or medium size and zero otherwise). Firms operating in the manufacturing sector are associated with lower sales growth. On the other hand, limited liability firms, firms located in large urban areas and export-oriented firms are associated with higher sales rate of growth. Foreign-owned firms and firms with large dominant shareholders are also associated with stronger sales rate of growth. Government ownership does not appear to be a significant predictor of firms' sales growth. The inclusion of firm-specific characteristics affects the size of the labor skill effect but not the direction. These findings remain unchanged when all firm-specific characteristics are included in the analysis. However, a different picture arises when the sample is split between high- and low-income countries. While the labor skill effect remains robust, its size is twice as high in high-income countries compared with that of low-income ones. Furthermore, ownership structure does not significantly affect sales rate of growth in high-income countries, whereas export-oriented status of firms is not a significant predictor of sales growth. In all cases, the inclusion of firm-specific characteristics is associated with a considerable size effect of labor skill constraints on firms' sales rate of growth. This is new evidence highlighting the important role of labor skills for sales growth as well as of the role of firm-specific characteristics in explaining firms' performance across different microeconomic conditions in developing countries.

Table 4. Labor skills, firm-specific characteristics and firm performance

GSALES	1	2	3	4	5	6	7	8	9	10 High-income	11 Low-income
SKILLS	2.73***	2.93***	2.66***	2.74***	1.91***	2.68***	2.74***	2.60***	1.95***	2.33***	1.47***
	(11.5)	(12.4)	(11.2)	(11.5)	(7.9)	(11.1)	(11.5)	(10.8)	(7.94)	(6.69)	(4.27)
AGE		-3.28***							-3.78***	-2.96***	-4.25***
		(-23.67)							(-25.9)	(-12.88)	(-22.76)
SIZE			-1.79***						-1.92***	-3.81***	-0.72**
			(-8.04)						(-7.77)	(-10.90)	(-2.10)
SECTR				-1.61***					-1.58***	-1.93***	-1.23***
				(-9.80)					(-8.67)	(-7.21)	(-4.99)
LEGAL					4.05***				4.49***	2.52***	4.97***
					(21.07)				(21.83)	(7.51)	(18.07)
LOCAT						2.42***			2.58***	1.60***	2.98***
						(12.45)			(13.24)	(5.17)	(11.86)
EXPR							0.01***		0.009***	0.02***	0.01
							(4.96)		(3.1)	(4.68)	(0.55)
OWNF								0.03***	0.013***	0.01	0.02***
								(8.88)	(3.53)	(0.83)	(3.56)
OWNG								1.51	1.74	1.32	1.78
								(1.23)	(1.33)	(0.91)	(0.88)
OWND								0.63***	1.28***	-0.62	2.38***
								(2.38)	(4.63)	(-1.48)	(6.53)
Obs.	84186	83263	84186	84186	83558	81176	83747	83013	78766	27066	51700
Adj. R^2	0.0017	0.009	0.0023	0.0028	0.0067	0.0036	0.002	0.0028	0.021	0.017	0.022

Note: Dependent variable is GSALES= sales rate of growth. An OLS model with country and sectoral fixed effects is used. Z values in parentheses. Symbols ***,**,* indicate significance at the 1%, 5% and 10% level, respectively.

In order to deeper investigate whether the effect of skill constraints is heterogenous across sectors, Equation (1) is re-estimated separately for six sectors: manufacturing, retail and wholesale commerce, services, transport and construction and the rest of the universe. Table 5 presents the results of the benchmark model. The results show that skills constraints are significant for the manufacturing, retail and services sectors but turn out to be insignificant for the wholesale, transport & construction and the remaining sectors. The firm-level characteristics are also significant in most sectors. A notable exception is the wholesales sector, in which both skills constraints and the firm-specific characteristics, except for firms' age, do not appear to be significant predictors of the rate of growth of sales. This is to some extent reasonable to expect, as the wholesale sector depends mainly on distribution channels which in turn do not much depend on skills and the characteristics of producing firms.

Table 5. Labor skills and firm performance by sector of activity.

GSALES	Manufacturing	Retail	Wholesale	Services	Transport/ Construction	Rest of the universe
SKILLS	0.033***	0.019***	-0.002	0.026***	0.010	0.013
	(10.42)	(2.90)	(-0.07)	(4.84)	(0.49)	(1.59)
AGE	-3.604***	-3.088***	-5.794***	-4.152***	-9.740***	-3.013***
	(-20.24)	(-71.61)	(-3.82)	(-11.93)	(-8.01)	(-6.04)
SIZE	2.249***	4.789***	5.250	3.662***	8.074***	4.134***
	(7.58)	(5.49)	(1.45)	(6.09)	(4.59)	(4.36)
LEGAL	0.822	-2.030	1.014	0.710	-7.396***	-1.025
	(1.32)	(-1.39)	(0.23)	(0.62)	(-2.61)	(-0.54)
EXPR	0.009***	0.042***	0.039	0.021***	0.008	0.018*
	(2.73)	(2.43)	(1.12)	(2.62)	(0.26)	(1.69)
OWNF	-0.006	-0.071**	0.082	-0.058*	-0.032	0.057**
	(-0.31)	(-2.03)	(0.81)	(-1.92)	(-0.14)	(2.00)
OWNG	0.015	0.030	-0.227	-0.062	-0.109	0.018
	(0.56)	(0.59)	(-0.97)	(-1.43)	(-0.54)	(0.31)
OWND	-0.033	-0.088***	-0.030	-0.063**	-0.056	0.032
	(-1.62)	(-2.66)	(-0.41)	(-2.17)	(-0.3)	(1.23)
OBS.	46860	11858	1321	18778	1502	3105
R2	0.0134	0.0115	0.0161	0.0112	0.0625	0.0197

Note: Dependent variable is GSALES= sales rate of growth. An OLS model with country fixed effects is used. Z values in parentheses. Symbols ***,**,* indicate significance at the 1%, 5% and 10% level, respectively.

However, the consideration of the aforementioned firm-specific characteristics does not provide a direct illustration of the significance of labor conditions within the firm. In order to see the impact of labor skill constraints on firms', Equation (1) is re-estimated to include the impact of the RSKILL (ratio of skilled over unskilled workers in the firm), RPROD (ratio of non-production over production workers in the firm) and RPERM (ratio of temporary over permanent full-time workers in the firm). The results are reported in Table 6. Labor skill constraints are still showing a statistically significant and positive estimated coefficient, but the magnitude of the effect is smaller than in Table 4 (column 1). The labor structure of production seems to matter too. Firms with higher current ratios of unskilled workers and non-production workers report stronger sales growth but also strong labor skill constraints. It appears that the share of non-production labor is positively correlated with sales growth rates. On the other hand, the ratio of temporary workers shows a not statistically significant coefficient. While these results remain the same when all variables are included in the analysis, they differ between high- and low-income countries. The proportion of non-production workers does not appear significant in either of the two sub-groups, whilst the ratio of temporary workers now appear significant, it is negatively correlated with sales growth for high-income countries, while positively correlated for low-income countries. Also, the size of the labor skill coefficient is considerably lower in low-income countries. It seems that the less-technology based and less-manufacturing driven structure of production in low-income developing countries raises the importance of temporary workers.

Table 6. Labor skills, labor structure and firms' performance.

GSALES	1	2	3	4	5	6
					High-income	Low-income
SKILLS	2.51***	2.53***	2.78***	2.51***	2.11***	1.90***
	(7.93)	(8.14)	(11.56)	(7.77)	(4.49)	(4.21)
RSKILL	0.023***			0.02***	0.04***	0.01*
	(5.98)			(5.55)	(6.63)	(1.74)
RPROD		0.034*		0.031*	0.01	0.04
		(1.81)		(1.88)	(0.41)	(1.60)

RPERM			0.11	0.13	-1.60***	0.45***
			(1.16)	(0.74)	(-3.06)	(2.67)
Obs.	42305	43870	80442	40201	14107	26094
Adj. R^2	0.0025	0.0018	0.0018	0.0025	0.0054	0.0013

Note: Dependent variable is GSALES= sales rate of growth. An OLS model with country and sectoral fixed effects is used. Z values in parentheses. Symbols ***,**,* indicate significance at the 1%, 5% and 10% level, respectively.

In order to investigate the regional impact of labor skill constraints and the firm-specific characteristics on firms' sales growth, Equation (1) is re-estimated for each of the UN-classified regions: Africa, Europe and Central Asia, Middle-East and North Africa, East Asia and the Pacific and other Special Arrangement Regions. Table 7presents the results of the specification estimated in the last column of Table 4 (model 9) in, with all the business constraints variables included. The results show considerable differences as regards the estimate coefficient of labor skill constraints among the different regions. Labor skill constraints appear to be significant for all regions except two: East-Asia and the Pacific and the Special Administrative Regions. Also, the labor skills coefficient shows a negative sign for the MENA region. Thus, whereas labor skills do not appear to be a constraint for East-Asian companies, they pose a problem for the less dynamic, slow sales growth firms in the MENA region. Moreover, the other firm-specific characteristics appear to be significantly correlated with firms' sales growth in most regions. This is especially so for firms' age and size. These latter two characteristics are shown to be important in all regions and therefore an indisputable target of public policy. A notable exception is government ownership that appears to be insignificant throughout. It is conjectured that this diversity of results in the different regions is the result of various additional economic and non-economic factors that should be properly accounted for. The MENA region stands out as a case for special attention since most of the findings of other regions do not appear to hold for this region. This is new evidence that shows a strong regional dimension in the analysis of firms' sales growth constraints that deserves further analysis, taking into consideration diverse factors, such as the trade and investment flows, the technological characteristics of infrastructure and the social and environmental conditions on a global scale.

Table 7. Labor skills, firm-specific characteristics and performance across regions

GSALES	Africa	East Asia-Pacific	Europe & Central Asia	Latin America & Caribbean	Middle-East & North Africa	Special Administrative Regions
Panel A						
SKILLS	2.96***	-0.03	3.02***	1.65***	-3.37***	0.96
	(3.94)	(-0.03)	(6.19)	(4.59)	(-4.20)	(1.61)
AGE	-5.06***	-3.62***	-5.95***	-3.06***	2.89***	-2.43***
	(-12.55)	(-6.80)	(-16.66)	(-12.44)	(6.51)	(-8.33)
SIZE	-2.20**	-2.20***	-4.06***	-1.94***	-3.25***	-0.53
	(-2.26)	(-3.23)	(-7.39)	(-4.47)	(-4.25)	(-1.24)
SECTR	-0.24	-2.66***	-0.65	-1.81***	-2.27***	-2.50***
	(-0.49)	(-4.15)	(-1.46)	(-6.81)	(-3.59)	(-5.31)
LEGAL	5.09***	-0.91	0.18	2.73***	2.47***	0.92*
	(8.43)	(-1.19)	(0.34)	(6.96)	(3.85)	(1.81)
LOCAT	2.15***	-0.54	2.54***	1.31***	-6.49***	0.05
	(3.81)	(-0.72)	(5.31)	(3.29)	(-10.52)	(0.14)
EXPR	-0.01	0.02	0.03***	0.01	0.05***	0.01
	(-1.19)	(0.31)	(5.62)	(0.90)	(7.10)	(0.72)
OWNF	0.03***	-0.02**	0.01	-0.01*	0.04***	0.07***
	(3.45)	(-2.15)	(-0.63)	(-1.76)	(3.94)	(3.61)
OWNG	3.13	-0.05	-0.78	3.77	-2.61	3.18
	(0.70)	(-0.03)	(-0.40)	(0.68)	(-0.66)	(0.66)
OWND	2.53***	-3.09***	0.38	0.38	-2.41***	0.42
	(2.56)	(-3.08)	(0.61)	(0.87)	(-3.44)	(0.78)

Obs.	18219	7181	16225	17867	5416	13492
Adj. R^2	0.0154	0.0137	0.0271	0.0179	0.0692	0.0127

Panel B						
SKILLS	2.19**	3.33***	2.70***	2.10***	-3.47***	0.91
	(1.96)	(2.33)	(3.70)	(4.32)	(-2.94)	(1.31)
RSKILL	0.02***	0.01	0.04***	0.01**	0.08***	-0.02***
	(2.20)	(0.65)	(3.24)	(2.15)	(5.99)	(-2.07)
RPROD	0.05	-0.13***	0.05	-0.01	0.19***	0.11***
	(0.92)	(-2.01)	(1.41)	(-0.33)	(2.17)	(2.30)
RPERM	-0.44	0.60	2.19***	0.13	-1.33	0.54
	(-0.92)	(1.53)	(2.28)	(0.43)	(-1.49)	(1.16)
Obs.	7543	4132	6596	10226	2633	9036
Adj. R^2	0.0017	0.0045	0.0053	0.0024	0.0228	0.0016

Note: Dependent variable is GSALES= sales rate of growth. An OLS model with country and sectoral effects is used. Z values in parentheses. Symbols ***,**,* indicate significance at the 1%, 5% and 10% level, respectively.

Finally, in order to test for the economic significance of the results of the regression analysis and hence for the likely policy intervention impact, the estimated coefficient in tables 4-7 could be interpreted as marginal effects of labor skill constraints and firm-specific characteristics. These effects show the marginal discrete change in the dependent variable (GSALES) following a value or unit change in each categorical or numerical regressor, respectively (dy/dx). The results show that a unit or category change in labor skill constraints and most firm-specific characteristics exerts an economically meaningful effect on firms' annual sales rate of growth in most models. An exception is government ownership of firms which appears to be always insignificant. Further, differences also appear between high- and low-income countries. It seems that institutions associated with government ownership conditions are such that such policy effects are weakened. This new finding sheds some light on the difficulties in improving firm performance in developing countries.

5.   Country Factors

In the previous section we mainly focused on firm characteristics as determinants of firm performance, with labor skill constrains as target variable, while controlling for unobservable country specific factors with country dummy variables. There may be concerns that the results obtained above depend on the nature of labor skill constraints and other firm-specific characteristics of the sample countries. In particular, different countries have different, more or less developed institutions, different societal structures and are characterized by different norms of behavior which affect domestic patterns of consumption and the organization of production as well as the effectiveness of infrastructure. Therefore, it is an empirical question to investigate what are the country-level factors that contribute the most to explain the variation of the rate growth of sales. In order to test the relative importance of country-specific factors, a series of additional regressions are estimated to account for the impact of various national economic and non-economic conditions. In a series of successive models, Equation (1) is modified to include the impact of a country's: (a) economic, financial and human development level; (b) institutional and regulatory governance quality; and (c) social heterogeneity and legal conditions. The variables corresponding to each of the above groups of factors are described in the Appendix. In this case the model is estimated without country fixed effects and hence, the principal variation in the data is cross-setional as opposed to temporal. Hence, the results provide evidence of correlations rather than causation.

5.1   Impact of economic, financial and human development

Development dynamics affect the size and distribution of labor skills demanded by firms. Development is associated with the rise and decline of industrial sectors, the introduction of new technology, structural transformation in the production and distribution of goods and services. Madigan (2015) argues that these changes create the need for labor skills upgrading, whilst Autor 2010) argues that they may cause skill polarization. More generally, Mincer (1995) argues that human capital plays a major role in explaining labor market and economic growth dynamics. At the macroeconomic level, the social stock of human capital and its growth are central to the process of economic growth; at the micro level, differences in human capital stock and in their growth can explain much of the observed variation in the wage structure and distribution among individuals and groups. Acemoglu (2003) argued that labor skills and inequality are linked through technology and its impact on high-skill labor demand. Although other factors, including the decline in the minimum wage, de-unionization, and globalization have played some role, technology is the major driving force

behind the changes in the wage structure. This is due to the existence of technology-skill complementarities: technical change favors more skilled (educated) workers, replaces tasks previously performed by the unskilled, and increases the demand for skills. In order to check for these conjectures, Equation (1) is expanded to include regressors capturing the impact of economic, financial and human development of the sample countries. Table 8 presents the results of the model after controlling for economic development (GDPCP), financial development (FINDPLG), income inequality (GINI) and human development (HDI), sequentially.

In all models, economic, financial and human development levels as well as income inequality, when individually considered, are positively and significantly correlated with firms' annual sales rate of growth. The estimated coefficient of labor skill constraints remains significant with a positive sign with slight variations in the magnitude of the effect. Higher levels of development are associated with higher rates of sales growth of firms. However, firms' sales rate of growth is shown to be positively affected by income inequality. When all development variables are included in the analysis, economic development is inversely related with firms' sales growth, however since this variable is highly correlated with human development, we should rely on the results including these two variables separately. When the firm-specific characteristics are included in the analysis, the estimated coefficients of labor skill constraints and the levels of economic, financial and human development, remain robust. The levels of national development remain significant when internal labor structure conditions are considered. Among the latter, only the unskilled over skilled labor ratio appears to be significant.

When all firm-specific and country variables are included in the analysis differences arise between the high- and low-income countries groups as well. Labor skill constraints remain significant with a positive sign only for high-income countries, whereas for low-income countries the coefficient of labor skill is not statistically significant. Moreover, the impact of financial development is three times greater for low-income countries than for high income countries[1].

In conclusion, economic, financial and human development levels of countries do affect annual sales rate of growth of firms operating in the sample of countries. They do not affect the sign of the estimated coefficient of labor skill constraints, but they do affect the magnitude and significance of the effect. They also do not vary between high- and low-income countries. As in the previous section, most of the firm-specific characteristics appear to be significantly correlated with sales growth for all models, except for government ownership of the firm which is insignificant throughout and export

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[1] Coefficient not shown, available upon request.

orientation, which is significant only in some models. This new evidence highlights that the impact of labor skill constraints on firms' sales growth rates is affected by country economic and other development factors with respect to the magnitude of the effect and the relative impact of firm-specific characteristics and internal labor structure conditions.

Table 8. Impact of economic, financial and human development

GSALES	1	2	3	4	5	6	7	8	9	10
									High-Income	Low-Income
SKILLS	2.42***	2.31***	2.78***	2.38***	1.97***	1.68***	1.65***	1.46***	2.83***	0.73
	(10.04)	(9.59)	(11.67)	(9.94)	(8.08)	(6.71)	(5.01)	(4.34)	(5.80)	(1.60)
RSKILL							0.01***	0.01***	0.02***	0.01
							(3.35)	(2.79)	(3.39)	(-0.11)
RPERM							0.08	0.13	-0.86*	0.34*
							(0.39)	(0.65)	(-1.80)	(1.66)
GDPCPLG	2.31***				-2.31***	-2.82***	-4.44***	-4.96***	-12.42***	-5.00***
	(11.79)				(-4.84)	(-5.79)	(-5.99)	(-6.62)	(-9.55)	(-3.77)
GINI		0.27***			0.31***	0.25***	0.37***	0.33***	0.14***	0.38***
		(21.82)			(24.80)	(18.79)	(23.07)	(9.66)	(5.60)	(13.41)
FINDPLG			2.40***		2.01***	2.68***	4.44***	4.68***	12.63***	-1.12
			(7.39)		(5.47)	(7.06)	(9.44)	(7.24)	(20.32)	(-1.38)
HDI				10.58***	17.35***	16.01***	21.83***	21.05***	32.33***	20.69***
				(13.17)	(9.54)	(8.65)	(7.61)	(4.34)	(8.07)	(5.06)
FIRMCH	NO	NO	NO	NO	NO	YES	YES	YES	YES	YES
Obs.	84186	83302	83791	83584	82907	77572	39736	37752	13343	24409
Adj. R^2	0.0032	0.0080	0.0024	0.0040	0.0116	0.0273	0.0206	0.0384	0.0650	0.0389

Note: Dependent variable is GSALES. Z values in parentheses. Symbols ***,**,* indicate significance at the 1%, 5% and 10% level, respectively. RPROD was non-statistically significant and is not included in the models. FIRMCH denotes that the corresponding model includes: AGE, SIZE, SECTR, LEGA, LOCAT, EXPR, OWNNF, OWNNG and OWNND.

5.2   Impact of the regulatory governance institutions

Institutions are expected to affect the labor skills demanded by firms. Henrekson (2014) argues that governance and regulatory institutions affect the wage-setting process through centralized or decentralized wage bargaining. An artificially compressed wage structure makes it more difficult for profitable high-productivity firms to use salaries as an incentive to recruit skilled employees. Moreover, stringent job security provisions and other regulations that unduly restrict the flexibility of employment contracting may harm early-stage entrepreneurs with high-growth expectations more than they do mature firms and firms without growth aspirations, thereby affecting labor skills demand. Moreover, a supportive public social insurance system can encourage entrepreneurship by insuring against unfavorable outcomes, thereby encouraging demand for new labor skills. The OECD (2014) argues that freedom of association enhances unionization thereby affecting the market for labor skills. Dimant, Krieger and Meierrieks (2013) argue that where corruption is rampant, jobs are granted not because of merit but because of political connections. This cronyism can lead to lower returns to human capital (e.g. vacancies are not filled and people with the right qualifications are not hired). This in turn slows firm investment and growth and acts as an incentive for emigration, especially for the skilled labor force. The brain drain can trigger a vicious cycle for a country as the emigration of highly-skilled individuals further slows economic growth and slower growth encourages more emigration. The World Bank (2015) argues that government effectiveness is an important factor in promoting labor skill upgrading in developing countries. National skills development programs need to ensure the proper training and effective placement of newly-trained labor, in accordance with firm's needs.

In order to test to what extent the abovementioned theories relate to our empirical application, Equation (1) is expanded to include regressors capturing the impact of a country's overall quality of governance institutions. Table 9 presents the results of the benchmark regression model after controlling for a country's freedom of public expression (VOICC), political stability (POLSTB), government effectiveness in the provision of public services (GVEFF), the quality of regulation (RGQLT), the extent of compliance to the rule of law (RLLW) and the effective control of corruption (CNTCR).

In all models, when individually considered, the regulatory governance indicators appear to be significantly and positively correlated with firms' performance. Higher values of freedom of expression, political stability, government effectiveness, regulatory quality and combat of corruption

are associated with higher sales growth of firms. The inclusion of regulatory governance indicators does not affect the direction of the effect of labor skill constraints on the rate of growth of sales, but it does affect the magnitude of the effect. However, when all governance indicators are included in the analysis, they remain significant but the sign of voice and accountability, government effectiveness and rule of law turns negative. This could be due to the high correlation between pairs of governance indicators. When all firm-specific characteristics are added in the analysis, the coefficient of labor skill constraints remains significant and positively signed. Foreign, government and dominant shareholder ownership turn out to be insignificant. The ratio of unskilled over skilled workers remains significant but the ratios of non-production workers and of temporary workers do not[2]. Furthermore, the indicators for government effectiveness and regulatory quality turn insignificant. Finally, when the sample is split between high- and low-income countries, the results change. While labor skill constraints remain only significant for high-income countries, the impact of institutional governance indicators changes to some extent. In all models, the role of political stability, rule of law and control of corruption remain significant, while that of voice and accountability and government effectiveness change. It appears that the conditions regarding regulatory quality and government effectiveness only play a role when the country is more developed and public intervention is more effective. This is new evidence that highlights that the impact of labor skill constraints on firms' sales is affected by national governance institutions with respect to the magnitude of the effect and the relative impact of firm-specific characteristics and internal labor structure conditions.

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[2] The two non-significant variables are not included in the final model.

Table 9. Impact of governance institutions

GSALES	1	2	3	4	5	6	7	8	9	10
									High-Income	Low-Income
SKILLS	2.71***	1.89***	2.69***	2.53***	2.74***	2.55***	1.40***	0.97***	1.82***	0.24
	(11.33)	(7.96)	(11.27)	(10.60)	(11.51)	(10.69)	(5.83)	(2.90)	93.78)	(0.54)
RSKILL								0.02***	0.03***	0.02
								(3.81)	(4.71)	(0.25)
VOICC	0.43***						-1.87***	-1.95***	0.68	-1.71***
	(3.30)						(-10.82)	(-8.00)	(1.56)	(-4.04)
POLSTB		3.95***					5.09***	4.39***	6.58***	2.88***
		(32.17)					(32.78)	(18.80)	(14.50)	(9.42)
GVEFF			1.95***				-0.75*	-0.13	13.35***	1.01
			(11.47)				(-1.75)	(-0.20)	(9.67)	(1.05)
RGQLT				2.45***			3.23***	0.77	-10.71***	0.98
				(15.87)			(10.62)	(1.62)	(-11.85)	91.32)
RLLW					1.27***		-8.53***	-5.95***	17.12***	-12.54***
					(7.83)		(-20.82)	(-9.47)	(10.50)	(-15.12)
CNTCR						2.88***	5.30***	5.53***	-19.34***	11.80***
						(18.35)	(14.05)	(9.15)	(-15.59)	(12.39)
FIRMCH	NO	NO	NO	NO	NO	YES	YES	YES	YES	YES
Obs.	83584	83584	83584	83584	83584	83584	83584	37918	13384	24534
Adj. R^2	0.0018	0.0172	0.0035	0.0051	0.0025	0.0061	0.0272	0.0470	0.083	0.056

Note: Dependent variable is GSALES. Z values in parentheses. Symbols ***,**,* indicate statistical significance at the 1%, 5% and 10% level, respectively. FIRMCH indicates firm characteristics.

5.3   Impact of the social and cultural environment

Firms' performance can be affected by a country's organizational, institutional and social structures. The social environment of a country can be instrumental in determining the effectiveness of firm-specific characteristics in shaping the impact of labor skill constraints on sales growth. Alesina, Devleeschauwer, Easterly, Kurlat and Wacziarg (2003) argued that heterogeneity (fractionalization) in society is an important determinant of political stability, quality of institutions, and economic policy effectiveness. Annet (2001) further argued that greater social heterogeneity causes social conflict that leads to political instability and hence inefficient decision-making. A report by the World Economic Forum (2014) argues that effectively reducing skills mismatch requires creation of a comprehensive long-term strategy, one involving public-private partnerships among governments, employers and unions to continuously develop and improve the use of skills. These can come better about, in societies that are prone to collaboration and cooperation. Deming (2015) argued that the labor market increasingly rewards cognitive and social skills of labor, since high-level social skills are associated with lower coordination costs, allowing workers to specialize and trade more efficiently on tasks. Spoonley (2014) argued that super-diversity in society, that is a substantial increase in the scale and scope of minority ethnic and immigrant groups in a region, can provide certain economic benefits, such as higher levels of worker productivity and innovation. Fischer and Pastore (2015) argued that religion affects the participation of female labor force participation in the labor market that also includes those with university education. In order to check for these hypotheses, Equation (1) is augmented with regressors capturing the impact of a number of a country's social and cultural conditions. Table 10 presents the results of model (1) after controlling for a country's ethnic heterogeneity (fractionalization) in society (FRCTHN), linguistic heterogeneity (FRCLNG) and religious heterogeneity (FRCRLG).

In all models, the different measures of social heterogeneity (fractionalization) are shown to have a significant effect on firms' sales growth. Higher levels of ethnic and religious heterogeneity as well as lower levels of linguistic heterogeneity are associated with higher sales growth of firms. The inclusion of social fractionalization measures does not affect the results obtained for labor skill constraints concerning the direction of the effect but it does affect slightly

the magnitude. When all firm-specific characteristics are added into the analysis, labor skill constraints remain significantly related with firms' sales rate of growth. Foreign, government and dominant shareholder ownership turn insignificant[3]. The ratio of unskilled over skilled workers remains significant but the ratios of non-production workers and of temporary workers do not. Interestingly, ethnic heterogeneity appears insignificant in high-income countries, most likely because of a higher capacity of those countries to integrate immigration and ethnic differences. This is new evidence that highlights that the impact of labor skill constraints on firms' sales is affected by social heterogeneity with respect to the magnitude of the effect and the relative impact of firm-specific characteristics and internal labor structure conditions.

Table 10. Impact of social institutions

GSALES	1	2	3	4	5	6 High-Income	7 Low-Income
SKILLS	2.84***	2.58***	2.82***	2.23***	1.21***	1.71***	0.93**
	(11.89)	(10.66)	(11.86)	(9.18)	(3.60)	(3.44)	(2.01)
RSKILL					0.01***	0.03***	0.02
					(3.55)	(4.92)	(-0.11)
RPROD					0.01	-0.02	0.02
					(0.49)	(-0.67)	(0.65)
RPERM					0.17	-1.25***	0.32*
					(1.03)	(-2.46)	(1.88)
FRCTHN	4.00***			7.62***	6.99***	0.32	10.58***
	(8.92)			(15.50)	(9.62)	(0.25)	(11.38)
FRCLNG		-1.63***		-7.71***	-7.91***	-8.73***	-8.58***
		(-5.19)		(-22.91)	(-16.54)	(-6.45)	(-14.59)
FRCRLG			7.71***	8.58***	10.58***	13.22***	7.56***

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[3] The coefficients of firm level characteristics are not shown to save space, available upon request.

|			(16.94)	(19.02)	(16.67)	(11.82)	(7.59)
FIRMCH	NO	NO	NO	NO	YES	YES	YES
Obs.	83406	83541	83652	82761	37797	13347	24450
Adj. R^2	0.0029	0.0021	0.0053	0.0097	0.037	0.0333	0.0041

Note: Dependent variable is GSALES. Z values in parentheses. Symbols ***,**,* indicate statistical significance at the 1%, 5% and 10% level, respectively. FIRMCH denotes that the corresponding model includes: AGE, SIZE, SECTR, LEGA, LOCAT, EXPR, OWNNF, OWNNG and OWNND.

6. Robustness Checks

As robustness we first estimate similar regressions using labor productivity instead of the rate of sales growth as performance variable. The main results are presented in Table 11. The dependent variable is constructed dividing total sales in the previous year by the total number of full time employees (Figure 1). The results, when controlling for country and sectoral fixed effects show that there is also a positive correlation between skills constrains and labor productivity. Similarly, when controlling for firm characteristics the positive correlation mainly prevails, with the only exception of when all variables are added in the same model. More research is needed in this respect to be able to compute total factor productivity and to exploit the new available dataset constructed by the WB in 2016.

As a second robustness check we estimated the main model, with the rate growth of sales with dependent variable by adding labor productivity as an additional control in the right hand side. The main results are presented in Table 12. We find the similar pattern of positive correlations between skill constraints and the rate growth of sales, but as before, due to the lack of panel data, we cannot interpret the results as causal. Interestingly, in this case also the positive and significant coefficient of SKILLS is obtained when all the firm-level variables are added to the model simultaneously.

Figure 1. Labor productivity distribution
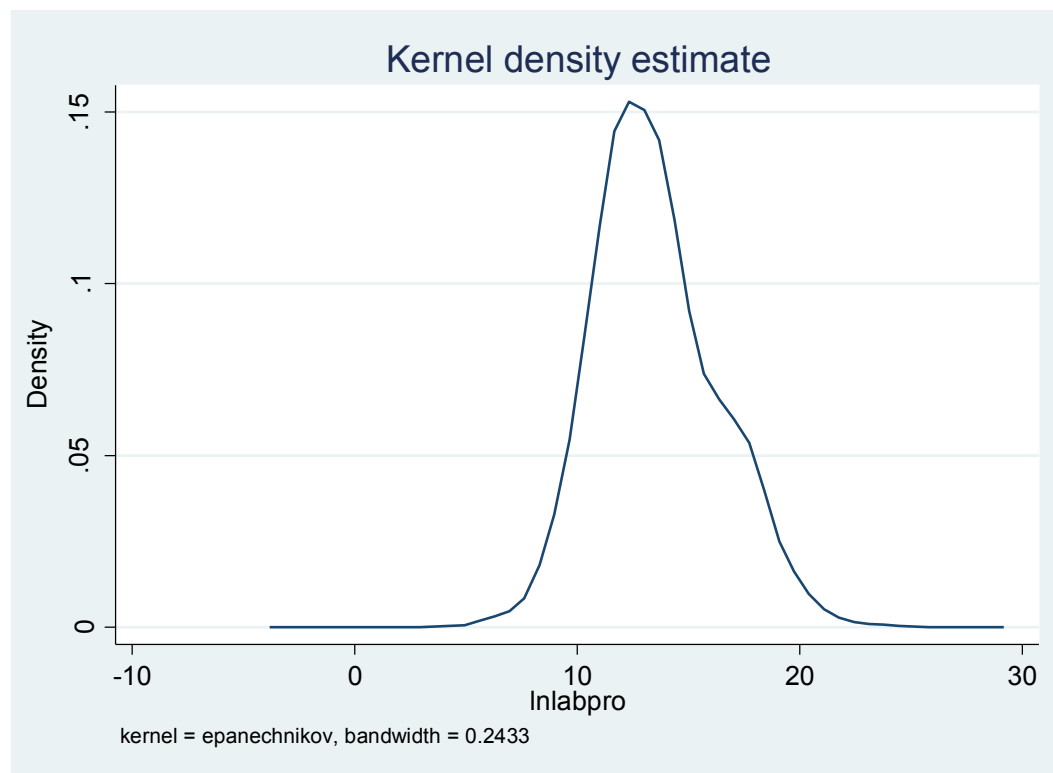
Kernel density estimate

kernel = epanechnikov, bandwidth = 0.2433

Table 11. Labor skills, firm-specific characteristics and labor productivity

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
SKILLS	0.0401***	0.0289*	0.0292**	0.0177	0.0382***	0.0358***	0.0341***	0.0401***	0.0394***	0.00431
	[0.0125]	[0.0152]	[0.0125]	[0.0124]	[0.0125]	[0.0125]	[0.0124]	[0.0125]	[0.0125]	[0.0151]
AGE		0.00649***								0.00419***
		[0.000445]								[0.000444]
SIZE			-0.365***							-0.171***
			[0.0130]							[0.0165]
LEGAL				0.538***						0.406***
				[0.0126]						[0.0165]
LOCAT					0.280***					0.268***
					[0.0187]					[0.0201]
EXPR						0.338***				0.123***
						[0.0203]				[0.0252]
OWNNF							0.612***			0.470***
							[0.0193]			[0.0243]
OWNNG								0.126*		-0.0587
								[0.0650]		[0.0773]
OWNND									-0.249***	-0.0962***
									[0.0136]	[0.0167]
Observations	96,591	69,384	96,591	96,591	96,591	96,591	96,591	96,591	96,591	69,384
R-squared	0.750	0.749	0.753	0.755	0.751	0.751	0.754	0.750	0.751	0.757

Note: Dependent variable is the natural log of labor productivity. OLS regression with sectoral and country fixed effects. Robust standard errors in brackets.

*** p<0.01, ** p<0.05, * p<0.1.

Table 12. Determinants of the rate growth of sales adding labor productivity

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SKILLS	0.0309***	0.0416***	0.0315***	0.0349***	0.0306***	0.0319***	0.0436***
	[0.0111]	[0.0137]	[0.0111]	[0.0111]	[0.0111]	[0.0111]	[0.0137]
LNLABPRO	0.174***	0.179***	0.174***	0.177***	0.173***	0.177***	0.183***
	[0.00603]	[0.00702]	[0.00610]	[0.00617]	[0.00605]	[0.00614]	[0.00723]
AGE		-0.00408***					-0.00404***
		[0.000382]					[0.000388]
SIZE			0.0176				-0.0235*
			[0.0109]				[0.0139]
LEGAL				-0.0955***			-0.0807***
				[0.0111]			[0.0146]
EXPR					0.0261		0.0509**
					[0.0186]		[0.0240]
OWNNF						-0.109***	-0.126***
						[0.0161]	[0.0204]
OWNNG						0.00711	0.0785
						[0.0601]	[0.0818]
OWNND						0.0375***	-0.000137
						[0.0120]	[0.0151]
Observations	80,914	57,877	80,914	80,914	80,914	80,914	57,877
R-squared	0.137	0.144	0.137	0.138	0.137	0.138	0.145

Note: Dependent variable is GSALES. OLS regression with sectoral and country fixed effects. Robust standard errors in brackets. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

7.   Conclusions

Labor skills are a significant factor affecting the structure and cost of production and subsequently the performance of firms. Based on a large and consistent data set from World Bank's Enterprise Surveys, the paper explores the statistical relationship between labor skill constraints and other firm-specific characteristics as well as aspects of internal labor conditions of firms and firms' sales growth in 135 developing countries. Measures of firms' annual sales rate of growth and labor skill constraints are obtained by firms' objective responses. The categorical nature of the data is associated with advantages and disadvantages over formal reporting information in developing countries. In most models, labor skill constraints and other firm-specific characteristics appear to be significantly correlated with sales growth. While firm age, size, legal status and location of operations appear to affect firm sales rate of growth in high and low income countries, firms' export status is only positively correlated with sales growth in high-income developing countries, whereas ownership structure is relevant only in low income countries and not in all models. Among the internal labor structure indicators only the ratio of unskilled over skilled workers is significant, whilst the ratios of non-production over production workers and of the temporary over permanent full-time workers appear to be insignificant in most models and especially in high-income developing countries. The effect of labor constraints appears robust after controlling for the impact of various country-level economic and non-economic factors; however, the magnitude of the effect is affected. Furthermore, the effect of firm-specific characteristics varies in accordance with the various national-level economic and non-economic factors. The levels of economic, financial and human development as well as the quality of governance institutions and the extent of social heterogeneity appear to have a significant effect on firm sales and to influence the coefficients of labor constraints and other firm characteristics. These economic and non-economic national factors affect both the supply- and demand-side conditions of firms' sales rate of growth and thereby have an impact on the role that firms' specialized characteristics have on explaining firm performance. The paper provides new evidence on the functioning of labor markets in developing counties that considers the explicit impact of labor constraints and firm-specific characteristics on firms' performance. The evidence shows

that the interaction between labor market conditions and firm performance is mitigated in often predictable way by national factors, thus providing a more solid basis for development policy. The analysis needs extension to include the impact of global trade, investment and market liberalization, the non-economic role of national culture and other institutional factors, such as political conditions and democracy, as well as of additional infrastructure conditions in influencing the interaction of labor market institutions and firms' performance.

References

Acemoglou, D. (2003). Technology and Inequality, NBER Report: Winter.

Ahmed, M. U., Kristal, M. M. and Pagell, M. (2014). Impact of operational and marketing capabilities on firm performance: Evidence from economic growth and downturns. International Journal of Production Economics154, 59-71.

Autor, D. (2010). The Polarization of Job Opportunities in the U.S. Labor Market. Hamilton Project, Brookings Institution, Washington DC.

Becker, G.(1962). Investment in human capital: a theoretical analysis. Journal of Political Economy 70 (5II), 9 - 49.

Becker, G. (1964). Human Capital. Columbia University Press, New York.

Bennett, J. and McGuinness, S. (2009). Assessing the impact of skill shortages on the productivity performance of high-tech firms in Northern Ireland. Applied Economics 41, 6, 727-737.

Bhattacharya, R., and Wolde, H. (2010). Constraints on growth in the MENA region. Washington, DC: Internat. Monetary Fund.

Bombardini, M., Gallipoli, G., and Pupato, G. (2012). Skill dispersion and trade flows. The American Economic Review, 102(5), 2327-2348.

Deming, D. J. (2015). The Growing Importance of Social Skills in the Labor Market, NBER Working Paper No. 21473, August.

Dimant, E., T. Krieger, and D. Meierrieks. (2013). The effect of corruption on migration, 1985–2000. Applied Economics Letters 20 (13), 1270–1274.

Fischer, J.A.V. and F. Pastore (2015) Tempora mutantur, nos et mutamur in illis: Religion and Female Employment over Time. IZA DP No. 9244, July.

Galindo-Rueda, Fernando and Haskel, Jonathan, Skills, Workforce Characteristics and Firm-Level Productivity: Evidence from the Matched ABI/Employer Skills Survey (March 2005). IZA Discussion Paper No. 1542.

Giesing, Y., and Laurentsyeva, N. (2014). Brain Drain and Firm Productivity: Evidence from the Sequential Opening of EU Labour Markets. Springer.

Haskel, J. and Martin, C. (1996). Skill shortages, productivity growth and wage inflation. In: Booth, A.; Snower, D. (eds). Acquiring skills: market failures: their symptoms and policy responses. Cambridge: University Press, 147-174.

Healy, J. *at al.* (2015). Adjusting to skill shortages in Australian SMEs. Applied Economics 47,24, 2470-2487.

Henrekson, M. (2014). How labor market institutions affect job creation and productivity growth. Research Institute of Industrial Economics, Sweden. doi: 10.15185/izawol.38.

Iranzo, S., Schivardi, F., & Tosetti, E. (2008). Skill Dispersion and Firm Productivity: An Analysis with Employer‐Employee Matched Data. Journal of Labor Economics, 26(2), 247-285. Retrieved from: http://www.jstor.org/stable/10.1086/587091.

Leuven, E., Oosterbeek, H., van Ophem, H. (2004). Explaining international differences in male skill wage differentials by differences in demand and supply of skill. Economic Journal 114, 466 – 495.

Machin, S., Ryan, A., van Reenen, J. (1996). Technology and changes in skill structure: evidence from and international panel of industries, The Labor Market Consequences of Technical and Structural Change, Discussion Paper No. 4.

Madigan, K. (2015).Skill Shortage is the Worst Since 2006, Small Business Survey Says. The Wall Street Journal, March 10.

Mahy, B., Rycx, F., & Vermeylen, G. (2015). Educational mismatch and firm productivity: Do skills, technology and uncertainty matter? De Economist, 163(2), 233-262.

Mincer, J. (1994). Economic Development, Growth of Human Capital, and the Dynamics of the Wage Structure, Columbia University, September, 1994-95 Discussion Paper Series No. 744.

Montt, G. (2015). The causes and consequences of field-of-study mismatch: AN ANALYSIS USING PIAAC. OECD Social, Employment, and Migration Working Papers, (167).

Nickell, S., Bell, B.D. (1995). The collapse in demand for the unskilled and unemployment across the OECD. Oxford Review of Economic Policy 11.1, 40 – 62.

Rehman, N. U. (2015). Drivers of firms' growth: A case study of software firms in Islamabad/Rawalpindi regions. Journal of Management Development, 34(8), 901-921.

Spoonley, P. (2014). Superdiversity, social cohesion, and economic benefits. IZA Working paper, No 46.

Stevens, M. (1994). A theoretical model of on-the-job training with imperfect competition. Oxford Economic Papers 46, 537 - 562.

Stevens, M. (1996). Transferable training and poaching externalities. In: Booth, Snower (Eds.), Acquiring Skills: Market Failures, their Symptoms, and Policy Responses. Cambridge University Press, Cambridge, 21–40.

Pozzoli, D., Pytlikova, M., & Parrotta, P. (2014). Labor diversity and firmproductivity. European Economic Review 66, 144-179. doi:10.1016/j.euroecorev.2013.12.002

The OECD (2014). Labor Migration, Skills & Student Mobility in Asia. Asian Development Bank Institute.

The World Bank (2015). Labor Market Impacts and Effectiveness of Skills Development Programs in 5 States in India: Assam, Andhra Pradesh, Madhya Pradesh, Odisha and Rajasthan. Education Global Practice, Report no. 94682-IN, April.

The World Economic Forum (2014). Matching Skills and Labor Market Needs. Davos-Klosters, Switzerland, 22-25 January.

Appendix. Definition of variables

Name	Description and source
GSALES	Firm's real annual growth rate of sales reported during the current fiscal year from a previous period, from the World Bank Enterprise Surveys.
SKILLS	Binary variable that reflects the extent to which firms identify labor skill level as a major constraint for their performance
AGE	Logarithm of the number of years since the year that the company was established, from the World Bank Enterprise Surveys.
SIZE	Dummy variable that takes the value of 1 if the firm is either small (5-19 employees) or medium (20-99 employees) and 0 otherwise, from the World Bank Enterprise Surveys.
SECTR	Dummy variable that takes the value of 1 if the firm is in manufacturing and 0 otherwise, from the World Bank Enterprise Surveys.
EXPR	Dummy variable that takes the value of 1 if the firm has more than half of its GSALES exported and 0 otherwise, from the World Bank Enterprise Surveys.
LEGAL	Dummy variable that takes the value of 1 if the firm is a public or private limited liability company and 0 otherwise, from the World Bank Enterprise Surveys.
LOCAT	Dummy variable that takes the value of 1 if the firm is operating in the capital city or large cities with a population of more than one million people and 0 otherwise, from the World Bank Enterprise.
OWNF	Dummy variable that takes the value of 1 if the firm is equal to or more than fifty percent foreign owned and 0 otherwise, from the World Bank Enterprise Surveys.
OWNG	Dummy variable that takes the value of 1 if the firm is equal to or more than fifty percent government owned and 0 otherwise, from the World Bank Enterprise Surveys.
OWND	Dummy variable that takes the value of 1 if the firm has a dominant private shareholder with equal to or more than fifty percent stake in the firm and 0 otherwise, from the World Bank Enterprise Surveys.
RSKILL	Ratio of unskilled over skilled workers, from the World Bank Enterprise Surveys.
RPROD	Ratio of non-production over production workers, from the World Bank Enterprise Surveys.
RPERM	Ratio of temporary over permanent full-time workers, from the World Bank Enterprise Surveys.
GDPCPLG	Logarithm of GDP per capita (current USD), from the World Bank Development Indicators. It is generally considered a measure of a country's level of economic development.
GINI	Gini coefficient, from the World Bank Development Indicators. It is a measure of a country's income distribution and it is generally considered an indicator of income inequality.
HDI	Index ranging from 0 to 1, with higher values corresponding to higher human development, form the UNDP indicators. It is a summary measure of average achievement in key dimensions of human development: a long and healthy life, knowledge and decent standard of living.
FINDPLG	Logarithm of domestic credit to the private sector (% GDP), from the World Bank Development Indicators. It is generally considered a measure of a country's level of financial development.

VOICC	Index ranging from -2.5 to 2.5, with higher values corresponding to the extent of democratic freedom of expression, from the World Bank Worldwide Governance Indicators. Voice and accountability captures perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.
POLSTB	Index ranging from -2.5 to 2.5, with higher values corresponding to higher political stability, from the World Bank Worldwide Governance Indicators. It reflects perceptions of the likelihood of political instability and/or politically motivated violence, including terrorism.
GVEFF	Index ranging from -2.5 to 2.5, with higher values corresponding to better government effectiveness, from the World Bank Worldwide Governance Indicators. It reflects perceptions on the quality of public services, the quality of the civil service and its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's
RGQLT	Index ranging from -2.5 to 2.5, with higher values corresponding to better quality of regulation, from the World Bank Worldwide Governance Indicators. It reflects perceptions regarding the ability of the government to formulate and implement sound policies and regulations that permit and promote private SCTR development.
RLLW	Index ranging from -2.5 to 2.5, with higher values corresponding to better rule of law, from the World Bank Worldwide Governance Indicators. It reflects the degree to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.
CNTCR	Index ranging from -2.5 to 2.5, with higher values corresponding to better control of corruption, from the World Bank Worldwide Governance Indicators. It reflects the extent to which public power is exercised for private grain, including both petty and grand forms of corruption, as well as 'capture' of the state by elites and private interests. It also measures the strength and effectiveness of a country's policy and institutional framework to prevent and combat corruption.
FRCTHN	Index ranging from 0 to 1, from Alesina *at al.* (2003). It reflects the likelihood that two randomly selected people from a given country will not share the same ethnic origin (ethnic heterogeneity). A higher index reflects a lower probability of common sharing.
FRCLNG	Index ranging from 0 to 1, from Alesina *at al.* (2003). It reflects the likelihood that two randomly selected people from a given country will not share the same language (linguistic heterogeneity). A higher index reflects a lower probability of common sharing.
FRCRLG	Index ranging from 0 to 1, from Alesina *at al.* (2003). It reflects the likelihood that two randomly selected people from a given country will not share the same religion (religious heterogeneity). A higher index reflects a lower probability of common sharing.