cirano

Allier savoir et décision

2015s-46

What Factors Influence Firm Perceptions of Labour Market Constraints to Growth in the MENA Region?

Ali Fakih, Pascal L. Ghazalian

Série Scientifique/Scientific Series

2015s-46

What Factors Influence Firm Perceptions of Labour Market Constraints to Growth in the MENA Region?

Ali Fakih, Pascal L. Ghazalian

Série Scientifique
Scientific Series

Montréal
Octobre/October 2015

CIRANO
Allier savoir et décision

Centre interuniversitaire de recherche en analyse des organisations

CIRANO

Le CIRANO est un organisme sans but lucratif constitué en vertu de la Loi des compagnies du Québec

CIRANO is a private non-profit organization incorporated under the Québec Companies Act.

Les partenaires du CIRANO

Partenaires corporatifs
Autorité des marchés financiers
Banque de développement du Canada
Banque du Canada
Banque Laurentienne du Canada
Banque Nationale du Canada
Bell Canada
BMO Groupe financier
Caisse de dépôt et placement du Québec
Fédération des caisses Desjardins du Québec
Financière Sun Life, Québec
Gaz Métro
Hydro-Québec
Industrie Canada
Intact
Investissements PSP
Ministère de l'Économie, de l'Innovation et des Exportations
Ministère des Finances du Québec
Power Corporation du Canada
Rio Tinto Alcan
Ville de Montréal

Partenaires universitaires
École Polytechnique de Montréal
École de technologie supérieure (ÉTS)
HEC Montréal
Institut national de la recherche scientifique (INRS)
McGill University
Université Concordia
Université de Montréal
Université de Sherbrooke
Université du Québec
Université du Québec à Montréal
Université Laval

Le CIRANO collabore avec de nombreux centres et chaires de recherche universitaires dont on peut consulter la liste sur son site web.

ISSN 2292-0838 (en ligne)

What Factors Influence Firm Perceptions of Labour Market Constraints to Growth in the MENA Region?

Ali Fakih[*]*, Pascal L. Ghazalian*[†]

Résumé/abstract

Labour market constraints constitute prominent obstacles to firm development and economic growth of countries located in the Middle East and North Africa (MENA) region. This paper aims at examining the implications of firm characteristics, national locations, and sectoral associations for the perceptions of firms concerning two basic labour market constraints: labour regulations and labour skill shortages. The empirical analysis is carried out using firm-level dataset sourced from the World Bank's Enterprise Surveys database. A bivariate probit estimator is used to account for potential correlations between the errors in the two labour market constraints' equations. We implement overall estimations and comparative cross-country and cross-sector analyses, and use alternative estimation models. The empirical results reveal some important implications of firm characteristics (e.g., firm size, labour compositions) for firm perceptions of labour regulations and labour skill shortages. They also delineate important cross-country and cross-sector variations. We also find significant heterogeneity in the factors' implications for the perceptions of firms belonging to different sectors and located in different MENA countries. This paper provides policy-makers with information needed in the design of labour policies that attenuate the impacts of labour market constraints and enhance the performance of firms and the long-run economic growth.

Mots clés/keywords : labour regulations, labour skill shortages, labour market constraints, bivariate probit model, MENA region

Codes JEL/JEL Codes *:* J20, K20, K31, O53

[*] Assistant Professor, Department of Economics, School of Business, Lebanese American University, Beirut, Lebanon, P.O.Box: 13-5053; E-mail: afakih@lau.edu.lb

[†] Associate Professor, Department of Economics, University of Lethbridge, Lethbridge, Alberta, Canada, T1K 3M4; E-mail: pascal.ghazalian@uleth.ca (corresponding author)

1. Introduction

Stringent labour market constraints are expected to pose serious obstacles to firm performance and economic growth. A wide range of literature finds that rigid labour regulations would induce lower labour force participation and higher unemployment rates (e.g., Botero et al., 2004; Besley and Burgess, 2004; Amin, 2009; Djankov and Ramalho, 2009), and would prevent labour markets from being efficient leading to losses in productivity (e.g., Kaplan, 2009). Another strand of literature inspects the problem of labour skill shortages or "skill deficits", which can be defined as the divergence between the educational attainments of workers and the skill requirements of jobs (Kiker et al., 1997). This literature regularly indicates that accentuated labour skill shortages impose significant restrictions on employment creation and economic growth (e.g., Pissarides and Véganzonès-Varoudakis, 2007; Bhattacharya and Wolde, 2012), and could eventually inflict severe impacts on economic performance and labour market outcomes (e.g., Allen and van der Velden, 2001).

The implications of labour market constraints are deemed to be of particular concerns for the Middle East and North Africa (MENA) region. Although the MENA region has generally realized higher annual employment growth rates compared to other geo-economic regions (International Labour Organization, 2012), rigid labour regulations and lack of suitable labour skills were often identified as main obstacles to firm operation and development in the MENA region (Drzeniek-Hanouz and Dusek, 2013). MENA countries have one of the least flexible labour markets, which remain too tight compared to labour markets in other developing countries (Angel-Urdinola and Kuddo, 2010; Bhattacharya and Wolde, 2012).[1] Table 1 presents the percentages of firms identifying different business obstacles as major or very severe (henceforth, major/severe) constraints across geo-economic regions. The statistics emphasize that the MENA region has the highest percentages of firms that consider labour regulations and labour skill shortages to be major/severe business constraints compared to other geo-economic regions. For example, labour regulations and labour skill shortages are identified as major/severe problems to 25% and 38% of firms located in the MENA region, respectively, compared to only 9% and

16% of firms located in South Asia.[2] Also, in the case of the MENA region, Table 1 shows that the constraint of labour skill shortages is associated with one of the highest percentages compared to other business obstacles, whereas the constraint of labour regulations occupy an intermediate rank.

Understanding the factors influencing employability constraints constitute an essential requirement toward the implementation of policies aiming at improving the regulatory and institutional environment for business (Pierre and Scarpetta, 2004; Kaplan and Pathania, 2010). This is particularly relevant for MENA countries that have recently undergone significant labour reforms, where employment creation is listed among the primary objectives (Angel-Urdinola and Kuddo, 2010). Several studies underline systematic differences in firm perceptions of labour market constraints through firm characteristics, as well as across countries and sectors (e.g., Pierre and Scarpetta, 2004; Kaplan and Pathania, 2010; Lyon et al., 2012; Meyer and Vandenberg, 2013). Therefore, designing policies that alleviate the adverse implications of labour market constraints requires a comprehension of the categories of firms that are more likely to endure the burden of these constraints.

This paper examines the implications of firm characteristics for the perceptions of firms located in the MENA region concerning the stringency of labour regulations and labour skill shortages. It also examines the heterogeneity in firm perceptions of labour market constraints across MENA countries and across sectors. We use a dataset sourced from the World Bank's Enterprise Surveys database, which includes information on firm perceptions of many business constraints. Firm perception data are collected through surveys, which are generally answered by senior managers and business owners. Hence, following the previous literature (e.g., Pierre and Scarpetta, 2004; Kaplan and Pathania, 2010; Meyer and Vandenberg, 2013), our dependent variables are determined as perception-based indicators. We implement overall examination and comparative cross-country and cross-sector empirical analyses of the factors influencing firm perceptions of labour regulations and labour skill shortages for the MENA region. MENA countries are characterized by a considerable level of diversity in macroeconomic and industrial factors, and by important differences in labour market conditions and institutions (Angel-

Urdinola and Kuddo, 2010), suggesting potential cross-country heterogeneity. Also, cross-sector heterogeneity is expected given the varying structures in labour requirements between sectors. Through the basic regressions, we use a bivariate probit model that allows for firm perceptions of labour regulations and labour skill shortages to be jointly formulated. This estimation model takes into account potential correlation between the error terms in the two labour market constraints' equations.

2. Review of Related Literature

2.1. Labour Regulations

Labour regulations are normally expressed through laws that regulate and govern the employment relationships between employees, employers, unions, and government in order to protect the basic standards of fair treatment for workers (Kaplan, 2009) and to maximize the social welfare (Botero et al., 2004). Governments commonly intervene in labour markets through regulations because employers may mistreat workers, leading to unfairness and inefficient outcomes for workers such as unfair dismissals, unfair minimum wage, lay-offs for economic reasons, and under-payment (Djankov and Ramalho, 2009).[3] These regulations and laws may be written through labour codes, current legislations, and norms set by collective agreements (Pierre and Scarpetta, 2004).

Several studies report variations in firm perceptions of labour regulations through firm characteristics and across countries and sectors. Gelb et al. (2007) use data covering firms located in 26 Sub-Saharan African countries to examine the implications of various factors for firm perceptions of the business environment. Among the results, they find that large firms have higher propensities to complain about the rigidity of labour regulations. They argue that, in developing countries, small firms are more likely to work within restricted markets and, therefore, they are less visible to regulators, and are less appealing targets for officials. They also find that exporting activities and private foreign ownership do not exhibit statistically significant impacts on firm perceptions of labour regulations. They also report that firm perceptions of labour regulations do not exert considerable variations across sectors. Hallward-

Driemeier and Aterido (2009) investigate the role of firm characteristics in determining firm perceptions of various business constraints, using data covering firms located in 105 countries. The results suggest that small firms may face more problems in dealing with the requirements of poor labour regulations, and may become easier targets in corrupted environments in developing countries.

Clarke (2010) uses data covering firms located in South Africa to study the factors influencing firm perceptions of business constraints. Among the results, he finds that large firms and exporting firms are more likely to report labour regulations as a significant obstacle to their development. Also, he finds that firm age and type of firm ownership do not exercise statistically significant role in explaining the variations in firm perceptions of labour regulations. Bartelsman et al. (2010) document how business constraints, as perceived by individual firms, differ across countries and across firm characteristics. They show that firm age, ownership type, export orientation, industry binary variables, and country binary variables are important indicators in explaining the differences in firm perceptions of business constraints between Europe and Central Asia (ECA) and Latin America and the Caribbean (LAC) regions. The results also show that large firms and exporting firms in the ECA region are more likely to be affected by rigid labour regulations, reflecting costs of labour adjustment. Vargas (2012) implements the analysis for firms located in Bolivia, focusing on the implications of firm size for firm perceptions of business constraints. Among the results, he finds that small firms are less likely to identify labour regulations as an important business constraint. Also, he finds that manufacturing firms are more likely to report labour regulations as a significant business constraint compared to firms belonging to other sectors.

Meyer and Vandenberg (2013) analyze the relationship between firm characteristics and firm perceptions of labour regulations using data covering firms located in five Asian economies (Bangladesh, Indonesia, Pakistan, the Philippines, and Viet Nam). They find systematic differences in firm perceptions of labour regulations across firm characteristics and sectors. In four of the five countries examined, they find that exporting firms are more likely to perceive labour regulations as an important obstacle to their

operations compared to non-exporting firms. They also find that, in four of the five countries, large firms have higher propensities to perceive labour regulations as a significant business constraint. They argue that small firms may enjoy *de facto* or *de jure* exemption from the enforcement of labour regulations. Also, they show that young firms have higher tendencies to report difficulties in coping with labour regulations.

2.2. Labour Skill Shortages

Mismatches between worker skills and job requirements are often classified among the significant obstacles facing firm productivity and growth, particularly in developing countries (Almeida and Aterido, 2011). For example, skill mismatches form an important constraint on hiring decisions, leading to higher levels of unemployment and important costs for firms (O'Sullivan et al., 2011) and causing higher turnover rates (Hersch, 1991). Gupta et al. (2010) argue that weak performances of labour-intensive industries could be related to labour skill shortages. Piore (1986) suggests that a low-skilled workforce may decrease the internal flexibility, leading to inefficient functioning of firms.

Empirical evidence on the factors influencing firm perceptions of labour skill shortages points out to large variations through firm characteristics and across countries and sectors. Gelb et al. (2007) argue that the problem of labour skill shortages tends to be more prevalent for firms that are large, more productive, and use advanced technologies. Additionally, they note that small firms may use less sophisticated production techniques that require fewer skilled workers. Using dataset covering firms located in Sub-Saharan Africa, Gelb et al. (2007) find that large firms are more likely to report labour skill shortages as one main business constraint. They also find that exporting activities and type of firm ownership do not exhibit important influences on firm perceptions of labour skill shortages. They note that the availability of skilled labour may become a more binding constraint as economies become more sophisticated and as governments magnify their capacities in enforcing labour regulations.

Hallward-Driemeier and Aterido (2009) find that large firms and exporting firms are more likely to report labour skill shortages as a significant obstacle to business operations. They also find that government-owned firms are less likely to perceive labour skill shortages as an important business constraint. In the case of firms located in South Africa, Clarke (2010) finds that large firms and exporting firms have higher propensities to perceive labour skill shortages as a significant business obstacle. He also reports that firm age and type of firm ownership do not exhibit important influences on firm perceptions of labour skill shortages. Kaplan and Pathania (2010) find that large firms are more likely to identify labour skill shortages as one main business constraint. However, Vargas (2012) does not find significant influences of firm size, but he reports important variations across sectors.

Using data covering firms located in Canada, Sabourin (2001) shows that firm size and technological intensity are negatively correlated with the probability of firms to identify labour skill shortages as one primary business obstacle. Also, he finds that type of firm ownership and Research and Development (R&D) activities have no statistically significant influences on these firm perceptions. Baldwin and Lin (2002) find that young firms are more likely to designate labour skill shortages as a considerable problem using data covering Canadian manufacturing firms. However, they find that firm size and ownership type do no exhibit important influences.

Green et al. (1998) implement the empirical analysis for firms located in the United Kingdom. They find that higher skilled share of employment accentuates the problem of labour skill shortages as perceived by employers. They also report that the share of part-time workers does not exhibit important effects. Lyon et al. (2012) find that medium and large size firms are more likely to designate labour skill shortages as an important constraint on firm operations and growth. They find that exporting firms have lower propensities to report labour skill shortages as a significant business constraint compared to non-exporting firms. Also, they do not find important variations across sectors.

3. Some Considerations about Data

The empirical analysis is carried out for the perceived levels of labour market constraints as reported by the respondents (e.g., senior managers, business owners) through the World Bank's Enterprise Surveys database. Pierre and Scarpetta (2004, 2006) examine the relationship between the perceived and actual stringency of labour regulations using national labour protection indices (i.e., *de jure* labour laws). They find that the reported perceptions are closely related to the actual levels of labour regulations' constraints. Specifically, countries with higher national indices on the stringency of labour regulations are associated with higher proportions of firms perceiving labour regulations as being significant constraints.

Kaplan and Pathania (2010) indicate that the perception-based indicators capture the actual institutional environment (e.g., laws, regulations, infrastructure, corruption), particularly when objective measures are inadequate. They argue that the perception-based indicators reflect the *de facto* severity of business constraints, and serve as a normal check vis-à-vis national indicators. Clarke (2010) notes that the collection of objective measures could be difficult, particularly when it comes to sensitive indicators (e.g., corruption). In such cases, perception-based indicators can serve as a substitute. Hallward-Driemeier and Aterido (2009) find that the perception-based and objective measures of business constraints are closely correlated with each other. They indicate that subjective measures enable the ranking of business constraints within and between countries, particularly when comparing the rigidity of the business environment. Also, they argue that perception-based measures provide information on the most severe obstacles for businesses growth and development as identified by the business entity, and would eventually assist managers and policy-makers to recognize reform priorities. Hence, perception-based measures tend to reflect the actual rigidity of business constraints faced by firms.

However, there are some concerns regarding perception-based measures. Specifically, these measures could be subjected to: 1) potential measurement errors leading to biased results, 2) variations in managers willingness to report actual negative or positive responses due to differences in personalities, views, and culture, 3) performance bias where managers tend to rank business obstacles according to the

performance of their firms or to the business environment conditions through which the firm operates, and 4) defects due to imperfections in question formulations and answer interpretations (Bertrand and Mullainathan, 2001; Senik, 2005; Hallward-Driemeier and Aterido, 2009). Some studies (e.g., Glaeser et al., 2004; Kaplan and Pathania, 2010) argue that caution should be exercised when using perception-based measures as independent variables through empirical analyses. This is because these measures may embody information on growth, which would lead to reverse causality issues. Meanwhile, these studies indicate that using these measures as dependent variables is more intuitive to capture growth in the business environment. These indications complement the aforementioned empirical findings reflecting a close correspondence between perceived and actual measures of business constraints.

It is important to note that the empirical analysis in this paper exclusively covers firms that exist in the market (i.e., those that have already entered the market, and that did not exit the market). This is to say that the empirical analysis examines the business obstacles as perceived by the existing firms in the market. Hausmann and Velasco (2005) depict this issue through a camel-hippopotamus analogy. Camels living in the desert do not identify access to water as a primary problem since they have adjusted to the situation by learning how to conserve water. Meanwhile, hippopotami lack the ability to stay in the desert since water scarcity is a critical obstacle for their survival. Hence, by generating and analyzing data from interviews with "camels" about water constraints, we may be missing distinct information from "hippopotami". Gelb et al. (2007) argue that such selection is incomplete since many firms choose to enter the market despite the severity of business constraints. They also indicate that the ability to adjust to a business constraint does not mean that firms do not recognize it anymore as a serious problem. They provide an illustration using the World Bank's Enterprises Surveys database: the perceptions of generator-owning firms regarding the electricity as a business constraint are not distinguishable from the perceptions of firms that do not own generators. Furthermore, they note that the intensity of complaints are often highly correlated with corresponding national indices. Dethier et al. (2011) suggest that

empirical analyses covering "hippopotami" should be carried out using a different frameworks (e.g., entry or exit models).[4]

4. Data Description and Variables

We use a dataset sourced from the World Bank's Enterprise Surveys database. This database represents a comprehensive source of firm-level data in emerging and developing economies. It covers firms operating in the manufacturing, service, and other sectors. It contains information on various aspects of the business environment such as, access to finance, corruption, workforce characteristics, innovation and technology, and trade. It should be noted that one of many advantages of using data from these surveys is that the questions are identical through firms across all countries. The basic dataset used in this paper covers 5,052 firms located in eight developing Arab countries of the MENA region: Algeria, Egypt, Jordan, Lebanon, Morocco, Oman, Syria, and Yemen.[5]

Through these surveys, firms' representatives (e.g., senior managers, business owners) are asked whether labour regulations and labour skill shortages are considered prominent constraints on business operations and development. The responses are used to generate the basic dependent binary variables, which equal one when a firm declares the corresponding labour market constraint as a major/severe business obstacle and zero otherwise. Following the previous literature on business constraints (e.g., Gelb et al., 2007; Kaplan and Pathania, 2010; Clarke, 2010; Meyer and Vandenberg, 2013), the explanatory variables cover firm characteristics' variables which comprise: 1) a binary variable that equals one for firms characterized by private foreign ownership and zero otherwise,[6] 2) a binary variable that equals one for firms engaged in exporting activities and zero otherwise, 3) firm size depicted through the number of total employment and presented in hundreds of workers through the regressions, 4) firm age measured by the number of years since firm establishment, 5) firm use of Information and Communication Technology (ICT) depicted through a binary variable that takes the value of one for firms regularly using the Internet to communicate with clients and to source information and zero

otherwise, 6) two firm labour composition variables: the first is represented through the fraction of skilled production workers in total number of production workers, and the second is depicted through the fraction of non-production workers in total employment. The use of skilled production workers' share and the use of non-production workers' share through the regressions imply that the results are relative to the use of unskilled production workers and to the use of production workers, respectively. The explanatory variables also include country-specific binary variables and sector-specific binary variables to capture cross-country and cross-sector variations.

Table 2 displays summary statistics of the variables used in the empirical analysis. The first panel shows the results for the dependent variables. We find that around 24.6% of firms in the regression dataset report that labour regulations represent a major/severe business constraint, while 38.0% of firms report that labour skill shortages exercise a major/severe business constraint.[7] The second panel shows statistics for the explanatory variables. The results indicate that 4.8% of firms are characterized by private foreign ownership and that 22.5% of firms are engaged in exporting activities. The average firm size is 124.0 full-time workers (with a standard deviation of 317.1 full-time workers) and the average firm age is 20.9 years (with a standard deviation of 16.6 years). Also, we find that 50.4% of firms use the Internet to communicate with clients and to source information. The percentage of skilled production workers in total number of production workers and the percentage of non-production workers in total employment have averages of 61.6% and 26.1%, respectively.

5. Empirical Specification

Consider a given firm j $(j=1,\ldots,J)$ belonging to sector k $(k=1,\ldots,K)$ and located in country c $(c=1,\ldots,C)$. Firm perception levels of constraints related to labour regulations and those related to labour skill shortages are depicted through the latent variables R^*_{jkc} and S^*_{jkc}, respectively. These latent variables are not observed. However, we observe the perceptions of firms through dichotomous

responses on whether labour regulations and labour skill shortages do or do not pose major/severe obstacles on firm operations and development. Let R_{jkc} depict a binary variable that takes the value of one when the corresponding firm identifies labour regulations as a major/severe business constraint and zero otherwise. Also, let S_{jkc} represent a binary variable that takes the value of one when the corresponding firm identifies labour skill shortages as a major/severe business constraint and zero otherwise. The benchmark empirical specifications can be represented as:

$$(1) \qquad R^*_{jkc} = X_j \alpha^R + Y_k \beta^R + Z_c \gamma^R + \varepsilon^R_{jkc}, \quad R_{jkc} = 1 \text{ if } R^*_{jkc} > 0, \text{ and } R_{jkc} = 0 \text{ otherwise}$$

$$(2) \qquad S^*_{jkc} = X_j \alpha^S + Y_k \beta^S + Z_c \gamma^S + \varepsilon^S_{jkc}, \quad S_{jkc} = 1 \text{ if } S^*_{jkc} > 0, \text{ and } S_{jkc} = 0 \text{ otherwise}$$

where X_j represents a vector of variables depicting firm characteristics, Y_k is a vector of binary variables depicting sectors, Z_c represents a vector of binary variables depicting countries, and ε^R_{jkc} and ε^S_{jkc} are the stochastic error terms of the corresponding equations. The univariate probit estimator would produce biased estimates when there are some unobserved or omitted characteristics that simultaneously affect firm perceptions of labour regulations and labour skill shortages (Deadman and MacDonald, 2004; Greene, 2008). We allow for the errors in these two labour market constraints' equations to be potentially correlated. Thus, the two equations are jointly modelled using a bivariate probit estimator. The error terms are assumed to be independently and identically distributed as bivariate normal with ρ depicting the correlation parameter. Specifically, we have:

$$(3) \qquad \begin{cases} E\left[\varepsilon^R_{jkc} \middle| X_j, Y_k, Z_c\right] = E\left[\varepsilon^S_{jkc} \middle| X_j, Y_k, Z_c\right] = 0, \\ Var\left[\varepsilon^R_{jkc} \middle| X_j, Y_k, Z_c\right] = Var\left[\varepsilon^S_{jkc} \middle| X_j, Y_k, Z_c\right] = 1, \text{ and} \\ Cov\left[\varepsilon^R_{jkc}, \varepsilon^S_{jkc} \middle| X_j, Y_k, Z_c\right] = \rho \end{cases}$$

Through the empirical analysis, we use the Wald test to determine whether the correlation parameter ρ is statistically significant.[8] The rejection of the null hypothesis indicates that firm perceptions of the labour market constraints are jointly formulated (Greene, 2008).[9] The bivariate probit specification

allows us to estimate unconditional marginal effects, but also conditional and joint marginal effects of variables influencing firm perceptions of the labour market constraints.

6. Benchmark Empirical Results

Table 3 presents the marginal effects from the benchmark bivariate probit estimation carried out for the pooled dataset covering existing firms' perceptions of labour market constraints. The Wald test rejects the null hypothesis of zero correlation between the errors in the two labour market constraints' equations and, hence, it indicates that the model should be estimated through the bivariate probit estimator rather than through the univariate probit estimator. The estimated coefficient of correlation between the errors in the two equations is positive and statistically significant at the 1% level. Table 3 displays the unconditional marginal effects for $\Pr\left(R_{jkc}=1\right)$ and $\Pr\left(S_{jkc}=1\right)$. It also includes the joint marginal effects for $\Pr\left(R_{jkc}=1,S_{jkc}=1\right)$ and $\Pr\left(R_{jkc}=0,S_{jkc}=0\right)$, and the conditional marginal effects for $\Pr\left(R_{jkc}=1\middle|S_{jkc}=1\right)$ and $\Pr\left(S_{jkc}=1\middle|R_{jkc}=1\right)$.[10] These marginal effects are determined at the mean values of the explanatory variables. For explanatory binary variables, the marginal effects are calculated through discrete changes in probabilities as the binary variable changes from 0 to 1.

Firm Characteristics. We find that larger firms have lower propensities to identify labour market constraints as major/severe obstacles facing business operations and development. This is in line with the results reported in some other empirical studies (e.g., Pierre and Scarpetta, 2004; Hallward-Driemeier and Aterido, 2009). The unconditional marginal effects imply that an increase in firm size by one hundred full-time workers reduces the likelihood of firms to perceive labour regulations and labour skill shortages as major/severe constraints on business operations by 0.8 and 0.5 percentage points, respectively. Also, the joint marginal effect of firm size for $\Pr\left(R_{jkc}=1,S_{jkc}=1\right)$ indicates that an increase in firm size by one hundred workers decreases the likelihood of firms to jointly identify labour regulations and labour skill shortages as major/severe business constraints by 0.5 percentage points.

The results on the relationship between firm size and firm perceptions of labour regulations are consistent with arguments provided in the literature, which suggest that smaller firms have more limited abilities to realize internal adjustments in response to labour regulations (Meyer and Vandenberg, 2013). Hence, smaller firms have higher tendencies to be more adversely affected by labour regulations. These results are also in line with some other findings showing that labour regulations have disproportional effects on small firms (Aterido et al., 2011). The results on the relationship between firm size and firm perceptions of labour skill shortages imply that smaller firms in MENA countries may encounter more difficulties in realizing future growth, since adequacy of educated workforce is essential for firm competitiveness and performance (Storey, 1994; Jensen and McGuckin, 1997). These results could also suggest that smaller firms have more difficulties in accessing skilled labour markets, identifying required labour skills, and investing in workforce training programs (Jansen and Lanz, 2013).

The implication of exporting activities for firm perceptions of labour regulations is not statistically significant. These results are similar to those found in some previous studies, such as Gelb et al. (2007) in the case of Sub-Saharan African firms. Yet, they deviate from those reported in some studies covering firms located in other developing regions. For example, Meyer and Vandenberg (2013) find that exporting firms located in some South East Asian countries have higher tendencies to perceive labour regulations as a major/severe business constraint compared to non-exporting firms. They attributed these findings to variations in labour demand requirements between exporting and non-exporting firms. Also, Lyon et al. (2012) find that non-exporting firms are more likely to identify labour skill shortages as a major/severe business constraint compared to exporting firms.

The effect of firm age is negative and statistically significant in the case of labour skill shortages' equation. The unconditional marginal effect and the conditional marginal effect for $\Pr\left(S_{jkc}=1\middle|R_{jkc}=1\right)$ indicate that an increase in firm age by 10 years reduces the likelihood to perceive labour skill shortages as a major/severe business constraint by 1 percentage point. Although relatively small in magnitude, this

impact is consistent with some *a priori* expectations discussed in the literature, suggesting that older firms have more accumulated experiences to attenuate the effects of business obstacles as perceived by the survey respondents (Meyer and Vandenberg, 2013).

We find that an increase in the proportion of non-production workers in total employment by 10 percentage points raises the likelihood of firms to identify labour skill shortages as a major/severe business constraint by 1.3 percentage points. Also, we find that an increase in this proportion by 10 percentage points raises this likelihood by 1.6 percentage points, when assessed conditional on identifying labour regulations as a major/severe business constraint. The effect of the proportion of skilled production workers in total number of production workers on firm perceptions of these labour market constraints is not statistically significant. These findings suggest that the implications of labour skill shortages are primarily associated with the inadequacy of non-production workers rather than with the inadequacy of skilled production workers.

The results show that firms with private foreign ownership are less likely to perceive labour skill shortages as a major/severe business constraint by 6.0 percentage points. They suggest that foreign affiliates have higher capabilities in attenuating the implications of labour skill shortages compared to local, domestically owned firms. Almeida (2007) indicates that foreign-owned firms have higher tendencies to pay higher wages and to attract educated workforce compared to domestic firms. These tendencies could eventually mitigate the perceptions of firms with private foreign ownership concerning labour skill shortages compared to firms with domestic ownership.

Countries' Binary Variables. The results emphasize significant variations in the perceptions of firms located in different countries of the MENA region concerning labour market constraints. Hence, they underscore the implications of national characteristics for these firm perceptions. The binary variable depicting firms located in Algeria is set as the reference for MENA countries through the regressions. The unconditional marginal effects reveal that firms located in Lebanon have statistically higher propensities to perceive labour regulations as a major/severe business constraint by 34.4

percentage points compared to firms located in the *Maghreb* countries (i.e., Algeria and Morocco) and in Yemen. The corresponding propensities for firms located in Egypt, Oman, and Syria are higher by 17.3, 31.9, and 22.3 percentage points, respectively, compared to firms located in the two *Maghreb* countries and in Yemen. Also, firms located in Egypt, Lebanon, and Oman have statistically higher propensities to perceive labour skill shortages as a major/severe business constraint by 15.4, 17.5, and 13.5 percentage points, respectively, compared to firms located in the other MENA countries.[11]

These results complement other empirical findings in the literature, which document international variations in the perceived magnitude of labour market constraints. For example, Pierre and Scarpetta (2004) show that countries with more stringent *de jure* labour laws have higher proportions of firms identifying labour regulations as being restrictive. Gelb et al. (2007) find significant variations in firm perceptions of labour market constraints, among other business obstacles, across Sub-Saharan African countries. Also, Lyon et al. (2012) present some important regional differences in firm perceptions of labour skill shortages. Drzeniek-Hanouz and Dusek (2013) indicate that labour market constraints constitute significant obstacles on business development in the Arab world. They also describe considerable variations in the perceptions of firms located in different MENA sub-regions: North Africa (including Egypt), the Levant, and the Gulf sub-regions.

Sectors' Binary Variables. We find that firm perceptions of labour market constraints vary across sectors. The binary variable for firms belonging to the service sector is set as the reference for sectors through the regressions. The unconditional marginal effects indicate that firms belonging to the manufacturing sector and to the category covering the remaining other (non-manufacturing and non-service) sectors have higher propensities to perceive labour regulations as a major/severe business constraint by 9.9 and 10.1 percentage points, respectively, compared to firms belonging to the service sector. The estimates for the labour skill shortages' equation are 12.6 and 11.8 percentage points, respectively. These results suggest that labour market constraints, as perceived by the survey

respondents, disproportionally impact manufacturing firms and firms belonging to the other sectors compared to firms belonging to the service sector.

Firm perceptions of labour market constraints can be alternatively represented through ordinal responses in the dataset. Specifically, firms identify the stringency of labour regulations and labour skill shortages as: no or minor obstacle (outcome 1), moderate obstacles (outcome 2), and major or very severe obstacles (outcome 3). Table 4 displays the marginal effects obtained through the ordered probit model. The results are comparable to the corresponding marginal effects for $\Pr(R_{jkc}=1)$ and $\Pr(S_{jkc}=1)$ that are reported in Table 3.

7. Empirical Results by Sector and by Country

7.1. Empirical Results by Sector

The results from the empirical analysis implemented for datasets covering individual sectors are displayed in Table 5. The estimated coefficients of correlation between the errors in the two labour market constraints' equations are positive and statistically significant at the 1% level for all sectors. To save space, Table 5 does not display the rows of marginal effects of firm characteristics that do not exhibit statistical significance at all. In general, the results for firms belonging to the manufacturing sectors are qualitatively similar to the benchmark results for pooled dataset. We also find few differences. For example, the perceptions of manufacturing firms located in Jordan concerning labour skill shortages appear to be less pronounced compared to manufacturing firms located in the other MENA countries. Firms located in Jordan have statistically lower propensities to perceive labour skill shortages as a major/severe business constraint compared to firms located in Algeria and those located in Egypt by 11.3 and (11.3+14.0=) 25.3 percentage points, respectively.

The results derived from the service sector's dataset reveal some notable differences compared to those obtained from the manufacturing sector's dataset.[12] In the case of the service sector, firm perceptions of labour regulations do not exhibit statistically significant heterogeneity across firm

characteristics. We find that firm perceptions of labour skill shortages are accentuated with an increase in the ratio of non-production workers to total employment. The marginal effect shows that an increase in this ratio by 10 percentage points raises the likelihood of perceiving labour skill shortages as a major/severe business constraint by 3.1 percentage points. The magnitude of this effect is considerably higher than the one reported for manufacturing firms.

Our dataset does not contain service firms located in Algeria that report labour regulations and labour skill shortages as major/severe constraints on business operations. In other words, service firms located in Algeria predict failure perfectly and, therefore, they are dropped from the service sector's dataset. Then, the binary variable depicting firms located in Egypt is set as the reference for MENA countries. We find that service firms located in Egypt and Lebanon have statistically higher likelihoods than those located in Jordan to perceive labour regulations as a major/severe business constraint by 6.7 and (6.7+2.1=) 8.8 percentage points, respectively. The corresponding likelihood for service firms located in Oman is considerably higher than those located in Jordan by (18.4+6.7=) 25.1 percentage points. We also find that service firms located in Egypt and Lebanon have lower propensities than those located in Jordan to identify labour skill shortages as a major/severe business constraint by 16.1 and (16.1-1.3=) 14.8 percentage points, respectively. The joint marginal effects for $\Pr\left(R_{jkc}=1, S_{jkc}=1\right)$ indicate that service firms located in Egypt and Jordan have statistically comparable likelihoods to identify both labour market constraints as major/severe obstacles on business operations as perceived by the survey respondents. These likelihoods are lower than the corresponding likelihood for service firms located in Oman by more than 11 percentage points.

Finally, the results for the other sectors' category reveal that firms located in Oman are statistically more likely to perceive labour regulations as a major/severe business constraint by 34.9 percentage points compared to firms located in the other MENA countries (except Lebanon). Also, we find that firms located in Egypt and Lebanon have higher propensities to perceive labour skill shortages

as a major/severe business constraint by 44.2 and 31.3 percentage points, respectively, compared to firms located in the other MENA countries.

7.2. Empirical Results by Country

The results from the empirical analysis carried out for datasets covering firms located in individual MENA countries are displayed in Table 6. The estimated coefficients of correlation between the errors in the two labour market constraints' equations are positive and statistically significant at the 1% level for all countries. To save space, Table 6 does not display the rows of marginal effects of firm characteristics that do not exhibit statistical significance at all. In the case of Algeria, service firms predict failure perfectly and, hence, they are dropped from the dataset. Then, the other sectors' category is set as the reference for sectors. We find that the perceptions of firms located in Algeria concerning labour regulations do not exhibit statistically significant variations between the manufacturing sector and the other sectors' category. Exporting firms are less likely to perceive labour regulations as a major/severe business constraint by 13.5 percentage points compared to non-exporting firms. Also, an increase in the skilled production workers' ratio by 10 percentage points reduces the extent of these perceptions by 0.7 percentage points. We find that manufacturing firms have a statistically higher likelihood to identify labour skill shortages as a major/severe business constraint by 12.1 percentage points compared to other sectors' firms.

Manufacturing firms located in Egypt have statistically higher propensities to perceive labour regulations and labour skill shortages as major/severe business constraints by 15.7 and 20.6 percentage points, respectively, compared to service firms. The implications of firm size for firm perceptions of labour regulations are similar to the benchmark results. Also, the effects of firm age, private foreign ownership, and the proportion of non-production worker in total employment are reminiscent of those obtained from the pooled regressions.

Service firms located in Jordan have statistically higher propensities to identify labour skill shortages as a major/severe business constraint compared to manufacturing and other sector's firms by 19.2 and 13.6 percentage points, respectively. The non-production workers' ratio exhibits positive implications for firm perceptions of labour skill shortages. An increase in this ratio by 10 percentage points raises the magnitude of these perceptions by 3.2 percentage points. In contrast, this ratio has negative impacts on firm perceptions of labour regulations. An increase in this ratio by 10 percentage points induces a decrease in the magnitude of these perceptions by 2.0 percentage points.

In the case of Lebanon, manufacturing and service firms have lower propensities to perceive labour skill shortages as a major/severe business constraint by 34.6 percentage points compared to firms belonging to the other sectors. Firm characteristics do not exhibit statistically significant implications, with the exception of firm use of ICT in the case of labour regulations. The perceptions of firms located in Oman concerning labour market constraints do not exhibit statistically significant variations across sectors. The conditional marginal effects for $\Pr\left(R_{jkc}=1\middle|S_{jkc}=1\right)$ indicate that exporting activities and an increase in firm size by one hundred workers reduce the corresponding probabilities by 34.6 and 38.0 percentage points, respectively.

In our dataset, firms located in Morocco, Syria, and Yemen belong exclusively to the manufacturing sector. We find that exporting firms located in Morocco are more likely to perceive labour regulations and labour skill shortages as major/severe business constraints by 15.3 and 22.3 percentage points, respectively, compared to non-exporting firms. Also, an increase in the skilled production workers' ratio by 10 percentage points raises the likelihood of indentifying labour skill shortages as a major/severe business constraint by 2.9 percentage points. Finally, exporting firms located in Yemen are less likely to perceive labour regulations as a major/severe business constraint by 11.2 percentage points, and are more likely to perceive labour skill shortages as a major/severe business constraint by 34.8 percentage points, compared to non-exporting firms.

8. Conclusion

Labour market constraints are often identified as main business obstacles facing firm operation and development in the MENA region. Therefore, they are naturally listed through the primary items on the labour policy agenda of the MENA countries. The comprehension of the factors influencing the perceived severity of labour market constraints is essential in the design of policies aiming at improving labour market conditions and enhancing business environments. This paper examines the implications of firm characteristics, national locations, and sectoral associations for the perceptions of firms located in the MENA region concerning two primary labour market constraints: labour regulations and labour skill shortages. The empirical analysis is carried out using firm-level dataset sourced from the World Bank's Enterprise Surveys database. A bivariate probit estimator is used to account for potential correlations between the errors in the labour regulations' equation and labour skill shortages' equation. The empirical results are generated through overall estimations and by implementing comparative cross-country and cross-sector analyses.

The benchmark empirical results obtained from the overall estimations reveal important implications of firm characteristics for firm perceptions of labour market constraints. Larger firms appear to have lower propensities to identify labour market constraints as major/severe business obstacles. These results imply that small firms have limited flexibility in adjusting to labour regulations and to labour skill shortages. Hence, they suggest that small firms may encounter difficulties in realizing future growth through the MENA region. Also, we find that firms with private foreign ownership are less likely to endure the implications of labour skill shortages compared to domestic firms. This is consistent with higher tendencies of foreign affiliates to pay higher wages and to attract educated workforce compared to domestic firms. Meanwhile, exporting activities do not have statistically significant effects on firm perceptions of labour market constraints. This finding could stem from the generally limited engagement of MENA exporting firms in international trade.

We find that firms with higher proportions of non-production workers in total employment have higher propensities to perceive labour skill shortages as a major/severe business constraint. However, the proportion of skilled production workers in total number of production workers does not exercise statistically significant influences on firm perceptions. These findings suggest that the implications of labour skill shortages are primarily associated with inadequacy of non-production workers rather than inadequacy of skilled production workers. The results also emphasize considerable cross-country and cross-sector variations in firm perceptions of labour market constraints.

Finally, the empirical analysis reveals significant heterogeneity through the implications of firm characteristics and national locations for the perceptions of firms belonging to different sectors concerning labour market constraints. Also, it underlines important heterogeneity through the implications of firm characteristics and sectoral associations for the perceptions of firms located in different countries concerning labour market constraints.

Reforms in labour regulations and investment in human capital are important governmental policy interventions for promoting firm development and economic growth. This paper provides policy-makers with information needed to design labour policies that attenuate the impact of labour market constraints and enhance the performance of firms in the MENA region. Specifically, the design of labour policies should encompass the findings that the perceptions of labour market constraints significantly vary through firm characteristics, countries, and sectors. Furthermore, given the heterogeneity in the implications of the factors influencing firm perceptions of labour market constraints, labour policies should be customized by country, and should recognize the varying consequences for different sectors.

References

Allen, J., and R. van der Velden. 2001. "Educational Mismatches Versus Skill Mismatches: Effects on Wages, Job Satisfaction, and on-the-Job Search." *Oxford Economic Papers*, 53(3): 434–452.

Almeida, R. 2007. "The Labor Market Effects of Foreign Owned Firms." *Journal of International Economics*, 72(1): 75–96.

Almeida, R., and R. Aterido. 2011. "On-the-Job Training and Rigidity of Employment Protection in the Developing World: Evidence from Differential Enforcement." *Labour Economics*, 18(1): S71–S82.

Amin, M. 2009. "Labor Regulation and Employment in India's Retail Stores." *Journal of Comparative Economics*, 37(1): 47–61.

Angel-Urdinola, D.F., and A. Kuddo. 2010. "Key Characteristics of Employment Regulation in the Middle East and North Africa." Social Protection Discussion Paper No. 55674, The World Bank, Washington, DC.

Aterido, R., M. Hallward-Driemeier, and C. Pages. 2011. "Big Constraints to Small Firms' Growth? Business Environment and Employment Growth across Firms." *Economic Development and Cultural Change* 59(3): 609–647.

Baldwin, J., and Z. Lin. 2002. "Impediments to Advanced Technology Adoption for Canadian Manufacturers." *Research Policy*, 31(1): 1–18.

Bartelsman, E., J. Haltiwanger, and S. Scarpetta. 2010. "Cross-Country and Within-Country Differences in the Business Climate." *International Journal of Industrial Organization*, 28(4): 368–371.

Bertrand, M., and S. Mullainathan. 2001. "Do People Mean What They Say? Implications for Subjective Survey Data." *American Economic Review*, 91(2): 67–72.

Besley, T., and R. Burgess. 2004. "Can Labor Regulation Hinder Economic Performance? Evidence from India." *Quarterly Journal of Economics*, 119(1): 91–134.

Bhattacharya, R., and H. Wolde. 2012. "Business Environment Constraints on Growth in the MENA Region." *Middle East Development Journal*, 4(1): 1–18.

Bigsten, A., and M. Söderbom. 2006. "What Have We Learned From a Decade of Manufacturing Enterprise Surveys in Africa?" *World Bank Research Observer*, 21(2): 241–265.

Boeri, T., and J. Jimeno. 2005. "The Effects of Employment Protection: Learning from Variable Enforcement." *European Economic Review*, 49(8): 2057–2077.

Botero, J., S. Djankov, R. La Porta, F. Lopez-de-Silanes, and A. Shleifer. 2004. "The Regulation of Labor." *Quarterly Journal of Economics*, 119(3): 1339–1382.

Chamlou, N. 2008. *Environment for Women's Entrepreneurship in the Middle East and North Africa Region*. The World Bank, Washington, DC.

Clarke, G.R.G. 2010. “Are Managers’ Perceptions of Constraints to Growth Reliable? Evidence from a Natural Experiment in South Africa.” *Journal of Globalization and Development*, 2(1): 1–28.

Contessi, S., F. de Nicola, and L. Li. 2013. “International Trade, Female Labor, and Entrepreneurship in MENA Countries.” *Federal Reserve Bank of St. Louis Review*, 94(3): 197–220.

Deadman, D., and Z. MacDonald. 2004. “Offenders as Victims of Crime? An Investigation into the Relationship between Criminal Behaviour and Victimization.” *Journal of the Royal Statistical Society Series A*, 167(1): 53–67.

Dethier, J.-J., M. Hirn, and S. Straub. 2011. “Explaining Enterprise Performance in Developing Countries with Business Climate Survey Data.” *The World Bank Research Observer*, 26(2): 258–309.

Djankov, S., and R. Ramalho. 2009. “Employment Laws in Developing Countries.” *Journal of Comparative Economics*, 37(1): 3–13.

Drzeniek-Hanouz, M., and M. Dusek. 2013. *The Arab World Competitiveness Report 2013*. The World Economic Forum, Geneva, Switzerland, and The European Bank for Reconstruction and Development, London, The United Kingdom.

Fakih, A., and P.L. Ghazalian. 2014. “Which Firms Export? An Empirical Analysis for the Manufacturing Sector in the MENA Region”. *Journal of Economic Studies*, 41(5): 672–695.

Fakih, A., and P.L. Ghazalian. 2015. “Female Employment in MENA’s Manufacturing Sector: The Implications of Firm-Related and National Factors”. *Economic Change and Restructuring*, 48(1): 37–69.

Gelb, A., V. Ramachandran, M.K. Shah, and G. Turner. 2007. “What Matters to African Firms? The Relevance of Perceptions Data.” Policy Research Working Paper No. 4446, The World Bank, Washington, DC.

Glaeser, E.L., R. La Porta, F. Lopez-de-Silanes, and A. Shleifer. 2004. “Do Institutions Cause Growth?” *Journal of Economic Growth* 9(3): 271–303.

Gomez-Mera, L., T. Kenyon, Y. Margalit, J.G. Reis, and G. Varela. 2015. *New Voices in Investment: A Survey of Investors from Emerging Countries*. The World Bank, Washington, DC.

Green, F., S. Machin, and D. Wilkinson. 1998. “The Meaning and Determinants of Skills Shortages.” *Oxford Bulletin of Economics and Statistics*, 60(2): 165–187.

Greene, W.H. 2008. *Econometric Analysis*, 6th Edition. Prentice Hall, Upper Saddle River, NJ.

Gupta, P., R. Hasan, and U. Kumar. 2010. “What Constraints Indian Manufacturing.” In B. Eichengreen, P. Gupta, and U. Kumar (Eds.), *Emerging Giants: China and India in the World Economy*. Oxford University Press, New York, NY.

Hallward-Driemeier, M., and R. Aterido. 2009. “Comparing Apples with...Apples: How to Make (More) Sense of Subjective Rankings of Constraints to Business.” Policy Research Working Paper No. 5054, The World Bank, Washington, DC.

Hausmann, R., and A. Velasco. 2005. “Slow Growth in Latin America: Common Outcomes, Common Causes?” Working Paper, Center for International Development, Harvard University, Cambridge, MA.

Hersch, J. 1991. “Education Match and Job Match.” *Review of Economics and Statistics*, 73(1): 140–144.

International Labour Organization (ILO). 2012. *Global Employment Trends 2012: Preventing a Deeper Jobs Crisis*. ILO, Geneva, Switzerland.

Jansen, M., and R. Lanz. 2013. “Skills and Export Competitiveness for Small and Medium-Sized Enterprises.” *4th Global Review of Aid for Trade*, World Trade Organization, Geneva, Switzerland.

Jensen, J.B., and R.H. McGuckin. 1997. “Firm Performance and Evolution: Empirical Regularities in the U.S. Microdata.” *Industrial and Corporate Change*, 6(1): 25–47.

Kaplan, D.S. 2009. “Job Creation and Labor Reform in Latin America.” *Journal of Comparative Economics*, 37(1), 91–105.

Kaplan, D.S., and V. Pathania. 2010. “What Influences Firms’ Perceptions?” *Journal of Comparative Economics*, 38(4): 419–431.

Kiker, B.F., M.C. Santos, and M. Mendes de Oliveira. 1997. “Overeducation and Undereducation: Evidence for Portugal.” *Economics of Education Review*, 16(2): 111–125.

Lyon, S., M. Ranzani, and F.C. Rosati. 2012. “Skill Deficit in Developing Countries: A Review of Empirical Evidence from Enterprise Surveys.” Working Paper No. 64, Understanding Children’s Work Programme, Rome, Italy.

Meyer, M., and P. Vandenberg. 2013. “Globalization, Labor Market Regulation, and Firm Behavior.” Working Paper No. 361, Asian Development Bank, Manila, Philippines.

Organization for Economic Cooperation and Development (OECD). 2008. *OECD Benchmark Definition of Foreign Direct Investment - 4th Edition*. OECD Publishing, Paris, France.

O’Sullivan, A., M.-E. Rey, and J.G. Mendez. 2011. “Opportunities and Challenges in the MENA Region.” MENA-OECD Investment Programme, Organization for Economic Cooperation and Development (OECD), Paris, France.

Pierre, G., and S. Scarpetta. 2004. “Employment Regulations through the Eyes of Employers: Do They Matter and How Do Firms Respond to Them?” Discussion Paper No. 1424, Institute for the Study of Labor (IZA), Bonn, Germany.

Pierre, G., and S. Scarpetta. 2006. “Employment Protection: Do Firms’ Perceptions Match with Legislation?” *Economics Letters*, 90(3): 328–334.

Piore, M.J. 1986. “Perspectives on Labor Market Flexibility.” *Industrial Relations*, 25(2): 146–166.

Pissarides, C.A., and M.-A. Véganzonès-Varoudakis. 2007. “Labor Markets and Economic Growth in the MENA Region.” In J.B. Nugent and H. Pesaran (Eds.), *Explaining Growth in the Middle East*. Elsevier, Amsterdam, The Netherlands.

Sabourin, D. 2001. “Skill Shortages and Advanced Technology Adoption.” Working Paper No. 175, Microeconomics Analysis Division, Statistics Canada, Ottawa, Canada.

Senik, C. 2005. “Income Distribution and Well-Being: What Can We Learn from Subjective Data?” *Journal of Economic Surveys*, 19(1): 43–63.

Storey, D.J. 1994. *Understanding the Small Business Sector*. Routledge, London, UK.

Vargas, J.P.M. 2012. “Binding Constraints: Does Firm Size Matter?” MPRA Paper No. 41286, University Library of Munich, Munich, Germany.

Endnotes

[1] For example, labour codes of Egypt, Lebanon, and Yemen do not allow women to work during evening or night hours (Chamlou, 2008).

[2] The Arab World Competitiveness Report (Drzeniek-Hanouz and Dusek, 2013) also reveals that restrictive labour regulations and labour skill shortages emerge as the most problematic factors for doing business, and are among the main weaknesses that adversely affect the employment competitiveness of Arab countries in the MENA region.

[3] Labour regulations are also deemed to be important for business development because a poor business environment could lead to higher costs of certain services that are important for manufacturing firms (Bigsten and Söderbom, 2006) and could affect firms' choices concerning the allocation of resources (Boeri and Jimeno, 2005).

[4] The World Bank's Enterprise Surveys database does not contain observations covering "hippopotami". Some other surveys can be characterized through the inclusion of "hippopotami". For example, Gomez-Mera et al. (2015) examine the characteristics, motivations, strategies, and needs of investors in emerging economies. They use a dataset derived from broadened surveys covering interviews with investors and non-investors as well.

[5] The corresponding survey year/fiscal year are: 2002/2001 and 2007/2006 for Algeria's firms, 2007/2005 and 2008/2007 for Egypt's firms, 2006/2006 for Jordan's firms, 2006/2004 and 2009/2008 for Lebanon's firms, 2007/2005 for Morocco's firms, 2003/2002 for Oman's firms, 2003/2002 and 2009/2008 for Syria's firms, and 2010/2009 for Yemen's firms. There are some studies that also use datasets derived from the World Bank's Enterprise Surveys database for empirical analyses pertaining to the MENA region (e.g., Contessi et al., 2013; Fakih and Ghazalian, 2014, 2015).

[6] This binary variable equals one when the percentage of private foreign ownership in total ownership is equal or above 10% and zero otherwise. The threshold of 10% ownership is commonly used in the Foreign Direct Investment (FDI) benchmark descriptions to designate long-lasting interests and influential power on management decisions (Organization for Economic Cooperation and Development, 2008).

[7] Table A1 of the Appendix displays summary statistics by country and by sector. Among countries, Syria has the highest proportions of firms reporting labour regulations and labour skill shortages as major/severe constraints on business operations. Among sectors, the manufacturing sector has the highest proportions of firms reporting these labour market constraints as major/severe business obstacles.

[8] If the Wald test shows that ρ is not statistically significant, then the two equations can be estimated separately using the univariate probit estimator.

[9] Let $T_{jkc}^{R} = 2R_{jkc} - 1$ and $T_{jkc}^{S} = 2S_{jkc} - 1$. Also, let $W_{jkc}^{R} = T_{jkc}^{R} G_{jkc}^{R}$ where $G_{jkc}^{R} = X_j \alpha^{R} + Y_k \beta^{R} + Z_c \gamma^{R}$, and let $W_{jkc}^{S} = T_{jkc}^{S} G_{jkc}^{S}$ where $G_{jkc}^{S} = X_j \alpha^{S} + Y_k \beta^{S} + Z_c \gamma^{S}$. Next, define $\rho_{jkc}^{*} = T_{jkc}^{R} T_{jkc}^{S} \rho$. Then, we have $\Pr\left(\tilde{R} = R_{jkc}, \tilde{S} = S_{jkc}\right) = \Phi_2\left(W_{jkc}^{R}, W_{jkc}^{S}, \rho_{jkc}^{*}\right)$ where $\Phi_2(\cdot)$ denotes bivariate normal cumulative distribution function. The log-likelihood function of the bivariate model is given as: $\log L = \sum_{j=1}^{J} \log \Phi_2\left(W_{jkc}^{R}, W_{jkc}^{S}, \rho_{jkc}^{*}\right)$.

[10] The estimated coefficients and the joint marginal effects for $\Pr\left(R_{jkc} = 1, S_{jkc} = 0\right)$ and $\Pr\left(R_{jkc} = 0, S_{jkc} = 1\right)$ are presented in Table A.2 of the Appendix.

[11] Also, the joint marginal effects for $\Pr\left(R_{jkc} = 1, S_{jkc} = 1\right)$ and the conditional marginal effects for $\Pr\left(R_{jkc} = 1 \middle| S_{jkc} = 1\right)$ reveal higher propensities for firms located in Egypt, Lebanon, Oman, and Syria compared to those located in the other MENA countries. The conditional marginal effects for $\Pr\left(S_{jkc} = 1 \middle| R_{jkc} = 1\right)$ imply higher propensities for firms located in Egypt and Lebanon compared to those located in the other MENA countries.

[12] In our dataset, firms located in Morocco, Syria, and Yemen belong exclusively to the manufacturing sector.

Table 1 – Percentage of firms identifying business obstacles as major/severe constraints

	MENA	EAP	EECA	LAC	SAR	SSA	OECD	World
Labour regulations	24.94	10.77	12.07	24.64	9.01	8.82	10.92	14.57
Labour skill shortages	37.76	19.22	22.85	35.24	15.88	19.27	10.56	24.50
Access/cost of finance	34.21	17.46	24.66	26.31	21.62	46.57	27.86	13.57
Business licensing and permits	23.88	10.41	16.00	18.97	12.60	16.69	8.88	16.04
Competitors in the informal sector	49.00	34.43	29.21	40.54	16.43	34.43	NA	34.20
Corruption	52.28	24.48	30.08	50.15	37.76	34.04	7.07	35.90
Crime, theft and disorder	16.91	14.65	20.60	30.10	19.51	28.21	6.28	22.28
Customs and trade regulations	25.11	15.01	15.72	15.98	17.19	19.04	6.44	16.75
Electricity	35.64	21.68	21.30	38.19	50.02	51.68	4.72	33.41
Functioning of the courts	23.57	8.20	21.10	21.16	19.84	13.35	NA	18.27
Tax administration	35.40	17.22	25.86	29.02	24.64	26.57	19.33	25.91
Tax rates	48.59	22.33	40.59	38.57	27.95	36.98	24.15	36.04
Transportation	17.43	14.53	12.89	20.00	13.51	26.79	6.15	17.20

Notes: The statistics are sourced from the World Bank's Enterprise Surveys database. They cover the following geo-economic regions: Middle East and North Africa (MENA), East Asia and the Pacific (EAP), Eastern Europe and Central Asia (EECA), Latin America and the Caribbean (LAC), South Asia Region (SAR), Sub-Saharan Africa (SSA), and the Organization for Economic Cooperation and Development (OECD) countries.

Table 2 – Descriptive statistics

	Mean	Standard deviation
Dependent variables		
Labour regulations (binary variable)	0.246	0.431
Labour skill shortages (binary variable)	0.380	0.485
Explanatory variables		
Firm characteristics		
Foreign ownership (binary variable)	0.048	0.213
Exporting firm (binary variable)	0.225	0.418
Firm size (total employment)	124.019	317.055
Firm age (years)	20.938	16.646
Firm use of ICT (binary variable)	0.504	0.500
Skilled/Total production workers	0.616	0.277
Non-production/Total employment	0.261	0.198
Countries		
Algeria	0.130	0.336
Egypt	0.526	0.499
Jordan	0.096	0.295
Lebanon	0.063	0.243
Morocco	0.035	0.185
Oman	0.021	0.145
Syria	0.082	0.275
Yemen	0.043	0.203
Sectors		
Manufacturing sector	0.776	0.416
Service sector	0.176	0.381
Other sectors	0.047	0.211
Number of observations	5052	

Table 3 – Benchmark empirical results from the bivariate probit model (marginal effects)

	(i)	(ii)	(iii)	(iv)	(v)	(vi)
	$\Pr(R=1)$	$\Pr(S=1)$	$\Pr(R=1,S=1)$	$\Pr(R=0,S=0)$	$\Pr(R=1\|S=1)$	$\Pr(S=1\|R=1)$
Foreign ownership	-0.011	-0.060*	-0.021	0.050	0.004	-0.064*
	(0.029)	(0.033)	(0.017)	(0.032)	(0.038)	(0.038)
Exporting firm	0.007	-0.028	-0.004	0.017	0.017	-0.034
	(0.017)	(0.019)	(0.011)	(0.019)	(0.021)	(0.021)
Firm size	-0.008***	-0.005**	-0.005***	0.008***	-0.008***	-0.003
	(0.002)	(0.003)	(0.001)	(0.003)	(0.003)	(0.003)
Firm age	-0.000	-0.001***	-0.000	0.001**	0.000	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Firm use of ICT	-0.000	0.000**	0.000	-0.000	-0.000	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Skilled/Total production workers	-0.004	-0.028	-0.009	0.023	0.003	-0.029
	(0.022)	(0.025)	(0.014)	(0.024)	(0.028)	(0.027)
Non-production/Total employment	-0.047	0.130***	0.011	-0.073**	-0.098**	0.162***
	(0.034)	(0.038)	(0.021)	(0.036)	(0.043)	(0.040)
Egypt	0.173***	0.154***	0.124***	-0.202***	0.181***	0.096***
	(0.020)	(0.022)	(0.013)	(0.021)	(0.026)	(0.025)
Jordan	0.030	0.003	0.015	-0.017	0.038	-0.009
	(0.031)	(0.031)	(0.019)	(0.030)	(0.038)	(0.034)
Lebanon	0.344***	0.175***	0.242***	-0.277***	0.333***	0.074**
	(0.040)	(0.038)	(0.032)	(0.029)	(0.038)	(0.037)
Morocco	0.057	0.043	0.040	-0.060	0.059	0.024
	(0.046)	(0.047)	(0.032)	(0.047)	(0.052)	(0.045)
Oman	0.319***	0.135**	0.210***	-0.244***	0.315***	0.042
	(0.056)	(0.055)	(0.047)	(0.044)	(0.052)	(0.052)
Syria	0.223***	0.048	0.120***	-0.150***	0.246***	-0.024
	(0.035)	(0.033)	(0.024)	(0.029)	(0.036)	(0.034)
Yemen	-0.049	0.010	-0.022	0.016	-0.067	0.033
	(0.035)	(0.040)	(0.022)	(0.039)	(0.046)	(0.042)
Manufacturing sector	0.099***	0.126***	0.076***	-0.149***	0.096***	0.100***
	(0.016)	(0.019)	(0.009)	(0.019)	(0.021)	(0.023)
Other sectors	0.101***	0.118***	0.087***	-0.132***	0.091**	0.085**
	(0.039)	(0.038)	(0.027)	(0.034)	(0.044)	(0.037)
Number of observations	5052					
Rho	0.397***					

	(0.021)
Wald test (chi-squared)	259.386
p-value	(0.000)
Log pseudo-likelihood	-5866.220

Notes: *R* stands for labour regulations. *S* stands for labour skill shortages. Statistical significance: *=10%; **=5%; ***=1%. Robust standard errors are in parentheses. Algeria is the reference for country binary variables. Service sector is the reference for sector binary variables.

Table 4 – Empirical results from the ordered probit model (marginal effects)

	(i)	(ii)	(iii)	(iv)	(v)	(vi)
	Labour regulations			Labour skill shortages		
	No/Minor	Moderate	Major/Severe	No/Minor	Moderate	Major/Severe
Foreign ownership	0.019	-0.005	-0.013	0.073**	-0.019*	-0.054**
	(0.030)	(0.008)	(0.021)	(0.035)	(0.011)	(0.027)
Exporting firm	-0.006	0.002	0.004	-0.020	-0.011	0.031
	(0.018)	(0.007)	(0.012)	(0.017)	(0.010)	(0.027)
Firm size	0.010***	-0.003***	-0.007***	0.007**	-0.001	-0.006**
	(0.003)	(0.001)	(0.002)	(0.003)	(0.001)	(0.003)
Firm age	0.000	-0.000	-0.000	0.002***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Firm use of ICT	0.000	-0.000	-0.000	-0.001*	0.001	0.001*
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
Skilled/Total production workers	0.009	-0.002	-0.006	0.045	-0.013	-0.031
	(0.020)	(0.005)	(0.014)	(0.028)	(0.008)	(0.019)
Non-production/Total employment	0.054	-0.013	-0.041	-0.213***	0.046***	0.167***
	(0.033)	(0.008)	(0.025)	(0.038)	(0.010)	(0.030)
Egypt	-0.183***	0.042***	0.141***	-0.162***	0.034***	0.128***
	(0.021)	(0.005)	(0.016)	(0.020)	(0.006)	(0.016)
Jordan	-0.039	0.012	0.027	0.047	-0.021	-0.025
	(0.030)	(0.010)	(0.020)	(0.036)	(0.017)	(0.019)
Lebanon	-0.381***	0.054***	0.327***	-0.180***	-0.048***	0.228***
	(0.027)	(0.010)	(0.024)	(0.032)	(0.017)	(0.040)
Morocco	-0.051	0.010	0.040	-0.037	-0.013	0.051
	(0.033)	(0.007)	(0.026)	(0.025)	(0.012)	(0.035)
Oman	-0.340***	0.051***	0.288***	-0.157***	-0.050***	0.208***
	(0.039)	(0.017)	(0.038)	(0.030)	(0.018)	(0.040)
Syria	-0.253***	0.049***	0.204***	-0.039*	-0.015**	0.054*
	(0.033)	(0.006)	(0.027)	(0.023)	(0.007)	(0.032)
Yemen	0.044	-0.021	-0.023	-0.027	-0.019	0.046
	(0.029)	(0.015)	(0.016)	(0.024)	(0.012)	(0.041)
Manufacturing sector	-0.171***	0.057***	0.114***	-0.190***	0.051***	0.139***
	(0.024)	(0.010)	(0.016)	(0.022)	(0.011)	(0.015)
Other sectors	-0.169***	0.042***	0.126***	-0.107***	-0.041**	0.148***
	(0.034)	(0.006)	(0.027)	(0.025)	(0.018)	(0.036)
Number of observations		4719			4719	
Log pseudo-likelihood		-4593.8			-4840.5	

Notes: Statistical significance: *=10%; **=5%; ***=1%. Robust standard errors are in parentheses. Algeria is the reference for country binary variables. Service sector is the reference for sector binary variables.

Table 5 – Empirical results by sector (marginal effects from the bivariate probit model)

	(i)	(ii)	(iii)	(iv)	(v)	(vi)
	$\Pr(R=1)$	$\Pr(S=1)$	$\Pr(R=1,S=1)$	$\Pr(R=0,S=0)$	$\Pr(R=1\|S=1)$	$\Pr(S=1\|R=1)$
	Manufacturing sector					
Egypt	0.190***	0.140***	0.132***	-0.198***	0.202***	0.074***
	(0.023)	(0.024)	(0.014)	(0.023)	(0.028)	(0.027)
Jordan	0.013	-0.113***	-0.027	0.073**	0.052	-0.135***
	(0.036)	(0.033)	(0.019)	(0.035)	(0.045)	(0.040)
Lebanon	0.299***	0.109**	0.189***	-0.219***	0.301***	0.020
	(0.050)	(0.048)	(0.039)	(0.038)	(0.048)	(0.048)
Morocco	0.047	-0.002	0.022	-0.022	0.059	-0.021
	(0.048)	(0.048)	(0.032)	(0.048)	(0.054)	(0.048)
Oman	0.189**	0.046	0.107	-0.129	0.206**	-0.015
	(0.089)	(0.084)	(0.070)	(0.083)	(0.083)	(0.078)
Syria	0.230***	0.020	0.113***	-0.137***	0.260***	-0.056
	(0.036)	(0.033)	(0.024)	(0.030)	(0.037)	(0.035)
Yemen	-0.044	-0.011	-0.025	0.030	-0.055	0.007
	(0.038)	(0.040)	(0.023)	(0.040)	(0.049)	(0.043)
Foreign ownership	-0.009	-0.077**	-0.025	0.061	0.012	-0.084*
	(0.035)	(0.038)	(0.020)	(0.038)	(0.044)	(0.044)
Firm size	-0.010***	-0.008***	-0.007***	0.010***	-0.010***	-0.004
	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)
Firm age	0.000	-0.001**	-0.000	0.001	0.001	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Firm use of ICT	0.000	0.000**	0.000	-0.000*	0.000	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Non-production/Total employment	-0.083*	0.088*	-0.018	-0.023	-0.131**	0.128**
	(0.045)	(0.049)	(0.029)	(0.047)	(0.056)	(0.052)
Number of observations	3924					
Rho	0.402***					
	(0.024)					
	Service sector					
Jordan	-0.067*	0.161***	-0.007	-0.101**	-0.132**	0.206***
	(0.038)	(0.053)	(0.025)	(0.050)	(0.054)	(0.052)
Lebanon	0.021***	0.013**	0.012***	-0.022***	0.026***	0.005
	(0.004)	(0.005)	(0.003)	(0.005)	(0.005)	(0.006)
Oman	0.184**	0.099	0.114**	-0.169**	0.200**	0.041

	(0.081)	(0.085)	(0.056)	(0.076)	(0.088)	(0.088)
Exporting firm	-0.050	-0.080	-0.038*	0.092*	-0.049	-0.073
	(0.038)	(0.049)	(0.021)	(0.053)	(0.054)	(0.059)
Firm age	-0.000	-0.002**	-0.001	0.002**	0.000	-0.003**
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)
Non-production/Total employment	0.077	0.308***	0.103***	-0.282***	0.019	0.327***
	(0.055)	(0.067)	(0.031)	(0.066)	(0.076)	(0.077)
Number of observations	884					
Rho	0.385***					
	(0.056)					
	Other sectors					
Egypt	0.107	0.442***	0.164*	-0.385***	0.007	0.375***
	(0.107)	(0.103)	(0.087)	(0.096)	(0.126)	(0.088)
Jordan	0.079	0.064	0.058	-0.086	0.084	0.033
	(0.100)	(0.112)	(0.068)	(0.102)	(0.122)	(0.114)
Lebanon	0.242*	0.313**	0.234**	-0.321***	0.199	0.212*
	(0.134)	(0.127)	(0.113)	(0.105)	(0.142)	(0.108)
Oman	0.349***	0.191	0.248**	-0.292***	0.347***	0.069
	(0.120)	(0.122)	(0.102)	(0.098)	(0.116)	(0.116)
Firm age	-0.003	0.003	-0.001	-0.001	-0.005*	0.004
	(0.002)	(0.003)	(0.001)	(0.003)	(0.003)	(0.003)
Firm use of ICT	-0.000	0.001*	0.000	-0.001	-0.001	0.002**
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)
Number of observations	238					
Rho	0.444***					
	(0.103)					

Notes: *R* stands for labour regulations. *S* stands for labour skill shortages. Statistical significance: *=10%; **=5%; ***=1%. Robust standard errors are in parentheses. In the cases of the manufacturing sector and the other sectors, Algeria is the reference for country binary variables. In the case of the service sector, firms located in Algeria predict failure perfectly and, therefore, they are dropped from the dataset. Then, Egypt is set as the reference country.

Table 6 – Empirical results by country (marginal effects from the bivariate probit model)

	(i)	(ii)	(iii)	(iv)	(v)	(vi)
	$\Pr(R=1)$	$\Pr(S=1)$	$\Pr(R=1,S=1)$	$\Pr(R=0,S=0)$	$\Pr(R=1\|S=1)$	$\Pr(S=1\|R=1)$
	Algeria					
Manufacturing sector	-0.020	0.121**	0.013	-0.089*	-0.059	0.164**
	(0.040)	(0.049)	(0.018)	(0.050)	(0.062)	(0.069)
Exporting firm	-0.135***	-0.090	-0.072***	0.153	-0.227***	0.359***
	(0.014)	(0.189)	(0.010)	(0.189)	(0.029)	(0.131)
Firm use of ICT	0.000	0.001**	0.000**	-0.001***	0.000	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Skilled/Total production workers	-0.071*	-0.055	-0.041*	0.085	-0.092	-0.025
	(0.041)	(0.059)	(0.023)	(0.059)	(0.059)	(0.068)
Number of observations	651					
Rho	0.344***					
	(0.072)					
	Egypt					
Manufacturing sector	0.157***	0.206***	0.127***	-0.236***	0.148***	0.167***
	(0.020)	(0.024)	(0.012)	(0.024)	(0.027)	(0.028)
Other sectors	0.032	0.278***	0.090	-0.219***	-0.025	0.239***
	(0.068)	(0.062)	(0.058)	(0.056)	(0.073)	(0.045)
Foreign ownership	-0.016	-0.091*	-0.033	0.073	0.005	-0.094
	(0.049)	(0.053)	(0.029)	(0.052)	(0.061)	(0.061)
Firm size	-0.007***	-0.004	-0.005***	0.007**	-0.008**	-0.002
	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)
Firm age	-0.000	-0.002***	-0.001**	0.002***	0.000	-0.002***
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)
Skilled/Total production workers	0.044	-0.077*	0.001	0.034	0.073*	-0.096**
	(0.035)	(0.039)	(0.022)	(0.036)	(0.042)	(0.041)
Non-production/Total employment	0.035	0.218***	0.079**	-0.174***	-0.013	0.215***
	(0.048)	(0.052)	(0.031)	(0.049)	(0.057)	(0.053)
Number of observations	2661					
Rho	0.369***					
	(0.029)					
	Jordan					
Manufacturing sector	0.032	-0.192***	-0.011	0.149***	0.103*	-0.249***
	(0.036)	(0.057)	(0.022)	(0.055)	(0.060)	(0.062)
Other sectors	0.099	-0.136**	0.000	0.037	0.213*	-0.252**

	(0.086)	(0.063)	(0.032)	(0.086)	(0.127)	(0.103)
Foreign ownership	-0.139***	-0.059	-0.072***	0.126*	-0.249***	0.106
	(0.022)	(0.075)	(0.015)	(0.075)	(0.051)	(0.121)
Firm use of ICT	0.001*	0.001	0.000*	-0.001*	0.001	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Non-production/Total employment	-0.201**	0.321***	-0.039	-0.159	-0.426***	0.556***
	(0.085)	(0.107)	(0.047)	(0.109)	(0.152)	(0.147)
Number of observations	489					
Rho	0.419***					
	(0.083)					
	Lebanon					
Manufacturing sector	-0.002	0.093	0.038	-0.052	-0.035	0.101
	(0.063)	(0.063)	(0.044)	(0.057)	(0.067)	(0.065)
Other sectors	0.011	0.346***	0.130	-0.227***	-0.094	0.311***
	(0.109)	(0.097)	(0.098)	(0.084)	(0.111)	(0.068)
Foreign ownership	0.182	-0.084	0.022	-0.076	0.210**	-0.154
	(0.120)	(0.124)	(0.092)	(0.103)	(0.107)	(0.144)
Firm use of ICT	-0.002***	-0.001	-0.001**	0.002**	-0.002**	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Number of observations	320					
Rho	0.454***					
	(0.078)					
	Oman					
Manufacturing sector	0.002	-0.108	-0.041	0.064	0.067	-0.124
	(0.121)	(0.122)	(0.091)	(0.119)	(0.132)	(0.125)
Other sectors	0.213	-0.119	0.030	-0.063	0.303**	-0.264*
	(0.137)	(0.118)	(0.096)	(0.123)	(0.119)	(0.137)
Exporting firm	-0.161	0.248*	-0.046	-0.134	-0.346**	0.283***
	(0.121)	(0.146)	(0.107)	(0.141)	(0.145)	(0.080)
Firm size	-0.232	0.142	-0.064	0.027	-0.380**	0.295*
	(0.163)	(0.151)	(0.120)	(0.148)	(0.192)	(0.157)
Number of observations	110					
Rho	0.670***					
	(0.103)					
	Morocco					
Exporting firm	0.153**	0.223***	0.130***	-0.246***	0.158	0.128
	(0.064)	(0.079)	(0.046)	(0.090)	(0.153)	(0.111)
Skilled/Total production workers	0.065	0.288***	0.101	-0.253**	-0.111	0.278**

	(0.080)	(0.101)	(0.063)	(0.100)	(0.142)	(0.114)
Number of observations			180			
Rho			0.751***			
			(0.078)			
			Syria			
Foreign ownership	0.128	0.392*	0.217	-0.303	0.039	0.329**
	(0.272)	(0.226)	(0.262)	(0.188)	(0.259)	(0.152)
Exporting firm	0.118**	-0.015	0.043	-0.060	0.140**	-0.055
	(0.054)	(0.054)	(0.034)	(0.050)	(0.059)	(0.060)
Number of observations			417			
Rho			0.390***			
			(0.072)			
			Yemen			
Exporting firm	-0.112***	0.348**	-0.073***	-0.309*	-0.247***	0.347
	(0.022)	(0.174)	(0.018)	(0.174)	(0.056)	(84.683)
Firm size	-0.013	-0.089*	-0.015	0.087*	-0.002	-0.081
	(0.025)	(0.054)	(0.017)	(0.053)	(0.049)	(0.062)
Firm use of ICT	0.001	0.001	0.001*	-0.001*	0.001	0.001
	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)
Skilled/Total production workers	0.006	-0.218**	-0.013	0.199*	0.073	-0.249**
	(0.057)	(0.109)	(0.040)	(0.109)	(0.113)	(0.123)
Number of observations			218			
Rho			0.520***			
			(0.117)			

Notes: *R* stands for labour regulations. *S* stands for labour skill shortages. Statistical significance: *=10%; **=5%; ***=1%. Robust standard errors are in parentheses. The service sector is set as the reference sector in the cases of Egypt, Jordan, Lebanon, and Oman. In the case of Algeria, service firms predict failure perfectly and, therefore, they are dropped from the dataset. Then, the other sectors' category is set as the reference. In our dataset, firms located in Morocco, Syria, and Yemen belong exclusively to the manufacturing sector.

Appendix: Table A.1 – Descriptive statistics for the dependent variables by country and by sector

	(i)	(ii)	(iii)	(iv)	(v)
	Number of Observations	Labour regulations		Labour skill shortages	
		Mean	Standard deviation	Mean	Standard deviation
Overall	5052	0.246	0.431	0.380	0.485
By country					
Algeria	657	0.138	0.345	0.317	0.465
Egypt	2661	0.273	0.445	0.421	0.493
Jordan	489	0.141	0.348	0.286	0.452
Lebanon	320	0.368	0.482	0.480	0.500
Morocco	180	0.184	0.389	0.320	0.468
Oman	110	0.354	0.480	0.400	0.492
Syria	417	0.420	0.493	0.485	0.500
Yemen	218	0.110	0.313	0.316	0.466
By sector					
Manufacturing sector	3924	0.258	0.437	0.392	0.488
Service sector	884	0.198	0.399	0.328	0.469
Other sectors	238	0.227	0.419	0.380	0.486

Appendix: Table A.2 – Other results from the bivariate probit model

	Estimated coefficients		Marginal effects	
	(i)	(ii)	(iii)	(iv)
	Labour regulations (R)	Labour skill shortages (S)	$\Pr(R=1,S=0)$	$\Pr(R=0,S=1)$
Foreign ownership	-0.035	-0.162*	0.010	-0.039
	(0.096)	(0.091)	(0.017)	(0.024)
Exporting firm	0.021	-0.074	0.011	-0.024*
	(0.055)	(0.052)	(0.009)	(0.014)
Firm size	-0.024***	-0.014**	-0.002*	-0.000
	(0.008)	(0.007)	(0.001)	(0.002)
Firm age	-0.000	-0.003***	0.000	-0.001**
	(0.001)	(0.001)	(0.000)	(0.000)
Firm use of ICT	-0.000	0.001**	-0.000	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)
Skilled/Total production workers	-0.013	-0.074	0.005	-0.019
	(0.072)	(0.067)	(0.012)	(0.019)
Non-production/Total employment	-0.151	0.343***	-0.058***	0.119***
	(0.110)	(0.099)	(0.018)	(0.029)
Egypt	0.570***	0.408***	0.049***	0.029*
	(0.069)	(0.060)	(0.011)	(0.018)
Jordan	0.096	0.007	0.015	-0.013
	(0.096)	(0.082)	(0.017)	(0.024)
Lebanon	0.933***	0.446***	0.102***	-0.067***
	(0.103)	(0.095)	(0.024)	(0.024)
Morocco	0.175	0.112	0.016	0.003
	(0.134)	(0.121)	(0.021)	(0.032)
Oman	0.860***	0.344**	0.109***	-0.074**
	(0.144)	(0.138)	(0.034)	(0.031)
Syria	0.627***	0.124	0.102***	-0.073***
	(0.090)	(0.084)	(0.022)	(0.021)
Yemen	-0.167	0.027	-0.026	0.033
	(0.129)	(0.104)	(0.017)	(0.033)
Manufacturing sector	0.345***	0.345***	0.022***	0.050***
	(0.059)	(0.055)	(0.009)	(0.015)
Other sectors	0.301***	0.300***	0.014	0.030
	(0.108)	(0.096)	(0.019)	(0.030)
Number of observations	5052	5052	5052	5052

Notes: *R* stands for labour regulations. *S* stands for labour skill shortages. Statistical significance: *=10%; **=5%; ***=1%. Robust standard errors are in parentheses. Algeria is the reference for country binary variables. Service sector is the reference for sector binary variables.

1130, rue Sherbrooke Ouest, bureau 1400, Montréal (Québec) H3A 2M8

Tél. : 514-985-4000 • Téléc. : 514-985-4039

www.cirano.qc.ca • info@cirano.qc.ca

Centre interuniversitaire de recherche en analyse des organisations
Center for Interuniversity Research and Analysis on Organizations