

Female employment in MENA's manufacturing sector: the implications of firm-related and national factors

Ali Fakh · Pascal L. Ghazalian

Received: 12 May 2014 / Accepted: 16 December 2014 / Published online: 6 January 2015
© Springer Science+Business Media New York 2014

Abstract The Middle East and North Africa (MENA) region has realized significant advances toward improving women's well-being and social status over the last few decades. However, women's employment rate in the MENA region remains one of the lowest in the world. This paper examines the implications of firm-related and national factors for female employment in manufacturing firms located in the MENA region. The empirical analysis is implemented for firm-level data derived from the World Bank's Enterprise Surveys database. It uses fractional logit and other econometric models to perform the estimations for female overall employment, female non-production employment, and female employment in managerial positions. The results reveal significant implications of firm-related factors, such as private foreign ownership, exporting activities, firm size, and labour composition, for female employment. They also show that national factors, such as economic development and gender equality, promote female employment. There are considerable differences in the estimated marginal effects across female employment categories. This paper provides policy-makers with directions to design strategies aiming at enhancing women's economic opportunities and employment rates.

Keywords Female employment · Fractional logit model · Manufacturing firms · MENA region

JEL Classification J16 · J21 · J23 · J82

A. Fakh
Department of Economics, School of Business, Lebanese American University,
P.O. Box 13-5053, Beirut, Lebanon
e-mail: afakh@lau.edu.lb

P. L. Ghazalian (✉)
Department of Economics, University of Lethbridge, Lethbridge, AB T1K 3M4, Canada
e-mail: pascal.ghazalian@uleth.ca

1 Introduction

Increasing female employment rates remains an essential item on the labour policy agenda of the Middle East and North Africa (MENA) region.¹ Despite that MENA countries have realized important achievements in promoting women's well-being and social status over the past few decades,² MENA's record in terms of female employment is still lagging behind many geo-economic regions and remains one of the lowest in the world (Morrison et al. 2008; The World Bank 2011; International Labour Organization 2014). Table 1 presents some comparative statistics that illustrate labour force characteristics of the MENA region, sub-grouped into Middle East (ME) and North Africa (NA), and those of other geo-economic regions through recent years. It shows that the MENA region is generally characterized by higher annual employment growth rates compared to many other geo-economic regions. However, the MENA region also has the highest unemployment rates for youth and women, and the lowest employment-to-population ratio for women. The World Bank's (2011) report shows that around 50 % of women in developing countries are either employed or actively looking for jobs compared to 25.2 % in the MENA region. In addition, it notes that this relatively low female labour force participation rate³ mainly reflects the implications of social and cultural norms that restrict women from actively contributing to the labour market outside their homes.⁴ Rauch and Kostyshak (2009) indicate that MENA's Arab countries have laws that prohibit labour discrimination in the workplace. They argue that the low levels of female participation in MENA's labour markets have to stem from de facto discrimination rather than from de jure discrimination. Klasen and Lamanna (2009) note that women in the MENA region face structural barriers in employment, in addition to social and cultural impediments that limit their contribution to the labour market.

It is important to understand the reasons behind the prevailing low female employment and workforce participation rates in MENA countries and the various factors that could contribute in raising these rates. This is because the prevalence of gender inequality in the labour market restrains economic growth and would result in under-exploited production resources (Klasen and Lamanna 2009; Cuberes and

¹ Female employment rate is commonly determined as the proportion of women employed in the private and public sectors (Stevenson 2010; The World Bank 2013a).

² Several countries in the MENA region have dedicated significant resources to women's education over the past few decades. For example, since the 1990s, MENA countries have enjoyed substantial growth in female enrolment in primary and secondary education, and have benefited from some progress in female enrolment in tertiary education (Morrison et al. 2008).

³ Female labour force (workforce) participation rate is usually measured as the proportion of women aged 15 years and older who are economically active (i.e., employed or looking for jobs) (Stevenson 2010; World Bank 2013a). Hence, female employment rates and female labour force participation rates are linked, but they are not interchangeably equivalent. Note that lower rates of women participation in the labour market are typically associated with lower female employment rates. According to the World Bank (2013a), employment includes the contribution in all market production (paid work) in addition to certain types of non-market production (unpaid work). Thus, it covers the proportion of women that are currently working.

⁴ Also, Chamlou et al. (2011) find that traditional social norms reduce women's participation in the labour market in Jordan.

Table 1 Labour market indicators by geo-economic region (averages, 2007–2012)

	Annual real GDP growth rate (%)	Unemployment rate (%)		Employment-to-population ratio (%) Female	Annual employment growth rate (%)
		Youth	Female		
ME	4.8	25.1	20.4	14.6	3.4
NA	5.4	25.5	19.0	19.0	2.2
World	4.1	12.5	6.3	47.5	1.2
DE and EU	1.7	16.2	7.6	48.9	0.1
EA	8.7	9.1	3.5	61.3	0.6
SEAP	5.1	13.8	5.0	56.0	2.1
SA	6.7	9.7	4.7	30.9	0.9
LAC	4.7	14.4	8.8	48.1	2.1
SSA	5.3	12.0	8.4	59.3	3.0

Source: International Labour Organization (2014)

ME Middle East, NA North Africa, DE developed economies, EU European Union, EA East Asia, SEAP South-East Asia and the Pacific, SA South Asia, LAC Latin America and the Caribbean, SSA Sub-Saharan Africa, GDP Gross Domestic Product

Teignier-Baqué 2011; International Labour Organization 2014). Hence, examining the factors that determine female employment and workforce participation rates would provide directions to policy-makers to develop labour market strategies aiming at increasing women's economic opportunities.

There is a wide strand of empirical literature that examines the determining factors of female participation in the labour market (e.g., Mincer 1962; Killingworth and Heckman 1986; Prieto-Rodríguez and Rodríguez-Gutiérrez 2003; Greenwood et al. 2005; Kohara 2010; Smith 2011; Esfahani and Shajari 2012; Karaoglan and Okten 2012; Klasen and Pieters 2012). This strand of literature has primarily focused on the supply-side factors such as demographic, socio-economic, and household-related characteristics using household survey data. Meanwhile, firm-related factors, which also influence female employment and workforce participation rates, have received less attention in the literature. In this context, Bratti et al. (2005) find that demand-side and job-related factors provide explanations for new mothers' participation in the labour market in Italy. Pissarides et al. (2005) note that low female employment and workforce participation rates could be explained by demand-side factors because firms may not offer enough jobs that attract women to contribute to the labour market. Thus, low female employment and workforce participation rates could be associated with employers' preferences and characteristics. Lee et al. (2008) find that low labour force participation rates among married women are driven by demand-side factors in South Korea. Buchanan et al. (2010) underline the importance of demand-side factors that affect female employment and workforce participation rates, focusing on the demand for skilled workers. Abe (2013) concludes that a combination of supply-side and demand-side factors contributes in explaining female labour force participation rates in Japan.

In recent years, there has been an increasing amount of empirical research on the various aspects of women's labour market in the MENA region. For instance, Chamlou (2008) explores women entrepreneurs' contribution to the social and economic development of the MENA region, and reviews the factors that promote women's entrepreneurship. Also, Chamlou et al. (2011) examine the determinants of female labour force participation rates in Jordan, focusing on the role of social norms in reducing these rates. Hayo and Caris (2013) look into the role of identity, specifically religion and cultural traditions, in explaining the low rates of female labour force participation in the MENA region. The Organization for Economic Cooperation and Development's (2012) report investigates women entrepreneurs' access to finance in the MENA region, describing significant gender-related obstacles. Contessi et al. (2013) examine the relationship between female ownership and entrepreneurship of manufacturing firms in the MENA region and trade openness. They also look into the effects of female employment on exporting activities. They find that trade openness has disproportionate implications for industries characterized by comparative advantage in terms of female ownership, entrepreneurship, and employment.

The primary objective of this paper is to examine the implications of firm-related and national factors for female employment in manufacturing firms located in the MENA region. The results would assist policy-makers in understanding the demand-side factors that influence female employment rates, and in designing strategies that enhance women's economic opportunities. We use firm-level data rather than household characteristics data to analyze the determinants of female employment rates in the MENA labour market. The data come from the World Bank's Enterprise Surveys database, which is a comprehensive and comparable source of firm-level data. We also examine the role of macro-factors, such as national economic development and gender inequality levels, in determining female employment rates. We use the fractional logit model of Papke and Wooldridge (1996) and other estimation models to carry out the empirical analysis. The remainder of this paper is organized as follows. Section 2 describes the data sources and variables used through the empirical analysis. Section 3 discusses the expected implications of firm-related and national factors for female employment rates. Section 4 describes the empirical methodology. Section 5 presents the empirical results. Section 6 provides concluding remarks.

2 Data and variables

The dataset used through the empirical investigation is derived from the World Bank's Enterprise Surveys database. The latter represents a comprehensive source of firm-level data in emerging and developing countries. It covers various indicators of the business environment, and it comprises data on firm-level female employment. The dataset includes manufacturing firms located in eight Arab countries in the MENA region: Algeria, Egypt, Jordan, Lebanon, Morocco, Oman,

Syria, and Yemen.⁵ It covers the following manufacturing industries: chemicals and pharmaceuticals, electronics, food, garments, leather, metals and machinery, non-metallic and plastic materials, textiles, wood and furniture, and other manufacturing. The final dataset comprises 3,619 firm observations.⁶

In this paper, female employment is basically depicted by: (1) the fraction of female full-time workers in total full-time employment and, (2) the fraction of female non-production full-time workers in total non-production full-time workers.⁷ The explanatory variables related to firm characteristics include: (1) firm size measured by the number of employees; (2) firm age since establishment, (3) a binary variable that equals one for an exporting firm and zero otherwise; (4) firm ownership variables depicted through the fraction of private foreign ownership in total ownership and through the fraction of government ownership in total ownership with a reference being the fraction of private domestic ownership in total ownership; (5) a binary variable representing the use of Information and Communication Technology (ICT) that equals one for firm use of own Internet website and zero otherwise; and (6) firm labour composition variables represented through the fraction of skilled production workers in total production workers and through the fraction of non-production workers in total employment. According to the World Bank's Enterprise Surveys, production workers are employees engaged in fabricating, processing, assembling, inspecting, receiving, storing, handling, packing, warehousing, shipping (but not delivering), maintenance, repair, product development, auxiliary production for plant's own use (e.g., power plant), recordkeeping, and other services closely associated with these production operations. Non-production workers comprise employees that are not engaged in the aforementioned production activities. They mainly cover management, administration, and sales employees.

Country variables include Gender Inequality Index (GII) sourced from the United Nations Development Programme's (UNDP's) Human Development Reports,⁸ Gross Domestic Product per Capita (GDPC) depicting national economic

⁵ The 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, 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.

⁶ It is worth noting that sample attrition is not a pertinent issue through the empirical analysis. Sample attrition is a common incident in panel data collected over two or more points in time. It occurs when some cross-sectional units (e.g., some firms) are dropped out from the original set over time. Attrition would generate bias if the dropped-out cross-sectional units are systematically different from those which remain in the sample. The final dataset used in this paper is characterized as a cross-section where each firm corresponds to only one observation without regard to differences in time.

⁷ The World Bank's Enterprise Surveys database includes information on the number of part-time workers. However, data covering female part-time employment are inadequate to carry out an empirical analysis through this paper. Women normally demand more part-time arrangements than men to balance between family responsibilities and work tasks. However, women on part-time jobs usually receive fewer benefits than regular full-time workers (e.g., Zeytinoglu et al. 2010). Accordingly, firm characteristics are expected to have various effects on part-time female employment.

⁸ The UNDP's GII is designed for the measurement of gender disparity. It covers female disadvantages through three dimensions: reproductive health, empowerment, and economic activities. It ranges from zero (full gender equality) to one (extreme gender inequality).

development level, and a national business freedom index. The last two variables are derived from the World Development Indicators (WDI) database of the World Bank.⁹ The national business freedom index is constructed by averaging the percentile rankings of each country on ten different indicators (starting a business, dealing with construction permits, getting electricity, registering property, getting credit, protecting investors, paying taxes, trading across borders, enforcing contracts, and resolving insolvency). It is worth noting that the business freedom index does not encompass gender inequality indicators.

Table 2 provides descriptive statistics for the dependent and explanatory variables used through the empirical investigation. These statistics indicate that the percentage of female full-time workers in total full-time employment has a mean of 14.8 % (with a standard deviation of 22.8 %), whereas the percentage of female non-production full-time workers in total non-production full-time workers has a considerably lower mean of 2.9 % (with a standard deviation of 6.6 %). The statistics also show that private foreign ownership has a mean of 4.3 % (with a standard deviation of 18.8 %), whereas government ownership has a mean of 2.6 % (with a standard deviation of 15.4 %). The surveyed manufacturing firms in our dataset have an average of 135 full-time workers (with a standard deviation of 323 full-time workers). We find that around 36 % of manufacturing firms in the sample use their own Internet websites to communicate with clients, and to source and provide information. Alternative statistics indicate that around 49 % of firms use E-mail as a form of business communication. The mean of the percentage of skilled production workers in total production workers and the mean of the percentage of non-production workers in total employment are 61.1 % (with a standard deviation of 27.0 %) and 23.2 % (with a standard deviation of 16.7 %), respectively. The Variance Inflation Factor (VIF) is used to assess the degree of multicollinearity of the *i*th explanatory variable with the other explanatory variables in a regression model. A VIF score above 10 indicates multicollinearity problems (Kutner et al. 2004). Table 3 shows that the VIF scores are small being below 1.4 with an average of 1.15.

3 Expected implications of variables for female employment

This section describes the expected implications of firm-related characteristics and national development variables for female employment.

3.1 Ownership type

The empirical literature commonly reveals positive effects of multinational activities and Foreign Direct Investment (FDI) on female employment rates (e.g.,

⁹ The WDI's ease of doing business indicator is a ranking score of countries according to the quality of regulatory environment in enhancing business. We inversely rank the MENA countries in our dataset, giving higher scores to more business-conducive regulatory environments. Hence, a positive coefficient on this variable would indicate a positive effect of business freedom on the dependent female employment variable.

Table 2 Descriptive statistics

	Mean	Standard deviation
<i>Dependent variables</i>		
Female full-time workers (fraction in total full-time employment)	0.148	0.228
Female non-production full-time workers (fraction in total non-production full-time workers)	0.029	0.066
<i>Explanatory variables</i>		
Foreign ownership (fraction in total ownership)	0.043	0.188
Government ownership (fraction in total ownership)	0.026	0.154
Exporting firm (binary variable)	0.308	0.461
Firm size (total employment)	134.811	322.594
Firm age (years)	21.038	16.436
Skilled/Total production workers	0.611	0.270
Non-production/Total employment	0.232	0.167
Firm use of ICT, Internet website (binary variable)	0.359	0.479
Firm use of ICT, E-mail (binary variable)	0.489	0.500
GDPG (current USD)	2,198.275	932.863
Gender inequality index (national indicator)	0.554	0.073
Business freedom (national indicator)	5.337	1.643

Table 3 Variance inflation factor (VIF)

	(1)		(2)	
	VIF	Tolerance (1/VIF)	VIF	Tolerance (1/VIF)
Foreign ownership	1.06	0.94	1.06	0.94
Government ownership	1.14	0.88	1.13	0.88
Exporting firm	1.37	0.73	1.36	0.74
Firm size	1.32	0.76	1.32	0.76
Firm age	1.07	0.93	1.07	0.93
Skilled production workers ratio	1.02	0.98	1.03	0.97
Non-production workers ratio	1.04	0.96	1.04	0.96
Firm use of ICT	1.29	0.78	1.28	0.78
Ln(GDPG)	1.12	0.89		
Business freedom	1.12	0.89		
Gender inequality index (GII)			1.04	0.96
Mean	1.15	0.87	1.15	0.88

Curd et al. 2007; Siegel et al. 2011). Several studies indicate that multinational firms tend to employ female workers at higher rates than domestic firms to benefit from their under-exploited skills and/or gender wage gaps stemming from the

implications of national gender inequality (Hewlett and Rashid 2010; Siegel et al. 2011). Furthermore, multinational enterprises, particularly those headquartered in countries with higher records of national gender equality than those prevailing in MENA countries, are arguably more resistant to the implications of social gender inequality in MENA countries. Then, they would transfer this relative immunity into the business culture and hiring practices of their affiliated firms in MENA countries, resulting in higher female employment rates. Hence, private foreign ownership is expected to promote female employment rates in MENA manufacturing firms. The extent of female employment in the public sector vis-à-vis the private domestic sector is also pertinent for the manufacturing sector in the MENA region. The World Bank's (2011) report indicates that the public sector generally tends to employ more female (particularly skilled and non-production) workers than the private sector through MENA countries. For instance, it is noted that the public sector normally offers more jobs that are considered to be "female-friendly" such as administration jobs. Accordingly, female employment rates are expected to be higher in the public sector than in the private domestic sector, particularly in non-production occupations.

3.2 Exporting activities

The enhancing implications of exporting activities and trade openness for female employment rates in developing countries are regularly underlined through the empirical literature (e.g., International Labour Organization 1985; Kabeer and Mahmud 2004; Moghadam 2005; Bussmann 2009; Gaddis and Pieters 2012). Moghadam (2005) notes that female employment rates tend to be higher in MENA countries characterized by export-oriented manufacturing industries. Manufacturing industries in developing countries are expected to have comparative advantage in labour-intensive production. Exporting activities would further emphasize this comparative advantage, leading to increases in the proportions of female workers. Moreover, exporting firms facing higher competition levels in foreign markets would be compelled to employ under-exploited female labour resources. Kabeer and Mahmud (2004) argue that, in labour-intensive exporting sectors facing important levels of market competition, the demand for female labour force is generally higher. This is because women tend to accept lower wages. It is important to highlight Becker's (1971) seminal view which indicates that discrimination is less likely to occur under the forces of competitive markets. Specifically, it would be more difficult for firms to survive when they discriminate against women. Becker's (1971) "employer taste" model shows that discrimination is costly for firms in the long-run when labour markets operate under competitive market conditions. In such cases, profitability and market share of firms would eventually decrease. Hence, positive relationships are expected between exporting activities and female employment rates.

3.3 Firm size

Some studies explain that larger firms use more complex technologies and tend to have more unpleasant working environment due to increasing labour divisions and impersonal working atmosphere (Masters 1969; Schmidt and Zimmermann 1991). These factors could disproportionately affect female employment rates in larger firms. Also, women tend to demand more flexible working arrangements due to household responsibilities (Fagan 2001). Such arrangements are presumably more difficult to find in larger firms (Sarbu 2014). Meanwhile, larger firms have tendencies to offer more benefits (Mitchell and Andrews 1981; Brown et al. 1996; Currie and Madrian 1999) and higher wages compared to smaller firms (Masters 1969; Schmidt and Zimmermann 1991).¹⁰ Such factors would promote female employment. According to this review, the relationship between firm size and female employment is ambiguous a priori.

3.4 Workforce composition

It is commonly argued in the literature that firms in developing countries tend to employ relatively more female workers for light (primarily unskilled) occupations and tasks that do not require extensive training (Çağatay and Berik 1991; Çağatay and Özler 1995). Accordingly, firms that are more unskilled-labour intensive in production would be expected to have higher fractions of female workers. Based on this review, a negative relationship is expected between skilled production ratio and female employment rate. Also, a negative relationship is expected between non-production ratio (covering highly skilled workers) and female employment rates.

3.5 Firm use of ICT

There are few studies that examine the relationship between female employment and ICT. In this context, Dettling (2012) finds that the use of the Internet at home has positive implications for married women's labour supply rates. This finding can be related to the wider literature that underline positive effects of technological change on female labour force participation (e.g., Olivetti 2006; Attanasio et al. 2008). Firm use of ICT would generally facilitate the communication and flow of information between firm and the labour market. However, gender-biased implications of ICT use on employment may occur. For instance, ICT use may have disproportionately smaller implications for women than for men, leading to lower female employment rates. Therefore, the implications of ICT use for female employment can be positive or negative.

¹⁰ Larger firms tend to pay higher wages because they are normally expected to earn higher profits and to be more innovative and capital-intensive compared to smaller firms. They also tend to pay higher wages to compensate for disutilities in the working atmosphere (Masters 1969; Schmidt and Zimmermann 1991).

3.6 National indicators

A number of studies examine the implications of economic growth for female workforce participation rates (e.g., Goldin 1995; Mammen and Paxson 2000; Tansel 2001; Tam 2011). These studies often show that increases in GDPC would initially result in reductions in female workforce participation rates as economic activities shift from family farms to industrial firms. Continuing increases in GDPC would promote female educational attainments and would lessen the stigma of women joining the labour force and, hence, they would positively influence female workforce participation rates. Empirical evidence on such U-shaped relationships is typically realized using panel datasets characterized by considerable cross-country variations and evolving GDPC patterns over time. It follows that positive relationships between economic development and female employment are expected when implementing the analysis over recent time periods, and for cross-country datasets collected over recent points in time. Cuberes and Teignier (2014) review the literature on the relationship between gender inequality and economic growth, focusing on macroeconomic perspectives. They find that GDPC is negatively correlated with gender inequality in education and in the labour market. This means that at higher stages of economic development, gaps between women and men tend to be lower. They underline three principal factors that generate these trends: income elasticity channel, technological progress, and advances in women rights. These factors promote women to enter into the formal labour market (paid work), and to be less restricted in home production.¹¹ It is important to indicate that continuous improvements in national gender equality are also expected to result in higher female employment rates (Mammen and Paxson 2000).¹² Based on this review, a positive relationship is expected between national economic and socio-economic development factors and female employment.

4 Empirical methodology

The empirical analysis examines the determinants of female employment rates in manufacturing firms located in the MENA region. Female employment variables are primarily represented as fractions from total employment. Given the fractional nature of the dependent variables, we use the seminal fractional logit model of Papke and Wooldridge (1996) to carry out the empirical investigation. The estimation model of Papke and Wooldridge (1996) is designed to take into account the bounded nature of fractional dependent variables between zero and one. These boundaries are established by definition and not by censoring (Wagner 2001; Ramalho et al. 2011; Fakh and Ghazalian 2014). The fractional logit model is a

¹¹ Cavalcanti and Tavares (2008) show that technological progress in the household sector (through durable goods) contribute in liberating women from domestic work. This outcome eventually leads to increases in women participation in the labour market. They also find a positive relationship between GDPC and female workforce participation.

¹² Increases in female employment and workforce participation rates *per se* may not be necessarily a sign of a decline in gender inequality (Standing 1999; Klasen and Pieters 2012).

one-step approach where limited observations (i.e., zero female workers) and strictly positive fractions of female workers are estimated in one equation. Comparatively, the Heckman selection model is a two-step approach where the first step estimates the decision to employ female workers using the whole dataset, and the second step estimates the fraction of female workers equation. The latter estimation takes into account the probability of employing female workers from the first step estimation. Besides some conceptual issues,¹³ one critical disadvantage of using the Heckman selection model is that there should be at least one variable in the selection equation that does not affect the outcome equation to get precise estimates (Puhani 2000; Sartori 2003). However, it is difficult to find variables that are important for the decision to employ female workers but not relevant for the employment volume of female workers (and vice versa). Also, the Heckman selection model requires a normality assumption to obtain consistent estimates. Furthermore, predictions obtained from the Heckman selection model applied to an empirical model with a fractional dependent variable are not bounded between zero and one.

The application of an alternative two-limit (zero and one) Tobit estimator would also encounter some basic issues. The Tobit estimator is used for censored data, but it is not conceptually pertinent when the values of the dependent variables fall within a given interval by definition (Maddala 1991; Ramalho et al. 2011). Moreover, this estimator entails stringent assumptions such as homoskedasticity and normality prior to censoring. A comprehensive discussion on the appropriateness of the fractional logit model, and on the various issues associated with the use of alternative methods to estimate empirical specifications characterized by fractional dependent variables can be found in the econometric literature (e.g., Wagner 2001; Ramalho et al. 2011).

Let $F_{ic} \in [0, 1]$ denote a fractional variable of female employment for a manufacturing firm “ i ” located in a country “ c ” in the MENA region. The fractional logit model is represented by:

$$E(F_{ic}|X_i, Z_c) = G(X_i\alpha + Z_c\beta) = \exp(X_i\alpha + Z_c\beta) / [1 + \exp(X_i\alpha + Z_c\beta)] \quad (1)$$

where X_i is a vector of firm-related variables with a corresponding vector of coefficients depicted by α , Z_c is a vector of country-related variables with a corresponding vector of coefficients depicted by β , and $0 \leq G(\cdot) \leq 1$ is the cumulative distribution function of the logistic distribution. The estimation procedure of fractional logit models are described in Papke and Wooldridge (1996). The “sandwich” formula of the variance–covariance matrix sets robustness to arbitrary heteroskedasticity and correlation between residuals (Gourieroux et al. 1984; Papke and Wooldridge 1996).

¹³ For instance, consider estimating an equation characterized by wage as the dependent variable and schooling level as the regressor. We only observe wages of working individuals. Hence, a two-step estimation method is warranted in this case. The first step determines the probability of working, and the second step explains the wage equation after taking into account the probability of working. A corresponding two-step approach would be conceptually more difficult to adapt for the empirical analysis of female employment rates through this study.

5 Empirical results

5.1 Fraction of female workers in total employment

The empirical results from the fractional logit model applied for the fraction of female full-time workers in total full-time employment are presented in Table 4. Column (1) shows that MENA's manufacturing firms with higher levels of private foreign ownership have higher rates of female employment. This finding is reminiscent of the results reported through several empirical studies (e.g., Curd et al. 2007; Siegel et al. 2011). The marginal effect implies that an increase in private foreign ownership by 10 % points induces an increase in the proportion of female workers in total employment by 1.4 % points. We also find that government ownership does not exhibit a statistically significant effect on female employment rates. The World Bank's (2011) report indicates that there is a general tendency of the public sector to employ more female workers than the private sector through the MENA region. The results suggest that this tendency does not prevail for overall female employment rates through MENA's manufacturing firms with government ownership.

There are positive implications of exporting activities for female employment rates, in accordance with the empirical literature (e.g., Kabeer and Mahmud 2004; Gaddis and Pieters 2012). Specifically, we find that MENA's manufacturing firms engaged in exporting activities have higher proportions of female workers by an average of 3.2 % points compared to non-exporting firms. The estimates reveal an inverse U-shaped relationship between firm size and female employment rates. This outcome suggests that the enhancing firm-size-related factors (e.g., benefits, higher wages) for female employment prevail over an intermediate range of firm size. The subsequent decreasing implication of firm size for female employment rates would reflect the consequences of complex and relatively impersonal working environments in larger firms. It could also stem from lower margins for flexible working arrangements in larger firms.

The results show that the estimated coefficient on the skilled production labour ratio is not statistically significant. They also reveal that the ratio of non-production workers negatively impacts the proportion of female workers. An increase in this ratio by 10 % points reduces the proportion of female workers by 0.7 % points. This effect implies that female workers are employed at higher rates in manufacturing firms that use production labour more intensively. Given that non-production workers are presumably highly skilled, this effect is consistent with the argument indicating that firms in developing countries tend to employ more female workers for relatively unskilled occupations (Çağatay and Berik 1991; Çağatay and Özler 1995). The marginal effect of the ICT variable is negative and statistically significant at the 5 % level. It implies that firms using own Internet websites have lower female employment rates by 2.1 % points on average. Hence, there is some gender bias in the effects of firm ICT use on overall employment outcomes.¹⁴

¹⁴ The regressions can be alternatively implemented with a binary variable that equals one for firms using E-mail as a form of business communication and zero otherwise. The corresponding results are similar to those obtained through the benchmark regressions.

Table 4 Fraction of female full-time workers (fractional logit model)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Foreign ownership	0.138*** (0.014)	0.076*** (0.013)	0.144*** (0.015)	0.089*** (0.014)	0.147*** (0.016)	0.143*** (0.017)	0.047*** (0.013)	0.058*** (0.013)
Government ownership	-0.039 (0.025)	-0.002 (0.021)	-0.040 (0.025)	-0.003 (0.022)	-0.038 (0.027)	-0.021 (0.033)	-0.004 (0.020)	-0.001 (0.022)
Exporting firm	0.032*** (0.010)	0.031*** (0.009)	0.023*** (0.009)	0.015** (0.007)	0.038*** (0.010)	0.045*** (0.011)	0.034*** (0.009)	0.032*** (0.009)
Firm size	0.012*** (0.003)	0.005* (0.003)	0.012*** (0.003)	0.005* (0.003)	0.009*** (0.003)	0.010*** (0.003)	0.003 (0.003)	0.005* (0.003)
Firm size squared	-0.0008*** (0.0002)	-0.0006*** (0.0002)	-0.0008*** (0.0002)	-0.0006*** (0.0002)	-0.0007*** (0.0002)	-0.0007*** (0.0002)	-0.0004*** (0.0001)	-0.0007*** (0.0002)
Firm age	-0.0002 (0.0002)	0.0002 (0.0002)	-0.0002 (0.0002)	0.0002 (0.0002)	-0.0002 (0.0002)	-0.0003 (0.0003)	0.0001 (0.0002)	0.0002 (0.0002)
Skilled production workers ratio	0.006 (0.014)	-0.022* (0.012)	0.005 (0.014)	-0.020 (0.013)	0.006 (0.014)	0.010 (0.016)	-0.024* (0.013)	-0.020* (0.012)
Non-production workers ratio	-0.072*** (0.022)	-0.040** (0.020)	-0.076*** (0.022)	-0.041** (0.020)	-0.069*** (0.021)	-0.045** (0.022)	-0.036** (0.017)	-0.042** (0.020)
Firm use of ICT	-0.021** (0.008)	-0.003 (0.007)	-0.019** (0.009)	-0.001 (0.008)	-0.017** (0.008)	-0.032*** (0.010)	0.005 (0.008)	-0.004 (0.007)
Ln(GDPC)	0.083*** (0.010)	0.090*** (0.009)	0.090*** (0.009)	0.090*** (0.008)	0.090*** (0.008)	0.048*** (0.013)	0.074*** (0.010)	0.074*** (0.010)
Business freedom	0.010*** (0.002)	0.013*** (0.002)	0.013*** (0.002)	0.013*** (0.002)	0.013*** (0.002)	0.019*** (0.007)	0.004*** (0.002)	0.004*** (0.002)
Gender inequality index (GII)			-0.425*** (0.053)	-0.386*** (0.047)	-0.187*** (0.060)			
Non-discrimination clause				0.060*** (0.008)				

Table 4 continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Equal remuneration					0.071 *** (0.015)			0.010*** (0.003)
Inward FDI index								
National variables	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Industry-specific effects	No	Yes	No	Yes	No	No	Yes	Yes
Country-specific effects	No	No	No	No	No	No	Yes	No
Number of observations	3,619	3,464	3,619	3,464	3,619	2,836	3,464	3,464
Log pseudo-likelihood	-1,205.5	-1,051.7	-1,214.2	-1,069.5	-1,175.3	-982.3	-1,015.2	-1,049.4

Statistical significance: * 10 %; ** 5 %; *** 1 %. Robust standard errors are in parentheses

The national variables exercise significant effects on the female employment variable. We find that a 10 % increase in GDP raises the female employment rates by 0.8 % points. This result reveals important differences in female employment rates across MENA countries. For example, Algeria's GDP is around four times higher than Yemen's GDP in our dataset. The implications of economic development implies that manufacturing firms at Algeria's GDP have, on average, higher rates of female workers than those at Yemen's GDP by around 32.0 % points, *ceteris paribus*.¹⁵ The results also show that an improvement in national business freedom index by one point leads to an increase in female employment rates by 1.0 % point.

The results from an empirical specification that includes industry-specific effects are presented in column (2). They are generally comparable to those presented in the previous column with few differences.¹⁶ The marginal effect of private foreign ownership on female employment rates remains positive and statistically significant at the 1 % level, but it becomes smaller in magnitude compared to the one presented in the previous column. Some industries have higher levels of private foreign ownership than other industries in our dataset. For example, the average private foreign ownership is 13.3 % (with a standard deviation of 31.8 %) for the chemicals and pharmaceutical industry. Comparatively, the average private foreign ownership for the non-metallic and plastic materials industry is 0.8 % (with a standard deviation of 7.2 %), and there are no firms with private foreign ownership in the leather industry and in the wood and furniture industry. Hence, the inclusion of industry-specific effect would absorb some of these inter-industrial variations, resulting in a lower marginal effect of private foreign ownership on female employment rates.

The marginal effect of firm size on overall female employment rates remains characterized by an inverse U-shaped relationship. However, compared to the previous column, the magnitude of this effect has moderately decreased. The inclusion of industry-specific effects naturally captures inter-industrial variations in firm size, leading to lower estimates. The marginal effects still suggest that female workers have higher propensities to be employed in medium-size firms, but lower propensities to work in large firms with relatively more stressful and impersonal working atmosphere. Also, the marginal effect of skilled production workers ratio

¹⁵ The percentage of female workers in total employment for manufacturing firms located in Algeria has a mean of 22.9 % and a standard deviation of 28.0 % in our dataset. The corresponding statistics for manufacturing firms located in Yemen show a considerably lower mean of 5.4 % with a standard deviation of 6.8 %.

¹⁶ We note that the estimation of fixed effect models through non-linear regressions would give rise to incidental parameters problems in panel datasets when T is fixed and N approaches infinity (Wooldridge 2002; Li 2011). In this case, the estimates obtained from fixed effect models would be inconsistent. The dataset used in this paper corresponds to a cross-section of firm observations located in few MENA countries. The specific-effects used in our model are not firm-specific effects. They consist of a limited (finite) set of industry dummy variables that equal one when the observed firm belongs to a given industry and zero otherwise, and a limited set of country dummy variables that equal one when the observed firm is located in a given MENA country and zero otherwise. The use of industry dummy and country dummy variables does not raise identification issues such as incidental parameters because the sample size is determined by the number of firms.

becomes negative and statistically significant at the 10 % level. Finally, the marginal effect of non-production workers ratio remains negative and statistically significant, but it becomes moderately smaller in magnitude (i.e., in absolute terms) compared to the one presented in the previous column.¹⁷

Column (3) presents the marginal effects when substituting the national economic development factors with the GII variable through the empirical specification.¹⁸ In line with the previous literature (e.g., Mammen and Paxson 2000), we find that gender inequality has negative implications for female employment rates. The marginal effect indicates that a decrease in GII by 0.1 points raises the female employment rates in manufacturing firms by 4.3 % points. This result implies some important cross-country differences. For example, Yemen's GII is higher than Algeria's GII by around 0.4 points. Hence, the estimated effect of GII suggests that manufacturing firms at Algeria's GII have, on average, higher proportions of female workers than those at Yemen's GII by around 17.2 % points, *ceteris paribus*. Column (4) displays comparable results from the empirical specification that includes industry-specific effects.

The results obtained from an empirical specification that includes supplementary indicators of gender parity across MENA countries are presented in column (5). These indicators are sourced from the World Bank's Women, Business and the Law (WBL) database. The first indicator is a binary variable that equals one when the Constitution of the corresponding MENA country includes a non-discrimination clause and zero otherwise. The second indicator is a binary variable that equals one when the law in the corresponding MENA country mandates equal remuneration for men and women for work of equal value and zero otherwise.¹⁹ The results are similar to those presented in the previous column. As expected, the estimated coefficient on the GII decreases (in absolute term) and remains statistically significant at the 1 % level. The GII is a comprehensive measure that encompasses various aspects of national gender inequality. Therefore, the inclusion of extra individual gender parity indicators through the empirical model absorbs some effects of the GII variable. Also, as expected, the estimated coefficients on the WBL gender parity indicators are both positive and statistically significant at the 1 % level.

The dataset used in this paper spans over a range of time periods characterized by different economic conditions. The benchmark empirical model controls for the

¹⁷ We note that the estimations are also implemented using the alternative fractional probit model. The corresponding marginal effects are presented in columns (1) and (2) of Table 8 of the "Appendix". They are found to be equivalent to the results obtained through the fractional logit model.

¹⁸ The correlation coefficient between the GII and the GDPC variables is around -0.9 . Consequently, these variables are not included together in the same regression due to multicollinearity. We note that positive relationships are commonly documented in the literature between economic development and national gender equality (e.g., Weiss et al. 1976; Clark et al. 1991; Abu Ghaida and Klasen 2002; Klasen and Lamanna 2009; Cuberes and Teignier-Baqué 2011).

¹⁹ Some indicators do not exhibit variations across MENA countries covered in the dataset. For example, the Constitution of all MENA countries covered in the dataset guarantee equality between genders before the law. Also, there are some indicators that cannot be distinguished from country-specific effects. For example, Morocco is the only MENA country in the dataset where personal law is not recognized as a valid source of law under the Constitution.

national economic performance through the GIPC variable. We also check for the robustness of the results by restricting firm observations to those collected over a narrower time period of 2007–2010. The estimates, presented in column (6), remain similar to the benchmark results.

The marginal effects from estimating an alternative empirical specification that includes country-specific and industry-specific effects are displayed in column (7). They are generally similar to the corresponding benchmark results. The marginal effect of private foreign ownership on female employment rate becomes moderately lower through this specification. This outcome is anticipated given the inter-national variations in inward FDI conditions across MENA countries. The inclusion of country-specific effects naturally absorbs the implications of these inter-national variations, resulting in lower estimates for the marginal effects of private foreign ownership. As shown in column (8), the estimation of an empirical specification that includes a national inward FDI index beside the other basic national variables yields lower marginal effects of private foreign ownership.²⁰

5.2 Fraction of female non-production workers in total non-production workers

Table 5 presents the empirical results from the fractional logit model implemented for the fraction of female non-production full-time workers in total non-production full-time workers. The results from the benchmark empirical specification are presented in column (1). The effect of private foreign ownership is positive and statistically significant. The magnitude of this effect is considerably lower compared to the one estimated for the overall fraction of female workers in total employment. The marginal effect indicates that an increase in private foreign ownership by 10 % points raises the proportion of female non-production workers by <0.2 % points. This result suggests that multinational manufacturing firms in the MENA region have a somewhat higher tendency to employ non-production female workers than domestic manufacturing firms. Meanwhile, the review of the results in Tables 4 and 5 suggests that these multinational manufacturing firms have a higher propensity to employ female workers in production positions rather than in non-production occupations. The effect of government ownership is not statistically significant. This result suggests that the documented higher tendency of the public sector to employ female workers (The World Bank 2011) does not cover non-production positions through MENA's manufacturing firms with government ownership.

We find that the effect of exporting activities is not statistically significant. The review of the results in Tables 4 and 5 implies that exporting activities of manufacturing firms generate a higher propensity to employ female labour in production positions, but not in non-production positions. This outcome can be related to Kabeer and Mahmud's (2004) argument, being indicative of a higher tendency of production female workers to accept lower wages than non-production female workers. As in the previous case of overall female employment rates, we find

²⁰ The national inward FDI index is derived from the United Nations Conference on Trade and Development (UNCTAD) database, and is determined as the ratio of total inward FDI stock to gross fixed capital formation.

Table 5 Fraction of female full-time non-production workers (fractional logit model)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Foreign ownership	0.015*** (0.003)	0.011*** (0.002)	0.018*** (0.003)	0.014*** (0.003)	0.021*** (0.003)	0.014*** (0.003)	0.006** (0.003)	0.008*** (0.003)
Government ownership	0.001 (0.005)	0.001 (0.004)	-0.004 (0.005)	-0.002 (0.005)	-0.006 (0.005)	0.004 (0.006)	-0.001 (0.004)	0.002 (0.004)
Exporting firm	-0.001 (0.002)	0.001 (0.002)	-0.001 (0.002)	-0.002 (0.002)	0.002 (0.003)	0.002 (0.002)	0.001 (0.002)	0.001 (0.002)
Firm size	0.0015** (0.0006)	0.0006 (0.0004)	0.0014** (0.0006)	0.0007 (0.0005)	0.0011* (0.0006)	0.0017*** (0.0006)	0.0003 (0.0002)	0.0005 (0.0004)
Firm size squared	-0.00007** (0.00003)	-0.00003 (0.00002)	-0.00006** (0.00003)	-0.00004 (0.00003)	-0.00005* (0.00003)	-0.00007** (0.00003)	-0.00001 (0.00001)	-0.00003 (0.00002)
Firm age	0.0001 (0.0001)	0.0001 (0.0001)	0.0001 (0.0001)	0.0001 (0.0001)	0.0001 (0.0001)	-0.0001 (0.0001)	0.0001 (0.0001)	0.0001 (0.0001)
Skilled production workers ratio	0.001 (0.003)	-0.001 (0.003)	0.001 (0.003)	-0.003 (0.003)	-0.001 (0.003)	-0.001 (0.003)	-0.003 (0.003)	-0.001 (0.003)
Non-production workers ratio	0.068*** (0.005)	0.065*** (0.004)	0.069*** (0.005)	0.067*** (0.004)	0.072*** (0.005)	0.082*** (0.005)	0.052*** (0.004)	0.064*** (0.004)
Firm use of ICT	0.004** (0.002)	0.004** (0.002)	0.006*** (0.002)	0.005** (0.002)	0.005*** (0.002)	0.002** (0.001)	0.005** (0.002)	0.004** (0.002)
Ln(GDPC)	0.028*** (0.003)	0.029*** (0.002)	0.029*** (0.002)	0.029*** (0.002)	0.029*** (0.002)	0.029*** (0.002)	0.029*** (0.002)	0.027*** (0.002)
Business freedom	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)
Gender inequality index (GII)			-0.091*** (0.014)	-0.099*** (0.011)	-0.067*** (0.018)			

Table 5 continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Non-discrimination clause					0.010*** (0.002)			
Equal remuneration					0.007** (0.003)			
Inward FDI index								0.004** (0.002)
National variables	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Industry-specific effects	No	Yes	No	Yes	No	No	Yes	Yes
Country-specific effects	No	No	No	No	No	No	Yes	No
Number of observations	3,619	3,464	3,619	3,464	3,619	2,836	3,464	3,464
Log pseudo-likelihood	-362.1	-340.8	-370.3	-348.7	-365.7	-289.1	-332.5	340.0

Statistical significance: * 10 %; ** 5 %; *** 1 %. Robust standard errors are in parentheses

an inverse U-shaped relationship between firm size and female non-production employment rates. The marginal effects are, however, lower in magnitudes compared to those prevailing in the case of overall female employment rates. Also, the results show that manufacturing firms with higher ratios of non-production workers have higher rates of female non-production employment. Specifically, an increase in the ratio of non-production workers by 10 % points raises the proportion of female non-production workers in total non-production employment by around 0.7 % points. The marginal effect of the ICT variable implies that firms using their own Internet websites have somewhat higher rates of female non-production workers by around 0.4 % points on average. It suggests that the Internet only slightly facilitates the employment of under-utilized non-production female labour force.

National variables have considerably lower effects on the fraction of female non-production workers in total non-production employment compared to their effects on the overall fraction of female workers in total employment. We find that a 10 % increase in GPC raises the proportion of female non-production workers by 0.3 % points. These results are reminiscent of some earlier findings in the literature that report significant enhancing effects of economic development on female production employment, but relatively small effects on female non-production employment (e.g., Weiss et al. 1976). Also, we find that the business freedom index does not exhibit a statistically significant effect on the fraction of female non-production workers. Column (3) shows the results obtained when replacing the basic economic development variables by GII through the empirical specification. We find that a decrease in GII by 0.1 points raises the fraction of female non-production workers by 0.9 % point. The results from the empirical specifications that include industry-specific effects are presented in columns (2) and (4). They are found to be comparable to the corresponding benchmark results.²¹

Column (5) displays the results obtained when adding the WBL indicators to the empirical specification. As discussed earlier, we find that the inclusion of the WBL indicators absorbs some of the GII effects. Column (6) shows that the estimates obtained when restricting firm observations to those collected over 2007–2010 are comparable to the benchmark results. The marginal effects from estimating an empirical specification that includes country-specific and industry-specific effects are presented in column (7). They are generally consistent with the benchmark estimates. The marginal effect of foreign ownership slightly decreases. As discussed earlier, country-specific effects absorb inter-national variations in FDI conditions across MENA countries, resulting in lower marginal effects of private foreign ownership. Also, column (8) shows that estimating an empirical specification that includes national inward FDI index beside the initial national variables leads to a lower marginal effect of private foreign ownership.

²¹ We note that the marginal effects from estimating fractional probit models are displayed in columns (3) and (4) of Table 8 of the “Appendix”. They are found to be similar to the estimates obtained from the fractional logit models.

5.3 Female workers in managerial positions

We complement the empirical analysis by exploring the implications of firm characteristics and national factors for the employment of women in senior managerial positions through the manufacturing sector. The lower presence of women in leadership positions in the workplace is well documented and discussed in the literature (e.g., Oakley 2000; Eagly and Karau 2002; Paris et al. 2009; The World Bank 2013b).²² This situation is commonly related to cultural and social norms which play a primary role in restricting female advancement through managerial careers (Hofstede 2001; Toh and Leonardelli 2012).

Table 6 displays the marginal effects from a probit estimation. Column (1) shows that an increase in foreign ownership by 10 % points raises the likelihood of women in senior managerial positions by 0.9 % points. This finding is consistent with some studies suggesting that the progress of women through managerial careers is smoother in multinational corporations (Bozkurt 2012). Meanwhile, the progress of women in senior managerial positions remain restricted in domestic firms by traditional and cultural norms (Bozkurt 2012; Toh and Leonardelli 2012). Some studies also noted that multinational corporations have higher propensities to promote women into senior managerial positions as a response to global competitiveness that encourages more efficient use of human resources (Adler and Izraeli 1994; Oakley 2000). These higher propensities could also stem from the relative immunity of foreign affiliates in terms of business culture to traditional and social norms in host countries vis-à-vis women workers. Exporting firms have higher likelihood to have senior female managers by 2.7 % points compared to non-exporting firms. We find that an increase in the ratio of non-production workers by 10 % points raises the likelihood of women in senior managerial positions by 0.6 % points. National economic development variables have positive implications for the likelihood of women in senior managerial positions. Column (2) shows comparable results when controlling for industry-specific effects. Also, columns (3) and (4) present the corresponding results when using the GII variable.

Finally, we examine the implications of firm-related and national factors for the fraction of women in all (lower and upper) managerial positions. This fraction is determined as the ratio of women in total full-time managerial employment. The marginal effects obtained from the fractional logit estimations are presented in columns (5) through (8) of Table 6. The results underline positive implications of private foreign ownership and exporting activities for the fraction of women in managerial positions. They also reveal that public manufacturing firms in MENA countries have lower propensities to have female workers in managerial positions compared to private domestic manufacturing firms. The fraction of women in managerial positions is relatively higher for firms with higher ratios of non-production workers. Also, national economic and socio-economic development

²² This is commonly depicted through the glass-ceiling hypothesis which states that it is more difficult for women than for men to be promoted to top managerial positions in the workplace (Oakley 2000; Eagly and Karau 2002).

Table 6 Female workers in managerial positions

	Senior female managers (probit model)			Female employment in all managerial positions (fractional logit model)				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Foreign ownership	0.089*** (0.013)	0.070*** (0.009)	0.092*** (0.014)	0.067*** (0.008)	0.025*** (0.004)	0.019*** (0.002)	0.028*** (0.005)	0.018*** (0.002)
Government ownership	-0.015 (0.014)	-0.012 (0.015)	-0.010 (0.014)	-0.006 (0.014)	-0.024** (0.012)	-0.018** (0.008)	-0.020** (0.010)	-0.012** (0.006)
Exporting firm	0.027** (0.012)	0.015* (0.009)	0.021* (0.012)	0.014* (0.008)	0.027*** (0.005)	0.015*** (0.001)	0.028*** (0.006)	0.017*** (0.001)
Firm size	0.001 (0.001)	0.001 (0.002)	0.001 (0.001)	0.001 (0.002)	0.006*** (0.001)	0.004*** (0.001)	0.007*** (0.001)	0.004*** (0.001)
Firm size squared	-0.0001 (0.0001)	-0.0001 (0.0001)	-0.0001 (0.0001)	-0.0001 (0.0001)	-0.0005*** (0.0001)	-0.0004*** (0.0001)	-0.0006*** (0.0001)	-0.0004*** (0.0001)
Firm age	0.0001 (0.0001)	0.0001 (0.0001)	0.0001 (0.0001)	0.0001 (0.0001)	0.0001 (0.0001)	-0.0001 (0.0001)	0.0001 (0.0001)	-0.0001 (0.0001)
Skilled production workers ratio	-0.001 (0.010)	-0.001 (0.005)	0.001 (0.013)	0.001 (0.006)	-0.002 (0.002)	-0.001 (0.001)	-0.003 (0.004)	-0.001 (0.002)
Non-production workers ratio	0.063*** (0.015)	0.047*** (0.013)	0.055*** (0.017)	0.035*** (0.014)	0.016** (0.007)	0.009* (0.005)	0.015** (0.006)	0.009* (0.005)
Firm use of ICT	0.005 (0.008)	0.004 (0.005)	0.007 (0.007)	0.006 (0.005)	-0.002 (0.003)	-0.001 (0.001)	-0.002 (0.003)	-0.001 (0.001)
Ln(GDP)	0.044*** (0.007)	0.035*** (0.006)			0.020*** (0.002)	0.016*** (0.001)		
Business freedom	0.012*** (0.003)	0.010*** (0.002)			0.008*** (0.001)	0.005*** (0.001)		

Table 6 continued

	Senior female managers (probit model)			Female employment in all managerial positions (fractional logit model)				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Gender inequality index (GII)			-0.128*** (0.023)	-0.113*** (0.025)			-0.090*** (0.018)	-0.072*** (0.016)
National variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-specific effects	No	Yes	No	Yes	No	Yes	No	Yes
Number of observations	1,238	1,165	1,238	1,165	1,742	1,590	1,742	1,590
Log pseudo-likelihood	-435.6	-429.4	-461.1	443.9	-237.4	-224.0	-245.8	-230.8

Statistical significance: * 10 %; ** 5 %; *** 1 %. Robust standard errors are in parentheses

variables exercise enhancing implications for the proportion of female workers in managerial positions.

5.4 Empirical results from alternative models

In this section, we check for the robustness of the baseline findings when using alternative specifications and estimators. The empirical analysis investigates next the factors influencing firm's decision to employ female workers using a probit model. The dependent variable is specified to equal one when firms decide to employ female workers and zero otherwise. The results obtained from the probit model are generally consistent with those obtained from the fractional logit model. The marginal effects are presented in columns (1) and (3) of Table 7 for overall female workers and for non-production female workers, respectively. They indicate that private foreign-owned firms and government-owned firms realize higher propensities to have women in their workforce by 35.5 and 19.0 % points, respectively, compared to private domestic-owned firms. The corresponding estimates for non-production female workers are 31.3 and 13.9 % points, respectively. We note that the positive effect of government ownership obtained through the probit model suggests higher tendencies of the public sector in the decision to hire female workers compared to the private domestic sector. However, the non-significant effect of government ownership obtained through the fractional logit model suggests that there are no implications for higher intensities of women employment. Exporting firms have higher propensities to have women in the overall workforce and in the non-production workforce by 7.8 and 6.5 % points, respectively, compared to non-exporting firms. The results reveal an inverse U-shaped relationship between the decision to employ female workers and firm size. Also, the decisions to employ overall and non-production female workers are promoted through firm use of ICT by 9.8 and 12.5 % points, respectively. National development factors positively influence the decision to employ female workers. For instance, a 10 % increase in GPDC raises the likelihood to employ overall and non-production female workers by 2.1 and 3.9 % points, respectively. The marginal effects from the corresponding empirical specifications that include industry-specific effects are presented in columns (2) and (4) for overall and non-production female workers, respectively. They remain generally consistent with the benchmark probit results.²³

The empirical analysis is implemented next using a two-limit (zero and one) Tobit estimator. The estimates are presented in Table 7 through columns (5) and (6) for overall female workers, and through columns (7) and (8) for female non-production workers. They are found to be qualitatively equivalent to the benchmark results. We note, however, that the use of the Tobit estimator for an empirical model characterized by a fractional dependent variable may not be suitable on balance. This is because the Tobit estimator is conceptually pertinent for censored data between zero and one but not for data naturally defined in that interval (Maddala

²³ The results from estimating linear probability models are presented in columns (5) through (8) of Table 8 of the "Appendix". They are comparable to those obtained from the probit model.

Table 7 Results from alternative empirical models

	Probit model				Tobit model			
	Female workers		Female non-production workers		Female workers		Female non-production workers	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Foreign ownership	0.355*** (0.063)	0.189*** (0.069)	0.313*** (0.052)	0.214*** (0.055)	0.205*** (0.025)	0.118*** (0.022)	0.057*** (0.007)	0.040*** (0.008)
Government ownership	0.190*** (0.070)	0.298*** (0.077)	0.139** (0.060)	0.184*** (0.062)	0.014 (0.028)	0.033 (0.025)	0.010 (0.011)	0.012 (0.009)
Exporting firm	0.078*** (0.022)	0.151*** (0.022)	0.065*** (0.022)	0.142*** (0.024)	0.060*** (0.014)	0.055*** (0.013)	0.009 (0.006)	0.012* (0.007)
Firm size	0.050*** (0.009)	0.031*** (0.009)	0.057*** (0.009)	0.045*** (0.009)	0.014*** (0.004)	0.005* (0.003)	0.004*** (0.001)	0.003*** (0.001)
Firm size squared	-0.0012*** (0.004)	-0.0008** (0.0004)	-0.0012*** (0.004)	-0.0010*** (0.004)	-0.0005** (0.0002)	-0.0004** (0.0002)	-0.0002** (0.0001)	-0.0003** (0.0001)
Firm age	0.0001 (0.0006)	0.0011* (0.0006)	0.0001 (0.0006)	0.0009 (0.0006)	-0.0002 (0.0003)	0.0004 (0.0003)	0.001 (0.0001)	0.0001 (0.0001)
Skilled production workers ratio	-0.025 (0.032)	-0.115*** (0.035)	0.019 (0.032)	-0.035 (0.035)	-0.010 (0.023)	-0.028 (0.022)	0.008 (0.007)	-0.004 (0.006)
Non-production workers ratio	0.237*** (0.053)	0.243*** (0.058)	0.600*** (0.054)	0.605*** (0.058)	-0.049** (0.024)	-0.038* (0.023)	0.154*** (0.014)	0.136*** (0.014)
Firm use of ICT	0.098*** (0.020)	0.153*** (0.021)	0.125*** (0.021)	0.141*** (0.022)	0.007 (0.013)	0.020 (0.013)	0.020*** (0.005)	0.023*** (0.005)
Ln(GDP/C)	0.212*** (0.027)	0.354*** (0.031)	0.387*** (0.030)	0.507*** (0.031)	0.152*** (0.016)	0.175*** (0.016)	0.079*** (0.010)	0.085*** (0.008)
Business freedom	0.026*** (0.005)	0.038*** (0.006)	0.008 (0.007)	0.017*** (0.006)	0.020*** (0.003)	0.025*** (0.003)	0.002 (0.002)	0.003 (0.002)

Table 7 continued

	Probit model				Tobit model			
	Female workers		Female non-production workers		Female workers		Female non-production workers	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
National variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-specific effects	No	Yes	No	Yes	No	Yes	No	Yes
Number of observations	3,619	3,464	3,619	3,464	3,619	3,464	3,619	3,464
Uncensored observations					2,042	2,034	1,385	1,382
Censored observations					1,577	1,430	2,234	2,082
Log pseudo-likelihood	-2,232.8	-1,856.3	-1,996.6	-1,819.4	-1,625.4	-1,125.8	-319.2	-233.7

Statistical significance: * 10 %; ** 5 %; *** 1 %. Robust standard errors are reported in parentheses

1991; Ramalho et al. 2011). Finally, as discussed earlier, the alternative Heckman selection model requires an exclusion restriction to produce reliable estimates (Puhani 2000; Sartori 2003). Specifically, there must be at least one variable which appears with a non-zero coefficient in the selection equation but does not appear in the outcome equation. Consequently, sample selection bias could not be corrected through the Heckman selection model since it is difficult to specify variables that are important for female employment decision but not relevant for female employment level.²⁴

6 Conclusion

MENA countries have realized significant advances toward improving women's well-being and social status over the last few decades. However, women's employment rate in the MENA region remains one of the lowest in the world. This paper examines the implications of firm-related and national factors for female employment rates in manufacturing firms located in the MENA region. The empirical investigation uses data derived from the World Bank's Enterprise Surveys database and implements the fractional logit model of Papke and Wooldridge (1996) and other empirical models.

The benchmark empirical results show significant implications of firm-related and national factors for overall female employment rates in MENA's manufacturing firms. They reveal positive influences of private foreign ownership and exporting activities on overall female employment rates. The relative labour composition of firms in terms of non-production workers is found to exert negative effects on these rates. The results also underscore positive implications of national economic development and gender equality factors for these rates.

The empirical investigation implemented for female non-production employment rates shows positive effects of private foreign ownership. However, these effects are considerably smaller in magnitude compared to the corresponding effects on overall female employment rates. Also, unlike the case of female overall employment rates, exporting activities do not show statistically significant effects on female non-production employment rates. These findings suggest that the implications of private foreign ownership and exporting activities are primarily prevailing for female production employment rates. The results also show considerable positive effects of labour composition in terms of non-production workers on female non-production employment rates. We find positive effects of national economic development and gender equality factors on female non-production employment rates. However, these effects are smaller in magnitude compared to those exercised on overall female employment rates. These findings imply that the implications of the national economic and socio-economic development factors are more prevalent for women's production employment

²⁴ The empirical analysis for disaggregated manufacturing industries would entail more observations through the industries. It would also require more variations in the composition of female workers and in different firm characteristics across firms within each industry. This dimension could be explored through an extended dataset which includes observations on firms located in other countries across industries.

rates than for women's non-production employment rates through the MENA's manufacturing sector.

The empirical analysis is complemented by examining the implications of firm characteristics and national factors for female employment rates in senior management and in overall managerial positions. Among the results, there are positive implications of private foreign ownership, exporting activities, and non-production labour composition for female managerial employment. The estimates also underline the positive implications of national development factors for female employment in managerial positions.

This paper provides policy-makers and analysts with directions to design strategies aiming at improving women's employment rates through the manufacturing sector in the MENA region. For instance, the positive implications of private foreign ownership and exporting activities for female employment rates through different labour categories underline the benefits of policies that promote inward FDI and facilitate exports. Nevertheless, the differing implications of these factors for women's production, non-production, and management employment rates should be accounted for when forming and implementing such policies. Furthermore, the estimates imply that policies should encompass the characteristics of firms in terms of labour compositions and size through their designs. Finally, the results depicting the positive effects of national development factors on female employment rates suggest that MENA governments should continue to adopt policies that enhance economic growth and support women's well-being, social status, and education to realize higher female employment rates.

Acknowledgments The authors are grateful to two anonymous reviewers and to the editor, George Hondroyannis, for comments and suggestions. The authors wish to thank Ragui Assaad, İpek İlkkaracan, Lars Vilhuber, and Philipp vom Berge, and the participants at the 47th Annual Conference of the Canadian Economics Association (2013), 34th Annual Meeting of the Middle East Economic Association (2014), and 20th Annual Conference of the Economic Research Forum (2014) for comments and discussions.

Appendix

See Table 8.

Table 8 Results from alternative empirical models

	Female employment intensity (fractional probit model)				Female employment decision (linear probability model)			
	Female workers		Female non-production workers		Female workers		Female non-production workers	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Foreign ownership	0.147*** (0.016)	0.088*** (0.015)	0.016*** (0.003)	0.012*** (0.003)	0.237*** (0.031)	0.082*** (0.031)	0.277*** (0.039)	0.186*** (0.040)
Government ownership	-0.034 (0.023)	-0.003 (0.021)	-0.001 (0.005)	0.001 (0.004)	0.146*** (0.045)	0.210*** (0.045)	0.132** (0.052)	0.160*** (0.051)
Exporting firm	0.030*** (0.009)	0.035*** (0.009)	0.001 (0.002)	0.001 (0.002)	0.080*** (0.020)	0.136*** (0.019)	0.055*** (0.020)	0.113*** (0.020)
Firm size	0.011*** (0.003)	0.005* (0.003)	0.0014** (0.0006)	0.0005 (0.0005)	0.041*** (0.008)	0.023*** (0.007)	0.052*** (0.009)	0.040*** (0.008)
Firm size squared	-0.0007*** (0.0002)	-0.0005*** (0.0002)	-0.00006** (0.00003)	-0.00002 (0.00002)	-0.0010*** (0.0004)	-0.0006** (0.0003)	-0.0012*** (0.0004)	-0.0009** (0.0004)
Firm age	-0.0002 (0.0002)	0.0002 (0.0002)	0.0001 (0.0001)	0.0001 (0.0001)	0.0001 (0.0005)	0.0010** (0.0005)	0.0001 (0.0005)	0.0007 (0.0004)
Skilled production workers ratio	0.005 (0.014)	-0.026* (0.014)	0.002 (0.003)	0.001 (0.003)	-0.025 (0.029)	-0.099*** (0.028)	0.020 (0.026)	-0.020 (0.027)
Non-production workers ratio	-0.074*** (0.021)	-0.039** (0.020)	0.077*** (0.005)	0.075*** (0.005)	0.217*** (0.047)	0.215*** (0.047)	0.519*** (0.044)	0.488*** (0.045)
Firm use of ICT	-0.017** (0.007)	0.001 (0.008)	0.004** (0.002)	0.005** (0.002)	0.096*** (0.019)	0.132*** (0.018)	0.110*** (0.019)	0.117*** (0.019)
Ln(GDPC)	0.088*** (0.011)	0.097*** (0.010)	0.033*** (0.003)	0.034*** (0.002)	0.197*** (0.025)	0.282*** (0.024)	0.341*** (0.024)	0.417*** (0.024)
Business freedom	0.010*** (0.002)	0.014*** (0.002)	0.001 (0.001)	0.001 (0.001)	0.025*** (0.005)	0.034*** (0.005)	0.004 (0.005)	0.010** (0.005)

Table 8 continued

	Female employment intensity (fractional probit model)				Female employment decision (linear probability model)			
	Female workers		Female non-production workers		Female workers		Female non-production workers	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
National variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-specific effects	No	Yes	No	Yes	No	Yes	No	Yes
Number of observations	3,619	3,464	3,619	3,464	3,619	3,464	3,619	3,464
Log pseudo-likelihood	-1,204.7	-1,052.1	-360.6	-339.9				
R ²					0.124	0.250	0.210	0.262

Statistical significance: * 10 %; ** 5 %; *** 1 %. Robust standard errors are reported in parentheses

References

- Abe Y (2013) Regional variations in labor force behavior of women in Japan. *Jpn World Econ* 28(1):112–124
- Abu Ghaida D, Klasen S (2002) The costs of missing the millennium development goal on gender equity. The World Bank, Washington, DC
- Adler NJ, Izraeli DN (1994) *Competitive frontiers: women managers in a global economy*. Blackwell Publishing, Cambridge, MA
- Attanasio O, Low H, Sanchez-Marcos V (2008) Explaining changes in female labour supply in a life-cycle model. *Am Econ Rev* 98(4):1517–1552
- Becker GS (1971) *The economics of discrimination*. University of Chicago Press, Chicago, IL
- Bozkurt Ö (2012) Foreign employers as relief routes: women, multinational corporations and managerial careers in Japan. *Gender Work Organ* 19(3):225–253
- Bratti M, Del Bono E, Vuri D (2005) New mothers' labour force participation in Italy: the role of job characteristics. *Labour* 19(s1):79–121
- Brown C, Hamilton J, Medoff J (1996) *Employers large and small*. Harvard University Press, Cambridge, MA
- Buchanan J, Scott L, Yu S, Schutz H, Jakubauskas M (2010) Skills demand and utilisation: an international review of approaches to measurement and policy development. Local Economic and Employment Development (LEED) Working Paper No. 2010/04, Organization for Economic Cooperation and Development (OECD) Publishing, Paris
- Bussmann M (2009) The effect of trade openness on women's welfare and work life. *World Dev* 37(6):1027–1038
- Çağatay N, Berik G (1991) Transition to export-led growth in Turkey: is there a feminisation of employment? *Cap Class* 15(1):153–177
- Çağatay N, Özler S (1995) Feminization of the labour force: the effects of long-term development and structural adjustment. *World Dev* 23(11):1883–1894
- Cavalcanti T, Tavares J (2008) Assessing the “Engines of Liberation”: home appliances and female labor force participation. *Rev Econ Stat* 90(1):81–88
- Chamlou N (2008) *The environment for women entrepreneurship in the Middle East and North Africa*. The World Bank, Washington, DC
- Chamlou N, Muzi S, Ahmed H (2011) “Understanding the Determinants of Female Labor Force Participation in the Middle East and North Africa Region: The Role of Education and Social Norms in Amman.” Working Paper No. 31, AlmaLaurea Inter-University Consortium, Bologna
- Clark R, Ramsbey TW, Adler ES (1991) Culture, gender, and labor force participation: a cross-national study. *Gend Soc* 5(1):47–66
- Contessi S, de Nicola F, Li L (2013) International trade, female labor, and entrepreneurship in MENA countries. *Fed Reserve Bank St Louis Rev* 94(3):197–220
- Cuberes D, Teignier M (2014) Gender inequality and economic growth: a critical review. *J Int Dev* 26(2):260–276
- Cuberes D, Teignier-Baqué M (2011) “Gender Inequality and Economic Growth.” Background Paper for World Development Report 2012: Gender Equality and Development. The World Bank, Washington, DC
- Curd A, Julian A, Sabow A, Seligman L (2007) The impact of foreign direct investment on Chinese women. In: Dayal-Gulati A, Finn M, Diermeier D (eds) *Global corporate citizenship*. Northwestern University Press, Evanston, IL
- Currie J, Madrian BC (1999) Health, health insurance and the labor market. In: Ashenfelter O, Card D (eds) *Handbook of labor economics*. Elsevier, Amsterdam
- Detting LJ (2012) “Opting Back In: Home Internet Use and Female Labor Supply.” Working Paper, Department of Economics, University of Maryland, College Park, MD
- Eagly AH, Karau SJ (2002) Role congruity theory of prejudice toward female leaders. *Psychol Rev* 109(3):573–598
- Esfahani HS, Shajari P (2012) Gender, education, family structure, and the allocation of labor in Iran. *Middle East Dev J* 4(2):1–40
- Fagan C (2001) Time, money and the gender order: work orientations and working-time preferences in Britain. *Gend Work Organ* 8(3):239–266

- Fakih A, Ghazalian PL (2014) Which firms export? An empirical analysis for the manufacturing sector in the MENA region. *J Econ Stud* 41(5):672–695
- Gaddis I, Pieters J (2012) “Trade Liberalization and Female Labor Force Participation. Evidence from Brazil.” IZA Discussion Paper No. 6809, Institute for the Study of Labor, Bonn
- Goldin C (1995) The U-shaped female labor force function in economic development and economic history. In: Schultz TP (ed) *Investment in women’s human capital and economic development*. University of Chicago Press, Chicago, IL
- Gourieroux C, Monfort A, Trognon A (1984) Pseudo-maximum likelihood methods: theory. *Econometrica* 52(3):681–700
- Greenwood J, Seshadri A, Yorukoglu M (2005) Engines of liberation. *Rev Econ Stud* 72(1):109–133
- Hayo B, Caris T (2013) Female labour force participation in the MENA region: the role of identity. *Rev Middle East Econ Finance* 9(3):271–292
- Hewlett SA, Rashid R (2010) The battle for female talent in emerging markets. *Harv Bus Rev* 88(5):101–106
- Hofstede GH (2001) *Culture consequences: comparing values, behaviors, institutions, and organizations across nations*. Sage Publications, Thousand Oaks, CA
- International Labour Organization (ILO) (1985) *Women workers in multinational enterprises in developing countries*. International Labour Organization, Geneva
- International Labour Organization (ILO) (2014) *Global employment trends 2014: risk of a jobless recovery?*. International Labour Organization, Geneva
- Kabeer N, Mahmud S (2004) Globalization, gender and poverty: Bangladeshi women workers in export and local markets. *J Int Dev* 16(1):93–109
- Karaoglan D, Okten C (2012) “Labor Force Participation of Married Women in Turkey: Is There an Added or a Discouraged Worker Effect?” IZA Discussion Paper No. 6616, Institute for the Study of Labor, Bonn
- Killingworth MR, Heckman JJ (1986) Female labor supply: a survey. In: Ashenfelter O, Laynard R (eds) *Handbook of labor economics*. Elsevier Science Publishers, New York, NY
- Klasen S, Lamanna F (2009) The impact of gender inequality in education and employment on economic growth: new evidence for a panel of countries. *Fem Econ* 15(3):91–132
- Klasen S, Pieters J (2012) “Push or Pull? Drivers of Female Labor Force Participation during India’s Economic Boom.” IZA Discussion Paper No. 6395, Institute for the Study of Labor, Bonn
- Kohara M (2010) The response of Japanese Wives’ labor supply to husbands’ job loss. *J Popul Econ* 23(4):1133–1149
- Kutner MH, Nachtsheim CJ, Neter J (2004) *Applied linear regression models*, 4th edn. McGraw-Hill/Irwin, New York, NY
- Lee BS, Jang S, Sarkar J (2008) Women labor force participation and marriage: the case of Korea. *J Asian Econ* 19(2):138–154
- Li X (2011) “Fixed Effects Estimation in Panel Nonlinear Fractional Response Models.” Working Paper No. 2011-11, Department of Economics, University of Connecticut, Storrs, CT
- Maddala GS (1991) A perspective on the use of limited-dependent and qualitative variables models in accounting research. *Account Rev* 66(4):788–807
- Mammen K, Paxson C (2000) Women’s work and economic development. *J Econ Perspect* 14(4):141–164
- Masters SH (1969) An interindustry analysis of wages and plant size. *Rev Econ Stat* 51(3):341–345
- Mincer J (1962) Labor force participation of married women: a study of labor supply. In: Lewis HG (ed) *Aspects of labor economics*. Princeton University Press, Princeton, NJ
- Mitchell OS, Andrews E (1981) Scale economies in private multi-employer pension systems. *Ind Labor Relat Rev* 34(4):522–530
- Moghadam V (2005) *Globalizing women: transnational feminist networks*. The Johns Hopkins University Press, Baltimore, MD
- Morrison AR, Sabarwal S, Sjöblom M (2008) The state of world progress, 1990–2007. In: Buvinić M, Morrison AR, Ofosu-Amaah AW, Sjöblom M (eds) *Equality for women: where do we stand on the millennium development goals 3?*. The International Bank for Reconstruction and Development/The World Bank, Washington, DC
- Oakley JG (2000) Gender-based barriers to senior management positions: understanding the scarcity of female CEOs. *J Bus Ethics* 27(4):321–334
- Olivetti C (2006) Changes in women’s aggregate hours of work: the role of returns to experience. *Rev Econ Dyn* 9(4):557–587

- Papke LE, Wooldridge JM (1996) Econometric methods for fractional response variables with an application to 401(k) plan participation rates. *J Appl Econom* 11(4):619–632
- Paris LD, Howell JP, Dorfman PW, Hanges PJ (2009) Preferred leadership prototypes of male and female leaders in 27 countries. *J Int Bus* 40(8):1396–1405
- Pissarides C, Garibaldi P, Olivetti C, Petrongolo B, Wasmer E (2005) Women in the labour force: how well is Europe doing? In: Boeri T, Del Boca D, Pissarides C (eds) *Women at work: an economic perspective*. Oxford University Press, London, UK
- Prieto-Rodríguez J, Rodríguez-Gutiérrez C (2003) Participation of married women in the European labor markets and the added worker effect. *J SocioEcon* 32(4):429–446
- Puhani P (2000) The Heckman correction for sample selection and its critique. *J Econ Surv* 14(1):53–68
- Ramalho EA, Ramalho JJ, Murteira JM (2011) Alternative estimating and testing empirical strategies for fractional regression models. *J Econ Surv* 25(1):19–68
- Rauch JE, Kostyshak S (2009) The three Arab worlds. *J Econ Perspect* 23(2):165–188
- Sarbu M (2014) “Determinants of Flexible Work Arrangements.” Discussion Paper No. 14-028, Centre for European Economic Research, Mannheim
- Sartori A (2003) An estimator for some binary-outcome selection models without exclusion restrictions. *Polit Anal* 11(2):111–138
- Schmidt CM, Zimmermann KF (1991) Work characteristics, firm size and wages. *Rev Econ Stat* 73(4):705–710
- Siegel J, Pyun L, Cheon BY (2011) “Multinational Firms, Labor Market Discrimination, and the Capture of Competitive Advantage by Exploiting the Social Divide.” Working Paper No. 11-011, Harvard Business School, Boston, MA
- Smith K (2011) Labor Force Participation in the Soviet and post-Soviet Baltic States. *Econ Change Restruct* 44(4):335–355
- Standing G (1999) Global feminization through flexible labor: a theme revisited. *World Dev* 27(3):583–602
- Stevenson L (2010) Private sector and enterprise development: fostering growth in the Middle East and North Africa. International Development Research Center (IDRC), Ottawa
- Tam H (2011) U-Shaped female labor participation with economic development: some panel data evidence. *Econ Lett* 110(2):140–142
- Tansel A (2001) “Economic Development and Female Labor Force Participation in Turkey: Time-Series Evidence and Cross-Province Estimates.” Economic Research Forum Working Paper No. 01/05, Department of Economics, Middle East Technical University, Ankara
- The Organization for Economic Cooperation and Development (OECD) (2012). *MENA Women Entrepreneurs’ Access to Credit and Financial Services*. In: *Women in business: policies to support women’s entrepreneurship development in the MENA region*. OECD Publishing, Paris
- The World Bank (2011) *Capabilities, opportunities and participation: gender equality and development in the Middle East and North Africa region*. The World Bank, Washington, DC
- The World Bank (2013a) *World development indicators, gender statistics*. The World Bank, Washington, DC
- The World Bank (2013b) *Gender at work*. The World Bank, Washington, DC
- Toh SM, Leonardelli GJ (2012) Cultural constraints on the emergence of women as leaders. *J World Bus* 47(4):604–611
- Wagner J (2001) A note on the firm size: export relationship. *Small Bus Econ* 17(4):229–237
- Weiss JA, Ramirez FO, Tracy T (1976) Female participation in the occupational system: a comparative institutional analysis. *Soc Probl* 23(5):525–534
- Wooldridge JM (2002) *Econometric analysis of cross section and panel data*. MIT Press, Cambridge, MA
- Zeytinoglu IU, Cooke G, Mann S (2010) Employer offered family support programs, gender and voluntary and involuntary part-time work. *Relat Ind/Ind Relat* 65(2):177–195

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.