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Female Workforce Participation in Armenia: Evidence from Enterprise Survey

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ABSTRACT

Using the dataset of the Enterprise Survey in Armenia (2013) by the World Bank and the European Bank for Reconstruction and Development, this paper is to study the relationship between the female workforce participation and enterprise performance in Armenia. Accounting for survey weights, the regression analysis showcases a positive, robust but insignificant relationship between the presence of at least one female top manager in the top management team of the enterprise and its annual sales growth rate. Moreover, a t-test for mean comparison reveals that there are no significant differences between female-managed and male-managed enterprises on the perception of business obstacles and various performance, business climate, firm characteristics, and quality and innovation indicators used in the regression analysis. This study aims to grab the attention of Armenian employers and employees as well as to engender further policy implications.

Keywords: Female workforce participation; Armenia; Enterprise Survey; Enterprise Performance; Female top manager; Annual sales growth.

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1. INTRODUCTION

Armenia, being a developing country, needs to consider utilizing its human resources fully and engage more women in the labor force to ameliorate its economic situation (Caucasus Research Resource Center Armenia, 2011). From 2007 to 2017, Armenia has been known to be the country with the lowest female workforce participation compared to Georgia and Azerbaijan (The World Bank, 2020). Hence, for the future economic growth of the country, the need to examine this phenomenon further is evident. This can be done through the analysis of female workforce participation in Armenian enterprises, and its effects on company performance.

With this aim in mind, the research targets to answer the following question: ***“To what extent does female workforce participation affect the performance of Armenian enterprises?”*** In order to address the research question, an ordinary least squared regression analysis is conducted with four groups of variables: female participation variable, firm characteristics/control variables, business climate variables, and additional controls. Female participation variable in this regression is the dummy variable for at least one female top manager being present in the top management team while the enterprise performance is measured by the annual sales growth rate. The dataset for the analysis is the Enterprise Survey 2013 in Armenia that has been conducted by the World Bank and the European Bank for Reconstruction and Development. This dataset is the one being scrutinized as it provides the most recent results on the abovementioned survey.

Exploring the impact of female participation on the enterprise performance of Chinese private companies in the telecommunication sector, Ren and Wang (2011) come to a positive and significant relationship between the two. On the other hand, Du Reitz and Henrekson (2000), working on a sample of 4200 Swedish entrepreneurs, admit weaker preferences of female entrepreneurs for sales growth on average but they do not find any support for their underperformance especially when it comes to profitability. Hence, mixed evidence is there to suggest any initial answer to the research question of this paper.

In the Armenian reality, the study by Zohrabyan (2013) reveals socio-economic factors determining female participation using Caucasus Barometer survey with 842 female respondents while Harutyunyan (2007) scrutinizes rural women’s participation in agricultural associations

through a survey of 94 respondents. Women's labor force participation in agriculture in Armenia has been researched by Bakhtavoryan and Dalakyan (2013) as well. Another studies by Baghdasaryan and Barseghyan (2019) estimate the gender wage gap and impact of child care policy on female labor force participation using Labor Force Survey and Household's Integrated Living Conditions Survey.

Abovementioned Armenian researchers have tackled individuals and households as their units of analysis and the first set of papers is mainly concentrated on women in rural areas while the current study sheds light on female participation on an enterprise level and provides with the opportunity to examine the impact of that participation on an enterprise performance indicator. The performance analysis on an enterprise level can engender a brand new viewpoint of the issue.

A wide number of research has been conducted using the World Bank's Enterprise Survey. Dethier, Hirn, and Straub (2010) summarize and analyze many of those research endeavors and suggest a generic specification that can be used to explain enterprise performance through this dataset. Ali and Shabir (2017) examine the differences in business obstacle perceptions and performance variables, comparing male and female-owned Indian enterprises using World Bank's Enterprise Survey Data for India (2014) as well. They conduct two-tailed t-tests for mean comparison to come to the conclusion. This approach is useful for understanding the importance of the gender in management and ownership in Armenia as well. Hence, a similar analysis is conducted in the scope of this paper.

Therefore, this study adds novel perspectives and experience to the existing knowledge on the topic in the following ways. Firstly, it is the pioneer in analyzing female participation in Armenian enterprises (private companies) providing with broader and more thorough vision of the situation. Secondly, it is the first one to scrutinize the data provided by the Enterprise Survey in Armenia with the aim to assess the impact of female participation on the enterprise performance.

The paired t-test for mean comparison showcases that overall, there are no significant differences in perceptions of business obstacles by male-managed versus female-managed companies. On the other hand, while male-managed companies tend to be significantly bigger in size than those managed by a female top manager, overall differences in other indicators are not

significant. The regression analysis results in the main effect variable (female top manager) to have a positive, robust, but insignificant impact on the annual sales growth rate of the Armenian privately owned enterprises.

The study intends several practical implications as well. Firstly, the main variable under consideration turns out to have a positive but an insignificant coefficient. This can help assess the existing situation and provide insights for future policies to be implemented. It hints on the fact that while female participation does not necessarily ameliorate the enterprise performance, it does not tend to worsen it as well. Secondly, showcasing no overall significant differences of gender performance in management can help the society and in particular, employers, overcome a number of stereotypes. Last but not least, knowing that their presence might have a positive impact on the enterprise performance can also motivate and empower women to embrace higher positions, making them more self-confident and eager to work productively. There is also a chance to incentivize employers to welcome more female employees and/or help the government find the direction for more effective campaigns.

In the following sections of this paper, the reader can find a thorough literature review analysis and the dots that this research connects in the framework of the existing research done, data description and necessary transformations in line with the analysis in differences of gender management, the theoretical and empirical basis of the econometric specification and the methodology used, the estimation and the interpretation of the results, and finally, the concluding section of this paper in line with the Appendix where one can access further information on the analysis conducted.

2. LITERATURE REVIEW

Female participation is a broadly discussed topic worldwide. Many researchers focus on what factors impact the female participation rate and the female participation trends over time, others investigate the consequences of increased or decreased participation and its relationship with different factors such as company performance, stock value, etc.

Female Participation trends can be examined through the prism of the female participation and economic development theory (Boserup, 1970; Goldin, 1995). It states that there is a U-shaped relationship between these two factors. So, at the initial stages of economic development, women

mainly work at the households and in the family-owned farms and businesses. With development, the economic shift towards factories and firms occurs, making women withdraw from the labor force. Then, with higher economic development, a sectoral shift towards services and light manufacturing brings women back to the labor market again and afterwards, the more the economy grows, the more females are engaged in its further development. Heath and Jayachandran (2016) look for the evidence of the U-shaped function in their research by plotting female participation rates and relevant GDPs from 1991 to 2011. While there was some dispersion to consider among countries, the best-fit relationship was, indeed, U-shaped. So, overall the female participation rate has been increasing in the most developing countries (Heath and Jayachandran, 2016). They also bring growing education rate for females as a driving force for their further employment. On the other hand, there are cases suggesting that only if the jobs that reward education are existent in the economy, the education can result into a higher labor force participation.

The relationship of female participation and household socio-economic characteristics in developing countries such as Pakistan (Faridi, Malik, and Basit, 2009), Burma (Mon, 2000), India (Sucharita, 2013), Syria (Nasser and Mehchy, 2011), etc. has also been investigated.

In the Armenian reality, the study by Zohrabyan (2013) reveals socio-economic factors determining female participation, using Caucasus Barometer survey with 842 female respondents, revealing that a woman in Armenia is less likely to be employed if she perceives that in case of scarcity of jobs, men have more rights to have a job. Furthermore, she states that the age, education and marital status also affect the odds of employment for an Armenian woman. Harutyunyan (2007) scrutinizes rural women's participation in agricultural associations through a survey of 94 respondents and the results indicated that two important factors affecting female labor force participation were the negative attitude of family members and the lack of skills. Women's labor force participation in agriculture in Armenia has been researched by Bakhtavoryan and Dalakyan (2013) as well. They summarize their findings by stating that an Armenian woman in rural areas is less likely to be employed with every additional year of age, more likely to participate in the labor force with a higher or secondary technical education and basic knowledge of Russian. Moreover, as opposed to a single woman, divorced or widowed women are more likely to participate in the labor force. Another studies by Baghdasaryan and

Barseghyan (2019) estimate the gender wage gap and impact of child care policy on female labor force participation using Labor Force Survey and Household's Integrated Living Conditions Survey.

This study adds value to those abovementioned ones conducted in the Armenian reality as it employs a novel approach by taking an enterprise as the unit of analysis and an enterprise-level study can help grasp a thorough understanding of the female labor force participation question in Armenia.

Du Reitz and Henrekson (2000) test the hypothesis of underperformance of female entrepreneurs as compared to male ones, derived from the results of previously conducted studies, by using a sample of 4200 Swedish entrepreneurs, out of which 405 females. They conduct a detailed analysis that confirms the female underperformance in terms of sales but reveals no gender difference in the profitability indicators. According to them, women tend to have weaker preferences for enterprise and sales growth than their male counterparts as they perceive the business as a way to independence, and control of their working lives rather than an aim to grow the business as far as possible.

When it comes to female labor force participation in enterprises and the impact of the latter on the company performance, Ren and Wang (2011) have researched Chinese private enterprises in Technology, Media, and Telecom sector to look for the answers to these questions. According to Ren and Wang (2011), female participation in top management impacts the company in several ways. First of all, it leads to sound decisions being made due to the different cognitive bases that genders possess. Secondly, the legitimacy of the enterprise is being enhanced. And lastly, female participation results in higher commitment from the consumers and employees. Dezso and Ross (2008) showcase that the positive relationship between female participation and firm performance is existent especially when a firm has an "innovation intensive" strategy and would accordingly benefit most from the female management style. Furthermore, Ren and Wang (2011) also specify the factor of education. They state that higher levels of education testify a stronger capability to process and analyze information. To test their hypotheses, Ren and Wang (2011) use the sample of China's listed companies in 2010 (data retrieved from China Stock Market & Accounting Research Database). They measure company performance with the help of Tobin's Q (Bertrand and Schoar, 2003), it is equal to $(\text{Equity Market Value} + \text{Liabilities Book Value}) /$

Total Book Assets. They use the female participation ratio as the main variable under consideration which is the number of female top managers divided by the total number of top managers. The main estimation specification to explain Tobin's Q used by Ren and Wang (2011) includes independent variables such as the female participation ratio, the team size they work in, the size of the enterprise, its book leverage, age, region, and the industry it operates in. They use a hierarchical OLS regression model that results in the main effect variable coefficient being positive and significant. On the other hand, it is very important to note that all of the companies analyzed in the study by Ren and Wang (2011) are listed on the stock exchange. This facilitates the use of Tobin's Q as the performance indicator and the accessibility of companies' information and financial statements. Unfortunately, a similar study in Armenia cannot be conducted because of the lack of enterprise information. So this study is limited by the scope of World Bank's Enterprise Survey Data.

This study is a pioneer in analyzing the latest World Bank's Enterprise Survey Data of Armenia (2013) to inform potential employers, employees, and the government on female workforce participation situation and impact in Armenia. There are several studies that use Enterprise Survey Data to explore female workforce participation from diverse perspectives in different developing countries.

Ali and Shabir (2017) examine the differences in the variables linked to business performance and business obstacles that companies face, comparing male and female-owned Indian enterprises using World Bank's Enterprise Survey Data for India (2014). They use descriptive statistics, chi-square test and the independent samples t-test to determine the differences in variables among female-owned vs male-owned enterprises and then run an ordered probit regression to understand the relative importance of those variables that affect female-owned enterprises. After analyzing 9281 Indian enterprises, they conclude that there is a significant difference in terms of size, location, type, age, annual sales growth, labor productivity growth, and capacity utilization of the firm. Moreover, the perception of business obstacles varies significantly on 10 obstacles out of 16 with female-owned companies perceiving facing less obstacles.

A similar paired sample t-test is conducted in the scope of this study to provide valuable insight on the difference between female-managed and male-managed enterprises.

Another study by Amin and Zarka (2018) examines the World Bank's Enterprise Survey Data to describe the levels of engagement and importance of female top managers in Malaysia benchmarking their indicators against the average across countries for the following comparator groups: countries in the East Asia & Pacific (EAP) region, upper-middle-income countries, and lower-middle-income countries. They conclude that approximately a quarter of all Malaysian firms have females as top-level executives. A female top manager is more likely to be employed by a large firm than a small one, in the retail sector than the rest of the economy, and in an exporting rather than a non-exporting enterprise. Enterprises with female top managers have a higher labor productivity than those managed by males. Contrariwise, male top managers are less sensitive towards business obstacles such as the regulatory burden, corruption, and crime.

It is interesting to scrutinize gender-based perception differences in Armenia as well to fight stereotypes, gender-bias and gain a deeper understanding.

Various studies use World Bank's Enterprise Survey Data to explain enterprise performance which is the aim of this research as well. A very rigorous analysis and recommendations are provided by Dethier, Hirn, and Straub (2010) who suggest explaining the enterprise performance through independent variable groups such as business climate indicators, firm characteristics, and additional controls. Enterprise performance is measured by profit, sales or employment growth as suggested by Dethier, Hirn, and Straub (2010) in their paper. Business Climate Indicators consist of infrastructure (electricity, water, internet connection availability, etc.), competition and regulation, access to finance, and corruption and crime. Firm Characteristics may include firm's size, leverage, liquidity, turnover, etc. Additional controls might be the education of the top management of the company, the innovativeness of the company, etc. (Dethier, Hirn, and Straub's, 2010). All of these variables can be measured using the Enterprise Survey Data.

As suggested by Dethier, Hirn, and Straub (2010), this study uses sales growth as a performance measure and a dependent variable. Quite a few studies showcase a similar approach trying to explain company performance and having sales growth as the dependent variable such as those by Fisman and Svensson (2007), Hallward-Driemeier, Wallsten, and Xu (2006), Honorati and Mengistae (2007), and Commander and Svejnar (2007). Bastos and Nasir (2004) control for firm age, exporter status, and foreign ownership, while Beck, Demirguc-Kunt, and Maksimovic

(2005) add the number of competitors, industry and location dummies to this list with Escribano and Guasch (2005) using firm size as well. Aterido, Hallward-Driemeier, and Pages (2007) suggest using firm characteristics such as firm size (micro/small/medium/large), firm age, ownership (foreign or not), exporter status, industry, region, etc. They also use a set of independent variables derived from the World Bank's Enterprise Survey that are used to describe the business climate such as overdraft facility, percent of sales sold on credit, percent of working capital financed externally, percent of investment financed externally (access to finance), days spent on inspection last year, average days to clear customs and to get a license (regulation), firms in comparable activities bribe to get things done, similar firm give gifts to officials, etc. (corruption), power outages during last year, percent of sales lost due to power outages, log of days with no water (infrastructure). Escribano and Guasch (2005) provide a variable to be used for assessing crime: no. of criminal attempts suffered infrastructure. Moreover, they suggest a set of variables that constitute the additional controls (a part of Dethier, Hirn, and Straub's (2010) econometric specification), naming the set as "Quality, innovation, and labor skills" that includes fraction of computer controlled machinery, fraction of total staff engaged in R&D, dummy for ISO quality certification, fraction of total staff with secondary or higher education, and dummy for training beyond "on the job" training. The studies mentioned above are not the only ones suggesting the same or similar models or usage of variables. Moreover, a number of authors such as Dollar, Hallward-Driemeier and Mengistae (2005), Fisman and Svensson (2007), and Hallward-Driemeier, Wallsten, and Xu (2006) include lagged sales from previous periods in order to explain the annual sales growth.

As none of the studies mentioned in the paragraph above aimed to explore the impact of female participation or similar effects on the enterprise performance, this study is to answer a new question but deriving a model from the examples above. Moreover, the peculiarities of the Armenian market and enterprises give rise to a number of issues with the World Bank's Armenian Enterprise Survey (2013) that make the changes or substitutions of a number of variables inevitable hence, resulting in a new model. All of these modifications and the reasons thereof will be discussed in the later sections of this paper.

3. DATA

The dataset used for this paper is a sample survey data that come from the Enterprise Survey conducted in Armenia by the World Bank and the European Bank for Reconstruction and Development in 2013. The unit of observation for this survey as well as for the current paper is an Armenian privately owned enterprise that either carries out production or provides services or both. Moreover, it has to have its own financial statements, make its own decisions and have its own management control and control over payroll. This cross-sectional dataset incorporates 360 units of analysis and 388 variables reported as of at the end of the fiscal year. The variables cover topics such as characteristics of the enterprise, infrastructure and services, sales and supplies, business climate indicators, labor, innovation, business environment, expectations, perceptions of obstacles, etc.

In order to showcase the differences in perceptions of obstacles and in a number of objective variables that are used in the regression analysis in the scope of gender management in Armenia, this research paper includes a two-tailed t test for mean difference following the example of Ali and Shabir (2007).

Perception of obstacles is a set of subjective variables concerning a number of business obstacles such as electricity, telecommunication, transport, access to land, access to finance, tax administrations, business licensing and permits, labor regulations, courts, crime, theft, and disorder, practices of competitors, political instability, corruption, and inadequately educated workforce. The answer options range from “No Obstacle”-0 to “Very Severe Obstacle”-4. These subjective variables are not suitable for the regression analysis but they are helpful in assessing the overall picture of managerial perceptions by gender. The results of the test are showcased in the Table 1 below.

Table 1. Responses on business obstacles across fully male-managed enterprises and those with at least one female top manager.

Business Obstacle	Female-Managed			Male-Managed			t	df	Sig(2-tailed)
	N	Mean	St. Dev	N	Mean	St. Dev			
Electricity	49	0.510	1.157	308	0.487	1.003	0.1471	355	0.883
Telecommunications	49	0.306	0.652	309	0.430	0.890	-0.938	356	0.349
Transport	48	0.479	1.010	304	0.878	1.147	-2.275**	350	0.024
Access to Land	48	0.958	1.184	287	0.760	1.032	1.209	333	0.228
Access to Finance	49	1.551	1.156	308	1.750	1.150	-1.125	355	0.262
Tax Administrations	49	1.449	1.501	308	1.455	1.447	-0.024	355	0.980
Business Licensing and Permits	49	0.224	0.771	307	0.332	0.844	-0.839	354	0.4019
Labour Regulations	49	0.224	0.587	309	0.324	0.809	-0.824	356	0.411
Courts	48	0.146	0.652	306	0.134	0.571	0.131	352	0.896
Crime, Theft, and Disorder	48	0.833	1.358	303	1.208	1.426	-1.702*	349	0.090
Practices of Competitors	40	0.400	0.871	260	0.642	1.224	-1.206	298	0.229
Political Instability	49	1.265	1.351	308	1.231	1.366	0.166	355	0.868
Corruption	48	0.667	1.294	304	0.878	1.306	-1.045	350	0.2968
Inadequately Educated Workforce	48	0.521	0.945	304	0.513	1.047	0.047	350	0.962

*significant at 0.1 level, **significant at 0.05 level, ***significant at 0.01 level

According to the analysis of the dataset, perceptions of only two business obstacles differ significantly among male and female-managed enterprises¹. Male-managed enterprises report perceiving Transport (at 0.05) and Crime, Theft, and Disorder (at 0.1) as significantly stronger obstacles than their female counterparts. Overall, it is reasonable to claim that there are no significant differences in perceptions of business obstacles between male and female-managed enterprises.

Table 2 represents the differences between male-managed enterprises and those with at least one female top manager when it comes to a few variables used in the regression analysis. The same methodology is used as above to derive the results that are reported below.

¹ Note that the female-managed enterprises are those that have at least one female top manager.

Table 2. Various relevant indicators across fully male-managed enterprises and those with at least one female top manager.

Indicator	Female Top Manager			Male Top Manager			t	df	Sig(2-tailed)
	N	Mean	St. Dev	N	Mean	St. Dev			
Sales Growth Rate (%)	23	7.9942	31.5592	183	3.69966	26.585	0.7146	204	0.4757
Firm Size	49	1.347	0.751	309	1.628	0.773	-2.371**	356	0.018
Foreign Ownership (%)	49	7.959	25.899	308	6.273	21.377	0.497	355	0.619
Exports as a Percentage of Sales (%)	49	1.633	11.429	305	4.174	16.204	-1.055	352	0.292
Overdraft Facility	49	0.224	0.422	308	0.357	0.480	-1.825*	355	0.069
Technology Licensed from a Foreign-owned Company	49	0.184	0.391	308	0.192	0.394	-0.130	355	0.897
Generator Owned	49	0.041	0.200	308	0.127	0.333	-1.752*	355	0.081
New Production/Supply Methods	49	0.061	0.242	309	0.058	0.235	0.082	356	0.935
New Organizational/Management Practices or Structures	49	0.041	0.200	309	0.074	0.263	-0.856	356	0.392
Female Owner	49	0.776	0.422	309	0.152	0.360	10.97***	356	0.000

*significant at 0.1 level, **significant at 0.05 level, ***significant at 0.01 level

Out of nine indicators that are mentioned in the table that enter the regression², only three made a significant difference; male-managed enterprises were significantly (at 0.05) bigger, had significantly (at 0.1) better access to overdraft facility, and a significantly (at 0.1) wider ownership of electricity generators. Access to overdraft and ownership of electricity generators can be correlated with the size of the enterprise as well. The last variable could be interesting to scrutinize as it showcases that the enterprises with at least one female owner employ significantly (at 0.01) more female top managers than fully male-owned ones. Hence, the analysis of the Armenian data does not hint overall significant performance and perception differences based on the gender of the manager.

To ensure the quality of the regression analysis, the data have been modified by removing the outliers and recently established enterprises from the list. So, this has reduced the number of units of observations to 355. Unfortunately, a significant number of missing responses and

² The first nine variables are present in the regression but the way they enter the regression can be modified. The specific modifications are explained later in the paper.

refusals have decreased this number even further. The significant number of missing observations is the biggest limitation of the dataset and hence, of the regression analysis itself.

The variables and the way they enter the regression are presented in the Table A1 of the Appendix of this paper with their calculations and other relevant information. The descriptive statistics of those variables are shown in the Table 3 below.

Table 3. Descriptive statistics of the variables used in the regression.

Descriptive Statistics					
Variable	Obs	Mean	Std.Dev.	Min	Max
SalesGrowthRatePerc	206	4.179	27.133	-153.506	235.528
FemTopManager	358	.137	.344	0	1
logSales2010	208	18.565	1.604	14.682	23.614
Region	359	.535	1.04	0	3
Industry	359	1.265	1.468	0	5
FirmSize	359	1.591	.775	0	3
ForeignOwnDummy	357	.092	.29	0	1
ExportDummy	355	.082	.274	0	1
logFirmAge	358	2.606	.475	1.099	4.431
logNCompetitors	301	1.489	.747	0	4.605
FrInformalGifts	352	1.125	.994	0	5
OverdraftFacility	357	.339	.474	0	1
WCExternalDummy	354	.61	.488	0	1
TaxInspected	359	.766	.424	0	1
GenOwned	358	.115	.319	0	1
CrimeDummy	335	.018	.133	0	1
TechLicenseForeign	358	.193	.395	0	1
NewManPractices	359	.07	.255	0	1
NewProdMethods	359	.058	.235	0	1

The dependent variable that is a proxy for the enterprise performance is the annual sales growth rate in percentages (SalesGrowthRatePerc) and is calculated as the difference of the natural logarithms of the Sales figures in 2013 and 2010 multiplied by 100 and divided by three, the main independent variable of interest is FemTopManager (a dummy variable to indicate whether there is at least one female top manager in the top management team) accompanied with a number of firm characteristics (control) variables, business climate variables, and additional

control variables such as those describing quality and innovation. Because of the significant skewness of the initial dataset, all of the variables but the dummy ones and the dependent one are transformed into their natural logarithmic form (those variables have the prefix “log” in front of their names).

4. ECONOMETRIC MODEL

Building on the econometric specification suggested by Dethier, Hirn, and Straub (2010), which is constructed to explain enterprise performance using World Bank’s Enterprise Survey data and used in a number of research papers to explain the impact of a specific factor on the enterprise performance, the following estimation equation is to be used in this study to test for female workforce participation impact on the enterprise performance:

$$\text{Enterprise Performance} = \beta_0 + \beta_1 (\text{Female Participation}) + \beta_2 (\text{Business Climate Indicators}) + \beta_3 (\text{Firm Characteristics}) + \beta_4 (\text{Additional Controls}) + \varepsilon$$

Please, note that Dethier, Hirn, and Straub’s (2010) specification is extended by including the Female Participation indicator as in the specification of Ren and Wang (2011).

All the figures of the variables mentioned below are for the reporting period ending on December 31, 2013 unless not stated otherwise.

Enterprise performance is measured with the help of annual sales growth as done by Dollar, Hallward-Driemeier and Mengistae (2005), Fisman and Svensson (2007), and Hallward-Driemeier, Wallsten, and Xu (2006). Moreover, sales amount is considered to be one of the preferable proxies by Dethier, Hirn, and Straub (2010).

Female participation in the scope of this estimation is measured with the help of the dummy variable indicating whether at least one female top manager is engaged in the top management team. Another possible way to measure the female participation is the percentage of female owners in the company or the dummy variable for female ownership. Unfortunately, because of a material number of missing observations, it is not reasonable to use this indicator. The same issue relates to the female participation ratio (permanent female workers/permanent workers).

Business climate indicators used for the current estimation are **access to finance** indicators: financing working capital externally and access to an overdraft facility; **competition**: number of competitors; **regulation**: whether the enterprise was inspected; **crime**: loss of products for

domestic market in transit because of theft/crime; **infrastructure**: whether the enterprise owns an electricity generator, and **corruption**: the frequency the companies in the same business line give bribes to get things done in spheres such as customs, taxes, licenses, regulations, etc.

Firm Characteristics/Controls include the number of the main competitors, firm size, firm age, ownership status, and exporter status while being controlled for the region in which the company operates and its industry. Moreover, while explaining the sales growth rate from 2010 to 2013, the sales figure from three fiscal years ago is to be lagged for the precision as done by Fisman and Svensson (2007), Hallward-Driemeier, Wallsten, and Xu (2006), Dollar, Hallward-Driemeier, and Mengistae (2005), etc.

Additional Controls are comprised of new managerial practices integrated and new production methods introduced by the management as well as whether the technology that the enterprise uses for production is licensed from a foreign-owned company to measure the innovativeness of the enterprise and the quality of its products as suggested by Escribano and Guasch (2005).

All the variables are carefully chosen to objectively describe the categories described and mentioned in the specification by Dethier, Hirn, and Straub (2010) and suggested by many other authors mentioned in the Literature Review section. Moreover, because of a significant number of missing responses for many questions in the survey, the ones that will be best suited not to affect radically the number of observations in the regression are used.

5. METHODOLOGY

This study is to conduct an OLS regression analysis using the specification stated above in order to understand the impact of female participation on the annual sales growth of the enterprise. As stated, Ren and Wang (2011) scrutinized a similar relationship using hierarchical ordinary least squares (OLS) method on a cross-sectional data adding different groups of variables level by level for a deeper analysis. Furthermore, a number of authors such as Beck, Demirguc-Kunt, and Maksimovic (2005), Escribano and Guasch (2005), Fisman and Svensson (2007), Hallward-Driemeier, Wallsten, and Xu (2006), Commander and Svejnar (2007), etc. use the OLS method to analyze the impact of various variables of interest on enterprise performance such as ownership, corruption, infrastructure, subjective obstacle perceptions, etc. using a similar econometric specification to the one summarized by Dethier, Hirn, and Straub (2010). Hence, the OLS regression is empirically proven to be a suitable method to predict enterprise performance

based on cross-sectional data and to monitor the impact and the behavior of a specific variable of interest, in this case, female participation. Importantly, the survey dataset originally incorporates survey sampling weights which, if ignored, can result in erroneous point estimates and standard errors (UCLA Statistical Consulting Group, 2016). Moreover, survey data weighting needs to be taken into consideration to yield an accurate reflection of the population in case of survey data imbalance. Hence, the regression output is reported in the next section with the use of survey weights.

6. ESTIMATION AND RESULTS

As mentioned above, an ordinary least squared regression with the incorporation of survey weights has been conducted to monitor the main effect of having at least one female top manager on the enterprise annual sales growth rate. Before proceeding to the analysis of the results, it is important to mention that the models have been tested for multicollinearity and heteroscedasticity³. Additionally, the endogeneity risk is mitigated by integrating a broad specter of objective variables including business climate indicators as suggested by Carlin, Schaffer, and Seabright (2006).

The overall regression includes four groups of variables: main effect, firm characteristics/control, business climate, and additional controls (Quality and Innovation) but not all of them are present in every model. So the estimation output that you can find in the Table 4 below consists of six models, considers survey weights, and reports robust standard errors. Model 1 contains only the firm characteristics/control variables and the main effect variable trying to predict the annual sales growth rate (%). Model 2 adds business climate variables as well but controls only for the firm size. Model 3 is the same as Model 2 but controls for the region as well. Model 4 includes all firm characteristics/control variables and business climate variables in line with the main effect variable. Finally, Model 5 adds additional controls to Model 4 resulting in a broader set of variables, and Model 6 excludes any other industries from the Model 5 but “Retail Industry”.

³ Variance Inflation Factor=1.784, hence no multicollinearity issue is present, and the homoscedasticity hypothesis holds true (White test, Prob > chi2 = 0.3926). You can find the test results in Table A2 and Figure A1 of the Appendix.

Table 4. OLS Regression of female participation in Armenian enterprises and enterprise performance.

<i>DV:</i> <i>SalesGrowthRatePerc</i>	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Main Effect						
FemTopManager	5.717 (6.673)	9.275 (8.173)	7.703 (8.245)	10.302 (7.734)	11.757 (7.141)	9.983 (6.975)
Firm Characteristics/Controls						
logSales2010	-7.877** (3.210)	-4.006* (2.193)	-4.511** (2.250)	-5.599** (2.515)	-6.117** (2.623)	-6.117** (2.428)
regionNorth	-7.577 (10.811)		-14.772 (16.724)	-8.593 (14.580)	-9.631 (14.353)	-11.387 (16.447)
regionSouthWest	-7.028 (4.294)		-8.340 (5.779)	-5.847 (6.031)	-2.980 (5.366)	-2.828 (5.340)
regionSouthEast	1.662 (5.678)		-0.201 (12.120)	8.859 (13.155)	11.137 (12.783)	4.929 (12.218)
industryretail	5.820 (4.658)			4.521 (5.951)	7.193 (5.721)	11.003** (5.274)
industryconstruction	-2.134 (12.724)			-17.486 (19.581)	-15.133 (18.691)	
industryfood	2.036 (8.075)			-4.652 (7.551)	-9.412 (6.683)	
industryhoreca	-9.755* (5.874)			-12.946* (6.666)	-10.174 (6.312)	
industryIT	-9.426 (11.322)			-5.078 (11.136)	-0.492 (10.275)	
firmsizemicro	-44.596** (19.385)	-36.711 (22.765)	-40.976* (22.887)	-52.686** (23.522)	-59.064** (23.807)	-55.745** (23.896)
firmsizesmall	-35.100** (14.607)	-35.539* (19.352)	-37.680* (19.437)	-41.428** (19.266)	-46.152** (19.477)	-43.156** (19.704)
firmsizemedium	-21.504* (11.428)	-25.010 (15.983)	-26.244* (15.759)	-26.717* (15.366)	-30.817** (15.284)	-30.597* (16.086)
logFirmAge	-4.923 (4.969)	-9.595** (4.709)	-8.649* (4.638)	-7.076 (4.403)	-4.430 (4.284)	-3.812 (4.271)
ForeignOwnDummy	1.043 (5.741)	-2.350 (6.394)	-2.768 (6.923)	-3.055 (6.818)	-1.102 (7.081)	-2.563 (7.329)
ExportDummy	-11.418 (10.930)	10.528 (11.414)	7.567 (11.439)	8.082 (13.327)	3.746 (12.921)	5.864 (10.705)
Business Climate Indicators						
logNCompetitors		0.021 (3.547)	-0.187 (3.629)	0.776 (3.548)	0.435 (3.661)	-0.129 (3.712)
OverdraftFacility		7.558 (4.817)	7.609 (5.073)	9.002* (4.894)	8.430* (4.407)	7.724* (4.364)
WCExternalDummy		-4.104 (4.968)	-6.199 (4.709)	-7.768 (4.840)	-10.906** (5.201)	-8.806* (4.819)

Table 4. (continuation)

TaxInspected		-2.755 (5.244)	-2.168 (5.458)	-0.487 (5.677)	-1.571 (5.526)	-3.030 (5.418)
GenOwned		5.185 (8.016)	8.211 (9.943)	3.079 (10.593)	4.165 (9.794)	9.106 (9.184)
InfGiftsSeldom		-0.897 (5.716)	-3.599 (7.727)	-1.920 (6.498)	-3.672 (6.446)	-5.225 (7.533)
InfGiftsSometimes		4.671 (4.811)	1.871 (5.969)	7.013 (5.522)	7.269 (5.382)	4.716 (6.100)
InfGiftsFreq		10.968* (6.535)	7.652 (7.566)	4.913 (8.903)	2.421 (6.729)	4.911 (6.573)
InfGiftsVFreq		-1.534 (6.228)	-4.030 (6.649)	-3.616 (6.094)	0.705 (6.867)	-2.481 (6.713)
InfGiftsAlways		21.015*** (7.034)	18.082** (8.447)	20.282*** (6.971)	14.930 (9.144)	13.084 (10.118)
CrimeDummy		30.902 (32.087)	27.473 (30.588)	24.732 (27.366)	26.066 (26.066)	28.292 (27.603)
Additional Controls						
TechLicenseForeign					17.249*** (5.933)	18.703*** (6.166)
NewManPractices					-14.978** (6.904)	-15.513** (7.104)
NewProdMethods					19.293** (8.092)	17.292** (6.885)
Constant	191.090** *	132.293** (68.685)	146.152** (62.557)	160.492** (62.296)	167.062*** (63.505)	162.296** (62.835)
Observations	205	160	160	160	159	159
R-squared	0.202	0.239	0.263	0.311	0.366	0.342

Robust standard errors in parentheses

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

Note: Variance scaled to handle strata with a single sampling unit.

The regression analysis conducted showcases a positive, robust but insignificant relationship between having at least one female top manager in the enterprise and the dependent variable in all the models. The insignificance of the main variable under consideration in Models 1 to 4 can be explained through the insufficiency of variable diversity as suggested by Dethier, Hirn, and Straub (2010) as well as the limited number of observations. Theoretically, Model 5 and 6 are the most reliable ones as they incorporate a sufficiently wide range of objective variables to provide sound results, even though they have the lowest number of observations which is the limitation of not only this model but the whole regression analysis. According to them, the FemTopManager variable yields positive coefficients with p-values of 0.102 (Model 5) and

0.155 (Model 6). This positive relationship might also be a consequence of a reverse causality issue being present.

Some of the significant variables in the models are worth further scrutiny. The natural logarithm of the lagged annual sales of three fiscal years ago (2010) is negative, robust, and significant in every model. In Model 5, a 1% increase in the lagged annual sales from 2010 decreases the annual sales growth rate by 0.061% at the significance level of 5%. Dollar, Hallward-Driemeier, and Mengistae (2005) report similar results stating that it is natural to have a strong negative relationship between the lagged level of output and its annual growth as new enterprises tend to grow faster. This also explains the negative, robust, and significant relationship between the age of the firm and its annual growth as shown in Models 2 and 3. According to the analysis, the size of the firm also matters and the enterprises with a micro, small, and medium sizes grow significantly slower than the reference group of large enterprises which can be associated with the level of availability of resources and investment potential of the enterprises. In Models 5 and 6, both Access to Finance variables are robust and significant. In Model 5 access to an overdraft facility increases the annual sales growth rate of the enterprise on average by 8.4% at the significance level of 10%, other predictors held constant. On the other hand, the externally financed working capital decreases the annual sales growth rate on average by 10.9% at the significance level of 5%, other predictors held constant. Similarly, Aterido and Hallward-Driemeier (2007) find access to finance variables significant in their analysis. The quality and innovation variables are all robust and significant. Moreover, they are indicators of managerial competence and hence, are relevant to the purpose of the study. The regression shows that licensing the technology from a foreign company increases the annual sales growth rate of the enterprise on average by 17.249% at the significance level of 1%, other predictors held constant (Model 5). Additionally, introducing new production/supply methods increases the annual sales growth rate of the enterprise on average by 19.293% at the significance level of 5%, other predictors held constant, while new managerial practices introduced decrease the annual sales growth rate of the enterprise on average by 14.978% at the significance level of 5%, other predictors held constant (Model 5).

7. CONCLUSION

The female workforce participation is an important economic issue for Armenia as a country with limited labor skills and resources. Furthermore, it is a social issue as the society's views harshly affect the lives of individuals, particularly women who are assigned a secondary role in the society.

According to the analysis, *the female top manager variable yields a positive but insignificant coefficient in the regression explaining the annual sales growth of an Armenian private enterprise with robust standard errors reported and survey weights considered.* Moreover, the study concludes that overall, there is no significant difference in business obstacle perceptions and various performance, business climate, firm characteristics, and quality and innovation indicators based on gender management, even though male-managed businesses are significantly bigger in size with a better access to overdraft facilities and a higher ownership of electricity generators.

Therefore, this study targets potential employers, female employees, and their colleagues, and encourages them to review their way of thinking and contribute more effectively to the development of the Armenian economy. It also adds value to the existing research analyses firstly, by taking an Armenian privately owned enterprise as its unit of analysis and secondly, by being the first one to use the World Bank's Armenian Enterprise Survey to analyze and discuss female workforce participation in Armenia.

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APPENDIX

Table A1. *Variables used in the regression, calculations and other relevant information.*

Variable Name	Description	Calculations/Categories
SalesGrowthRatePerc (Dependent Var.)	Annual sales growth rate in percentage.	$(\log \text{Sales}_{2013} - \log \text{Sales}_{2010}) * 100 / 3$
FemTopManager (Dummy Variable)	Showcases if there is at least one female top manager in the top management team.	At least one female top manager=1 otherwise=0 (reference cat.)
logSales2010	The natural logarithm of the sales figure from three fiscal years ago (2010).	
Region (Dummy Variable)	Controls for the region difference the enterprise operates in.	regionYerevan (reference) region North=1 or 0 regionSouth=1 or 0 regionSouthEast=1 or 0
Industry (Dummy Variable)	Controls for the industry the enterprise operates in.	Otherindustries (reference) industryretail=1 or 0 industryconstruction=1 or 0 industryfood=1 or 0 industryhoreca=1 or 0 industryIT=1 or 0
FirmSize (Dummy Variable)	The enterprise is considered to be micro if it employs less than 5 people, small if from 5 to 19, medium if from 20 to 99, and large if more than 100 employees.	firmsizemicro=1 or 0 firmsizesmall=1 or 0 firmsizemedium=1 or 0 firmsizelarge (reference)
ForeignOwnDummy (Dummy Variable)	Indicates whether the enterprise has a foreign ownership component. It takes the value of 1 if the enterprise's shares are owned by foreign investors by 10% or more.	Foreign ownership $\geq 10\%$ =1 otherwise=0 (reference)

ExportDummy (Dummy Variable)	Is to indicate the exporter status of the enterprise. It takes the value of 1 if the enterprise exports/sales is 10% or more.	Export/sales $\geq 10\%$ =1 otherwise=0 (reference)
logFirmAge	The natural logarithm of the age of the company in 2013.	Log of (2013-the year of establishment)
logNCompetitors	Natural logarithm of the number of competitors the enterprise faces in the main market	
FrInformalGifts (Dummy Variable)	The perception of the respondent on the frequency by which the companies in the similar business line pay bribes to get the things done. Answer categories are Never, Seldom, Sometimes, Frequent, Very Frequent, and Always.	InfGiftsNever (reference) InfGiftsSeldom=1 or 0 InfGiftsSometimes=1 or 0 InfGiftsFreq=1 or 0 InfGiftsVFreq=1 or 0 InfGiftAlways=1 or 0
OverdraftFacility (Dummy Variable)	Indicates whether the enterprise has access to an overdraft facility or not.	Access to overdraft=1 otherwise=0 (reference)
WCExternalDummy (Dummy Variable)	Takes the value of 1 if the percentage of working capital financed externally is equal to or exceeds 10%.	Working capital financed externally $\geq 10\%$ =1 otherwise=0 (reference)
TaxInspected (Dummy Variable)	Indicates whether the enterprise was inspected at least once in during the fiscal year.	Tax inspected at least once=1 otherwise=0 (reference)
GenOwned (Dummy Variable)	Indicates whether the enterprise owns an electricity generator to benefit in case of power outages.	Electricity generator owned =1 otherwise=0 (reference)
CrimeDummy (Dummy Variable)	Indicates whether the company lost any products while in transit in the domestic market because of theft/crime in the last fiscal year.	Products lost because of theft=1 otherwise=0(reference)

TechLicenseForeign (Dummy Variable)	Indicates whether the technology the company uses to carry out its business activities is licensed by a foreign company or not.	Technology is licensed by a foreign company=1 otherwise=0(reference)
NewManPractices (Dummy Variable)	Indicates whether the enterprise has introduced new or significantly improved managerial or organizational practices and structures over the last three fiscal years.	New managerial practices introduced=1, otherwise=0(reference)
NewProdMethods (Dummy Variable)	Indicates whether the enterprise has introduced new or significantly improved methods of production or supply of services and products.	New production/supply methods introduced=1, otherwise=0 (reference)

Table A2. *Variance Inflation Factors for the variables in Model 5 (all variables)*

Variance inflation factor	VIF	1/VIF
firmsizesmall	6.89	.145
firmsizemedium	4.728	.211
logSales2010	2.541	.394
firmsizemicro	2.461	.406
InfGiftsSometimes	2.154	.464
InfGiftsSeldom	2.068	.483
GenOwned	1.686	.593
industryretail	1.647	.607
regionSouthEast	1.629	.614
NewManPractices	1.627	.614
regionSouth West	1.612	.621
WCEXternalDummy	1.59	.629
NewProdMethods	1.46	.685
industryfood	1.371	.729
TechLicenseForeign	1.361	.735
InfGiftsFreq	1.36	.735
OverdraftFacility	1.355	.738
ExportDummy	1.353	.739
industryconstruction	1.336	.749
industryhoreca	1.316	.76
regionNorth	1.299	.77
logNCompetitors	1.275	.785
CrimeDummy	1.268	.788
TaxInspected	1.24	.807
ForeignOwnDummy	1.187	.843

FemTopManager	1.181	.846
industryIT	1.171	.854
logFirmAge	1.167	.857
InfGiftsAlways	1.113	.898
InfGiftsVFreq	1.073	.932
Mean VIF	1.784	.

Figure A1. *White test results (all variables)*

White's test for Ho: homoskedasticity
against Ha: unrestricted heteroskedasticity
chi2(146) = 150.03
Prob > chi2 = 0.3926