EGYPTIAN FEMALE ENTREPRENEURSHIP AS DRIVING FACTORS IN THE
DIGITAL ERA, A HOPE OR A CHALLENGE

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Abstract
This paper attempts to critically analyse the driving factors that affect Egyptian female employability in the digital sector. On the other hand, investigates the challenges that female face in the business world, in the light of the entrance of Egypt in the digital era and governments efforts to achieve the sustainable development goals. Currently, Egyptian females have a better chance than ever in becoming entrepreneurs. The aim of the paper is to analyse some of the factors that affect female as employers and draws a clearer image to what factors could help increasing female employability in Egypt during the period from 1991 to 2019.

This study used Augmented Dickey Fuller (ADF) test to check stationarity of variables. On the basis of results of ADF test, ARDL approach of cointegration was applied. Results show that internet ratio has positively affected female employability, while laws have not affected it significant. Finally, conclusion and policy recommendation are proposed.

Based on the study findings that show that female opportunities on Egyptian labour market need to be accompanied with schools and universities education development in order to equip them with digital knowledge and skills necessary in the digital era. Also, government policies and laws are still needed to consider female as an engine to growth.

Keywords: Female entrepreneurship, SDGs, Financial inclusion, Digital Era, Digitalization

JEL Codes: A2, J16, L25, L26

Introduction
Females in the United States were not allowed to own land or properties and if a female by law had lands and got married the entire ownership of her properties were given to her husband according to the “The Married Women's Property Act” of 1848, considered one of the most important estate laws in the United States (Shammas, 1994). For example, in 1929 Canada finally included women in the legal definition of “person” which means that until 1929 a woman in Canada was not even considered a person. After that women were given the right to become a member of Canada senate and increase their political participation. According to the World Bank, women are almost half of the population of the world countries but they are still unable to hold properties or to assert equal rights or protection when it comes to their estates (World Bank, 2019). “For men and women alike, land is the foundation for security, shelter,
and livelihood, supports women’s dignity and creates pathways to empowerment and economic opportunity,” said Karol Boudreaux, Chief Program Officer with the land rights group (World Bank, 2019). Thus, the discrimination against women continues in many fields especially in the business sector. The economy of our world is a very important factor for the survival of every country and women are an essential part of this economy as they makeup almost half of the world’s population. So, if equal chances were presented the world’s economy would blossom and reach new levels that will boost our economy.

The Egyptian culture was not fair to its females but was one of the main examples to how females were unequal to males throughout history. Consequently, even when females were able to hold jobs their entire earnings would go to their fathers or husbands. Year after year and century after century females were denied of their basic rights in Egypt. Females in Egypt weren’t allowed to have an education unless they were born to a rich family which shows a huge level of inequality and discrimination (Zuhur, 2001). This level of inequality was transferred for centuries and until this day with everything that changed over time still a lot of people believe that females shouldn’t be educated or take part in the labour force. According to the World Bank, in 1978 the illiteracy rate in adult females was over 80% which means that 80% of females were never offered an education. However, after many stages and fights for female rights in Egypt this ratio improved but there are still over 35% of illiterate adult females in Egypt in 2019 which clearly shows the cultural inheritance of female inequality in Egypt (World Bank, 2019).

As the technological factor has been lingering for years and economies that invest in technology end up winning as technology is considered the future of our world. Egypt has been one of the countries that has been working on improving the technological factor within the country and although the move towards digitalization has been going on for years now. The latest pandemic COVID-19 and the countries going on lockdown has improved the technological use globally and in Egypt was forced to enter a new stage of awareness of the technology importance and especially the information and communication technology. COVID-19 pandemic had worked to promote ICTs better than the country could have and now it became the true beginning of the digital era in Egypt. With the help of the previous information this research will try to answer the question of what is stopping Egyptian females from becoming entrepreneurs, will discuss the factors that affect the female entrepreneurship, and will find ways that could finally help the Egyptian female in increasing her employability and entrepreneurship chances. Egyptian females suffer from low employability levels due to factors that include but are not limited to, qualifications, social standards and how the society looks at women. These problems are not just faced by women in the work environment but also in their education, according to the World Bank 2017, only 12.67% of females in Egypt at least complete their post-secondary education. This among many other factors affect the female level of employability and their entrepreneurship chances.

Looking over all the previous factors its clear how females suffer from a problem in the work and business environment in Egypt. But this problem in Egypt is spread to the core of the Egyptian traditions and cultural beliefs which discriminates against women and is the reason for how they are not offered enough chances to be able to hold decent jobs or become entrepreneurs in the Egyptian community which is the core of the female entrepreneurship problem in Egypt. With our world trying to achieve a more sustainable environment especially with the goal to achieve the sustainable development goals – SDG (from the development goals the fourth goal which is quality education, the fifth goal which is gender equality, the 8th goal which is decent work and economic growth and the tenth goal which is reduced inequality), the focus on inequality and equal chances has been clearer and in order to move toward a more advanced world and a world with the basic rules of equality according to the SDGs goal the first step is to fight the discrimination against females as this will help our world develop to a
much more advanced world. With digitalization at the door females will have a better chance to achieve their purpose and help the country prosper as well as to get Egypt closer to achieving the global goals of sustainability. In Egypt, the labour force needs to have more female’s inclusion, in order to give Egyptian females better chances and let them have their position in the business world. Female employability factors should be kept into consideration in order to have them boosted by the digital era and the boost the world is getting by trying to achieve the 17 sustainable development goals by 2030. The question and the aim of the paper is to help understand the obstacles that hinder Egyptian females to join the business world. As well as how to prevent those obstacles by understanding their dynamics. Those barriers faced by females in Egypt or even by females globally are not new but they have been going on since the beginning of time and as much as they improve, they still need to be overcome so that females could have their rights and could help by being more productive members of their societies.

This study analyses factors and reasons to why females in Egypt are subjected to fewer chances than males in the business world and how to fix this problem for future generations by finding ways to improve them and allow females to have better chances for a better future. As the importance and purpose of this study is to address factors that will help females use and utilize technology to their advantage and find ways to give females a competitive advantage in order to be able to create better employment and entrepreneurship chances in the future. The following section will provide a literature overview for the role of female entrepreneur. Section three deploys the ANOVA test for determine the significant factors affecting female entrepreneurs. Finally, conclusion and policy recommendation

1. Literature Review
   1.1. Theoretical review

Many females in developing countries are deprived from education. Historically, traditions and ideologies were totally against women’s rights, especially the right to education (Russell, 1992). Males, however, were educated and held high positions in the country. Educational discrimination was not just against the female but it was also against the poor. So, the rich would get their males educated and even those rich people would most likely deny their daughters the same rights to education (Russell, 1992). However, Egypt was one of the countries that overcame this discriminatory loop before others. By the dawn of the 1860s, the Egyptian government had started investing in its human resources by sustaining a good educational flow that the population benefited from completely. Scratch that, the male population benefited from completely. The Egyptian educational system was a core foundation for Egypt and most countries in Africa and the Middle East. As those countries depended on the Egyptian educational system to help them lay the foundation of their own educational system but even then, females would rarely benefit from such system (Shann, 1992). In 1908, a small institution, that was an art school, was established to offer classes in Literature, Economics, History and Philosophy. Over the time, this institution kept on growing until it morphed into the mother of all universities in Egypt and Arab countries to become the prestigious Cairo University. According to Shann (1992), many of the faculty members of Middle Eastern and African countries completed their higher education in Egypt. Currently, the Egyptian government’s aim is to overcome discrimination in education and it is a goal near to be achieved (Vakili, Tahmasebi, Tahmasebi & Tahmasebi, 2016).

According to Zuhur (2001), the lack of female education was the main factor that drove the feminist movements that later helped the females to get an education. The movements improved the conditions for females in Egypt, but the odds were stacked against them due to cultural restriction reinforced by Egyptians. The Egyptian culture, until the 21st century, still believed that females should be nothing but housewives and still deny them their right to
education. This educational factor is theoretically one of the main factors that affect female entrepreneurship. On the other hand, the business world in Egypt was mainly dependent on agricultural goods. The Egyptians used their land for agriculture since 8000 BC and kept on utilizing the land until the late 1900s. According to Tucker (1976), only 3-4% of the Egyptian labour force were females and even females who participated in the labour force were looked down upon and were treated unfairly. The rest of Egyptian females dedicated their lives to running chores and becoming housewives with no education nor a chance to step on a higher level on the labour market, obtaining a bigger part of the labour force (Tucker, 1976). When Egypt began moving towards industrialization and businesses started to bloom, the lack of education between females was one of the primary reasons to why they still didn’t have a major participation in the industrial sector and remained as they were while males took over the industrial and business sectors (Crals & Vereeck, 2005).

Moving forward, the Egyptian economy kept on evolving to take on many new sectors which helped the economic development and put Egypt on the developing path with new small and medium enterprises every year and new job opportunities. But still females were denied in most of those opportunities due to the cultural attribute that has a high discrimination level against females and the previous lack of education and opportunities that they were subjected to over the years didn’t help as well (Nambisan, Wright & Feldman, 2019).

Putting all that aside, the most effective factors on entrepreneurship are the savings and investments. According to Tee (1987), savings is one of the important factors that affect investments as it creates the liquidity needed in order to start investing and with this available, liquidity finance for entrepreneurship will be available and will help entrepreneurs in starting new businesses, males and females are affected by the level of savings in each and every country. According to Quadrini (2009), entrepreneurship happens in the economy and is sustained if there’s sustainable savings and investment and referred to the golden savings rule that indicates an increase in investment due to savings and in order to maximize benefits savings should be closer to 50% of income. All those theories prove the importance of savings and its major effect on entrepreneurship.

1.2. Empirical review

In a more advanced overview, in order to stop the barriers that are faced by female entrepreneurship in Egypt, the factors that affect the level of entrepreneurship should be addressed and analysed, alongside the type of the Egyptian job market and business environment as well. Those two important points are the main framework in finding a way to stop this lack of female entrepreneurship and employability (Mahrous, 2019). First, the Egyptian business environment and job market is divided to many sectors and many types of businesses. Ever since Egypt started its industrialization phase, Egypt has had many business sectors (Assaad, Krafft & Yassin, 2020). The Egyptian market has been improved overtime and this benefited Egyptian females in terms of in job opportunities increase. However, Egyptian females just like African and some Middle Eastern females, suffer from a huge lack of education which reduces their qualifications in order to be competitive on labour markets which is one of the main reasons why females have a low employability chance (Assaad, Krafft & Yassin, 2020). Educational qualification is one of the most common barriers on most job markets and the lack of education takes away most of the job opportunities the female could get but worse, it denies females from ever becoming entrepreneurs due to the lack of knowledge and experience in addition to discrimination and culture (Crals & Vereeck, 2005; Aljuwaiber, 2020).

According the World Bank the adult female literacy rate has increased from 22% in the late 1970s to 65% by 2018. The improvement in female educational levels is significant. However, only 67% of those females finished their secondary education as literacy rate can be
increased even if primary and preparatory school has been finished. This problem in Egypt is created by many factors, including early marriage where females only finish some of their education but then stop in order to get married and become housewives (Kirby & Ibrahim, 2011). Considering all this and the fact that in order for females to get decent jobs and increase their entrepreneurial chances they need to at least finish their secondary education. That is why the factor that affects female educational qualification the most is whether they get to finish their secondary education or not. If they do, the chances a female has in getting a higher education and decent work increases and that is why secondary education is considered a factor that determines the educational chances of females (Assaad, Krafft & Yassin, 2020). After that comes the female economic opportunities, due to many factors mostly mentioned earlier, the female economic opportunities were very low in Egypt. Although the government has been working hard to improve the women’s stance, increase their opportunities and protect them by more laws. The level of economic opportunities is significantly low compared to other countries but it is also higher than most African and neighbouring countries (Mahrous, 2019). Also, savings and investment are two very important factors in the sustainability of the economy as those factors help create new business chances and motivates entrepreneurship and innovation with the ease of financing and the chance to build a business through investing the savings in new businesses and small and medium enterprises (SMEs) that has a huge effect on the economic development and growth in Egypt. The increased level of savings, investments and the new businesses increase the job opportunities in Egypt to both males and females which help both genders in finding new job and creating new entrepreneurial chances (Cralis & Vereeck, 2005). Those chances are created for both males and females as digitalization has a huge deal to do with globalization which calls for equality and equal chances for both genders which is considered a chance for females (Dahshan, Tolba & Badreldin, 2012). Hence, the digitalization movement has supported entrepreneurship worldwide and in Egypt as well as entrepreneurs has benefited from the new ICTs and technologies in addition to the new financial inclusion products that helped with the financing of businesses and helped entrepreneurs grow and sustain their SMEs and businesses and helped them plan a brighter future to it (Lyons & Contreras, 2017).

2. Model specification and data
Scientific literature on the topic distinguish variables that affect female entrepreneurship in Egypt. Indicators can be received as education, economic opportunities, technology, saving and financial inclusion. The research model is represented in the below Figure 1.

Figure 1. Research model

![Research model diagram]
2.1. Research Hypothesis

H1 - Higher education increases the female employability chances.
H2 - The female economic opportunities in Egypt has a direct relation with entrepreneurship chances of females in Egypt.
H3 - The level of technology and the countries use of technology creates more job opportunities which increases the female employability level.
H4 - The gross savings increases the female investment and entrepreneurship chances in Egypt.
H5 - Financial inclusion helps females in gaining better entrepreneurship chances.

3. Data & variables

This paper uses secondary data that is obtained from the world bank covering the period from 1991 till 2019 with data that represents every variable in order to be tested on the dependent variable in order to determine the relation and how every independent variable affect the dependent variable which is female entrepreneurship and employability. The statistics depends on a time series data as it analyses the same thing over a period of time with equal time intervals. The research is built on secondary data and all secondary data are taken and collected from previous research data and all are from the World Bank indicators. The research and analysis tackle five main factors that could affect the dependent variable. Those variables are education, technology, savings, economic opportunities and financial inclusion. All these factors help the female be more qualified and gives her a better chance in the real world but do they actually affect the dependent variable?

3.1. Dependent Variables: Female Entrepreneurship in Egypt (FEMP)

Female entrepreneurship is an essential factor for a more sustainable economic growth worldwide. With the world targeting a more equal and fair world females were given a chance to gain their rights and being taken seriously in the business environment after years of oppression by the male dominated society. However, after years of suppressed rights and very little gains the number of female entrepreneurs has decreased and the number of females qualified to become entrepreneurs has decreased as well. And in order to increase the number of female entrepreneurs, some factors were needed to be considered which included the level of education, technology, financial inclusion, savings and economic opportunities. All the previous factors were claimed to have an effect on female entrepreneurship and could help increase it.

Figure 2. Employers, female during 2005 till 2019

Source: https://www.worldbank.org/
In order to represent the female entrepreneurship, this indicator was chosen as it calculates the percentage of female employers as a percentage from the total female labour force in Egypt which indicate entrepreneurship. According to Figure 2, the percentage of female employers in Egypt has decreased ever since 2011 after the political instabilities. However, it started increasing in the past few years. As this indicator is used to determine how the changes in other factors affect the level of female entrepreneurship it also must be noted that there are other factors such as the economic and political instabilities in the country that affected the level of investments and lowered the female chances at a time.

3.2. Independent Variables: Female Higher Education (EDU)

In this paper, the percentage of females has been used in secondary schools as according to the world bank, most females who are enrolled in schools only get to finish their primary education and most females don’t even get a chance to enrol in secondary education better yet a university or a bachelor degree. Having at least a secondary education increases the female chances in enrolling for a bachelor degree or finding a job that only requires a secondary education. This multiplies their chances and that is why this indicator was selected for analysis of the educational factor and its effect on the female employability and entrepreneurship in Egypt. According to Figure 3, the percentage of females in secondary schools is almost constant with 48% over the years. This, percentage has improved over the years, but using our time interval it is almost constant with very minor fluctuations (Vakili, Tahmasebi, Tahmasebi & Tahmasebi, 2016).

3.3. Economic opportunities: Women business and law index score (LAW)

In many developing countries the women have fewer economic opportunities than men as the cultural and traditional aspects restrict the female and make her have fewer opportunities than males. Males in the Egyptian culture are empowered to go places, get a better education and have more chances of getting better jobs and being an influencing part of the community. The women in business and law index is an indicator that measures how laws and regulations affect women’s economic opportunity. Overall scores are calculated by taking the average score of each of the eight areas (Going Places, starting a job, getting paid, getting married, having children, running a Business, managing assets and getting a pension), this score is then calculated with a highest score of 100 to determine the female economic opportunities in a country.
This indicator is chosen in this paper as it describes the female business and legislations and how the culture, rules and regulations affect their economic opportunities and chances. Also, it shows that even if the females are excluded from the education violation and they do gain their education, their restricted by the low economic opportunities they face. Considering that, the Egyptian culture dictates that even the females that have better chances should be protected from the community and must face the cultural restrictions that they don’t get to experience half the opportunities that males are subjected to under the umbrella of protecting the females. The restrictions that females are subjected to limits their economic opportunities and lowers the score of the eight areas that the indicator covers which limits their chances in the Egyptian job market and make them not be taken seriously due to the male dominated environment (Zuhur, 2001). According to Figure 4, the women business and legislation in Egypt has improved over the years and ended up increasing which indicates how the laws and community is being more acceptable to female rights and they started obtaining their rights which led to a higher score over the years. But even with the indicator increasing its still below 50 which indicates a low level of economic opportunities for women in Egypt. This indicator will be used to analyse its effect on female entrepreneurship and employability as a factor that indicates economic opportunities.

3.4. Level of technology: % of ICT imported

The digital era is expanding in many fields in the Egyptian and global community. However, for this paper there is a main branch of digitalization that is essential to the business environment that is why the Information and communications technologies (ICTs) are selected. The ICT industry creates the data bases and the new technologies that are used in businesses which include, customers and employee’s data bases, and creating the platforms that employees use to communicate and manage their work (Nambisan, Wright & Feldman, 2019).

ICTs had become one of the most important and wide technological aspects that keeps on growing worldwide with new innovations each and every day. The widespread of ICTs and the more people familiarizing themselves with it creates a more stable work environment and
a more sustainable digital era which helps in creating many new jobs, economic and entrepreneurial opportunities for the entire community. This will open a new path for female entrepreneurs and will create more job opportunities especially for people with any technological knowledge as this has become one of the most important qualifications in our world today (Rizk & Kamel, 2013).

The indicator chosen to represent the ICT growth in the Egyptian community and businesses has been the percentage of Information and communication technologies imported as a percentage of total imports. The information and communication technologies imported include computers, communication equipment, and consumer electronic equipment. These imported goods stabilize the digitalisation more and indicates how much the ICT use is growing and how ICTs are a common commodity that is demanded and required by the community. Not just that, but this indicator is used to describe the technological factor that affects the female entrepreneurship and employability chances in Egypt among other factors (Badran, 2010). According to Figure 5, this indicator has fluctuated over the years between 4.5 and 3% which means that between 4.5% and 3% of Egyptian imports are ICTs goods which are used to improve the digitalization in Egypt. The imported ICTs goods will be used to see its effect on female chances in Egypt.

3.5. Savings: Gross Savings (% of GNI) (SAV)

As the main focus of the paper is female employment and entrepreneurial activities in Egypt. One of the main factors that affect investment and entrepreneurship are savings as savings has a positive relation with investment and as savings increase investments. When investment chances increase because of savings it creates a wide path to entrepreneurship which females will benefit from and will help them create their own new business chances (Tee, 1987).

Figure 6. Gross savings (% of GNI) during 2005 till 2019

Source: https://www.worldbank.org/

Figure 6 show the gross savings in Egypt has fluctuated over the years a noticed a major drop in past years starting from 2011 after the political imbalances that happened in the country. However, gross savings has been increasing over the past few years starting from 2016 to go from 9.8% of GNI in 2016 to reach 16.3% of GNI in 2019 this indicates new investment opportunities which female entrepreneurs should benefit from.

3.6. Financial inclusion (FIN)

Concerning ownership at a financial, female (% of population ages 15+). Financial inclusion is the process of providing financial products with all its kinds and make it accessible, useable, affordable and available to all the population of the country. After countries led by India has achieved major successes with financial inclusion and were able to innovate new technologies that fulfils the needs of the population it created a major movement that supports the moving towards financial inclusion (Lyons & Contreras, 2017).
After the spread of financial technologies females and the Egyptian population became more aware of the importance of the financial market which increased the financial literacy in the country. This indicator was chosen as it shows how financial inclusion is increasing in Egypt between females and how their responding to the financial literacy move (Fareed, Gabriel, Lenain & Reynaud, 2017). According to Figure 5, show the effect of the increase of ATM machines in an increasing trend, see Figure 7a.

Figure 7a. Automated teller machines (ATMs) (per 100,000 adults) during 2004 till 2019

The available data is not limited thus another variable is recommended which represent the individual using internet as it is available since 1994 and it is increasing as explained in the following Figure 7b.

Figure 7b. Individuals using the Internet (% of population) during 2000 till 2019

After viewing the model variables which shows the maximum and minimum value for the independent variables during the period under study which reflects the small difference between them, as seen in the following Table 1.

Table 1. Descriptive statistics

|        | FEMP     | EDU      | LAW      | ICT      | SAV      | NET      |
|--------|----------|----------|----------|----------|----------|----------|
| Mean   | 3.872821 | 46.83734 | 37.20714 | 2.716969 | 19.47451 | 14.60982 |
| Median | 3.9935   | 46.8     | 38.8     | 3.625276 | 18.69728 | 12.335   |
| Maximum| 6.491    | 48.56597 | 45       | 5.039085 | 35.29576 | 46.92434 |
| Minimum| 1.944    | 43.23911 | 32.5     | 0        | 9.71221  | 0.000579 |
| Std. Dev. | 1.306728 | 1.41469  | 4.307339 | 1.943329 | 6.507686 | 15.76118 |
| Skewness | 0.172505 | -0.78464 | 0.421205 | -0.63714 | 0.820924 | 0.684903 |
| Kurtosis | 2.103183 | 2.878924 | 2.211337 | 1.580577 | 3.605051 | 2.155935 |
| Jarque-Bera | 1.077197 | 2.890207 | 1.553585 | 4.245001 | 3.572045 | 3.020287 |

Source: author’s collaboration
3.7. Econometric Model

The analysis and techniques that will be used in this research is the regression model which indicates the relation and the coefficients of each of the selected variables using a quantitative method in order to be able to analyse the data obtained and check for the vitality of the hypotheses proposed. The variables set and the hypotheses of the model the economic model of the research was set to be that female entrepreneurship is determined by factors including the five factors of the model which are education (EDU), economic opportunities (LAW), technology (ICT), savings (SAV) and financial inclusion (FIN) . Which means that the economic model is as follows.

**Female Entrepreneurship (FEMP)** = \( F(EDU, LAW, ICT, SAV, FIN) \)

Which indicates that female entrepreneurship (F-EMP) is a function of the five independent variables stated by the model, and the hypothesis suggests and assumes that there’s a positive relation between all of the independent factors and the dependent female entrepreneurship.

The econometric model is used to derive and analyse the economic relations assumed by the hypothesis in order to conduct a quantitative analysis to determine the actual relations of the model in order to prove or reject the hypothesis claimed and to determine the relations of the economic model.

The interception coefficient which indicates any other factors affecting entrepreneurship is \( \alpha \). The coefficient of Education \( (\beta_1) \). The coefficient of Economic opportunities \( (\beta_2) \). The coefficient of Technology \( (\beta_3) \). The coefficient of Savings \( (\beta_4) \). The coefficient of Financial Inclusion \( (\beta_5) \). And \( (E) \) is Random error term.

\[ FEMP = \alpha + \beta_1 EDU_{1t} + \beta_2 LAW_{2t} + \beta_3 ICT_{3t} + \beta_4 SAV_{4t} + \beta_5 FIN_{5t} + E \]

3.8. Empirical Results

In the model assessment after interpreting the parameters and estimating the econometric model further analysis is required in order to determine the significance of the model and the multicollinearity and more indications that shows the importance and vitality of our model. In this section stationarity test, correlation test and ARDL test have been conducted.

3.8.1. Stationary test

Applying the Augmented Dickey Fuller test (ADF) and Phillips-Perron (PP) stationary test showed that all the majority of independent variable are non-stationary in level at constant and trend except education, saving and financial inclusion. While PP test it supports the ADF test as all the results showed a stationarity at the first difference, except Financial inclusion which is stationary at the second difference, see Table 2.

**Table 2. Stationary test – Augmented Dickey fuller (ADF) and Phillips-Perron (PP)**

| Variables | ADF | PP |
|-----------|-----|----|
|           | level | 1st diff | level | 1st diff |
| FEMP      | constant | trend | constant | trend | constant | trend |
|           | -0.7837 | -3.35182* | -5.96548**** | 6.21694**** | -1.17021 | -2.97839 |
| EDU       | 2.9447* | -2.83422 | 7.31236**** | 7.83269**** | 3.06285* | -2.68713 |
| Law       | -0.3101 | -2.53108 | 5.58515**** | 5.54347**** | -0.26479 | -2.55474 |
|           |         |         |         |         | 5.58466*** | 5.54347*** |
In case of having variables that record different order of integration application of Engel Granger and Johansen techniques is ruled out as both techniques require variables of same order of integration. In case variables have I (0) and I (1) order of integration and no variable of order I (2) the appropriate choice left is to use Autoregressive Distributive Lag (ARDL) model. To apply ARDL model than it is required to determine the lag, thus we use Unrestricted VAR model. Thus, using Akaike information criterion (AIC) optimum lag length 3 was selected (see Table 3).

Table 3. VAR Lag length Selection Criteria

| Lag | LogL | LR | FPE | AIC  | SC  | HQ  |
|-----|------|----|-----|------|-----|-----|
| 0   | -297.584 | NA | 1421.817 | 24.2867 | 24.57923 | 24.36783 |
| 1   | -183.074 | 164.8964 | 2.917738 | 18.00589 | 20.0536 | 18.57383 |
| 2   | -133.31 | 47.77304 | 1.73953 | 16.9048 | 20.70769 | 17.95956 |
| 3   | 37.19502 | 1.84241* | .000320* | 6.144398* | 1.70247* | 7.685972* |

Source: author’s collaboration

The bound tests has been applied, because it does not depend on pretesting the order of cointegration of the variables and it eliminates the uncertainty of pre-testing the order of integration of the variables. Also, the bound test approach is privileged because it can be applied to a small sample size which is the case in the current study.

After determine the lag length which is determined by AIC, then the next step, to check whether variables are associated in the long run to each other, Bounds test is performed on the following model.

Table 4. ARDL Bounds Test

| K | F                  | Critical Value Bounds | 10%    | 5%    | 2.5%  | 1%    |
|----|--------------------|-----------------------|--------|-------|-------|-------|
| 5  | 77.42401           | I0 Bound              | 2.26   | 2.62  | 2.96  | 3.41  |
|    |                    | I1 Bound              | 3.35   | 3.79  | 4.18  | 4.68  |

Source: author’s collaboration

The results show that the computed f-statistic equal 77.424 which more than the upper bound critical value at 1% level of significance; hence, the null hypothesis was rejected, confirming the existence of co-integration among the variables series in the model. The existence of co-integration supports the long-run relationship of the factors that affected Female as employer. Based on the result of the existence of cointegration ARDL to estimates the long run elasticities using the following specification has been applied:

\[ FEMP = \alpha_0 + \alpha_1 FEMP_{t-1} + \alpha_2 EDU_{t-1} + \alpha_3 LAW_{2t-1} + \alpha_4 ICT_{3t-1} + \alpha_5 Sav_{4t-1} + \alpha_6 FIN_{5t-1} + \epsilon \]
The model selection criteria, such as Akaike info. Criterion (AIC), Hannan-Quinn (HQ), and Adjusted R-squared used. ARDL (1, 3, 3, 3, 3, 3) model has been established as the best model for the series.

3.8.2. Long Run Estimates

Results of long run model are presented in Table 5. The lag selection in the empirical model is based on general to specific methodology of lag selection (Pesaran et al., 2001).

Table 5. ARDL long run relation

| Dependent variable: FEMP | Coefficient | Std. Error | t-Statistic | Prob.* |
|--------------------------|-------------|------------|-------------|--------|
| Y (-1)                   | 0.862619**  | 0.105237   | 8.196902    | 0.0038 |
| EDU (-1)                 | 0.730243**  | 0.063294   | 11.53726    | 0.0014 |
| EDU (-2)                 | -0.53443**  | 0.06816    | -7.840754   | 0.0043 |
| EDU (-3)                 | -0.27703*   | 0.084278   | -3.287054   | 0.0462 |
| LAW                     | 0.323901*   | 0.085364   | 3.794346    | 0.0321 |
| LAW (-1)                 | -0.1281     | 0.039819   | -3.217113   | 0.1487 |
| LAW (-2)                 | -0.01753    | 0.042142   | -0.415934   | 0.7054 |
| LAW (-3)                 | 0.05904     | 0.028283   | 2.08746     | 0.1281 |
| ICT                     | -0.34266**  | 0.04097    | -8.363673   | 0.0036 |
| ICT (-1)                 | 0.580202**  | 0.053811   | 10.78226    | 0.0017 |
| ICT (-2)                 | -0.55377**  | 0.076924   | -7.198977   | 0.0055 |
| ICT (-3)                 | -0.39196**  | 0.056364   | -6.954073   | 0.0061 |
| SAV                     | 0.253543**  | 0.025159   | 10.0777     | 0.0021 |
| SAV (-1)                 | -0.08239*   | 0.014799   | -5.567421   | 0.0114 |
| SAV (-2)                 | 0.101236*   | 0.019312   | 5.242153    | 0.0135 |
| SAV (-3)                 | -0.07151*   | 0.012631   | -5.661622   | 0.0109 |
| NET                     | 0.172483**  | 0.028777   | 5.99372     | 0.0093 |
| NET (-1)                 | 0.037044    | 0.031462   | 1.177436    | 0.3239 |
| NET (-2)                 | -0.36113*   | 0.028937   | -12.47977   | 0.0011 |
| NET (-3)                 | 0.213679*   | 0.03062    | 6.973842    | 0.006  |
| C                       | 0.152682    | 8.457785   | -1.805226   | 0.1688 |

Diagnostic test

| Sum squared resid | 0.028662 |
|-------------------|----------|
| R-squared         | 0.999376 |
| F-statistic       | 228.9373 |
| Adjusted R-squared| 0.995011 |
| Prob(F-statistic) | 0.000411 |
| S.E. of regression| 0.097745 |

Source: author’s collaboration

Results shows that coefficients of all independent variables are significant except law, however, the coefficient has negative sign with female employer but not significant. Education, saving and ICTs sign changes across lag time with FEMP. The coefficient of Education (0.7320) is highly significant but the sign in lag 2 and 3 is negative in lag 2 and 3 which can be explained that education is still in need to be linked with job opportunities. As at the beginning it reflects positively but not lasting. ICTs have appropriate positive sign (0.580202) and are significant at 5% level of significance, however the sign varies across lags. SAV shows positive relationship with FEMP and is significant but in lag 3 the sign changes which can be explained by the changes in the price level that have direct effect on the saving. Finally, internet shows a highly significant impact on lag 3 with FEMP and the sign is positive. The impact of internet to accelerate female employability takes time to have a positive effect which the case in many developing countries as they need many initiatives to foster employability. The value of Adjusted $R^2$ (0.9947) indicates that 99% variation in FEMP is explained by explanatory variables in model and F-Statistics is also significant at 1% significance level indicating that all independent variables in the model jointly affect FEMP.
Table 5 shows the results of long-run test, results indicates that most of the long-run coefficients are significant (at or under 5%), in explaining the dependent variable, information communication technology variable was significant at 10%. However, rest of variables are insignificant. Following the estimation of long-run coefficients, the error correction model (ECM) based on the ARDL model was formed to estimate the short-run coefficients. Examine serial correlation, Heteroskedasticity, model specification, model stability and normality were applied to ensure nonexistence of econometric problems.

Table 6. Heteroskedasticity Test

| Heteroskedasticity Test: Breusch-Pagan-Godfrey |        |        |
|-----------------------------------------------|--------|--------|
| F-statistic                                   | 0.639538 | Prob. F (8,17) | 0.7347 |
| Obs*R-squared                                 | 6.014747 | Prob. Chi-Square (8) | 0.6456 |
| Scaled explained SS                           | 2.921097 | Prob. Chi-Square (8) | 0.9392 |

Source: author’s collaboration

To check residuals for Heteroskedasticity Breusch Pegan Godfrey test is applied. Null hypotheses of no Heteroskedasticity were rejected as probability of F-statistics and Obs*R-squared are more than 0.05 suggesting that residuals have no problem of Heteroskedasticity.

4. Results
The whole regression model was proved to be significant with the variables. However, after conducting the ARDL test on the parameters to analyse their significance it was shown that four of the five picked parameters for the research were proved to be significant to the model. And only the Law independent variable was proved to be significant to the model. Which means that the savings coefficient has a positive significant relationship with the female entrepreneurship in Egypt and as the savings increase with 1% according to the results in lag 2 it increases female employability by 10%, a state that provide more chances for female entrepreneurship. The results of the study reflect the current situation of the urgent need to foster female opportunity in the digital era. The insignificant of law index on female employability emphasis of the continuity of depriving move of participation in the market as still many barriers are valid and limit its participation. Also, the sign of the regressors that changes showed the unstable impact of the changes in the independent variables on the female employability.

The limitations of this study were achieving sustainable data that would help the parameters become more significant. The indicators picked were representative to the variables but, they were not representing enough even when the model was proved to be significant with a coefficient of determination. Also, there are many more factors that affect the female entrepreneurship and employability chances not accounted in the model. However, most of the other factors has to do with the cultural beliefs and the traditional influence which couldn’t be quantified to be represented in the model. Females in Egypt have a brighter future than they ever had with all the new variables that keep on changing each and every single day.

5. Conclusion and Policy recommendation
Female entrepreneurship in Egypt faces many challenges and it would remain a challenge until the cultural beliefs and the peoples’ mentalities are more accepting to the new era the world is entering were equality is called for and women have to be treated as a significant part of the community. In order to achieve a more sustainable technological growth and the sustainable development goals which if achieved will boost our world and help create more and more chances for the female entrepreneurship and employability and won’t be achieved otherwise. But In the meantime, the government should focus on making education
mandatory for males and females in order to have a new generation that is educated and accepting to the new variables of the world. The Egyptian government is focusing on spreading equality in the meantime which is helping the females gain more grounds. And with the move towards achieving the SDGs the government and people are focusing on improving digitalization, financial inclusion and promoting equality as well by supporting SMEs and new businesses in order to boost the economy which gives females a stronger chance than ever but they have to be able to utilize this chance in order to be able to make a better future out of it (Bary, 2019). The digital era seeks qualification and with the world globalization stronger than ever, more job opportunities for females keep on presenting themselves especially with Multi-national cooperation (MNCs) that try to promote and obey the new rules of equality. All of those factors promote female employability, and as employability increase, female entrepreneurial chances increase with it which creates more job opportunities and keeps on promoting the female’s role in the community even in a male dominated environment such as Egypt (Dahshan, Tolba & Badreldin, 2012).

Also, utilizing the female labour force is one of the most important factors that will promote a better economy and help Egypt in its’ take off stage and could be one of the most significant factors in helping Egypt boost its development in the upcoming years. Going back to the model, the multiple regression model showed a positive relationship between most of the variables and female entrepreneurship which was already proved and anticipated from the literature and theories. However, the positive relation was proven without the significance of the variables. This insignificance could be accounted for by many things which could include a problem with the model or data itself. But this doesn’t change that those factors could help promote female entrepreneurship and employability in Egypt and none of the factors discussed in the model should be overlooked as all those factors will help Egypt achieve a better future. Even if the parameters and factors are insignificant to the female entrepreneurship in Egypt, they’re still significant in improving the female chances in the business world and in their employability chances and would be a key element in improving the Egyptian business environment overall.
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