An insight into the corona virus impact on the Egyptian female participation in the labor market

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This study aim is to assess the impacts of the current external shock coronavirus on the Egyptian female opportunities in the labour. The current pandemic set light on the current challenges that hinder females to enter formal labour market. The upcoming analysis will define the relation between growth and female participation in the labour market, determine the driving forces to the Egyptian female to guide in designing strategies and set policies. We apply an error correction model to determine the link amid economic growth and female labour participation (FLFP) in Egypt during the period 1990 till 2019.

The outcomes points out to the exiting of negative relation and insignificant impact of economic growth on FLFP, as well a percentage of females from population has inverse but significant relation on FLFP. The results will support literature and reflect on the challenges that hindered the female role to accelerate economic growth in order to participate in formal market. Results points out to the minor role of female in the formal economic activities and provide an insight on the missing link of the absent positive participation of the Egyptian female in the labour market. Female activities is not formally recorded and are unmeasured which is not reflected statistically but need new measures and assessments. Egyptian female is challenged with numerous obstacles difficulties such as lack of experience,

shortages of finance, marketing channels and finally the pandemic. The paper highlight to the importance to provide women will more opportunities in the market and provide financial supports to accelerate her participation.

نظرة مستقبلية تأثير فيروس كورونا على مشاركة المرأة المصرية في سوق العمل

المستخلص

تهدف هذه الدراسة إلى تقييم آثار الصدمة الخارجية الحالية لفيروس كورونا على فرص المرأة المصرية في العمل. سلط الوباء الحالي الضوء على التحديات الحالية التي تعيق دخول الإناث إلى سوق العمل الرسمي. سيحدد التحليل القادم العلاقة بين النمو ومشاركة المرأة في سوق العمل ، وتحديد القوى الدافعة للمرأة المصرية لتوجيهها في تصميم الاستراتيجيات ووضع السياسات. نقوم بتطبيق نموذج تصحيح الخطأ لتحديد الارتباط بين النمو الاقتصادي ومشاركة العمالة النسائية (FLFP) في مصر خلال الفترة ١٩٩٠ حتى ٢٠١٩. تشير النتائج لوجود علاقة عكسية واثرها ضئيل لتاثير علي النمو الاقتصادي من قبل عمالة المراءة. بالإضافة إلى أن نسبة الإناث من السكان لها علاقة عكسية ولها تاثير معنوي وستدعم النتائج الأدبيات وتعكس التحديات التي أعاقت دور المرأة لتسريع النمو الاقتصادي من أجل المشاركة في السوق الرسمية. وتشير النتائج إلى الدور الصغير الذي تلعبه المرأة في الأنشطة الاقتصادية الرسمية ، وتقدم نظرة ثاقبة على الحلقة المفقودة المتمثلة في غياب المشاركة الإيجابية للمرأة المصرية في سوق العمل. لا يتم تسجيل الأنشطة النسائية رسميًا ولا يتم قياسها وهو ما لا تقوم بإيضاحة الإحصائيات الامر الذي يحتاج إلى تدابير وتقييمات جديدة. تواجه المرأة المصرية العديد من الصعوبات مثل نقص الخبرة ونقص التمويل وقنوات التسويق وأخيراً التاثير السلبي لفيروس كورونا. تسلط الورقة الضوء على أهمية توفير المزيد من الفرص للمرأة في السوق وتقديم الدعم المالي لتسريع مشاركتها

الكلمات المفتاحية

مشاركة المرأة في العمل ؛ النمو الاقتصادي؛ فيروس كورونا

INTRODUCTION

Coronavirus place Egyptian females to face distinct challenges to survive due to the limited access to funds, slow demand that hindered their expansion plans, lack of financial knowledge, digitalizing their business, depending on traditional activities and the high demand on necessary products. Small and medium enterprises (SMEs) used to play outsize effects on business cycles and work force in both formal and informal sectors. Lockdown measures crashes revenues in many SMEs and accelerate unemployment rates across the globe and especially women as they had to stay at home with their children. The incident that widen gap between women's opportunities in labour market. The disruptive business need a package on government incentives either financially to secure their rebound and accelerating digitalizing their activities as technology can leverage their accessibility to new customers and markets.

Historically Egypt employment culture historically depends on longer times on the public sector till the economic reform in the 1990s'. The economic reform privatized many public industries and set many unemployed. During the period between 1990 and 2019 the unemployment rate recorded minimum rate of 7.95 % and maximum rate of 13.15%, World Development indicator (2020). During the same interval, the female unemployment rate (% of female labour force) recorded a minimum rate of 17.3% and maximum rate at 25.37% which is higher than of the male that recorded a minimum rate of 4.7% and maximum rate of 9.7%. This high rate of unemployment referred to many reasons. For instance, the structure of economic growth and that available jobs which was dominated by male, gender discrimination concerning work place pushing females out of the labour market in favor for the male. A situation that provides declining job opportunities for female in the formal market and mismatching between the business requirements and the available labour. This opened the door to informal occupations to gain cash in low skilled jobs. The participation of female in formal activities can accelerate economic growth but the picture in Egypt is different as market opportunities depends on the informal sectors.

According to the World Bank data, the total self-employed as a % from total employment in Egypt range from 30.1% to 45.18% during 1990 till 2019 while the female self-employed are higher than of the male as they range between 32.1% and 52.3 % while the male range between 29% and 43% during the same period. There are countless arguments about what are the capabilities of empowered young females in order to raise not only her standard of living but get society out of the poverty cycle thus enhancing economic growth. The current study aims to test for the long term idea to what extent the economic growth contributes in the female participation in the Egyptian labour market during 1990 to 2019. The research hypothesis proposes the existence of a positive influence on economic growth and the Egyptian FLFP. This paper is designed as follows: section 2 provide an over view to the literature focusing on the links between economic growth and FLFP. Followed by the data description of the economic model and the econometric methodology in section 3. Then section 4 reports the model results. Finally, conclusion and policy recommendations in the light of the pandemic effects.

Theoretical review

The higher female labor force participation could directly promote economic growth. First through the direct impact as the increasing size of the labor force on output, and interdict impact the impact though the productivity (Cuberes and Teignier 2016) , also the impact on higher domestic demand. The higher female labor participation the greater diversity that can foster new ideas for production regional case studies provides further support for the positive relationship between female labor force participation and growth, Tsani and others (2013) show that removing barriers to female labor force participation could have a significant positive impact on growth in Algeria, Israel, Jordan, Lebanon, Morocco, Palestine, Syria, Tunisia, and Turkey). There is a significant body of literature that examines the relationship between women's participation in labor force and economic growth. One of the key hypotheses that have emerged is that there is a U-shaped relationship between female labor force participation and economic growth. As the economy moves from agriculture where there is a close linkage between household and market production to an industrial and services-

based economy, female labor force participation rates fall. This structural change increases the education rates as well as declining in fertility, and then female economic activity increases during advanced phases of economic development. This hypothesis dates back to the 1960s (Sinha 1967), and has become a 'stylized fact', that called the feminization U hypothesis.

The hypothesis based on U-shaped theory was explained in detailed by Goldin (1995). Women work as an unpaid worker in the family owned business at the lower GDP level per capita. In the process of the economic development, the structural change from agricultural and manufacturing sectors created a new labor marker for women   so that they can work as paid workers. However, women still face social barriers for joining certain jobs. Women in this phase started to get altered to the importance of education. Goldin (1995) has revealed a declined part of U-shaped by the income effect. The home made goods seemed became less profitable as the relative prices of home produced goods tend to decline compared to the manufactured goods. Similarly, the demand for more labour was decreased due to the emergence of advanced technology in the agricultural. However, the rising part of U has been being explained by the substitution effect, women's income lead to the wider access to education sector.

The rising of service sector share in the economy attracts more women where they can have positions with highly paid wages. This decline in female labour force can be explained by the income effect that seems to be dominating in the initial phases of economic development. As the process of economic development moving up to more advanced economies, the substitution effect becomes stronger than the income effect among women with greater access to education. Apparently, a great bod of literature supports the U shape relationship. Being a away from home to market activities the smaller income effect (Mincer, 1962; Killingsworth 1986; and Goldin 1995).Young female are starting to demonstrate in the workplace, then they maintain face some obstacles while functioning their work. Nevertheless of the positive outputs, females are fraught to endure in the business environment given the obstacles they meet. Not all business people are lucky enough to have a financier or an investor for their business. Some have to bootstrap their business schemes, depend on credit cards or increase capital

on their own. Till present female's businesses maintain depriving from financial funding as lender didn't trust channel funds for female as the priority is given for male (Cheng, 2018). What would females attain if they had an impeccable support system? Stressed or failing in occupational could be the result of the absence of an adequate funding system. Female tend to meet the highest challenges in receiving support, from lacking the applicable connections to needing business access or emotional support. They also need counsellors and supporters to monitor them in this new pathway. The support system is often exclusive, forcing female to delay opening their businesses. According to the World Bank enterprise survey the small and medium enterprise in Egypt almost double between 205 and 2019 while large firms decline by 12% during the same interval, see the following table. A recent study showed that Egyptian female' share in managerial positions declined while their share as professionals improved- as white collars female' share as technicians, social professionals and clerical support workers. While Blue collar occupations witnessed a decline in female' employment share.

Table 1: Total number of firms by employees

Fiscal Year	Small (5-19 employees)	Medium (20-99 employees)	Large (100+ employees)
2005	517	360	462
2007	553	515	462
2012	1273	1029	595
2015	719	560	535
2019	1639	967	469

Source: Enterprise Surveys (http://www.enterprisesurveys.org), The World Bank.

The pandemic deepened the vulnerability of the Egyptian labour market. In 2020, CAPMAS survey showed that from 62% of the employed labour (formal workers) around 26% of the working labour force become unemployed and 56% work less number of hours and 18% are intermittent workers. While the informal

workers from the most affected groups as they are deprived from social security and health insurance. They reasoned this due to the disproportionate economic growth as the construction and transportation grow more than agriculture and industrialization and other sectors. Survey also showed that almost half of the families depend on borrowing from relatives to overcome the current situation and only 5.4% from irregular employment grant. Small and medium entrepreneurships response varies depend on the importance of the product they provide. If their activities depend on food, medical product and education than they will be in the safe zone while other face high risk. In the following section an empirical study to investigates for the impact of economic growth to female participation.

Methods

To carry out our analysis we employ time-series data on Egypt for female labor participation from total labor force from 1990 to 2019. These data are derived from the World Bank (WB) and World Development Indicators (WDI) database (2020). In this empirical analysis, we use female labor force participation as a % from total labor (FLFP) as dependent variable and economic indicators are GDP per capita as a (Y) and Female % from total population (P). We will test for the Kuznets hypothesis in the following formulated equation as follows: FLFP = f (Y; Y2; Y3; Z) (1)

An enormous researcher of econometric studies have been made to test the emergence of the Kuznet hypothesis in a wide variety of income- based gender inequality but few focuses on the relation of the impact of economic growth on FLFP . Typically, we will employ a reduced-form models in which the female participation in labor market -income indicator is a quadratic or cubic function of income. In this study, we investigate the existence of the U – shaped hypothesis that states the existence of the trade-off between gender equality and economic growth in the development of an economy. The time series model used in

the study is formulated following Dinda (2004) and de Bruyn et al. (1997) and it is given below:

$$FLFP_t = \alpha + \beta_1 Y_t + \beta_2 Y2_t + \beta_3 Y3_t + \varepsilon_t \qquad (2)$$

Where FLFP is an gender indicator, Y is the GDP per capita (constant 2010 US$) and Z could be other explanatory variables like Fertility rate, total (births per woman). In this paper we test for the validity of the following three models. For the first and the second model we use FLFP. To avoid the limitation of the reduced form in the first and second model we employ quadratic and cubic functions and adding control variables such as the Employment in agriculture, female (% of female employment) (modeled ILO estimate) (EMPA).

$$FLFP_t = \beta_0 + \beta_1 Y_t + \beta_2 Y2_t \qquad (3)$$

$$FLFP_t = \alpha + \beta_1 Y_t + \beta_2 Y2_t + \beta_3 Y3_t \qquad (4)$$

$$FLFP_t = \alpha + \beta_1 Y_t + \beta_2 Y2_t + \beta_3 Y3_t + \beta_4 EMPA \quad (5)$$

We can consider the following: $\beta_1 > 0$ and $\beta_2 = \beta_3 = 0$ will indicate a monotonically increasing relationship between income and gender equality; $\beta_1 > 0$ and $\beta_2 < 0$ and $\beta_3 = 0$ will indicate an inverted U-shaped relationship, thus the GKC hypothesis. $\beta_1 < 0$ and $\beta_2 > 0$ and $\beta_3 = 0$ will indicate U-shaped relationship between gender equality and the income and $\beta_1 > 0$ and $\beta_2 < 0$ and $\beta_3 > 0$ will indicate an N-shaped relationship between income and gender equality.

Empirical results

Since we used time series data, the first step is to test for stationarity for all the variables using two unit root tests. The first test is augmented Dickey-Fuller (ADF) (Dickey and Fuller, 1979). The second test is the Phillips-Perron (PP) test (hereafter, the ADF test and PP test). Tables 2 and 3 – in the appendix - summaries the results of these tests. The results of these tests

(ADF and PP) indicate that we cannot reject the null hypothesis of existence of a unit root at levels i.e. all the variables are non-stationary in their levels. However, the null hypothesis is rejected in the first difference except to P; it is non stationary in the first and second difference. Since the variables are non-stationary in their levels, we cannot regret the non-stationary variables on each other because this might lead to spurious regression than we omit this variable from the model. Thus, we proceed to investigate the possibility of co-integration relationship among variables using the Johansen (1995) test to determine which method we will employ to estimate the models. If Johansen's test indicates that the variables are not co-integrated, then we use VAR model. If the variables are co-integrated, then we use the Error Correction Model (ECM). Before we employ Johansen test, we use the Information Criterion of Akaika (AIC) to determine the lag length for the models because the Johansen test is sensitive to lag length.

Table 4 shows the lag length for the models depending on AIC. The results indicate that the lag length for the first model is 4, the lag length for the second model is 4, the lag length for the third model is 4. Johansen tests propose two different likelihood ratio tests to determine the number of cointegrating relationships. They are the Trace test and maximum Eigenvalue test. The trace statistics investigate for the null hypothesis of (r) co-integrating relations against the alternative of (n) co-integrating relations; where (n) is the number of variables in the system for r =0,1,2,…,n–1. The test is performed sequentially, beginning with the null hypothesis assuming that there are at most zero co-integrating vectors. If this null hypothesis is rejected continuing with the null hypothesis that there is at most one cointegrating vector. Then, the maximum Eigenvalue statistic tests the null hypothesis of (r) co-integrating relations against the alternative of r+1 co-integrating relations for r=0,1,2,…,n–1.

Additional test to be conducted is the adaptation of the Johansen's co-integration test which will follow. It begins with the null hypothesis assuming that there are no co-integrating vectors. The results present in table 6 with the trace tests and maximum Eigenvalue tests, . For the first model: the null hypothesis (H0) =1 is not rejected at the 5% level, where trace statistics (22.2378) < critical value (29.68). Consequently, the number of co-integrated vector with three lags is one, for the second model, the null hypothesis (H0) =2 is not rejected, so there is two long-run relationship among the variables, where trace statistics (28.9227*) < critical statistics (29.68) at 5% level. Finally the third model, the null hypothesis (H0) =3 is not rejected, so there are three long-run relationship among the variables, where trace statistics (14.8229) < critical statistics (15.41) at 5% level. Moreover, the third model, present the rank is more than zero, which means that there is a long-run relationship among the variables in the three models. So we will proceed to estimate the error correction model.

Results from Johansen test support the co-integration relationship among the variables. Consequently, we proceed to estimate error correction model (ECM) for the models. Results of the error correction model for the four models are presented in table 6 – see the appendix. The estimated effect of GDP per capita on female labor force participation rate is negatively significant in the first, second and third models respectively. For the employment in agriculture, female (% of female employment) (modeled ILO estimate) (EMPA) variable, there is a negative significant relation between this variable and FLFP. This means that the higher number of female in the agriculture sector have a negative effect on the female labor force participation. For the signs of the parameters in models (2, 3, 4), we found that B1 > 0, B2 < 0, and B3<0. This means that GKC follows down turn pattern.

Conclusion

In order to examine the relationship between FLFP and GDP per capita it is rather complex and co-integration analysis of the two variables in Egypt is not confirming the existing of the GKC relationship. The turning point may exist but in one country because of specific policies but absent in other countries. Egypt female labour force participation is very low, at about 25% in Egypt, female rates of unemployment are twice as high as those for males; while also significantly higher is the incidence of informal employment for females. Findings have important implications for policy

This paper contributes by testing GKC in the Egyptian economy and results provide the existing for the long term relation but with downturn pattern, which means that the GKC hypothesis is not supported by this data set. Policy implications in this study can be summarized as follows: Enforcement of laws for women Protection:

Several laws were enacted since, to protect women at home and work and remove inequality between women and men. Government and public sector works in general, do not violate the rights of working women. Focusing on Capacity building: Education and training are an essential part for developing women capabilities to participate in the economy. These should include and be amplified by a continuous process of capacity building and development to improve and retain the skills to do their jobs competently. Encourage female participation in technology activities. The Services Sector appears to be the growing sector with opportunities for future expansions in technology, banking services, communication.

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Appendix
Table 2 Augmented Dickey-Fuller unit root tests

Variables	Lags	Constant	Lags	Constant and trend
FLFP	4	-1.614	6	-1.994
Y	0	0.122	0	–2.112
Y2	0	1.070	0	-2.103
Y3	0	1.881	0	-2.084
EMPA	0	-2.580	0	-2.762
DFLFP	4	6.427	3	-6.595***
DY	0	-3.452*	0	-3.397*
DY2	6	-3,512*	6	-3.812*
DY3	6	-2.688*	6	-3.965*
DEMPA	1	-4.847***	1	-4.474***

Notes: (**) and (***) indicate 5% and 1% level of significant, respectively.

Akaike Information Criteria (AIC) is used to select the lag length.

DX represents the first difference of variable x.

DDX represents the second difference of variable x.

Table 3 Phillips-Perron Unit root test

Variables	Lags	Constant	Lags	Constant & Trend
FLFP	2	-1.577	2	-1.887
Y	2	0.3349	2	-2.465
Y2	2	0.916	2	-2.335
Y3	2	1.420	2	-1.871
EMPA	0	-2.531	0	-2.421
DFLFP	0	-6.402***	4	-6.719***
DY	0	-2.789*	0	-2.391
DDY	4	- 5.345**	4	-5.329**
DY2	4	-2.321	0	-2.441
DDY2	4	-5.161***	4	-5.031**
DY3	3	-2.023	3	-2.411
DDY3	3	-5.111**	3	-5.015**
DEMPA	3	-5.441***	3	-5.391***

Notes: (**) and (***) indicate 5% and 1% level of significant, respectively.

Akaike Information Criteria (AIC) is used to select the lag length.

DX represents the first difference of variable x.

DDX represents the second difference of variable x.

Table 4 AIC criteria for the three models

Lag Model 1	Model 2	Model 3
0 43.0058	81.138	86.9412
1 34.6242	70.6149	76.21
2 34.3818	70.4625	74.9569
3 34.6698	70.6203	74.4562
4 34.0445*	67.5937*	39.97*

Table 5 Johansen co-integration tests

Rank	Eigenvalue	Trace statistic	5% Critical value
		Model 1	
0		22.2378*	29.68
1	0.45902	5.6500	15.41
2	0.27924	0.0155	3.76
3	0.00057		
		Model (2)	
0		54.6306	47.21
1	0.61409	28.9227*	29.68
2	0.44600	12.9765	15.41
3	0.32910	2.1998	3.76
4	0.07824		
		Model (3)	
0		81.7838	68.52
1	0.67841	51.1533	47.21
2	0.54052	30.1564	29.68
3	0.43329	14.8229*	15.41
4	0.32622	4.1619	3.76
5	0.14285		

Table 6 Error correction model

	Model (1)	Model (2)	Model (3)
Y	0.00856*** (0.0204)	0.1617 *** (0.025)	0.1591235*** (0.0372)
Y2	-8.05 *** (0.085)	-.00007 *** (0.00001)	-0.00007*** (.00001)
Y3		0.00001**** 0.000001)	-0.000001*** (0. -0.00002)
EMPA			-0.0330 (0.0221)

Notes: *, **, and *** indicate 10%, 5%, and 1% level of significant, respectively.