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Would Closing the Gender Digital Divide Close the Economic Gender Gap in Emerging Markets and Developing Economies? An Empirical Assessment

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WOULD CLOSING THE GENDER DIGITAL DIVIDE CLOSE THE ECONOMIC GENDER GAP IN EMERGING MARKETS AND DEVELOPING ECONOMIES? AN EMPIRICAL ASSESSMENT

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Abstract

COVID-19 crisis accelerated the use of information technology-based solutions, as e-learning and remote work became the new normal. Nevertheless, access to and use of technology are not gender neutral. In Emerging Markets and Developing Economies (EMDEs), women have less access to the internet and other technological tools than men. Limited access to technology may hinder women's access to economic opportunities. Thus, the present paper investigates the impact of the digital gender divide on the gender gap in labor market participation, controlling for the gender gap in education, social norms and other macro-economic characteristics of EMDEs and developed countries. Using World Development Indicators, Global Findex database and World Value Surveys for 2017, a two-stage least squares approach was used to control for the endogeneity of the gender gap in access to internet. The results show that closing the gender gap in internet usage would reduce the gender gap in labor market participation. However, this positive effect is lower in the EMDEs than in advanced economies, shedding the light on the importance of traditional gender roles as key determinant of the gender gap in labor market participation in EMDEs. The present results have important implications for policies targeting women empowerment (SDG5) and reducing inequalities (SDG10). Digital solutions could help segments of women manage and balance familial obligations with paid work better.

Keywords: COVID-19, gender gap, digital divide, developing economies, emerging markets
JEL Classifications: D63, O10, O33

ملخص

سرَّعت أزمة فيروس كورونا الجديد COVID-19 من اســـتخدام الحلول القائمة على تكنولوجيا المعلومات، حيث أصـــبح التعلم الإلكتروني والعمل عن بُعد أمرًا طبيعيًا جديدًا. ومع ذلك، فإن الوصول إلى التكنولوجيا واستخدامها ليسا محايدين بين الجنسـين. في الأسـواق الناشـئة والاقتصـادات النامية (EMDEs)، يكون وصـول النسـاء إلى الإنترنت والأدوات التكنولوجية الأخرى أقل من الرجال. قد يؤدي الوصـول المحدود إلى التكنولوجيا إلى إعاقة وصـول المرأة إلى الفرص الاقتصـادية. وهكذا، تبحث هذه الورقة في تأثير الفجوة الرقمية بين الجنسـين على الفجوة بين الجنسـين في المشـاركة في سـوق العمل، والسـيطرة على الفجوة بين الجنسـين في التعليم، والأعراف الاجتماعية وخصـائص الاقتصـاد الكلي الأخرى في بلدان الأسـواق الصـاعدة والبلدان المتقدمة النمو. باستخدام مؤشرات التنمية العالمية وقاعدة بيانات المؤشر العالمي ومسوحات القيمة العالمية لعام 2017، تم اسـتخدام نهج المربعات الصـغرى المكون من مرحلتين للتحكم في تجانس الفجوة بين الجنسـين في الوصـول إلى الإنترنت. تظهر النتائج أن سد الفجوة بين الجنسين في استخدام الإنترنت من شأنه أن يقلل الفجوة بين الجنسين في المشاركة في ســـوق العمل. ومع ذلك، فإن هذا التأثير الإيجابي أقل في بلدان الأســـواق الناشـــئة والبلدان النامية منه في الاقتصـــادات المتقدمة، مما يسلط الضوء على أهمية الأدوار التقليدية للجنسين كمحدِّد رئيسي للفجوة بين الجنسين في المشاركة في سوق العمل في بلدان الأسـواق الناشـئة والبلدان النامية. النتائج الحالية لها آثار مهمة على السـياسـات التي تسـتهدف تمكين المرأة (الهدف 5) والحد من عدم المســـاواة (الهدف 10). يمكن أن تســـاعد الحلول الرقمية شرائح من النســـاء على إدارة وموازنة الالتزامات الأسرية مع العمل بأجر بشكل أفضل.

1. Introduction

Empowering women and girls (Sustainable Development Goal 5) and reducing inequalities (Sustainable development Goal 10) are two interconnected goals that are highly correlated with other Sustainable Development Goals (SDGs). Empowering women and girls by eliminating all forms of discrimination against them, ensuring their full and effective participation in labor markets and equal opportunities in leadership and access to economic resources will reduce the gender economic gap. Because empowered women with access to resources invest more in the human capital of their children, this would support the eradication of poverty (SDG1) and food insecurity (SDG2), the promotion of healthy lives (SDG3), and inclusive and equitable quality education (SDG 4), especially for future generations.

Labor force participation is a source of gender-based inequality. Worldwide, 47.13% of women and girls aged 15+ participated in the labor market in 2019, while the figure was 74% for the male population (World Development Indicators, 2020). This female labor participation rate varies between 61% in Sub-Saharan Africa and 20% in Middle East and North African countries. While male labor force participation rate varies between 66% in Europe and central Asia and 77% in South Asia (World Bank Indicators, 2020).

Determinants of the gender gap in labor markets include the gender gaps in education, gender roles in the society, national laws and regulations, and access to financial resources and technology. Among these the current paper focuses on access to information and communications technology (ICT). Research shows the gender digital divide represented by differential ICT access has significant impact on the gender gap in labor market participation (Antonio & Tuffley, 2014; Valberg, 2020; Viollaz & Winkler, 2020). In fact, access to and use of technology has a greater impact on women's access to education and financial resources because it can provide flexible arrangements, which may be more compatible with caregiver obligations (Antonio & Tuffley, 2014; World Bank, 2016).

The COVID-19 pandemic accelerated the use of information technology-based solutions worldwide. Limited mobility and increased working and learning from home have made digital devices and accessing internet all the more important to accessing economic opportunities. However, women in EMDEs are marginalized in the technology-based economy and do not take full opportunity from the potential of technology (Elnaggar, 2007; Ben Moussa and Seraphim, 2017). Drivers of the gender digital divide in EMDEs include the cost of ICTs, women's lack of skills, irrelevance to the tasks that society expects them to complete, and lack of access, sometimes due to safety and security concerns (Kwami, 2012; World Bank, 2016; Singh, 2017; The Mobile Gender Gap Report, 2018). Thus, women are more vulnerable to economic effects of the spread of the new coronavirus. The gender gap in access to education and economic opportunities as well as women's vulnerability to poverty is very likely to increase because of the pandemic.

Bridging the digital gender divide is thus more important than ever. The digitalization of business procedures and payments has the potential to reduce the gender gap in business ownership by increasing women's access to markets, productive assets, credits and information. Gender equality

in accessing economic opportunities will drive the achievement of sustainable development goals in EMDEs, including increasing investment in girls and women's human capital and reducing income inequality and poverty overall (World Development Report, 2016; Klapper et al, 2016).

Therefore, the question to ask is: "*would closing the gender gap in access to internet close the gender gap in the labor market?*" This paper addresses this question by investigating the impacts of the gender gap in access to internet on gender gap in labor market participation in different countries including EMDEs, controlling for the gender gap in education, social norms, and other macro-economic characteristics. The paper is organized as follows; section 1 reviews the literature of female labor force participation and access to technology. Section 2 describes the economic gender gap and digital gender divide in EMDEs. Section 3 presents the econometric model and the data. Section 4 discusses the main results. Finally, section 5 draws conclusions and provides policy implications.

2. Literature review

Extensive research has addressed determinants of female labor force participation and gender gap in labor market. At the micro level, key determinants include women's individual socioeconomic characteristics, their household's characteristics, and the characteristics of their communities as unemployment rate and education level of the community where they live (Assaad et al, 2014; Nazier and Ramadan, 2017). At the macro level, a country's economic level, fertility and population growth, unemployment rate, education level, and norms and values regarding gender roles drive female labor force participation.

What empirical evidence exists shows internet access has a positive impact on labor market outcomes in general, and especially for women (Valberg, 2020; Viollaz and Winkler, 2020). A U.S.-based study suggests this may be because telework makes work arrangements more flexible and saves workers time and money (Dettling, 2013). Information and technology play a significant role in empowering women by providing them better access to education and economic opportunities (Antonio & Tuffley, 2014; Ben Moussa and Seraphim, 2017). Ben Moussa and Seraphim (2017) used a sample of 190 university students to explore the implications of ICTs diffusion on Emirati women's empowerment. The results show that ICTs give Emirati women better access to education and job market opportunities and other resources.

In Jordan, Viollaz and Winkler (2020) adopt an instrumental variable approach to examine the impacts of digital technologies on reducing the gender gap in labor market. Using the Jordanian Labor Market Panel Survey (2010 and 2016), they found that female labor force participation increases with internet adoption, mainly among older skilled women, a result they attributed to their access to online job search. A study in rural areas of South Africa showed that full coverage by a mobile phone network leads to a 15-percentage point increase in employment and that women (albeit those without significant childcare obligations) accounted for most of the change (Kloner & Nolen, 2010). One study reviewing studies of developing countries as well as a study based in Jordan have tied unequal access to technology to women's inability to participate in economic

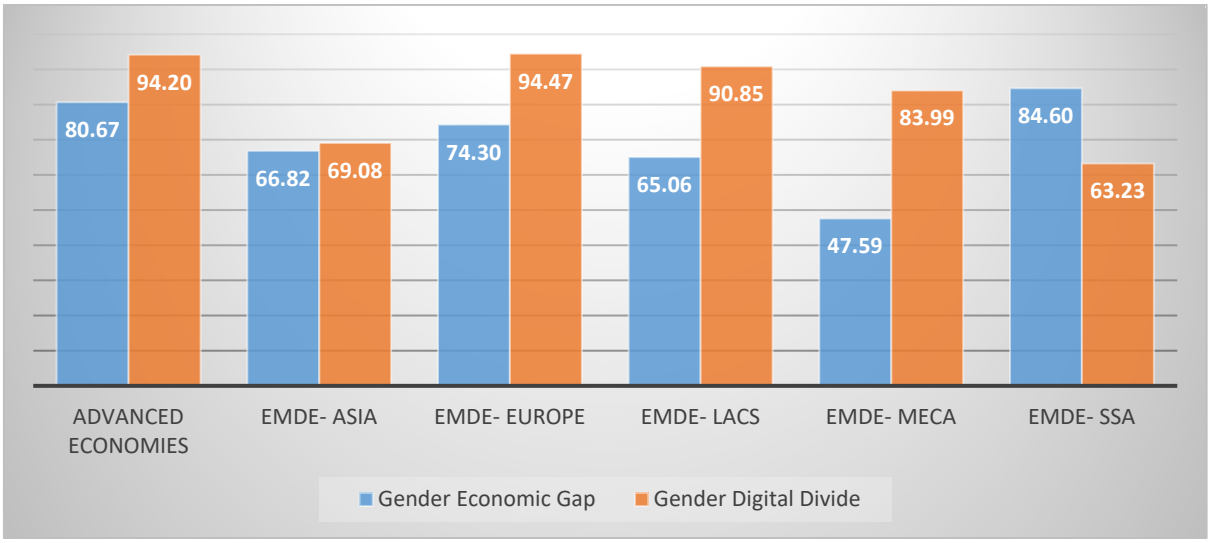
activities (Antonio & Tuffley, 2014; Viollaz & Winkler, 2020). Using panel data of 209 countries for the years 1960 through 2002, Chen (2004) found that an increase in ICT infrastructure increases women's access to economic opportunities, especially in conservative cultures where women face mobility restrictions. ICT production and usage increase productivity by increasing access to information, reducing transaction costs, and overcoming distance barriers. Similarly, a study using panel data for 156 countries from 1991 to 2014 found that ICTs have a positive effect on female labor force participation (Valberg, 2020). However, this positive effect differs with the level of economic development. In low income countries, the effect of ICTs on gender gap in labor market is almost non-existing.

Research to date has always looked at total access to the internet and its impact on the gender gap in labor market. Thus, this paper, by examining the gender gap in internet access, provides a significant contribution to the literature. Another factor differentiating this paper from past research is that it considers the social norms and gender roles in the society as a determinant of gender gap in labor market and access to technology. It does so by following Chen (2004) and Valberg (2020) in using a cross-country approach to allow for comparability and considers the EMDEs in the different regions. Such comparability overcomes the concern of external validity and thus provides a more reliable result.

3. Economic Gender Gap and Gender Digital Divide in EMDEs

The gender economic gap measured by the ratio of female to male labor participation rate varies across EMDE countries and regions. Female labor participation rates in EMDEs in the Middle East and Central Asia (MECA) region are lower than those in any other region, and it has the largest gender gap, with an average ratio of female to male labor participation rate of 47.59%. EMDEs in Sub Saharan Africa (SSA) actually have the smallest gender gap with an average female labor force participation rate of 84.60% of male labor force participation rate (Figure 1).

Figure 1: Average Gender Economic Gap and Gender Digital Divide by regions in 2017 (%)



Source: Constructed by the authors using World Development Indicators and Findex Database

Access to internet is one of the challenges facing EMDE countries in general and facing women in these countries in particular. On average, only 45% of people in EMDE countries use internet compared to 82% in advanced economies (World Development Indicators, 2020). The gender digital gap varies within regions. In advanced economies, on average more than 85% of men and 81% of women have access to internet. The largest gender digital gap is in emerging economies in SSA where the share of women accessing internet is on average 63% of the share of male using internet. On average, less than 30% of men and less than 20% of women have access to internet in emerging Sub Saharan countries. While in EMDEs in Europe, 72% of men and 68% of women have access to internet, resulting in a gender gap of 95% (Figure 1).

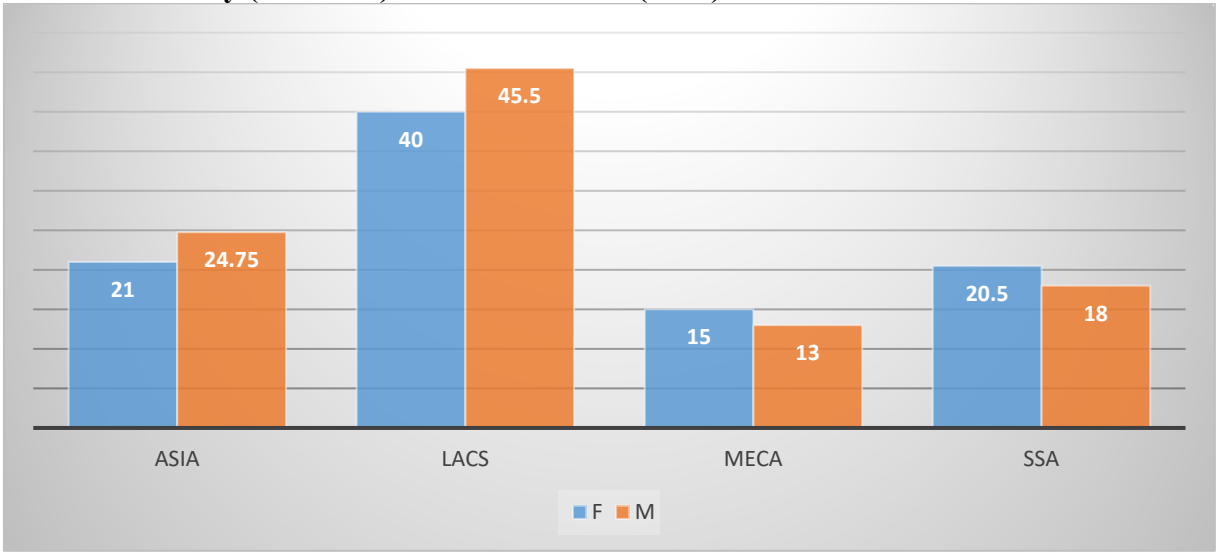
Barriers to internet access in EMDEs include affordability measured by handset cost and data cost, users' skills, availability, and users' perception of the relevance to their lives, safety, and security of internet (The Mobile Gender Gap Report, 2018). On average[2], more women than men in emerging economies in MECA and SSA consider affordability as a barrier for internet access (The Mobile Gender Gap Report, 2018; Figure 2). Low education, technology literacy, technology ownership, and control over the use of technology and sociocultural norms play a role in accessing internet (World Development Report, 2016; OECD, 2018). Women in South Asia are 38% less likely to own a phone than men. In Africa, women are 50% less likely to use internet than men (World Development Report, 2016). On average, in all studied regions, more than 10% of female mobile users who have not used the internet cite reading and writing difficulties as the main barrier (Figure 3).

Accessibility and security's role in the gender digital divide largely accrues patriarchal and conservative societies. In the studied countries from Latin American countries (LACs), more than

[2] Average is constructed based on countries in EMDEs where data is available in the Mobile Gender Gap Report 2018: Asia (Bangladesh, China, India and Myanmar); LACs (Guatemala and Mexico); MECA (Algeria); and SSA (Ghana, Nigeria, South Africa and Tanzania)

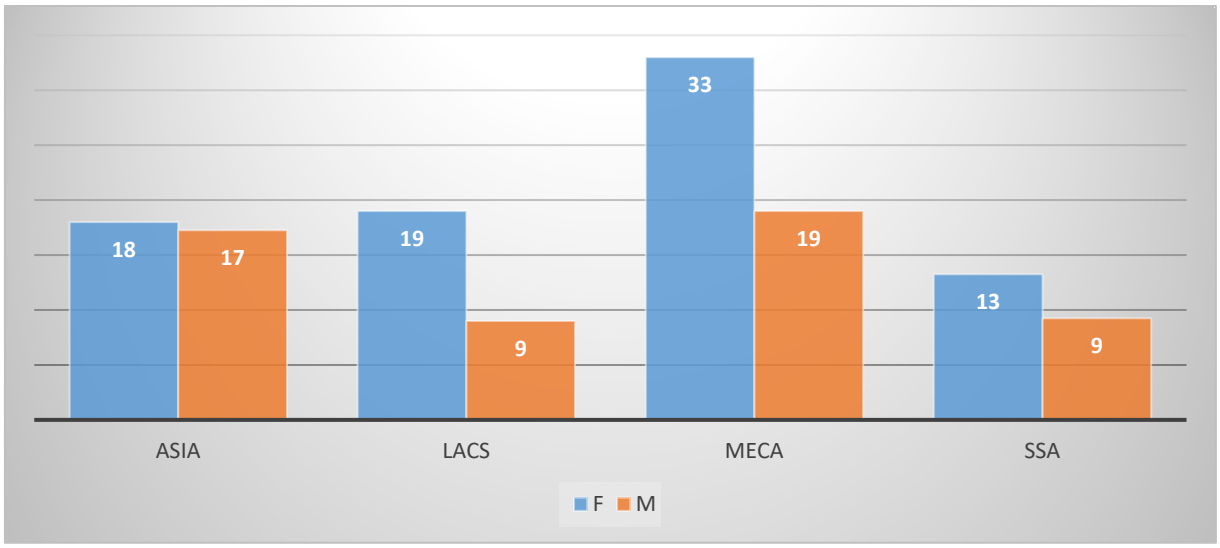
20% of female mobile users say their reason for avoiding the internet is to avoid being contacted by strangers. This share is 12% in Asia, 13% in MECA and 7% in SSA (Figure 4). More than 10% of female mobile users in all regions had not used the internet because their families would not approve (Figure 5).

Figure 2: Average percentage of mobile users who have not used mobile internet claiming that affordability (data cost) is a main barrier (2018)



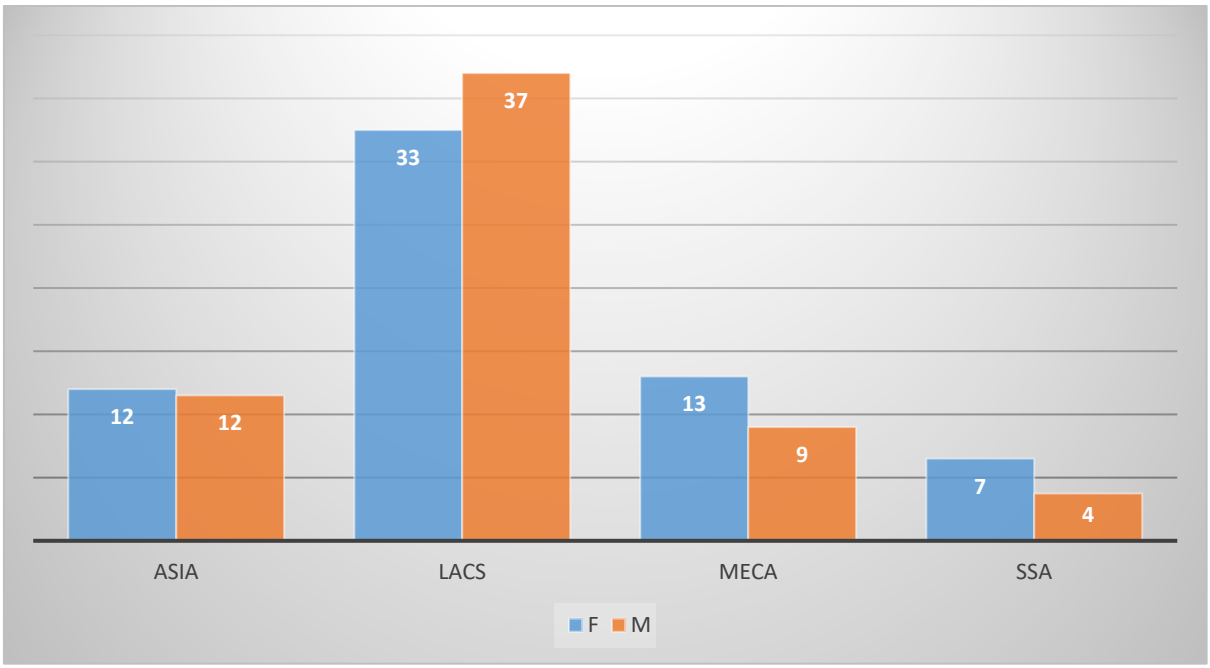
Source: Constructed by the authors using data from The Mobile Gender Gap Report 2018

Figure 3: Average percentage of mobile users who have not used mobile internet claiming that usability (reading and writing difficulties) is a main barrier (2018)



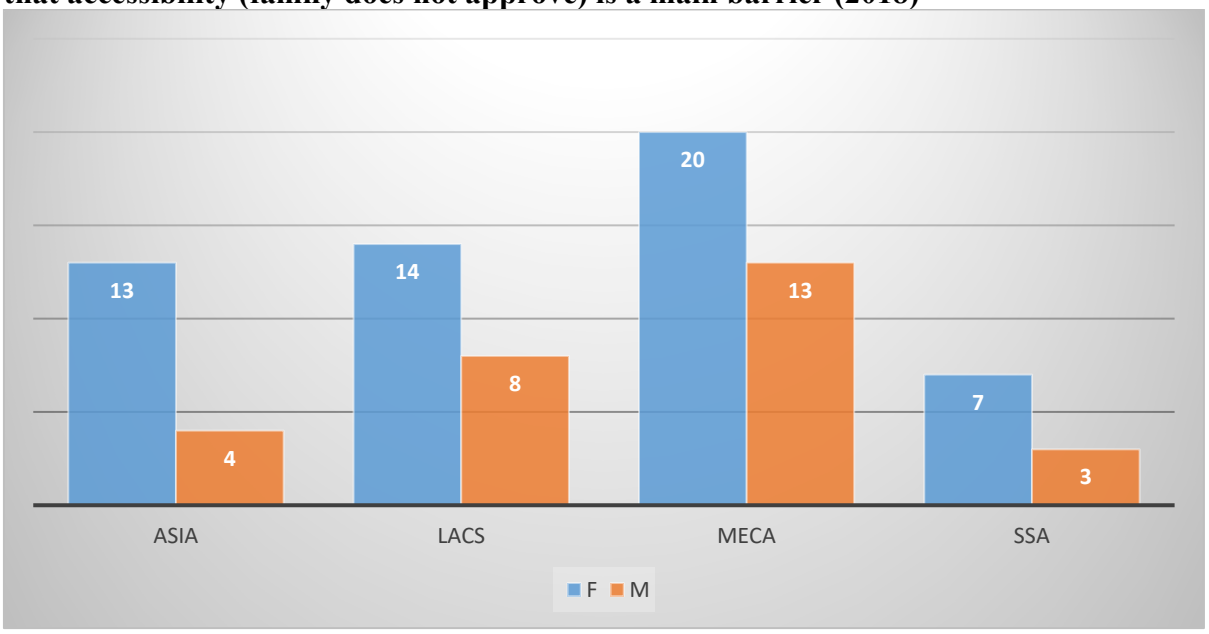
Source: Constructed by the authors using data from The Mobile Gender Gap Report 2018

Figure 4: Average percentage of mobile users who have not used mobile internet claiming that safety and security (strangers contacting me) is a main barrier (2018)



Source: Constructed by the authors using data from The Mobile Gender Gap Report 2018

Figure 5: Average percentage of mobile users who have not used mobile internet claiming that accessibility (family does not approve) is a main barrier (2018)



Source: constructed by the authors using data from The Mobile Gender Gap Report 2018

4. Data and methodology

The paper investigates how the gender digital divide affects the labor force participation gender gap using the World Development Indicators and Global Findex database for 2017[3]. The dependent variable is the gender economic gap measured by the ratio of female to male labor force participation rate. The explanatory variable of interest is the gender digital divide measured by the ratio of female internet users to male internet users.

To control for the structure of the economy, the share of agriculture value added in gross domestic product (GDP) and the share of manufacturing value added in GDP are included in the model. Economic growth typically increases job opportunities, but the structure of such economic growth may affect the economic opportunities available for women. If male-dominated sectors, as construction and hydrocarbon industry, are the main contributor to economic growth, economic opportunities for women are unlikely to increase.

Other control variables that determine female labor force participation include population growth, unemployment rate, and trade as share of GDP. As education may be considered an explanatory variable for female labor force participation, the gender parity index (GPI) in tertiary school enrollment of the previous year is included as well.

The correlation between the gender economic gap and digital divide may differ across EMDEs in different regions. For instance, in some MECA countries as Algeria, Egypt, Jordan, female internet users are more than 80% of male internet users, while the gender labor force participation gap is the highest worldwide. By contrast, in some SSA countries as Chad, Niger, South Sudan, female to male labor force participation is more than 70% while female internet users are less than 50% of male internet users (See Appendix II). Dummy variables for the regions and economic level of the countries are included to control for such differences.

As internet users are not randomly assigned and as education, income, and geography affect access to internet, the gender digital divide is likely to be endogenous to labor market outcomes (Dettling, 2013; Gurumurthy and Shami, 2014). Following the literature, we use a two stage least squares (2SLS) approach to control for this endogeneity. The identification assumption is that fixed broadband subscriptions (per 100 people)[4] affect the number of internet users, with no direct effect on labor force participation.

Finally, using the World Value Surveys, we estimate two other versions of the model, including variables reflecting the gender roles in the society. The first one includes the share of individuals who strongly agree or agree with the statement: "[It is a] Problem if women have more income

[3] The list of countries is available in appendix 1.

[4] Other instrumental variables, such as the number of secured internet servers per 1 million people and the number of mobile subscribers were tested. But these instruments were rejected based on the results of the endogeneity tests.

than [their] husband[s].” And the second variable is the share of individuals who strongly agree or agree with the statement: “[When] Jobs [are] scarce: Men should have more right to a job than women.” Summary statistics of the variables and their sources are presented in Table 1.

Table 1: Summary statistics and data sources

	Mean	Std. Dev.	Min	Max	Source	Year
Gender Economic Gap	71.45	19.29	21.92	100.35	WDI	2017
Gender Digital Divide	85.46	18.45	28.30	109.72	Findex Database	2017
Population Growth	1.15	1.15	-1.69	4.68	WDI	2017
GPI Tertiary Enrollment	1.11	0.25	0.42	1.55	WDI	2016
Agriculture, Value Added (% of GDP)	8.27	8.55	0.03	35.80	WDI	2017
Manufacturing, Value Added (% of GDP)	13.29	5.65	1.03	31.66	WDI	2017
Trade (as % of GDP)	94.84	66.23	25.22	400.08	WDI	2017
Unemployment Rate	7.34	5.27	0.49	27.07	WDI	2017
Fixed Broadband Subscriptions (per 100 people)	17.91	14.24	0.00	46.32	WDI	2017
Social Norm1	10.75729	19.00963	0	72.1	WVS	wave 4
Social_Norm 2	18.73333	24.49755	0	89.4	WVS	wave 4

*Social Norm 1: Share of individuals who strongly agree or agree that “Problem if women have more income than husband”

**Social Norm 2: Share of individuals who strongly agree or agree that “Jobs scarce: Men should have more right to a job than women”

5. Estimated results

The results of the first stage of the 2SLS model show that the fixed broadband subscriptions (per 100 people) is a significant positive determinant of the ratio of female to male internet users. Based on the result of under-identification test and the Stock and Yogo (2005) test, our equation is identified and we can reject the null hypothesis of weak instrument.[5]

The estimated results of the second stage for all models are presented in tables 2 and 3. Different versions of the model are estimated using different explanatory variables. Our findings confirm that closing the gender gap in internet usage increases gender equality in labor market. When the ratio of female internet users to male internet users increases, the ratio of female to male labor force participation rate increases (model 1 and 2).

Our findings show that the gender gap in labor market participation in emerging markets and developing economies in LACs region is significantly higher than the gender gap in advanced economies. Similar results were found for emerging economies in MECA and in SSA (model 1). The positive effect of the ratio of female internet users to male internet users is lower in the EMDEs than in advanced economies. In line with Valberg (2020), this result means that closing the gender gap in technology and internet access may not be the “*leapfrogging* strategy” (p.26) to close the gender gap in labor market (model 2).

[5] The results of the first stage of the two stages least square and the result of endogeneity test are available upon request.

The structure of economic growth affects whether it increases female labor force participation compared to male labor force participation. The higher the agriculture share in GDP the higher a country's female labor force participation. However, the higher the manufacturing sector share in GDP, the lower the female labor force participation. This means that the agriculture sector creates job opportunities for women but the manufacturing sector does not. And as the literature suggests, the higher a country's unemployment rate and the higher its population growth, the lower the gender equality in its labor market. The fact that population size has a significant negative effect confirms the double burden of paid and unpaid work for women as the main caregiver within the households, as population size suggests fertility rate. This negative effect becomes insignificant when the social norms are considered in the model (models 1 to 4).

Closing the gender gap in education does not necessarily coincide with a reduced gender gap in labor market. The ratio of women to men enrolled at the tertiary level in public and private schools has no significant effect on the ratio of female to male labor force participation. This is known in the Middle East as the "education paradox" (Assaad et al, 2018).

Finally, as expected, gender roles in the society and norms are key determinants of female labor force participation. When controlling for development level of the economy and for gender roles in the society, the gender gap in internet access loses its significance (models 3 and 4*)*. This confirms the complexity of females' labor force participation decision. Our results show that the higher the share of individuals who strongly agree or agree that it is a problem if women have more income than their husbands, the higher the gender gap in the labor market. Similarly, the higher the share of individuals who strongly agree or agree that when jobs are scarce, men should have more right to a job than women, the higher the gender gap in the labor market.

For robustness checks, two other models were estimated. The first one includes GDP growth instead of the share of the structure of economic growth. The results (see Appendix III- Model A) confirm the positive significant effect of increasing female access to internet on closing the gender gap in labor market. However, the GDP growth has no significant effect. For the second model, we constructed a panel data set using data from the International Telecommunication Union (ITU) about female and male internet users in 2018, in addition to the Findex database for 2017. The estimated results of the random effect[6] model (see Appendix III- Model B) confirm the importance of closing the gender gap in accessing internet for closing the gender gap in labor market.

6. Conclusions and policy implications

The paper examined the impact of gender gap in access to internet on the gender gap in labor force participation in 96 countries, where 62 countries are emerging markets. Control variables consisted of the economic growth structure, population, openness of the economy, unemployment rate,

[6] The selection of the random effect model was based on the results of the Hausman test.

gender gap in education and regional differences, and shares of individuals who strongly agree or agree that it is a problem if women out-earn their husbands and who strongly agree or agree that men have more right to a job than women if jobs are scarce.

As internet users are not randomly assigned and as education level, income, and geography affect access to the internet, an instrumental variable approach is used to control for the endogeneity of gender digital gap. The fixed broadband subscriptions (per 100 people) is used as an instrumental variable.

Different versions of the model are estimated using different explanatory variables. The results show that closing the gender gap in internet usage increases gender equality in the labor market. This result is robust to whatever version of the model is estimated. However, controlling for the development level of the economies in the different regions indicated that the positive effect of increasing female access to internet is lower in the EMDEs than in advanced economies. This confirms Valberg's (2020) conclusion that closing the gender gap in access to technology will not readily close the gender gap in a country's labor market. One factor driving this may be that traditional gender roles—women as caregivers and men as breadwinners—are a key determinant of the gender gap in labor market participation in EMDEs. While the flexibility affordances of ICTs blunt the impact of traditional gender roles in advanced economies, they seem to have little impact in EMDEs.

This paper's results have important implications for policies targeting women empowerment (SDG5) and reducing inequalities (SDG10). Based on the nature of work and economic activity, digital solutions could help segments of women manage and balance familial obligations with paid work better. However, limited access to technology may hinder women's access to economic opportunities in a context where e-learning and working from home became the new normal. Given how the COVID-19 pandemic has accelerated reliance on and importance of technology and digital devices in terms of market access and income, these factors will only be more important in the future. Thus, limited access to technology would increase inequality and become a factor of digital divide instead of becoming a factor of digital dividend.

Another implication is that interventions to support gender equality must target norms and gender roles in the society, as they play a significant role in affecting women's participation in labor market. Implemented policies and programs should address gender norms regarding caregiving roles to change the gender stratification system and individuals' behavior (Nazier and Ramadan, 2020; Assaad et al, 2020).

Finally, as development level and structure of economic growth matter, future research should consider how the extent of formal and informal employment in an economy affects interactions between the gender digital divide and the gender employment gap. If women are mainly concentrated in informal employment, digital solutions may not increase their opportunities. Table 2: Estimated Results of the 2 SLS- Second Stage Output (Models 1 and 2)

Dependent Variable: Female to Male Labor Force Participation		
	Model (1)	**Model (2)**
Digital Gender Gap [(1)]	1.093***	1.704**
	-0.401	-0.711
Population Growth	-0.0450**	-0.0495***
	-0.0185	-0.016
GPI- Tertiary Enrollment	-0.0793	0.0973
	-0.106	-0.0802
Agriculture, Value Added (% of GDP)	0.0145***	0.00653**
	-0.00536	-0.0032
Manufacturing, Value Added (% of GDP)	-0.00993***	-0.00781***
	-0.00281	-0.00254
Trade (% of GDP)	8.49E-06	-1.77E-05
	-0.000252	-0.000216
Unemployment Rate	-0.0118***	-0.00935***
	-0.00337	-0.0029
Reference Group: Advanced Economies		
EMDEs in Asia	-0.0584	0.898
	-0.076	-0.682
EMDEs in Europe	-0.148***	0.832
	-0.0556	-0.936
EMDEs in LACs	-0.157***	1.348*
	-0.055	-0.731
EMDE's in MECA	-0.271***	1.157*
	-0.0545	-0.663
EMDE's SSA	0.166**	1.577**
	-0.0712	-0.677
Digital Gender Gap in Asia		-0.0096
		-0.00756
Digital Gender Gap in Europe		-0.0101
		-0.00998
Digital Gender Gap in LAC		-0.0160**
		-0.00785
Digital Gender Gap in MECA		-0.0152**
		-0.00708
Digital Gender Gap in SSA		-0.0160**
		-0.0073
	0.0844	-0.726
Constant	-0.316	-0.714
Observations	96	96

Standard Errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1
Notes (1) Ratio of female internet users to male internet users

Table 3: Estimated Results of the 2 SLS- Second Stage Output (Models 3 and 4)

	Model (3)	Model (4)
Digital Gender Gap [(1)]	0.539	0.65
	-0.391	-0.399
Population Growth	-0.0400**	-0.0482***
	-0.0165	-0.0174
GPI- Tertiary Enrollment	-0.158	-0.16
	-0.114	-0.117
Agriculture, Value Added (% of GDP)	0.00971*	0.0121**
	-0.00585	-0.00593
Manufacturing, Value Added (% of GDP)	-0.00954***	-0.0100***
	-0.00302	-0.0031
Trade (% of GDP)	2.10E-05	5.89E-05
	-0.000273	-0.000282
Unemployment Rate	-0.0106***	-0.00987***
	-0.00335	-0.00351
	-0.121***	-0.126***
EMDE (Reference: Developed Economies)	-0.0444	-0.0459
	-0.00266***	
Norm 1[(2)]	-0.000885	
		-0.00182**
Norm 2[(3)]		-0.000721
	0.704**	0.608*
Constant	-0.311	-0.317
Observations	96	96

Standard Errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Notes:

(1) Ratio of female internet users to male internet users

(2) Share of individuals who strongly agree or agree that "Problem if women have more income than husband"

(3) Share of individuals who strongly agree or agree that "Jobs scarce: Men should have more right to a job than women"

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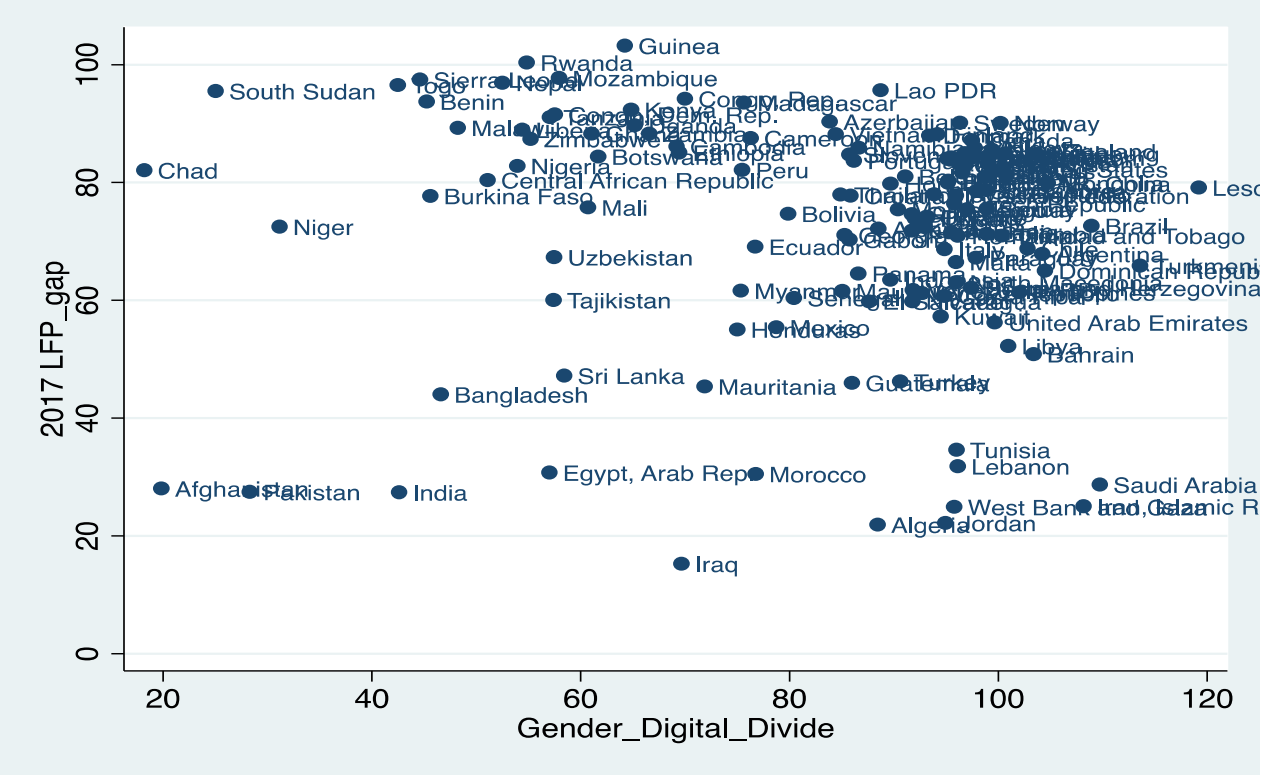
Annexes

Appendix I: List of countries

Advanced Economies	EMDEs in Asia	EMDEs in Europe	EMDEs in LACs	EMDEs in MECA	EMDEs in SSA
Australia	Bangladesh	Albania	Argentina	Algeria	Benin
Austria	China	Belarus	Chile	Armenia	Botswana
Belgium	India	Croatia	Colombia	Azerbaijan	Burkina Faso
Cyprus	Indonesia	Hungary	Costa Rica	Bahrain	Cameroon
Czech Republic	Nepal	Moldova	Dominican Republic	Egypt, Arab Rep.	Congo, Dem. Rep.
Denmark	Vietnam	Mongolia	El Salvador	Georgia	Ghana
Estonia		Montenegro	Honduras	Iran, Islamic Rep.	Kenya
Finland		Poland	Mexico	Jordan	Mauritius
France		Romania	Panama	Kazakhstan	Mozambique
Germany		Russian Federation	Peru	Kuwait	Namibia
Greece		Serbia		Kyrgyz Republic	Niger
Hong Kong SAR, China		Turkey		Mauritania	Rwanda
Ireland				Morocco	Senegal
Israel				Pakistan	South Africa
Italy				Saudi Arabia	Togo
Korea, Rep.				Tajikistan	
Latvia				Tunisia	
Lithuania				Uzbekistan	
Luxembourg				West Bank and Gaza	
Malta					
Netherlands					
New Zealand					
Norway					
Portugal					
Singapore					
Slovak Republic					
Slovenia					
Spain					
Sri Lanka					
Sweden					
Switzerland					
Thailand					
United Kingdom					
United States					

Appendix II: Gender Economic Gap and Gender Digital Divide (2017) (%)



Source: Constructed by the authors using World Development Indicators and Findex Database

Appendix III: Robustness Check- Estimated Results for Model (A) and Model (B):

Dependent Variable: Ratio of Female to Male Labor force participation

	Model A		Model B-Panel RE[(1)]
Gender Digital Divide	4.251**	Gender Digital Divide	0.0298*
	-1.667		-0.0158
GDP Growth	0.00366	Population Growth	1.176***
	-0.012		-0.4
Population (log)	-0.011	GPI Tertiary Enrollment	1.596
	-0.0193		-4.153
Trade (as share of GDP)	-0.000327	Agriculture (share of GDP)	-0.256
	-0.000412		-0.283
Unemployment Rate	-0.0172***	Manufacturing (share of GDP)	0.0791
	-0.00448		-0.16
GPI Tertiary Enrollment 2016	0.117	Trade (as share of GDP)	-0.043
	-0.128		-0.0284
EMDEs in Asia	3.504**	Unemployment Rate	0.262**
	-1.581		-0.106
EMDEs in Europe	3.896**		
	-1.951		
EMDEs in LACs	3.825**		
	-1.665		
EMDEs in MECA	4.081**		
	-1.621		
EMDEs in SSA	4.033**		
	-1.584		
Gender Digital Gap*Asia	-3.705**		
	-1.731		
Gender Digital Gap*Europe	-4.140**		
	-2.061		
Gender Digital Gap*LACs	-4.214**		
	-1.769		
Gender Digital Gap*MECA	-4.607***		
	-1.711		
Gender Digital Gap*SSA	-4.122**		
	-1.66		
Constant	-3.060*		
	-1.79		
Observations	105	Observations	87

(1) The random effect (RE) model was selected based on Hausman test