How women's agency affects fertility: New evidence based on Egyptian panel data

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Background

Women's empowerment has been a crucial topic in public and academic discussions during the past two decades, as it has been one of the UN's sustainable development goals as well as been linked to the promotion of women's and children's health and well-being. According to Kabeer's (1999) definition, women's empowerment is a dynamic process that includes three aspects: resources, agency, and achievements. In this empowerment process, women's rising agency is a key component through which the acquired resources are cristalized and transferred to enhance women's achievements. Women's agency refers to women's ability to "define their own life-choices and to pursue their own goals, even in the face of opposition from others" (Kabeer 1999: 438). Following this definition, women's agency is commonly measured by four indicators that cover the dimensions of decision-making, freedom of movement, financial autonomy, and gender norms.

In population and development research, female empowerment has been linked to people's changing fertility disires and behaviours in high-fertility countries across South and South-East Asia, Sub-Saharan Africa, and Middle East and North Afirca (i.e., MENA). At the micro level, previous studies generally found a negative association between women's empowerment and fertility desires or behaviours (Atake & Gnakou Ali, 2019; Upadhyay et al., 2014). However, while the fertility impacts of women's empowerment in resources (e.g., education and human capital) and achievements (e.g., labour force participation) have been widely discussed, the influences of female agency on fertility received much fewer attention. Among those who examined the fertility impacts of women's agency, empirical analyses were mostly based on cross-sectional data and associational estimation strategies. Moreover, the majority of these studies were based in sub-Saharan African or South Asian countries (Atake & Gnakou Ali, 2019; Upadhyay et al., 2014), whereas research for MENA countries are rare, despite their very different gender contexts under the influences of Islamic culture.

Drawing on these empirical gaps, our study aims to contribute to the literature by examining the causal effect of women's agency on fertility in Egypt. Egypt is an important country for studying women's agency in the MENA region, as it is the most populous country and has considerable cultural and political influences in that region. Like other MENA countries, Egypt's female labor market participation rate is among the lowest in the world and does not correspond to women's increased education (Assaad et al., 2020). The crux of this "MENA paradox" is that the development of female agency in this region is lagging behind, causing a mismatch between women's resources and achievements. Despite the postponment, women in the MENA region, especially the younger generation, evidently want more agency (Drolet, 2011; Mensch et al., 2003). To evaluate how this foreseeable trend of rising female agency is goging to shape the population development in Egypt and the MENA region, it is crucial to examine the causal effects of women's agency on fertility.

Research Design, Data, and Method

Drawing on theoretical discussions, we formulated a general hypothesis regarding the negative effects of women's agency on their number of births in Egypt. To test the hypothesis, we used three waves of data from the Egypt Labor Market Panel Survey (ELMPS, years 2006, 2012, and 2018). The ELMPS collects nationally representative samples of households and contain labor market, socio-economic, and demographic information, including the fertility and marriage histories over time. Moreover, the ELMPS includes several items to measure different dimensions of women's agency, including women's involvement in decision-making, financial autonomy, freedom of movement, and gender norms and attitudes. The outcome variable of this study is women's *total number of births* (rage: 0–10), which measures women's fertility. Our key explanatory variables are the first three diemsions of the agency measurements, which collectly capture women's "instrumental agency" (Yount et al., 2016). *Involvement in decision-making* was measured by six items, which captured the degree of women's involvement in: (1) making large household purchases; (2) household purchases for daily needs; (3) visits to family, friends, or relatives; (4) what food should be cooked each day; (5) getting medical treatment or advice for oneself; (6) buying clothes for oneself. We created an additive count variable that captured the number of decisions in which the woman was involved (range: 0–6). *Financial autonomy* was measured by a single-item question "Do you have direct access to household money in your hand to use?" Replies were coded as a binary variable (0 = No; 1 = Yes). *Freedom of movement* was measured by three items, which asked whether women need permission to go to specifica places including (1) local market, (2) local health center or doctor, (3) home of relatives, friends, or neighbors. We created an additive count variable that captured the number of places women can move freely without permission (rage: 0–3). Our model also included a set of time-varying control variables, including women's age and age-squared, educational level, employment history (ever worked or not), region of residence, and gender-role attitueds. To fullfile the requirement of our models (explained later), the analytical sample was restricted to 18-49 years old women who were married and have participated in all three panel waves in 2006, 2012, and 2018. The final sample includes 7,881 observations from 2,627 women, with a mean fertility of 2.9 children.

While there are already three empirical studies on the relationship between women's agency and fertility in the Egyptian contexts (Ambrosetti et al., 2021; El-Zeini, 2008; Samari, 2017), we argue that their analyses only allowed for an associational rather than a causal inference. From a methodological point of view, estimating the causal effect of women's agency on fertility is challenging. First, the estimation results could be biased at the presence of unobserved heterogeneity due to omitted confounding variables. Other than the basic socio-demographic variables like educational level, employment, and marital status, there are also some characteristics such as personality and detailed household backgrounds that are usually unobservable in survey data. Second, the theoretical relationship between womens' agency and fertility is not uni-directional but reciprocal. Recent studies have shown that women's childbirth transitions can also affect their agency in MENA countries (Friedrich, 2023; Friedrich et al., 2021). When modeling the causal effects of agency on fertility, the issue of reverse causality and causal simultaneity causes endogeneity, leading to biased estimates.

To address these issues, we specified a cross-lagged dynamic panel model with fixed effects (CLFE) using structural equation modeling and maximum likelihood esitmator (ML-SEM) (Allison et al., 2017). Adding to the conventional fixed effects model (FE), which provides good protection against unobserved time-invariant

heterogeneity, the CLFE model further tackles the issue of reverse causality, which is an underemphasized but crucial topic for causal estimation. The CLFE model of women's fertility is written as:

$$y_{it} = \beta_1 y_{it-1} + \beta_2 x_{it-1} + \beta_3 x_{it} + \delta_1 w_{it} + a_i + \varepsilon_{it}$$

where y_{it-1} is the lagged fertility for women i at time t (with i =1,..., N and t = 2, 3). x_{it-1} and x_{it} capture the lagged and the contemporaneous effects of women's agency on fertility. w_{it} denotes a set of time-varying control variables that confound the relationship between x and y. a_i is the time-constant individual-specific FE, which is treated as a latent variable in the ML-SEM framework and is allowed to correlate with y_{it} and x_{it} at all time points; and ε_{it} is the randome error term. The unbiasness of the CLFE estimates rests on a sequential heterogeneity assumption ($E(\varepsilon_{it} \mid x_{it}) = 0$ for $t \leq s$). That means, if reverse causality presents in a feedback mechanism where women's agency is both affecting and being affected by fertility in a sequential order ($\varepsilon_t \rightarrow y_t \rightarrow x_{t+1} \rightarrow y_{t+1} \rightarrow$ …), the CLFE estimates remain unbiased. A simulation study (Leszczensky & Wolbring, 2022) showed that in the presence of reverse causality the CLFE model yields unbiased estimates in both the lagged and contemporaneous effects of the explanatory variable; and using the ML-SEM method is statistically more efficient thatn the Arellano-Bond (AB) estimator.

Preliminary Findings

Modeling results from the CLFE models are presented in Table 1. First, Model 1 shows that women's increasing involvement in decision making has nearly no effect on their fertility in Egypt. Neither the comtemporaneous nor the lagged effects reach the 0.05 significance level. Second, Model 2 shows that higher financial autonomy also did not significantly affect women's fertility outcome. Third, Model 3 shows that higher freedem of movement could increase women's fertility in Egypt. Regarding the contemporaneous effect, women's freedom of movement increased by one scale unit could decrease their number of births by 0.023 (β = –0.023, p = 0.029); and the lagged effect of increased freedom of movement by one unit in the previous wave could decrease the number of birth by 0.013 (β = –0.013, p = 0.115). While the contermporaneous effect is statistically significant, its effect size is rather small given that the TFR of Egyptian women stays above 3.0 throughout the observation years (2006-2018).

In summary, our preliminary resultls provide rather limited supports for the general hypothesis, in which women's increasing agency in Egypt is argued to decrease their fertility outcomes. More specifically, only in one aspect of female agency empowerment—their freedom of movement—we found a statistically significant negative relationship between women's agency and fertility.

Our finding of a negative linkage between women's freedom of movement and fertility was also recorded in other MENA countries like Omen (Al-Riyami & Afifi, 2003) and in other regions like South Asia and sub-Saharan Africa (Upadhyay et al., 2014). However, our findings sharply contradict a previous study in Egypt using the same dataset (Samari, 2017), in which the author found positive effects of women's instrumental agency (participation in household decision making, financial autonomy, freedom of movement) on number of children. We argue that such a discrepancy is mainly resulted from the methodological limitation of Samari (2017), in which the issues of unobserved heterogeneity and reverse causality in causal analysis were not fully

addressed. Our CLFE model, on the other hand, has good protection against both issues, thus offering more accurate estimates of the causal effects of women's instrumental agency on fertility outcomes.

Next Steps

Women's empowerment is a multidimentional process in which the accumulation of resources, agency, and achievements may reinforce each other (Kabeer, 1999). From this theoretical perspective, the impact of women's agency on fertility is likely to differ across educational group and employment status. To empirical test the reinforcing effects, we are planning to introduce interaction terms in the CLFE model of women's fertility. These additional findings will provide valuable information regarding the conditions under which higher agency can really empower women and change their reproductive behaviors.

Table 1. Cross-lagged fixed effects models of the effects of women's agency on number of births.

	Model 1 b/(se)	Model 2 b/(se)	Model 3 b/(se)	Model 4 b/(se)
Key explanatory variables				
Involv. decision (*t*)	0.003			0.002
	(0.007)			(0.007)
Involv. decision (*t–1*)	-0.004			-0.003
	(0.007)			(0.007)
Financial autonomy (*t*)		0.013		0.016
		(0.029)		(0.029)
Financial autonomy (*t–1*)		-0.005		-0.003
		(0.025)		(0.026)
Freedom movement (*t*)			-0.023*	-0.024*
			(0.010)	(0.011)
Freedom movement (*t–1*)			-0.013	-0.011
			(0.013)	(0.014)
Lagged outcome variable				
N of births (*t–1*)	0.182**	0.190**	0.181**	0.191**
	(0.044)	(0.045)	(0.044)	(0.045)
N of observations	7,881	7,881	7,881	7,881
N of women	2,627	2,627	2,627	2,627
BIC	115146.73	94311.53	105992.25	146894.49

Note: All models control for time-varying varialbles including women's age and age-squared, educational level, and employment history. Significance level: $p < 0.05$ *, $p < 0.01$ *

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