Abstract for Population Association of America 2014 Annual Conference

Why is Fertility on the Rise in Egypt? The Role of Women's Employment Opportunities

By Caroline Krafft[1]

Short Abstract (150 words):
Can declining employment opportunities for women reverse the fertility transition? This paper presents new evidence that the demographic transition has not just stalled, but in fact reversed in Egypt. After falling for decades, fertility rates are increasing. The drivers of rising fertility rates are examined, with a particular focus on the role of declining employment opportunities for women. By using a unique panel dataset with detailed fertility and employment histories, the effects of local employment opportunities on women's fertility can be estimated. These are calculated by comparing the effect of changing economic conditions on the spacing and occurrence of sequential births for the same women, essentially using a duration model with woman-specific fixed effects. Preliminary results indicate that the decrease in public sector opportunities, which are particularly appealing to women, and the increasing role of the private sector have contributed to the rise in fertility.

[1] Caroline Krafft, Department of Applied Economics, University of Minnesota, 1994 Buford Ave, St. Paul, MN 55108, United States Tel: +1-607-342-5753 Email: kraff004@umn.edu

Why is Fertility on the Rise in Egypt? The Role of Women's Employment Opportunities
By Caroline Krafft

Extended Abstract

Introduction and Background

Previous evidence in Egypt indicated that, despite some stalls, overall fertility has been declining (Bongaarts 2008; El-Zanaty and Way 2009). The most recent evidence, however, indicates that the crude birth rate has been rising in Egypt, from a low of 26 (births per thousand people) in 2003-2006 to a high of 32 in 2012 (Central Agency for Public Mobilization and Statistics 2014). Until now, it has been unclear whether this was due to an increase in fertility or the changing age structure of the population. Egypt has a substantial youth bulge, and as of 2012 the peak of the youth bulge was in the 25-29 age range, prime childbearing age. This paper presents the first evidence that fertility has increased in Egypt.

Rising fertility in Egypt has coincided with substantial changes in the structure of the economy, and in particular the types of employment available. The share of employment in the public sector has declined substantially, while informal forms of employment have increased (Assaad 2009). Informal employment opportunities are substantially less appealing to women than formal, public sector jobs (Assaad and El-Hamidi 2009). As of 2012, the female (age 15-64) market employment rate was only 17.6%, and had declined substantially compared to 2006, when it was 22.3% (Assaad and Krafft 2013a), in part due to the changing structure of the economy. The decline in female employment is particularly notable given that factors associated with increases in female labor force participation, such as female education, have been improving (Assaad 2009).

Demographic transition theories maintain that declines in fertility cause increases in female labor force participation (Bloom et al. 2009; Canning and Schultz 2012; Schultz 2008). The empirical literature from both developed (Angrist and Evans 1998; Jacobsen, Pearce, and Rosenbloom 1999) and developing countries (Cáceres-Delpiano 2012; Cruces and Galiani 2007) provides substantial evidence that fertility impacts female employment. I argue that causality can also run in the opposite direction. Rising economic opportunities for women can cause decreases in fertility—or as is occurring in Egypt, declining opportunities can increase fertility. While demographic transition theories recognize that socio-economic changes raise costs and decrease the benefits of children, and theorize that this drives declines in fertility (Bongaarts 2006), these theories fail to fully account for the effect socio-economic changes can have on the alternatives to childbearing, such as changing employment opportunities for women. Previous theories have suggested that, when fertility declines, if employment opportunities for women are unappealing, they may substitute into home production or self-employment (Schultz 2008). However, the possibility of substituting back into childbearing has not been adequately addressed.

Allowing for rising fertility as a consequence of socio-economic changes is consistent with economic theories that recognize that one of the costs of children is an opportunity cost—the value of parents' time (Becker 1960). If, for women, the benefits of employment opportunities decrease, then the relative benefits of childbearing will rise, increasing fertility. The global evidence on this hypothesis has been very limited to date. There is some evidence from rural

India that increased economic opportunities for young women (ages 15-24) will delay marriage and childbearing (Jensen 2012), but the impact of such delays on lifetime fertility could not be estimated. This paper estimates the impact of economic opportunities for women on the timing and occurrence of births over the full range of women's child-bearing years, demonstrating how economic opportunities impact fertility.

Data

I use the Egypt Labor Market Panel Survey (ELMPS), a rich panel data set that includes detailed information on individuals' labor market and demographic characteristics. The ELMPS has three rounds to date: 1998, 2006, and 2012. The 2006 and 2012 rounds include both previous round households, split households, and a refresher sample. In 2012, the sample totaled 12,060 households and 49,186 individuals. Each round includes a detailed history of labor market statuses, and the 2006 and 2012 rounds include detailed fertility data for ever-married women. The rounds are nationally representative at the time of fielding, and the data includes weights that account for attrition processes.[2]

Methods

The analysis begins with a description of fertility patterns in Egypt over time, specifically using the total fertility rate (TFR), to demonstrate the recent rise in fertility. The contributions of different subgroups to the rise in fertility will be considered, examining characteristics such as age, education, work history, and place of residence. I will then use multivariate models to estimate the effect of individuals' characteristics and local economic opportunities on fertility outcomes. Controlling for individual characteristics, Cox proportional hazards models will be used to measure the effect of economic opportunities on the spacing and probability of sequential births. Additionally, proportional hazard models with strata for individual women will be estimated over different births. Stratification for multiple durations (births) on a single unit (an individual woman) removes biases related to woman-specific effects and is especially important when the woman-specific effects are correlated with covariates (Ridder and Tunali 1999). Essentially, this method creates woman-specific fixed effects across the timing and probability of different births. Women act as their own controls, allowing for causal estimates of the impact of changing economic opportunities on childbearing.

While Cox proportional hazards models can indicate the impact of changing economic opportunities on the probability of childbearing, of particular interest is the resulting change in the TFR. Van Hook and Altman (2013) demonstrate how to estimate total fertility rates from discrete-time survival models. I will extend their methodology to the Cox model in order to simulate how different economic opportunities would affect fertility. After estimating a Cox model, baseline survival, $S_0(t)$, is predicted. This can then be adjusted by covariates as follows (Moeschberger and Klein 2003):

$$\hat{S}(t|X) = S_0(t)^{exp(\Sigma_{k=1}^{p} \beta_k X_k)} \quad \textbf{(1)}$$

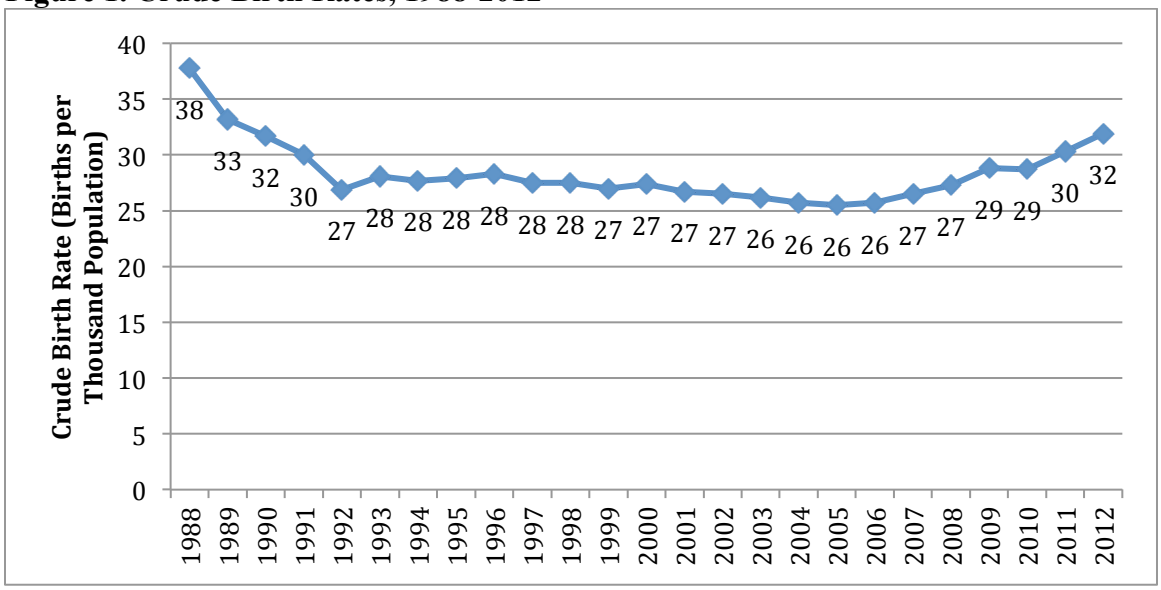
[2] See Assaad and Krafft (2013c) for additional information on the ELMPS.

This generates predictions of survival at each time for each birth, conditional on survival until that point. The hazard, the probability of a birth occurring between *t* and *t+1* if it has not yet happened, can then be extracted for each birth. Combining this with the resulting proportion at risk for each birth then generates the unconditional probability of each birth at each *t*. These can be summed over *t* and births to generate the TFR (a modification of Van Hook and Altman 2013). Since intervals from one birth to the next are being used, the proportion of women at risk for each birth will be adjusted by the proportion of women who ever have children.[3] Simulations for various covariate patterns of economic opportunity can also be undertaken, and TFRs compared.

Results

The crude birth rate has recently risen in Egypt**.** Figure 1 presents the crude birth rates (CBRs) for Egypt over the period 1988-2012. Starting in 1988, the CBR was 37.8 births per thousand of population. It declined rapidly through the early 1990s, falling to 26.9 births per thousand population in 1992, being fairly stable at around 28 births per thousand population from 1993-1998, dropping to around 27 births per thousand population in 1998-2002, and 26 births per thousand population over the period 2003-2006. The low point of the CBR was in 2005, when it was 25.5 births per thousand population. Starting in 2007, the CBR began to rise substantially, reaching 28.8 by 2009 and 31.9 in 2012.

Figure 1. Crude Birth Rates, 1988-2012



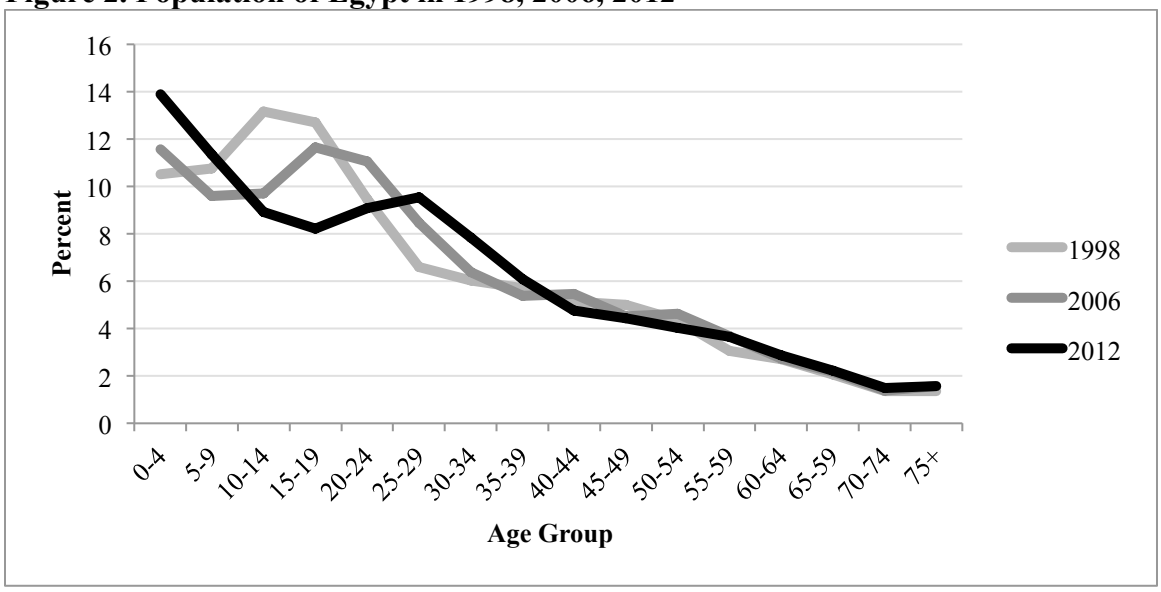
Note: 2012 is preliminary data
Source: Central Agency for Public Mobilization and Statistics (2014)

Although the CBR in Egypt has recently risen, this could be driven by the age structure of the population, specifically the peak of the youth bulge reaching childbearing age. Figure 2 shows the population structure of Egypt in 1998, 2006, and 2012. The youth bulge is clearly visible in 1998 within the 10-19 age range. By 2006, the youth bulge was in the 15-24 age range. In 2012,

[3] The estimate of women never having children is from the 2008 DHS, specifically the percent of all women 44-49 who never had children, 5.8% (El-Zanaty and Way 2009).

the peak was around 25-29. Between 2006 and 2012, the peak of the youth bulge entered prime childbearing age, as the median age at first births for recent cohorts is around 23 years of age. The youth bulge entering adult roles and beginning childbearing could drive up the CBR without any change in underlying fertility, as the CBR is sensitive to the age structure of the population.

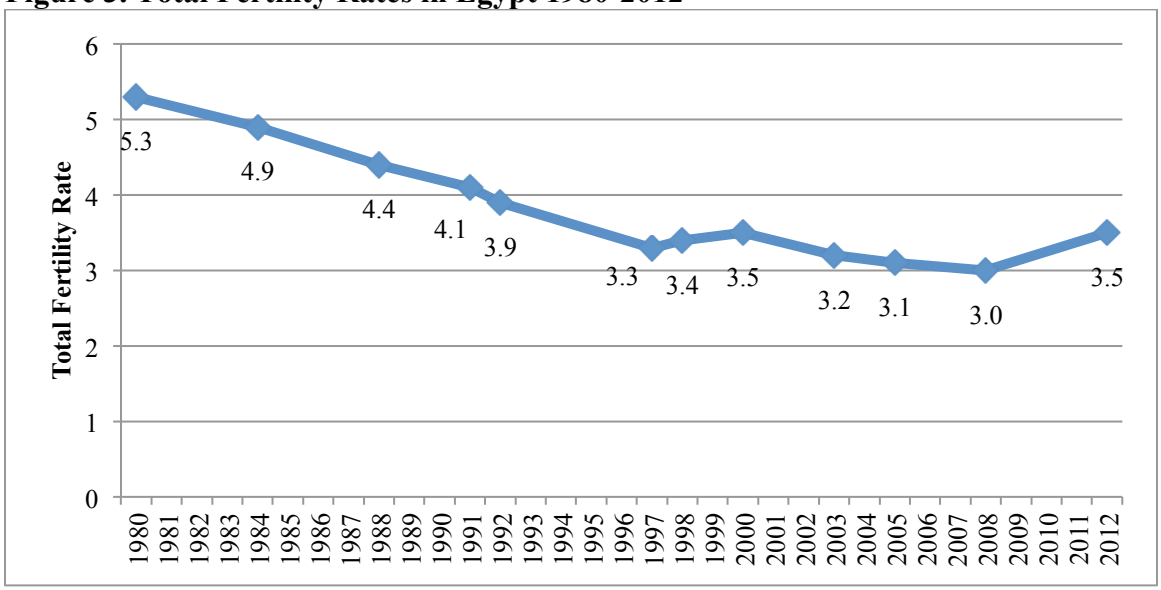
Figure 2. Population of Egypt in 1998, 2006, 2012



Source: Author's calculations using ELMS 1998, ELMPS 2006, ELMPS 2012

An important initial result of the analysis is that fertility has risen recently in Egypt. Figure 3 presents fertility trends in Egypt, specifically the TFR as measured by various previous surveys (primarily Demographic and Health Surveys) over the period 1980-2008. Additionally, Figure 3 includes the TFR calculated from the 2012 ELMPS. In 1980, the TFR was quite high, at 5.3, and declined rapidly, falling to 3.6 by 1995. Since 1995, there have been moderate fluctuations in the TFR, but over the period 2000-2008 it declined from 3.5 to 3.0. The 2006 round of the ELMPS found a TFR of 3.0 (not shown), consistent with the 2005 DHS (TFR of 3.1) and 2008 DHS (TFR of 3.0). However, the 2012 ELMPS indicates a substantial rise in fertility, to a TFR of 3.5.

Figure 3. Total Fertility Rates in Egypt 1980-2012



Notes: 1980, 1984, and 1991 are 12 months preceding the survey. 2012 is three years preceding the survey, remainder are 1-36 months preceding the survey.
Source: 1980-2008 are primarily Demographic and Health Survey statistics from El-Zanaty & Way (2009), 2012 is based on author's calculations from the ELMPS 2012.

At the same time as substantial changes in fertility, there have been considerable changes in the structure of the economy in Egypt. Public sector hiring has declined in recent years as a result of economic reforms (Assaad and Krafft 2013b). Public sector jobs in Egypt are especially appealing to women, as they include substantial benefits and moderate working hours that are more easily reconciled with parental and spousal roles (Assaad and El-Hamidi 2009). As the size of the public sector has decreased, there has been limited growth in the formal private sector. Informal private sector jobs have increasingly dominated employment, especially for new entrants (Assaad and Krafft 2013b). Women have increasingly withdrawn from the labor force and employment as public sector employment has declined. Decreased employment opportunities have also decreased the opportunity cost of time spent bearing and raising children.

Preliminary results from the Cox proportional hazards models with women-specific strata indicate that changes in the structure of the economy in Egypt are contributing to the rise in fertility. As the share of local economic opportunities in the public sector falls, and opportunities in the private sector increase, the hazard of subsequent births rises. Extending the methods of Van Hook and Altman (2013) to estimate total fertility rates from survival models, I find shifts in the economic structure since 1991 led to a 0.10-0.16 higher average TFR than would have prevailed if the 1991 economic structure had continued.

Discussion

This study contributes important evidence that fertility is on the rise in Egypt. Additionally, this study is one of the first to investigate the impact of economic opportunities for women on their

childbearing. While theories of the demographic transition and fertility decline have allowed for a variety of socio-economic factors to affect fertility (Kirk 1996), studies of the relationship between fertility and female labor force participation have focused on the impact of fertility on women's economic activities. This paper demonstrates that causality can occur in the opposite direction. Labor market opportunities, and especially the type of jobs available to women, have an important impact on fertility. Traditionally, declining economic opportunities (i.e. recessions) are associated with declines in fertility (Sobotka, Skirbekk, and Philipov 2011). However, this research indicates that economic opportunities may interact with gender. Specifically, as economic opportunities that are particularly appealing to women decline, so that the value of work is substantially reduced, women may substitute into childbearing and parenting. This important intersection of economic and demographic changes requires substantially more research, and consideration in economic and population policy-making.

References

Angrist, Joshua D., and William N. Evans. 1998. "Children and Their Parents' Labor Supply: Evidence from Exogenous Variation in Family Size." *The American Economic Review* 88 (3): 450–477.

Assaad, Ragui. 2009. "Labor Supply, Employment, and Unemployment in the Egyptian Economy, 1988-2006." In *The Egyptian Labor Market Revisited*, edited by Ragui Assaad, 1–52. Cairo, Egypt: The American University in Cairo Press.

Assaad, Ragui, and Fatma El-Hamidi. 2009. "Women in the Egyptian Labor Market: An Analysis of Developments, 1988-2006." In *The Egyptian Labor Market Revisited*, edited by Ragui Assaad, 219–258. Cairo, Egypt: American University in Cairo Press.

Assaad, Ragui, and Caroline Krafft. 2013a. "The Evolution of Labor Supply and Unemployment in The Egyptian Economy: 1988-2012." *Economic Research Forum Working Paper Series No. 806*. Economic Research Forum Working Paper Series. Cairo, Egypt.

———. 2013b. "The Structure and Evolution of Employment in Egypt: 1998-2012." *Economic Research Forum Working Paper Series No. 805*. Economic Research Forum Working Paper Series. Cairo, Egypt.

———. 2013c. "The Egypt Labor Market Panel Survey: Introducing the 2012 Round." *IZA Journal of Labor & Development* 2 (8): 1–30.

Becker, Gary S. 1960. "An Economic Analysis of Fertility." In *Demographic and Economic Change in Developed Countries*, 209–240. Princeton, NJ: National Bureau of Economic Research Special Conference Series 11. Princeton University Press.

Bloom, David E., David Canning, Günther Fink, and Jocelyn E. Finlay. 2009. "Fertility, Female Labor Force Participation, and the Demographic Dividend." *Journal of Economic Growth* 14 (2): 79–101.

Bongaarts, John. 2006. "The Causes of Stalling Fertility Transitions." *Studies in Family Planning* 37 (1): 1–16.

———. 2008. "Fertility Transitions in Developing Countries: Progress or Stagnation?" *Studies in Family Planning* 39 (2): 105–10.

Cáceres-Delpiano, Julio. 2012. "Can We Still Learn Something from the Relationship between Fertility and Mother's Employment? Evidence from Developing Countries." *Demography* 49 (1): 151–74.

Canning, David, and T. Paul Schultz. 2012. "The Economic Consequences of Reproductive Health and Family Planning." *Lancet* 380 (9837): 165–71.

Central Agency for Public Mobilization and Statistics. 2014. "Statistical Yearbook--Vital Statistics." Retrieved March 09, 2014. http://www.capmas.gov.eg/pdf/Electronic Static Book2013/english/vital/untitled1/files/untitled.pdf.

Cruces, Guillermo, and Sebastian Galiani. 2007. "Fertility and Female Labor Supply in Latin America: New Causal Evidence." *Labour Economics* 14 (3): 565–573.

El-Zanaty, Fatma, and Ann Way. 2009. "Egypt Demographic and Health Survey 2008." Cairo, Egypt: Ministry of Health, El-Zanaty and Associates, and Macro International.

Jacobsen, Joyce P., James Wishart III Pearce, and Joshua L. Rosenbloom. 1999. "The Effects of Childbearing on Married Women's Labor Supply and Earnings: Using Twin Births as a Natural Experiment." *Journal of Human Resources* 34 (3): 449–474.

Jensen, Robert. 2012. “Do Labor Market Opportunities Affect Young Women’s Work and Family Decisions? Experimental Evidence from India.” *The Quarterly Journal of Economics* 127 (2): 753–792.
Kirk, Dudley. 1996. “Demographic Transition Theory.” *Population Studies* 50 (3): 361–387.
Moeschberger, Melvin L., and John P. Klein. 2003. *Survival Analysis Techniques for Censored and Truncated Data*. Second Edi. New York, NY: Springer.
Ridder, Geert, and Insan Tunali. 1999. “Stratified Partial Likelihood Estimation.” *Journal of Econometrics* 92: 193–232.
Schultz, T. Paul. 2008. “Population Policies, Fertility, Women’s Human Capital, and Child Quality.” *Handbook of Development Economics* 4 (07): 3249–3303.
Sobotka, Tomáš, Vegard Skirbekk, and Dimiter Philipov. 2011. “Economic Recession and Fertility in the Developed World.” *Population and Development Review* 37 (2): 267–306.
Van Hook, Jennifer, and Claire E. Altman. 2013. “Using Discrete-Time Event History Fertility Models to Simulate Total Fertility Rates and Other Fertility Measures.” *Population Research and Policy Review* 32 (4): 585–610.