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A Micro-Investigation of the reasons behind the slowdown of Demographic transition in Egypt: Will Egypt Witness a Demographic Window?

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Abstract: The paper investigates the factors behind the slowdown in demographic transition in Egypt across different geographical and socio-economic groups. The authors relax the assumption of a uniform fertility behavior across households and re-visit interrelationships between demography and economic indicators from a micro perspective. Empirical findings reject mainstream beliefs that slow demographic transition in Egypt is attributed to the poorer, south-located and less-educated households. Fertility behaviors in Urban Egypt and among the high-educated females are found to be key contributors to the slowdown of demographic transition. Unemployment among the high-educated females in addition to lower public and foreign spending on family planning that accompanied political instabilities following January 25th revolution escalated the demographic pressures further. These findings have implications on the appropriate future demographic policies needed to speed up demographic transition in Egypt.

Keywords: Demographic Transition – Demographic Window – fertility – economic development

INTRODUCTION

The relation between population and development has been a controversial issue for so long. The debate whether population growth stimulates, deters, or may be doesn't affect growth has not be resolved until a recent school criticized older literature for focusing population growth as the only demographic factor affecting development. This modern school argues that population structure, not size or growth rate, can be a key determinant of a country's development. This literature strand bases its argument on the old "Demographic Transition Theory". It argues that the changes infertility and mortality rates lead to a change

in the demographic structure of a country; mainly dependency rates and working age population. Such change can have several implications on the economic performance in the country; particularly in the demographic window stage which is characterized by high working age population and low dependency. Literature also partly attributed economic miracles that took place in countries like East Asian countries to the called "demographic window".

Egypt has been witnessing tremendous changes in demographic variables during its process of demographic transition for more than five decades. Several studies and projections anticipated that Egypt would soon witness a demographic window. However, recent trends show a clear slowdown in the demographic transition process that might not just question the previous optimistic anticipations, but also raises doubts about the ability of the Egyptian economy to face the growing needs of the increasing population. This is especially given the current economic and political challenges facing the Egyptian economy. In this regard, this paper aims to investigate the demographic transition process in Egypt and the demographic-economic interrelationships. We aim to analyze the reasons behind the slowdown in the demographic transition process and the possible implications on Egypt's opportunity of entering the demographic window and enjoying potential dividends. Egypt, as well as many other developing countries, is characterized by huge socioeconomic, geographic, cultural and other forms of disparities. We argue that such disparities should impact fertility behavior and other demographic responses to changing economic and social conditions in differentmanners. Accordingly, we choose to follow the recent literature recommendations of Bloom et al. (2012) and Oshima and Mason (2002) and relax the assumption of a uniform fertility behavior across households. We aim tore-visit interrelationships between demography and economic indicators from a micro perspective. To do this, weempirically and statistically decomposedemographic-economic interrelationships and fertility behaviors across different socioeconomic and geographical groups; not just to prove non-uniformity, but also to find out the main groups contributing positively or negatively to the speed of demographic transition in Egypt.

The paper is organized as follows: we start by presenting the theoretical underpinnings of the demographic transition and demographic window concepts. Next we briefly present main literature arguments concerning demographic-economic interrelationships. Our empirical part starts at sectionfour,where we analyze the process of demographic transition in Egypt and possibility and timing of the demographic window in Egypt. In Section five we present our micro- investigation of the possible factors contributing to the slowdown of demographic transition in Egypt, both related to demographic-economic interrelationships and fertility behavior. Finally, section six concludes.

Demographic Transition and Demographic Window: Theoretical and Conceptual Underpinnings

Demographic Transition is the process of moving from high birth and death rates to low birth and death rates. The lags and different rates of decline of death rates and fertility rates result in changes in the age structure of the society (Kirk 1996). Demographic transition concept and early theoretical underpinnings are as old as World War II. However, throughout its history, the theory has been a fertile domain for enormous developments and interactions with other non-demographic disciplines and theories; most importantly economic development theories.

The *classicalarticulation* of demographic transition concept is attributed to Warren Thompson (1929) who classified world countries into three groups according to the status of development. He assumed that countries will move from the stage of high birth high death rates to an intermediate stage of high birth-low death rates, then eventually to the low birth-low death rates stage with more industrialization (Demeny and McNicoll, 2003). Thompson conceptual contributions, although considered a fundamental contribution to the demographic transition literature, wasn't considered a theory because it didn't provide the required theoretical explanations for the decreasing fertility phenomenon (Fang Cai, 2010).The first theoretical recognition of the demographic transition theory was actually attributed to Notestein (1945) Essay that incorporated a developed demographic transition model with future population scenarios. Notestein work was highly recognized not just because of his future population projections but also because he set the ground for unlimited work explaining the reasons behind changes in fertility trends in different societies and the three-then five- stage demographic transition model[4].

Despite the fundamental contribution of Thompson, Notestein and same-era scholars in explaining and investigating the demographic transition phenomena; their work was later extensively criticized. The main criticism that was directed to these works was their assumption that demographic transition is a purely naturally-impulsive phenomenon as a result of more development and more industrialization. The direct implication of this is that countries who would like to avoid demographic transition will have to stay at a primitive stage of underdevelopment with high death rates in order to avoid population growth. This critique was behind the evolution of the *new articulation* of the demographic transition theory; by Notestein himself. Notestein later introduced a new dimension to the theory; that demographic transition can be influenced through "government-sponsored policies of family planning" (Szerter 1993).Notestein work complemented other academic and institutional contributions in the field of population policies and fertility determinants. Population theories and empirical works gained wide acknowledgment in the international communities and public policy programs since then. Population growth and fertility variables were included and examined in economic growth and development theories.

However, the demographic transition theory had a different contribution that remained unleashed until recently. Assumed changes in age structures resulting from demographic transition and their possible impacts on the economy and society remained to be unexamined until the evolution of the new demographic-economic concept: The Demographic Window.

Prior to the evolution of the demographic window concept, theoretical and empirical literature focused on population growth as the only demographic factor affecting development. Findings were controversial and the debate whether population growth stimulates, deters, or may be doesn't affect growth was never resolved. Through its compelling argument, that population structure, not size or growth rate, can be a key determinant of a country's development, the demographic window concept provided an acknowledged resolution to this debate. This literature strand bases its argument on the old "Demographic Transition Theory" argument; that the lags between declines inmortality and fertility rates lead to a change in the demographic structure of a country; mainly changes in dependency rates and working-age population. These changescan then have significant effects on the country's economic performance; particularly in the demographic window stage which is characterized by high working age population and low dependency.

Literature like Barro (1996), Bloom et al (2001), Mason (2005), Bloom and Williamson (1998), Kelley and Schmidt (1999, 2001, and 2005) and others argue that during the demographic window stage, population in the working age grow with higher rates compared to total population growth rates; which will result in an increase in employment and savings indicators and hence can lead to sound advances in the economic performance of the country. However, literature identified that this is conditional to the presence of the needed policy environment that is able to absorb such growing labor and increasing resources. Literature also assumes that the fast decline in dependency ratios in early stages of demographic window can also lead to spillovers on human development due to the increase in per-capita share of expenditure on health and education.

This is the basic enunciation of the demographic window concept. However, a deeper and closer investigation of demographic transition and demographic window literature indicates several implications. In the next section we will first discuss the concept of the demographic window and how it was defined in the economic literature. We will also review in the following section the main empirical findings of the literature that examined the relation between demographic transition and window and economic performance.

Definition and Calculation of the Demographic Window: A Critical Analysis

Academic literature vary in their precise definitions and determinants of the demographic window timings and durations. Dependency rates are perceived as the main determinants of the window start and end (Ven and Smits 2011, Pool 2004, UN 2004, Lee and Mason 2006, UN ECA 2013 and Saad 2011). Some papers (such as UN 2004, Lee and Mason 2006, and UN ECA 2013) added other determinants such as population below 15 years and above 65 years; working age population, fertility rates; and birth and mortality rates.However, dependency rates remain to be the fundamental determinant of the start and end of a demographic window in the reviewed definitions. Definitions vary from the broad mentioning of the determinants of demographic window and its possible outcomes to precise determination of the exact dependency rates needed to enter a demographic window or end it.

The United Nations Population Division defines the demographic window as period as "a period in which the ratio of under 15 population reaches to less than 30 percent of the total population and the ratio of 65 years and older population is still less than 15 percent" (UN, 2004). The definition establishes on these conditions and adds "In these circumstances, the total age dependency ratio reaches to less than 0.5 and potentially the condition looks very favorable for an economic development". The report claims that this period is a "God-given gift" that can change it to a population bonus (UN, 2004). In Annex (1) of this paper we present a detailed analysis of the reviewed definition and our critical assessment to these definitions. Other definitions – such as Ven and Smits (2011), Pool (2004) and Lee and Mason are broader in terms of specifications of entry and exit conditions of the demographic window.

A notable contribution to demographic window definitions is Saad (2011). The author defines demographic window as follows:

"The period corresponding to the demographic dividend has been subdivided into three phases. In the first phase, the dependency ratio declines but is still fairly high (above two-thirds, that is, two persons in dependent-age groups for every three persons in working-age groups). In the second phase, the dependency

ratio falls below two-thirds and continues to decrease. In the third and final phase, the dependency ratio begins to rise as the proportion of older people increases, but is still below two-thirds. The two thirds cut-off point was chosen arbitrarily to serve as an illustrative benchmark" (Saad 2011).

Granting that this definition is the closest to the UN (2004) one, nonetheless, it also encompasses a considerable contribution that distinguishesitfrom all previous work.The definition *implicitly*fits the "three-channels-window" of the famous David Bloom work(The human development-labor-savings trajectory) into the precisely determinedphases of the demographic window.

In an attempt to reformulate this trajectory in a rather explicit way, were-capture both UN (2004) and Saad (2011) definitionsin a new definition of the demographic window. We define the demographic window as "the period where a country witnesses specific changes in population age structure and dependency ratios, as a result of demographic transition". The demographic dividend is the potential economic and social outcome during the demographic window that is conditioned by the ability of the country to utilize the different stages of this window through the suitable economic and social policies. Finally, the demographic gift is the point where the dependency rates reach their minimum before reversing their trends"[5].

We divide the demographic window into three stages, in a similar attempt to Saad (2011), and based on Bloom et al. (2003) famous arguments on the three main channels of possible interventions of demographic dividend with the economy: Labor force, savings and human development. The first window starts with having a continuous decline in dependency rates as a result of decreasing fertility rates. The potential dividend during this period is through the possible increasing the fiscal space and the potential raise in per capita share of social expenditure, which helps the establishment of a cohort ready to participate as labor in the following stage of the demographic window. The second window starts when dependency rates fall below 60% and where the population under 15 years old become less than 15% of total population. The potential dividend is through the increase in labor force that can lead to potential increases in production and thus growth.

The third window starts when population above 65 years old increase above 15% of total population and when dependency rates reverse to an increasing trend. The main potential dividend is through the potential increase in savings rate accompanied with higher older-age dependency and increasing growth rates of older population. A country will totally exit the demographic window once dependency rates rise again above 60%.

This decomposition of the demographic window into stages not just helps in the investigation of the possible demographic-economic interrelationships in each stage, but also helps to identify the optimum policy mix to utilize each stage. The importance of each dividend depends on the characteristics and development status of the country. For example, developing, high-populated, countries usually have longer second window and should benefit the most from this stage. Several East Asian countries, such as China, Singapore, and Hong Kong are clear examples of having maximized demographic dividend during this period. On the other hand, developed, less populated countries usually have longer third window and enjoy their maximum dividend during this stage. Japan is a clear example of this case.

Demographic economic interrelationships in empirical literature

As mentioned earlier, a vast strand of literature investigated the interrelationships between demographic and economic variables. Classical literature concentrated on only "the size" and the "growth rate" of

population without a deep investigation of the "structure" of population. The famous typical relation examined was that of impact of population growth on economic growth and development. However, later and consistent with the theoretical developments explained in the first section, the relation between population structure and development started to receive more attention in empirical literature; namely in the context of two main interrelated theoretical arguments: The demographic transition theory and the demographic dividend theory.

Pioneering literature like Bloom et al (2001), Mason (2005), Bloom and Williamson (1998), Bloom et al (2001) and others argue that during the demographic window stage, population in the working age grow with higher rates than total population; a phenomenon that leads to an increase in employment and savings indicators and the economic performance of the country. This is conditional to the presence of the needed policy environment that is able to absorb such growing labor and increasing resources. Literature also assumes that the fast decline in dependency ratios in early stages of demographic window can also lead to spillovers on human development due to the increase in per-capita share of expenditure on health and education. Nevertheless, a deeper and closer investigation of demographic transition and demographic window literature indicates several implications. Literature differentiated between the long-run and short-run dynamics of the demographic-economic interrelationships. Also literature, especially very recent ones, highlighted the importance of tackling the demographic-economic factors not only from a macro perspective but also from a micro one, especially in countries with clear disparities across different socioeconomic and geographical groups. The paper presents in the rest of this section a brief of these main arguments

Long-run dynamics of demographic-economic interrelationships

Literature mainly applied cross-country comparisons and regressions to investigate the relation between demographic changes and development in different forms and using different indicators. Barro (1996) affirmed in his known "Barro Convergence Model" the significant relation between demographic transition and development. Kelley and Schmidt (1999, 2001, and 2005) work confirmed Barro's findings, where they found that declining fertility and mortality rates and the increasing population density contributed positively and significantly to per capita income. For example, Kelley and Schmidt (2005) cross-country comparison concluded that the demographic factors alone contribute by around 20% of the per capita GDP growth during the period 1965-1990.

Bloom and Williamson (1998) and Williamson (2001) focused more on the population age structure and found that the increase in working-age population in proportion to dependent population positively and significantly impacts economic growth rate. More specifically, Bloom and Williamson (1998) empirical model indicated that a 1% increase in working-age population leads to an increase in per-capita income by 1.64% in the Asian tigers during the period 1965-1990. Also, Feyer (2004) argued that around 25-30% of the production gap between rich and poor countries is attributed to the variation in the demographic structure of these countries.

Bloom et al (2001) discussed the "reverse causality" relation between the demographic and economic variables in a model that assumed that all the demographic variables as well as capital formation and output are endogenous variables that affect each other. The paper argued that policy environment and other variables are exogenous and affect the whole system altogether. The paper found that demographic transition[6] significantly affects growth and it detected a significant relation in the other direction too; where demographic

changes affect growth through one channel which is education. The paper findings showed that the interaction between demographic transition and effective policies in East Asia contributed to more than 40% of the difference in growth rates between East Asia and Latin America. Finally, Feyrer (2004) attributed around quarter to third of the productive gap between rich and poor countries to the demographic structure in these countries. The paper found that demographic factors contribute to around 12% of the growth in real output in the examined countries, mainly through the impact of working age population changes on productivity.

Short-run dynamics of demographic-economic interrelationships

On the other hand, a limited number of studies highlighted the importance of investigating the short-run demographic responses to economic and political cycles. Demographic variables do interact with changes occurring as part of an economic lifecycle or periods of political instability following wars, revolutions or coups. This could lead to short-term deviations from the long run demographic-economic interrelationships (Rios-Neto, et al., 1997).

Studies claim that during economic and political downturns some factors may make the fertility response pro-cyclical; that is, decrease with the deteriorating economic and political conditions. Such factors include the increase in uncertainty, rising inflation and unemployment and their possible interactions with marriage and fertility rates. Andsera and Menendez (2009) found an empirically significant positive relation between fertility rate and the economic cycle in 18 Latin American countries. The positive relation evolved basically from the relation between fertility and unemployment; since fertility decreased significantly with increasing unemployment and decreasing GDP growth rates. Palloni and Tienda (1989) similarlyfound that the increase in unemployment rates, the deterioration in per capita income and rising inflation directly affect marriage rates and age at first marriage in a pro-cyclical manner. Inflation in particular was found to negatively affect fertility for a period that can reach 5 years. Bravo (1997) reached the same conclusion with an application on Chile[7]. Palloni and Hill (1997) also argued that economic downturns in Chile have led to a slowdown in fertility rates and higher order births and Rios-Neto et al. (1997) affirmed the same finding in Brazil.

However, some other factors were found to make the fertility response counter-cyclical. These factors are mainly the decrease in expenditure on family planning during crises and the rising female unemployment (Tapinos et al., 1997). For example, Ben-Porath (1973) found that fertility response to economic cycles can be counter-cyclical through the impact of rising unemployment on fertility. With rising female unemployment, women tend to bring more children due to the decreasing trade-off relation between childbearing and work. Another channel of possible counter-cyclical relation between fertility and economic cycle is the public expenditure and official development assistance. Mason (1997) and Tapinos et al. (1997)argue that public finance to family planning programs is generally affected in a negative way during economic and political downturns, due to the shift in national priorities and general fiscal austerity. Also, during economic downturns and currency devaluation, contraceptive use declines as a result of its increasing costs rise in both public and private sector.

In sum, the above empirical findings indicate that the final impact of economic cycles on fertility can be either positive or negative depending on the weights of the abovementioned factors. Literature also argued that the short-run responses of fertility to economic downturns vary with the developmental and demographic stage of countries; where countries in demographic pre-transitional stages and

population living close to subsistence levels are the most vulnerable to economic cycle effects. Economic downturns and rising unemployment in these regions usually lead to a desire in bringing more children. The case is opposed in countries with higher levels of development and at later stages of demographic transition. Such countries are less elastic to adjust their fertility behavior with changing economic conditions.

The Macro-micro nexus of the demographic transition

The previous empirical findings generally depended on a macroeconomic investigation of the relation between demographic transition and development in a country or a group of countries. Such literature assumed a *unified demographic behavior* across the country based on the life-cycle hypothesis (Bloom et al., 2012;Mason, 2002). However, this assumption needs to be revised to consider more for the non-uniformity in the economic and demographic behavior of different socioeconomic, age, education, and geographical groups. Despite the importance of this notion, empirical attempts in this regard are limited. Kuznets (1976, 1980),Oshima and Mason (2002),Schultz (1997),and Bloom (2012) tried to investigate the causality relation between demographic transition and economic well-being and income inequality across different socioeconomic categories and using tools that allow for decomposing fertility responses across different socioeconomic, geographical and educational categories. Kuznets (1976) argued that there are important variables that can be used to track the income inequality resulting from household size variation. Measuring per-capita household income as compared to income per equivalent adult and the traditional per-capita income can give an indication about the degree of inequality that results from disparities in household size. Later, Kuznets (1980) proposed The Total Disparity Measure; an index to measure income disparity resultingfrom variation in household size (indicator of dependency) (Kuznets, 1980, as cited in Schultz 1997). This measure depends on calculating absolute differences in incomes as compared to the different household sizes.

Later, some empirical studies, such as Oshima and Mason (2002) and Schultz (1997), built on the methodologies and measures presented by Kuznets and used variance decomposition techniques to investigate the impact of demographic transition on income disparities. Finally, a recognized attempt in this manner was that in Bloom et al. (2012). They further developed the micro analysis idea and attempted to decompose the economic-demographic interrelationships on the household level.Theyinvestigated the distributional effects of economic and welfare benefits associated with demographic transition across socioeconomic groups over time. Using statistical analysis and quantitative regressions, Bloom et al (2012) decomposed the possible factors affecting the changes in child dependency, across different socioeconomic groups, into (1) income-related factors and (2) fertility preferences. The paper found wide differences in the effects of demographic transition across socioeconomic status groups in countries that are still early stages of demographic transition, in addition to substantial behavioral variations across all groups during phases of rapid fertility decline.

Despite these limited attempts to investigate the economic-demographic transition nexus on the micro level, a wide area of research gaps in this regard still exist. Most importantly is the dual/ reverse causality between the economic-social-demographic interrelationships which needs to be addressed on the micro level, especially in developing countries enjoying relatively wide economic, social and geographic disparities, and obviously Egypt is no exception.

Hence, we conclude from the previous literature review that an investigation of the demographic transition in Egypt, or any developing country, and its relation to development should consider several important issues. First we should clearly define where the country stands on the demographic transition path and the timings of entering and ending the demographic window. Second, the relation between demographic transition and development should be addressed considering the existence of a dual/reverse causality relationship. Economic factors affecting the speed and variations in demographic transition should be studied on one hand, and on the other hand the implications of demographic transition on economic and social indicators should be assessed as well.

Third, it is important to differentiate between the long-run dynamics of demographic transition and the short-term fluctuations and responses to economic cycles; particularly during economic downturns and periods of economic or political instabilities. This is highly relevant to the Egyptian case since we have been facing changing economic and political conditions during the past five years that are expected to have affected the household behavior and public policies and haveled to a deviation in demographic indicators from long term trends. Finally, in a country like Egypt, with its known geographical, educational and socioeconomic disparities, to assess the demographic-economic-social interrelationships, micro-investigation (on household and per capita level) is expected toprovide more accurate and reliable findings than traditional country-level macro-investigation. Accordingly, we will investigate in the remaining of this paper the process of demographic transition in Egypt considering these highlighted conclusions.

Egypt's Demographic Transition- Not Fast Enough?

In this section, we will present the recent changes in the main demographic factors related to demographic transition in Egypt; in an attempt to analyze the possible factors contributing, positively or negatively, to the speed of demographic transition in Egypt.

The main indicators we are going to study are fertility trends, dependency trends and annual number of births. We depend on three main sources of data: Central Agency for Public Mobilization and Statistics (CAPMAS) and Egypt Demographic Health Surveys (EDHS), Egyptian Labor Market Panel Survey (ELMPS) and the Population Division of the Department of Economic and Social Affairs (UN DESA) affiliated to the United Nations. It is worth noting that some of CAPMAS and UN DESA data are just estimates depending on the latest Egyptian population 2006 Population census. Updated official data is considered a limitation to this research, since Population Census takes place every 10 years. We try to overcome this limitation by depending on complementary data sources such as EDHS and ELMPS survey-based data as well as other non-estimated data such as CAPMAS annual number of births bulletins. However in some situations we both census and other survey-based data are not up to date so we depend on the latest available data.

Demographic Trends in Egypt

Figure (1) depicts the trends in fertility rates since 1980 and till today. The figure shows that the fastest decline in fertility rates was in 80s till mid-90s. Starting the second half of 90s there was a clear slowdown in the rate of decline in fertility. This was prior to the recent upward shift that took place in the last 6 years; where fertility rates increased from 3 to 3.5 birth per woman during the period 2008-2014 according to the recent DHS survey (EDHS, 2014).

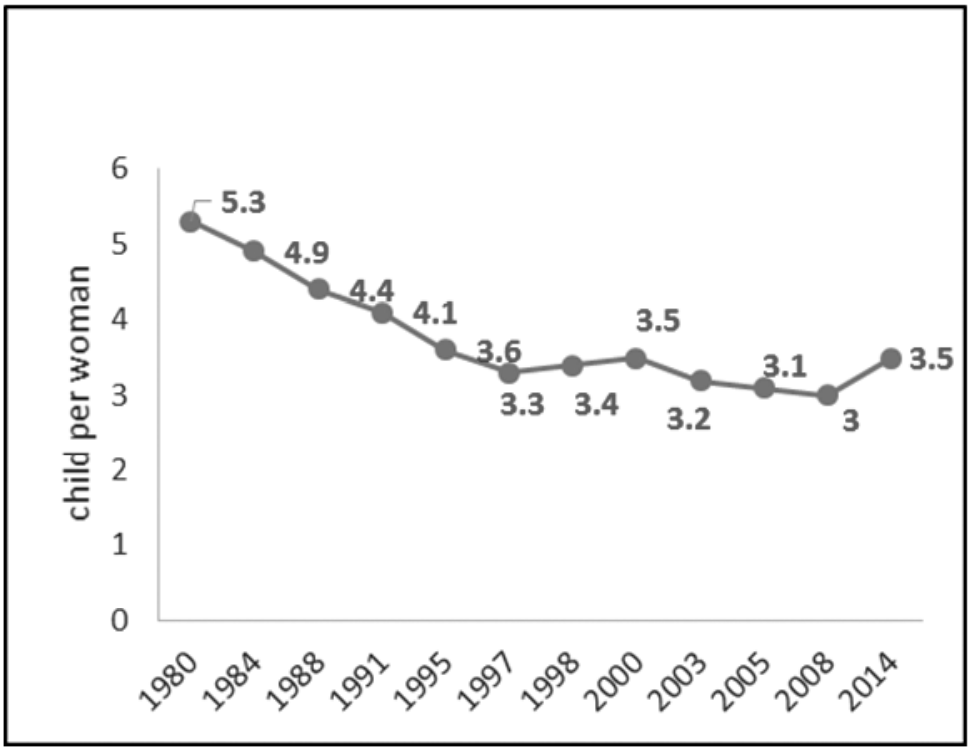


Figure 1: Fertility Rates in Egypt(1980-2014)

Source: EDHS

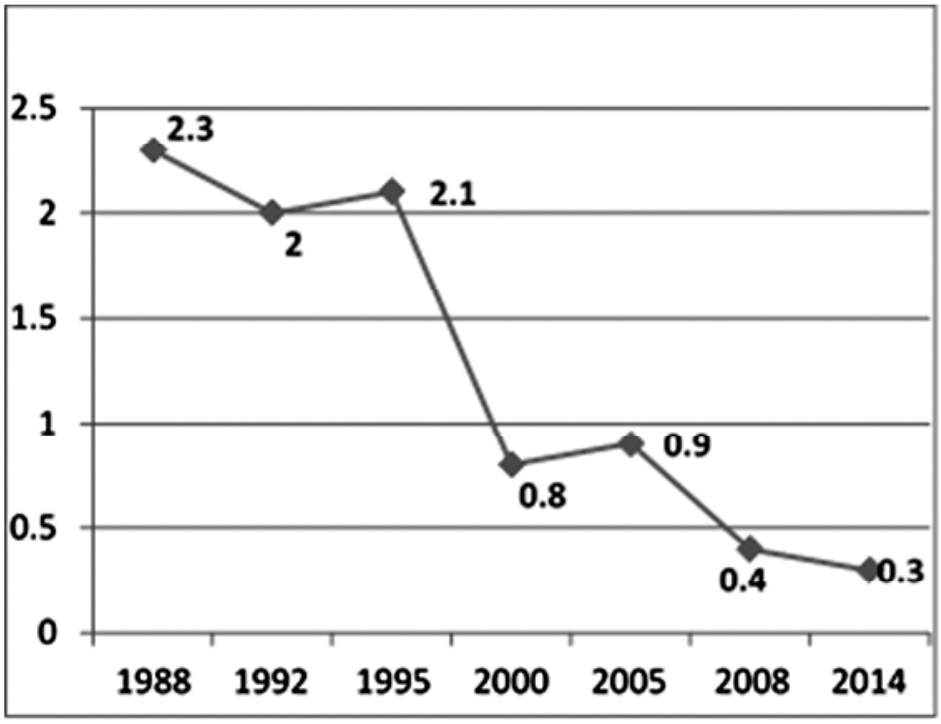


Figure 2: Birth Rates in Egypt (2000-2014)

Source: CAPMAS

Recent trends are are depicted in figure (2). The figure shows a clear upward trends in birth rates in the recent years fllowing 2006 census. The rate of increase becomes sharper in the four years following January 25th revoluation; a phenomenon previously mentioned in literature and might require a closer investigation.

As figure (3) shows, dependency rates have witnessed a sharp decline during the period 1990-2005. However, since 2005, dependency rates started to stagnate at around 60%. It is worth noting that the period 2010-2015 is an estimation based on 2006 census data as mentioned before. Accurate non-estimated dependency rates, though can't be calculated, are expected to be higher than this estimation because of the rise in fertility rates showed above.

The above trends show the clear slowdown in demographic indicators; particularly in the last 9 years and with rising slopes since January 2011 revolution. In the next section we will try to assess the impact of this slowdown on Egypt's possible opportunities of entering the demographic window given the recent trends.

The Possibility of a Demographic Window in Egypt

Based on the previous definition of the demographic window, we calculate the timing of entering and exiting from the window in table (1). We use UN DESA four dependency and age structure scenarios for Egypt, according to fertility assumptions provided in Annex (2), as the basis of our projection.

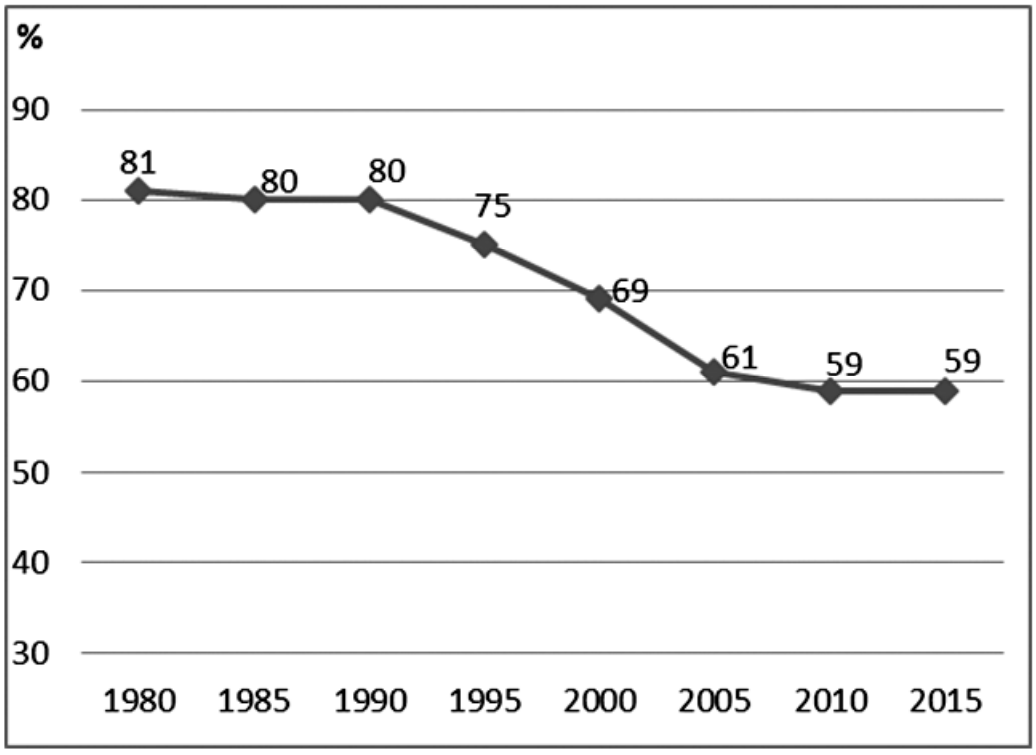


Figure 3: Total Dependency Rates in Egypt (1980–2015)*

*** The period 2010-2015 is an estimation based on 2006 census data and assuming constant fertility rates since 2006.**

Source: UN DESA, *World Population Prospects: The 2012 Revision.*

Table 1
The Demographic Window in Egypt according to dependency and age structure scenario projections

	Lowfertility	*MediumFertility*	*HighFertility*	*Constantfertility*
Start of First Window	1975-1980	1975-1980	1975-1980	1975-1980
End of First Window	2010-2015	2015-2020	2020-2025	2020-2025
Start of Second Window	2015-2020	2020-2025	2025-2030	2025-2030
End of Second Window	2050-2055	2045-2055	2045-2050	2045-2050
Start of third window	2055- 2060	2055-2060	2050-2055	–
Endof Third Window	2070-2075	2075-2080	2075-2080	–

Source: Calculated from UN DESA population Projections.

As mentioned before, UN DESA population projections for Egypt, and so our Demographic Window estimations, depend on CAPMAS 2006 Census and EDHS survey data till 2008. However, some more recent data indicate an increase in fertility in the years following 2006 Census.

Table 2
The Gap between Actual births and Fertility figures and the UN DESA scenarios baseline figures

	Annual Number of Births (1000)					*Fertility Rates (births per woman)*				
	UN DESA				*CAPMAS*	*UN DESA*				*EDHS*
	Low fertility	*Medium Fertility*	*High Fertility*	*Constant fertility*	*Actual**	*Low fertility*	*Medium Fertility*	*High Fertility*	*Constant fertility*	*Actual***
2010-2015	1728	1899	2069	1967	2420.5	2.54	2.79	3.04	2.89	3.5
Actual-estimated gap	693	522	352	454		0.96	0.71	0.46	0.61	

* Average 2010-2013

** 2014 EDHS

Sources: UN DESA, *World Population Prospects: The 2012 Revision,* CAPMAS, and EDHS, 2014.

The above table indicates a widening gap between the actual births recorded by CAPMAS and the estimated number of births in all UN DESA scenarios. The gap exists even at the *high fertility* scenario and is estimated by around 350 thousand births on average for the period 2010-2013.

The reason for this gap can be attributed to the divergence between actual and estimated fertility rates, depicted in the same table. Highest fertility estimation according to the high fertility scenario was previously projected by UN DESA to be 3.04 births per woman. However, actual fertility was announced to be 3.5 births per woman according to Egyptian 2014 EDHS. This indicates a general deviation from all the projections that were based on 2006 Census. Such deviation leads to the exclusion of all UN DESA scenarios, except the high-fertility scenario. The high-fertility scenario, though still below the actual figures, yet can probable if quick and efficient measures were implemented to reverse the increasing fertility trends and set birth rates back to 2006 census projections. Medium and low fertility scenarios would require more aggressive and radical set of policies to cause the needed decrease in fertility rates.

According to our calculation, in order to witness a second demographic window in 2025, this requires reducing fertility from 3.5 to 2.87 births/woman before 2025. Although might appear easy, achieving this target is questionable given the recent upward trends in fertility and the general set back in the performance of the demographic transition process in Egypt in the recent years.To figure out a way to solve this problem, this requires an investigation of the main possible factors that contributed in the slowdown of demographic transition in Egypt during the past three decades and a closer look at the possible reasons that contributed to the upward fertility trends in the past few years; particularly the years following January 25th revolution.

Factors contributing to the slowdown of demographic transition in Egypt

We divide the possible factors that could have contributed to the slowdown of demographic transition in Egypt into four categories: (1) population momentum and echo effect following the baby boom generation; (2) demographic-economic intricacies; (3) changes in the fertility behavior across different geographic, educational, and socioeconomic groups and (4) the implications of the recent economic and political downturns.

Population Momentum and the Echo Effect

Population momentum phenomenon generally happens in countries with long history of high fertility that generates the what-so-called "baby boom generation". When this cohort reaches marriage and childbearing age, this automatically turns into an increase in birth rates, even if fertility rates were constant or decreasing, causing the known "echo effect". This phenomenon is directly related to the current Egyptian situation to a great extent. Today, Egypt is witnessing a clear increase in females in reproductive age; a possible explanation for the rising birth rates in the recent years. Asaad and Krafft (2013) and Awad and Zohry (2005) anticipate that population growth rates in Egypt would continue at current rates as a result of high birth rates. Even if every woman decided to have two kids, there are already a high number of Egyptian women in the marriage and childbearing age, which directly influence the birth rates regardless of fertility levels.

Egyptian Labor Market Panel Survey (ELMPS) Data in table (3) highlight the clear substantial increase in the of growth rates of females in reproductive age compared to the overall population growth rates. Females aging (25-29) grew by rates significantly higher than population growth rates in the period 1998-2012. This category annually grew by 5% and 6% during the periods 1998-2006 and 2006-2012 respectively

Table 3
Female Population Growth Rates as Compared to Overall Population growth Rates (1988-2012)

Year	*Annual Population Growth Rate*	*Annual Population Growth Rates of Femalesin reproductive age (15-49)*	*Annual Population Growth Rates of Females (15-24)*	*Annual Population Growth Rates of Females (25-29)*
1988-1998			3.2	0.4
1998-2006	2	2.94	3.1	5
2006-2012	2.3	1.16	-2.4	6.1

Source: Egyptian Labor Market Panel Survey (ELMPS)

compared to only 0.4% growth rate in the period 1988-1998, where younger females (15-24) grew with 3.2% during the latter period. Such growth rates of females possibly contributed significantly to the increasing birth rates during the same periods; especially the period 2006-2012 that was previously shown in figure (2).

Demographic-Economic Intricacies: Quantitative Analysis

We examine here the impact of changes in socioeconomic conditions on the speed of demographic transition in Egypt. We use dependency indicators as a proxy for the demographic transition. To account for geographic and socioeconomic disparities, we apply a micro analysis across different geographical and socioeconomic groups. We depend on Egyptian DHS datasets for the period 1988-2014. To improve robustness of our tests, and follow Bloom et al. (2012) and depend on two dependency indicators: Mean number of children below 15 years per household[8], and (2) child dependency rates[9,10]. We divide the sample into five wealth quintiles based on a formulated wealth index[11]. Initially, in the following sub-section we provide a description of the sample used in the tests[12].

Geographical and Socioeconomic Variation in Dependency in Egypt: A Cross-sectional Investigation

A cross-section view on the DHS 1988-2014 survey samples is depicted in the figures (4) and (5). The negative relation between wealth status and dependency is clearly evident. The figures also show that Rural-Lower Egypt and Rural Upper Egypt have the highest dependency levels.

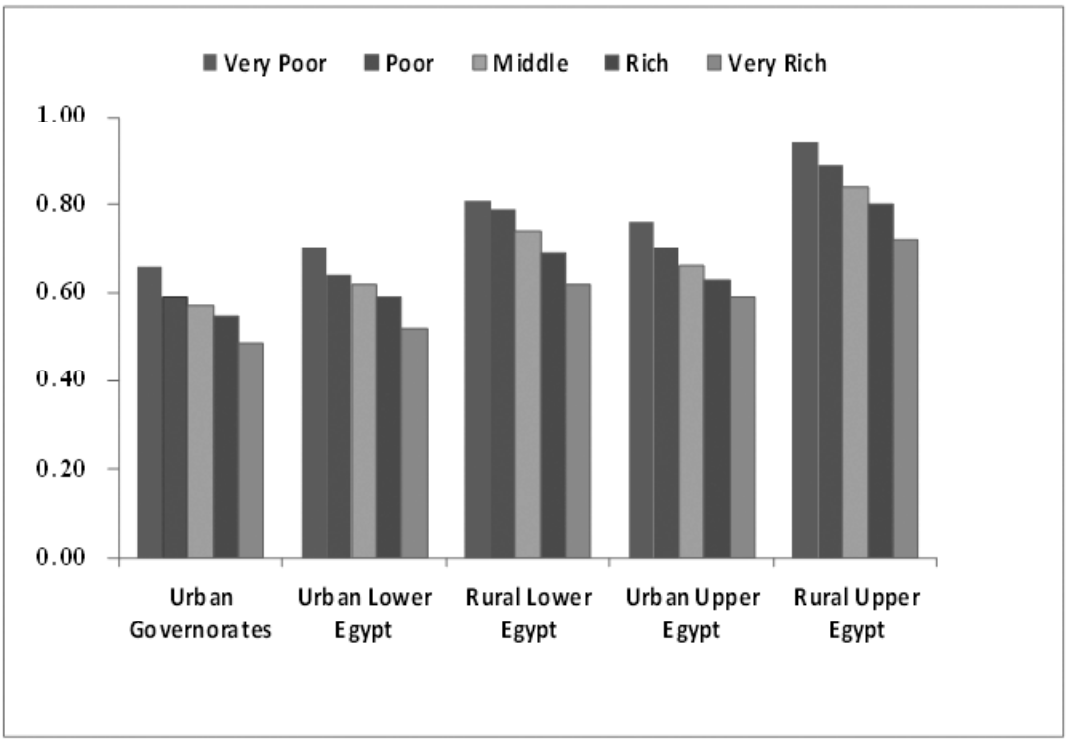


Figure 4: Dependency Rates by wealth quintiles and Geographical Regions for the DHS Sample

Source: EDHS: 1988-2014

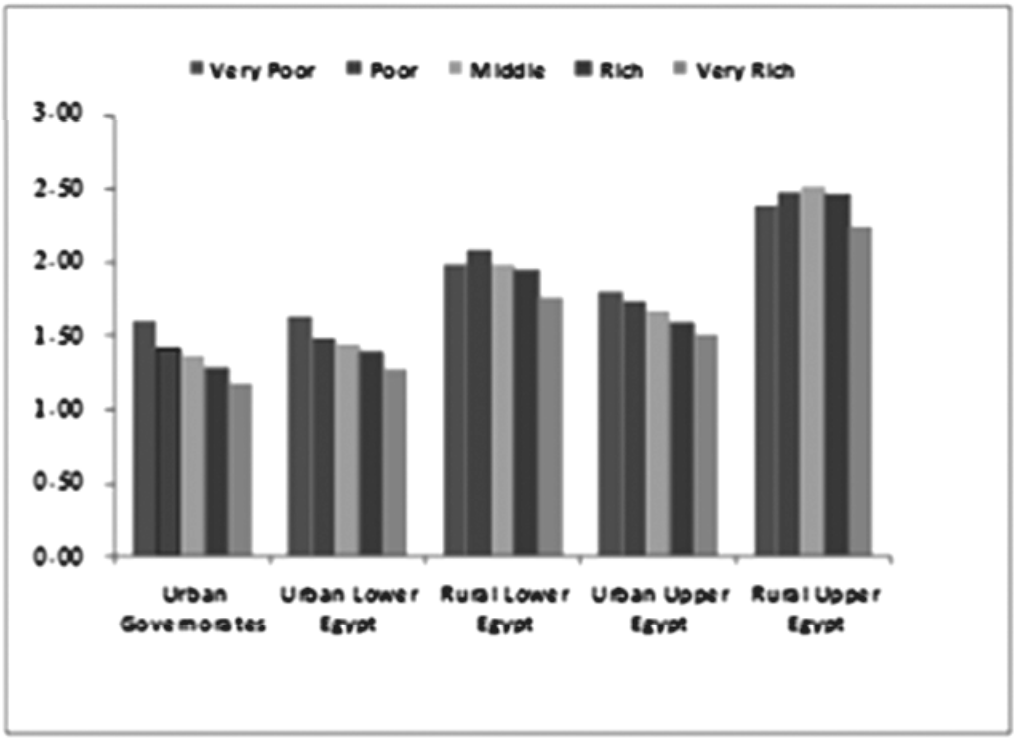


Figure 5: Mean Number of Children/Household by wealth quintiles and Geographical Regions for the DHS Sample

Source: EDHS: 1988-2014

The Relation between dependency and socioeconomic status in Egypt During the Period 1988-2014

We empirically examine the variations in the speed of demographic transition in Egypt –proxied by changes in child dependency- across different socioeconomic and geographical groups in Egypt. Our tested hypothesis is[13]:

- H_0: changes in child dependency over time are equal across all households regardless of socioeconomic status or geographical location.
- H_1: changes in child dependency over time vary across households with different socioeconomic status or living in different geographical location.

The Regression Equation is:

$$Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_1 x_2 + e$$

Y: Y_1 is the mean number of children below 15 years per household; Y_2 is the child dependency rates.

X_1 ،X_2 ،X_3, are the independent variables, where[14]:

- X_1: Wealth Index, to indicate for the socioeconomic status. It includes 5 categories: Very poor, poor, middle income, rich and very rich. Reference group is 'very poor'.
- X_2:Dummy variable to proxy for time, DHS survey were divided into two time periods. The

variable takes the value '0' for surveys before 2000 and takes the value '1' for surveys after 2000. Reference group is '0' (before 2000).

- X_3: Region. It is a proxy for the degree of urbanization. It includes 5 geographical groups that reflect degree of urbanization of sample households. It is ranked from highest to lowest and takes the values 1,2,3,4, and 5 for Urban Governorates, Urban Lower Egypt, Urban Lower Egypt, Rural Lower Egypt and Rural Upper Egypt respectively.
- X_1 X_2: is an interaction variable between time and socioeconomic status to test for changes in dependency while moving from socioeconomic status to another across time.

The first model is the simplest one. It includes four specifications for both dependency indicators with and without urbanization indicators (proxied by including region among the variables). Table (4) shows the empirical findings of the four specifications.

Table 4
Empirical Findings of Model (1): The relation between changes in living standards and dependency in Egypt during the period 1988-2014

	Y_1: Mean Number of dependent Children per Household		*Y_2: Dependency Rate*	
(1) X_s	*(2) No Region*	*(3) Region*	*(4) No Region*	*(5) Region*
Poor	0.1272-***	0.0536-**	0.0905-***	0.0714-***
	(0.0244)	(0.0243)	(0.0102)	(0.0103)
Middle	0.2077-***	0.09862-***	0.1397-***	0.1222-***
	(0.0241)	(0.0241)	(0.0101)	(0.0101)
Rich	0.2909-***	0.1816-***	0.1861-***	0.1592-***
	(0.0240)	(0.0239)	(0.0099)	(0.0100)
Very Rich	0.4624-***	0.3524-***	0.2651-***	0.2361-***
	(0.0232)	(0.0232)	(0.0097)	(0.0097)
Time	0.2811-***	0.2377-***	0.1543-***	0.1423-***
	(0.0242)	(0.0241)	(0.0104)	(0.0104)
Time +poor	0.0903**	0.0716**	0.0481***	0.0418**
	(0.0344)	(0.0339)	(0.0144)	(0.0143)
Time +Middle	0.1333***	0.0629*	0.0719***	0.05231***
	(0.0434)	(0.0338)	(0.0141)	(0.0141)
Time + Rich	0.1834***	0.0829**	0.0964***	0.0690***
	(0.0343)	(0.0336)	(0.0140)	(0.0139)
Time + very rich	0.2432***	0.1432***	0.1279***	0.0993***
	(0.0341)	(0.0329)	(0.0138)	(0.0138)
Region	–	0.2581***(0.0035)	-	0.0657***(0.0014)
Constant	2.1238***	1.2263***	0.8766***	0.6484***
	(0.0171)	(0.0202)	(0.0074)	(0.0087)
Number of Observations	108369	106663	105072	103410
(F-Stat interaction terms)	15.2	4.84	24.74	14.05
(p-value)	0.0000***	0.001***	0.000***	0.000***

The empirical findings of table (4) showsa negative relation between dependency and socioeconomic status proxied by the wealth index regardless of the region or level of urbanization. This means that higher living standards are generally associated with lower dependency levels. The urbanization indicator indicates also the negative relation between dependency and level of urbanization; where dependency rates tend to decrease with the increasing level of urbanization. The time variable indicate a general decline in dependency during the period 1988-2014 also regardless of the level of urbanization or the socioeconomic status.

Concerning the interaction between time and socioeconomic status, the empirical findings indicate the significance of interaction terms. This means rejecting the null hypothesis and confirming that the change in child dependency varies with the socioeconomic status across time and that the decrease in dependency during the examined period wasn't equally distributed across different socioeconomic status[15]. The positive and increasing coefficient indicates that the slope of decrease in dependency increases with moving to higher wealth quintiles.

Table 5
Empirical Findings of Model (2): The relation between changes in living standards and dependency in Egypt during the period 1988-2014 - with Fertility Categories

	Y_1: *Mean Number of dependent Children per Household*			Y_2: *Dependency Rate*		
(1) X_s	*(2) Low*	*(3) Medium*	*(4) High*	*(5) Low*	*(6) Medium*	*(7) High*
Poor	0.0046-	-0.0289	***-0.1183	***-0.0358	***-0.0523	-0.1138***
	(0.0219)	(0.0331)	(0.0452)	(0.0101)	(0.0151)	(0.0191)
Middle	-0.0212	**-0.0704	-0.2526***	***-0.0539	-0.0966***	0.1846-***
	(0.0214)	(0.0332)	(0.0440)	(0.0099)	(0.0148)	(0.0185)
Rich	***-0.0566	***-0.1597	-0.3735***	-0.0834***	-0.1523***	0.2481-***
	(0.0212)	(0.0326)	(0.0434)	(0.0097)	(0.0146)	(0.0182)
Very Rich	***-0.1532	-0.3376***	-0.6379***	-0.1342***	-0.2372***	0.3469-***
	(0.0209)	(0.0313)	(0.0413)	(0.0095)	(0.0140)	(0.0173)
Time	*-0.0394	-0.2079***	-0.5019***	-0.0493***	-0.1243***	0.2496-***
	(2210.0)	(0.0333)	(0.0437)	(0.0102)	(0.0154)	(0.0188)
Time +poor	0.0092	**0.0986	**0.1534	0.0128	0.0241	0.0906***
	(120.03)	(0.0471)	(0.0616)	(0.0142)	(0.0213)	(0.0257)
Time +Middle	**0.0679	**0.1054	*0.1964**	***0.0336	***0.0556	0.0997***
	(0.0311)	(0.0470)	(0.0612)	(0.0139)	(0.0211)	(0.0250)
Time + Rich	*0.0561	***0.1923	**0.1921*	***0.0393	***0.0892	0.1174***
	(090.03)	(0.0466)	(0.0599)	(0.0138)	(0.0207)	(0.0246)
Time + very rich	**0.0609	***0.2174	0.2852***	***0.0485	***0.1078	0.1594***
	(0.0303)	(0.0453)	(0.0570)	(0.0135)	(0.0202)	(0.0236)
Region	8880.0***	0.2257***	0.4138***	0.0179***	0.0709***	0.1348***
	(0.0033)	(0.0049)	(0.0059)	(0.0014)	(0.0021)	(0.0024)
	0.7686***	1.0572***	0.7344***	0.4492***	0.5844***	0.3839***
Constant	(0.0184)	(0.0278)	(0.0369)	(0.0085)	(0.0128)	(0.0158)
Number of Observations	50291	53827	44859	47038	50574	41606
(R-squared)	0.018	0.044	0.108	0.0114	0.0333	0.092
(F-Stat interaction terms)	2.11	7.1	6.44	4.27	9.75	11.77
(p-value)	0.077	0.000	0.000	0.002	0.000	0.000

However, the above model assumed a constant fertility rate across all sample households; which could possibly beimprecise as Bloom et al (2012) argued. We re-investigate the same relation after dividing the sample into three categories according to fertility level as follows: (1) low-fertility (1-2 children), (2) medium-fertility (2-4 children) (3) high-fertility (more than 4 children). Table (5) shows the empirical findings.

The above table indicates that the negative relation between socioeconomic status and mean number of dependent children per household is clearer and more significant in the high-fertility categories and in richer wealth quintiles. However, in the case of child dependency rate, the negative relation is strong and significant for all fertility categories and all wealth quintiles. Moreover, the speed of decline of dependency indicators across time increases significantly across different fertility groups; with the highest speed of decline in the high-fertility households.

Finally, concerning the interaction between time and socioeconomic status, the findings confirm the non-uniform pattern of decrease in dependency with improving socioeconomic status along time. This relation appears to be stronger and with sharper slope in the medium and high-fertility households in particular.

To enhance the robustness of our findings, we further re-investigate the hypothesis after dividing the sample once again into three geographical categories according to the speed of demographic transition. The proxy of the speed of demographic transition we use here is the change in fertility rates during the period 1988-2014 as appears in table (6).

Table 6
Classification of Geographical Areas according to the Speed of Demographic Transition

	Y_1: Mean Number of dependent Children per Household			*Y_2: Dependency Rate*		
(1) X_s	*(2) Low*	*(3) Medium*	*(4) High*	*(5) Low*	*(6) Medium*	*(7) High*
Poor	0.0046-	-0.0289	***-0.1183	***-0.0358	***-0.0523	-0.1138***
	(0.0219)	(0.0331)	(0.0452)	(0.0101)	(0.0151)	(0.0191)
Middle	-0.0212	**-0.0704	-0.2526***	***-0.0539	-0.0966***	0.1846-***
	(0.0214)	(0.0332)	(0.0440)	(0.0099)	(0.0148)	(0.0185)
Rich	***-0.0566	***-0.1597	-0.3735***	-0.0834***	-0.1523***	0.2481-***
	(0.0212)	(0.0326)	(0.0434)	(0.0097)	(0.0146)	(0.0182)
Very Rich	***-0.1532	-0.3376***	-0.6379***	-0.1342***	-0.2372***	0.3469-***
	(0.0209)	(0.0313)	(0.0413)	(0.0095)	(0.0140)	(0.0173)
Time	*-0.0394	-0.2079***	-0.5019***	-0.0493***	-0.1243***	0.2496-***
	(2210.0)	(0.0333)	(0.0437)	(0.0102)	(0.0154)	(0.0188)
Time +poor	0.0092	**0.0986	**0.1534	0.0128	0.0241	0.0906***
	(120.03)	(0.0471)	(0.0616)	(0.0142)	(0.0213)	(0.0257)
Time +Middle	**0.0679	**0.1054	*0.1964**	***0.0336	***0.0556	0.0997***
	(0.0311)	(0.0470)	(0.0612)	(0.0139)	(0.0211)	(0.0250)
Time + Rich	*0.0561	***0.1923	**0.1921*	***0.0393	***0.0892	0.1174***
	(090.03)	(0.0466)	(0.0599)	(0.0138)	(0.0207)	(0.0246)
Time + very rich	**0.0609	***0.2174	0.2852***	***0.0485	***0.1078	0.1594***
	(0.0303)	(0.0453)	(0.0570)	(0.0135)	(0.0202)	(0.0236)
Region	8880.0***	0.2257***	0.4138***	0.0179***	0.0709***	0.1348***
	(0.0033)	(0.0049)	(0.0059)	(0.0014)	(0.0021)	(0.0024)

(*contd... Table 6*)

	Y_1: *Mean Number of dependent Children per Household*			Y_2: *Dependency Rate*		
(1) X_s	*(2) Low*	*(3) Medium*	*(4) High*	*(5) Low*	*(6) Medium*	*(7) High*
	0.7686***	1.0572***	0.7344***	0.4492***	0.5844***	0.3839***
Constant	(0.0184)	(0.0278)	(0.0369)	(0.0085)	(0.0128)	(0.0158)
Number of Observations	50291	53827	44859	47038	50574	41606
(R-squared)	0.018	0.044	0.108	0.0114	0.0333	0.092
(F-Stat interaction terms)	2.11	7.1	6.44	4.27	9.75	11.77
(p-value)	0.077	0.000	0.000	0.002	0.000	0.000

Table 7
Empirical Findings of Model (3): The relation between changes in living standards and dependency in Egypt during the period 1988-2014 - with Geographical Classification according to the Speed of Demographic Transition

	Y_1: *Mean Number of dependent Children per Household*			Y_2: *Dependency Rate*		
(1) X_s	*(2) Slow*	*(3) Medium*	*(4) High*	*(5) Slow*	*(6) Medium*	*(7) High*
Poor	0.1955-***	0.0510-	0.0047-	0.0836-***	0.0667-***	0.0662-***
	(0.0459)	(0.0339)	(0.0496)	(0.0203)	(0.0145)	(0.0201)
Middle	0.2427-***	0.1290-***	0.0222	0.1045-***	0.1063-***	0.1308-***
	(0.0429)	(0.0334)	(0.0547)	(0.0196)	(0.0142)	(0.0211)
Rich	0.3684-***	0.2142-***	0.0285	0.1457-***	0.1653-***	0.1485-***
	(0.0431)	(0.0328)	(0.0553)	(0.0196)	(0.0139)	(0.0212)
Very Rich	0.4653-***	0.3887-***	0.2201-***	0.2002-***	0.2438-***	0.2482-***
	(0.0427)	(0.0318)	(0.0528)	(0.0195)	(0.0135)	(0.0206)
Time	0.2536-***	0.3273-***	0.1718-***	0.1290-***	0.1728-***	0.1189-***
	(0.0438)	(0.0343)	(0.0578)	(0.0199)	(0.0150)	(0.0197)
Time +poor	0.0259-	0.0991**	0.2194***	0.0173-	0.0615***	0.0478
	(0.0604)	(0.0473)	(0.0725)	(0.0268)	(0.0203)	(0.0293)
Time +Middle	0.0423-	0.1143**	0.2558***	0.0284	0.0678***	0.0843***
	(0.0584)	(0.0464)	(0.0781)	(0.0267)	(0.0197)	(0.0298)
Time + Rich	0.0228	0.1734***	0.1030	0.0536**	0.1065***	0.0422
	(0.0590)	(0.0458)	(0.0768)	(0.0268)	(0.0194)	(0.0294)
Time + very rich	0.0324	0.2404***	0.1769**	0.0636**	0.1393***	0.0845***
	(0.0581)	(0.0451)	(0.0735)	(0.0265)	(0.0192)	(0.0285)
Constant	1.7435***	2.0002***	2.4651***	0.7225***	0.8484***	0.9910***
	(0.0333)	(0.0243)	(0.0322)	(0.0154)	(0.0107)	(0.0136)
Number of Observations	24573	54266	27824	23693	52691	27026
(R-squared)	0.018	0.008	0.003	0.013	0.014	0.012
(F-Stat interaction terms)	0.66	7.91	3.81	1.97	14.98	2.93
(p-value)	0.63	0.000***	0.004***	0.095*	0.000***	0.019**

The above results again re-confirm the previous findings on the relation between wealth and dependency for most socioeconomic statuses and regions. However, the interaction terms are more significant in medium-transition categories and in higher wealth quintiles. This is clearly evident in the case of mean number of dependent children per household. The increasing speed of decline in dependency with improving living standards is also evident in the medium-transition regions; however it is evident only in poorer wealth quintiles.

In sum, the above tests indicate that the relation between improving wealth status and declining dependency in Egypt is non-uniform across different wealth quintiles, among households with different fertility characteristics and across geographical regions with varying stages of urbanization. In urban governorates and smaller families, there is no evidence of a strong relation between improving wealth status and decreasing child dependency. However, this is not the case in larger families, poorer households and regions with higher speed of demographic transition. Findings indicate that in larger families with relatively higher dependent children the speed of decline of dependency with increases significantly improving wealth status. This finding was specifically confirmed for medium-transition categories and for poorer families in particular. Results for high-transition regions and richer families were inconclusive.

Finally, it is worth noting that the above tests aimed at testing the hypothesis of non-uniform demographic response to changing socioeconomic conditions across different wealth groups and regions. Nevertheless, one can never assume that the parameters included in the model are the only ones affecting the tested dependent variables. A lot of other factors affect dependency levels fall under what we call fertility behavior which also vary across different socioeconomic, geographical and educational conditions. In the next section we will try to briefly micro-investigate the main changes in fertility behavior and its main determinants in Egypt across the abovementioned categories.

Fertility Behavior and contribution to the slowdown of demographic transition

Fertility is generally affected by a set of determinants defined in literature and empirical studies. Main determinants of fertility behavior include age at first marriage, urbanization, socioeconomic status,

Table 8
Changes in Fertility Rates during the Period 1988-2014 across geographical Regions

	Total Fertility Rates					*Fertility Rates by Residence*				
	Total	*Urban*	*Rural*	*urban gover-norates*	*lower Egypt*	*Urban Lower Egypt*	*Rural Lower Egypt*	*Upper Egypt*	*Urban Upper Egypt*	*Rural Upper Egypt*
1988	4.5	3.6	5.6	3.1	4.6	3.9	5	5.5	4.3	6.3
1992	3.9	2.9	4.9	2.7	3.7	2.8	4.1	5.1	3.6	6
1995	3.6	3	4.2	2.8	3.2	2.7	3.4	4.7	3.8	5.2
2000	3.5	3.1	3.9	2.9	3.2	3	3.3	4.2	3.4	4.7
2005	3.1	2.7	3.4	2.5	2.9	3	2.9	3.7	3.5	3.8
2008	3	2.7	3.2	2.6	2.9	3	2.8	3.4	3.4	3.4
2014	3.5	2.9	3.8	2.5	3.4	3	3.6	3.8	3.2	4.1
change 1988-2014	-1	-0.7	-1.8	-0.6	-1.2	-0.9	-1.4	-1.7	-1.1	-2.2

Source: EDHS 1988-2014.

education level, female employment and contraceptive prevalence. This is in addition to cultural and religious beliefs. In this section we try to assess to what extent the variation in fertility behavior across different geographical, educational, and socioeconomic groups could have contributed to the slowdown of demographic transition in Egypt. We presented in Figure (1) the fertility trends in Egypt since 1988 till today. Table (8) shows that the fastest decline in fertility rates was in Rural Upper Egypt and the least was in Urban Governorates.

A micro-investigation of fertility trends and behavior are depicted in this section. A quick investigation of the trends in main fertility preferences indicate that, in addition to the overall worsening in the overall fertility behavior in the country, specific deterioration in fertility determinants was found at the more urbanized regions, higher wealth quintiles and higher educational levels (figures 6,7and 8).

Figure (6) shows that the urban rural fertility gap decreased from 2 child per woman in 1988 to less than 1 child per woman in 2014. In a close manner, figure (7) indicates the gap in fertility rates between educated women and illiterate women decreased from 2.35 child per woman in 1988 to 0.3

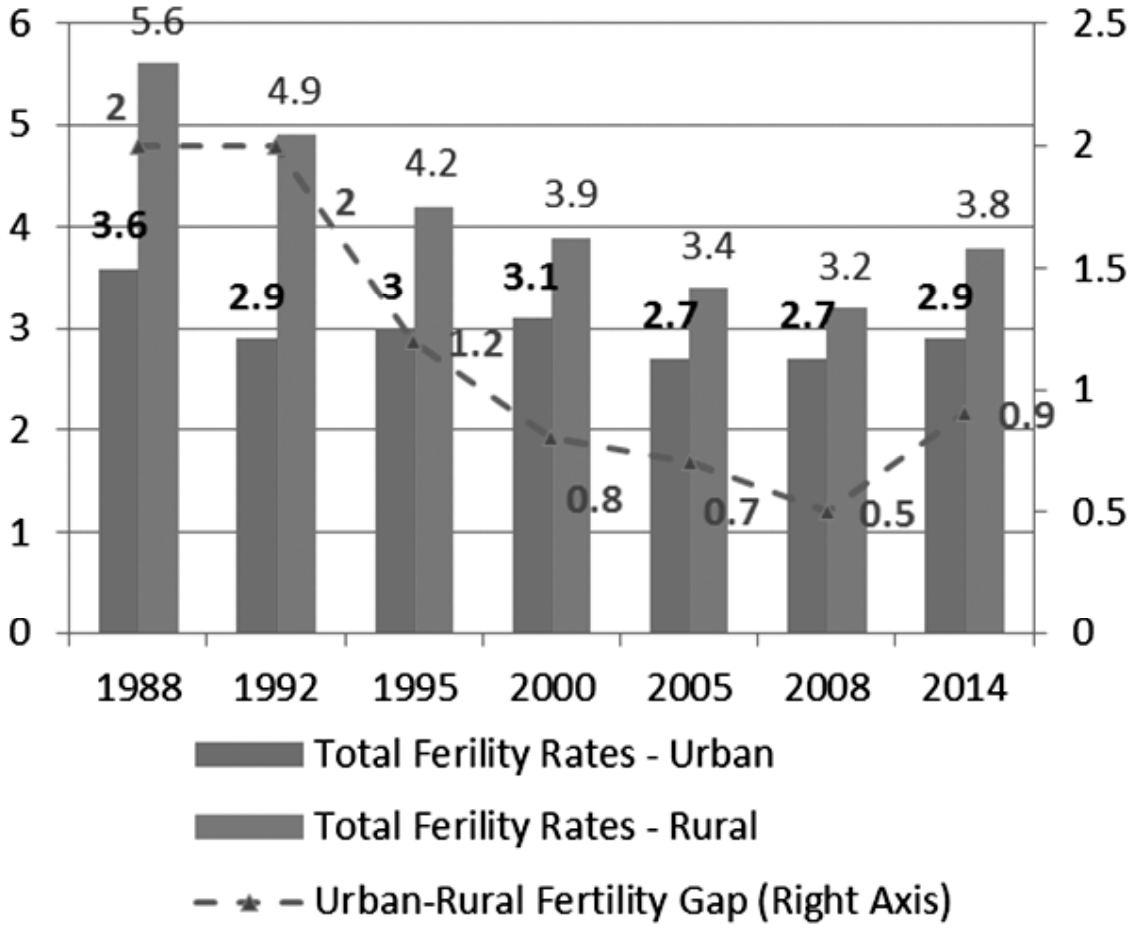


Figure 6: Rural–Urban Fertility Rates and Rural-Urban Fertility Gap* in Egypt 1988-2014
*** The difference between fertility rates in Rural and Urban Egypt.**

Source: EDHS 1988-2014.

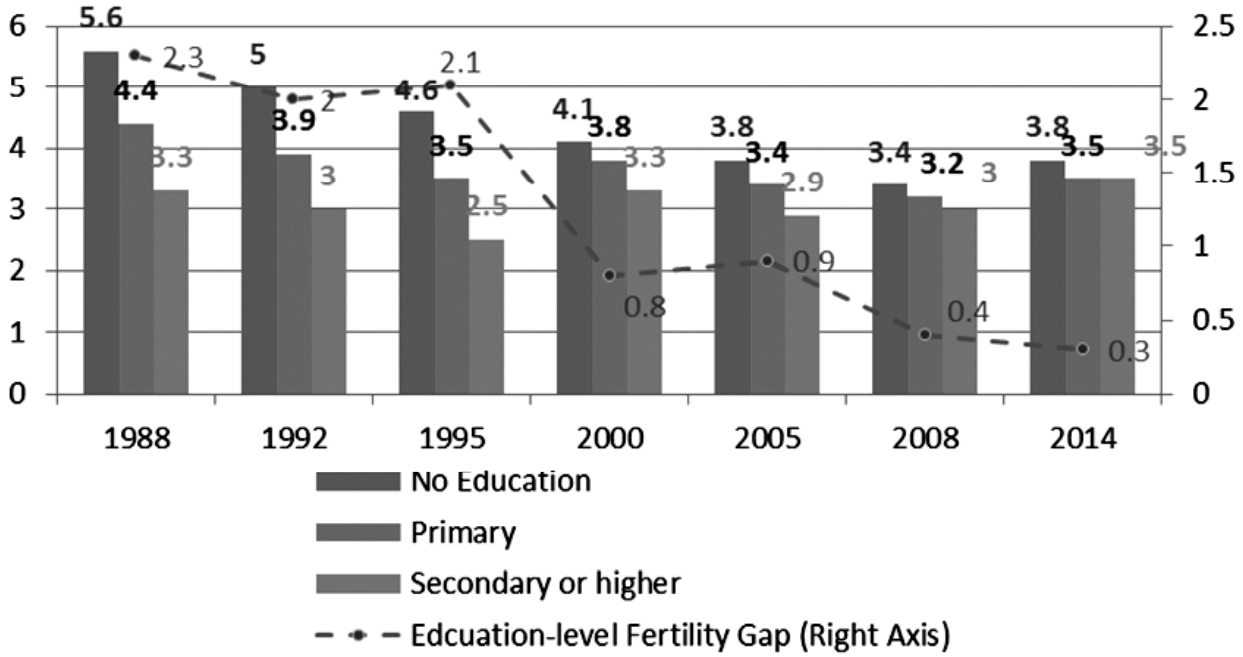


Figure 7: Fertility Rates according to Education Status and Education Fertility Gap* in Egypt 1988-2014

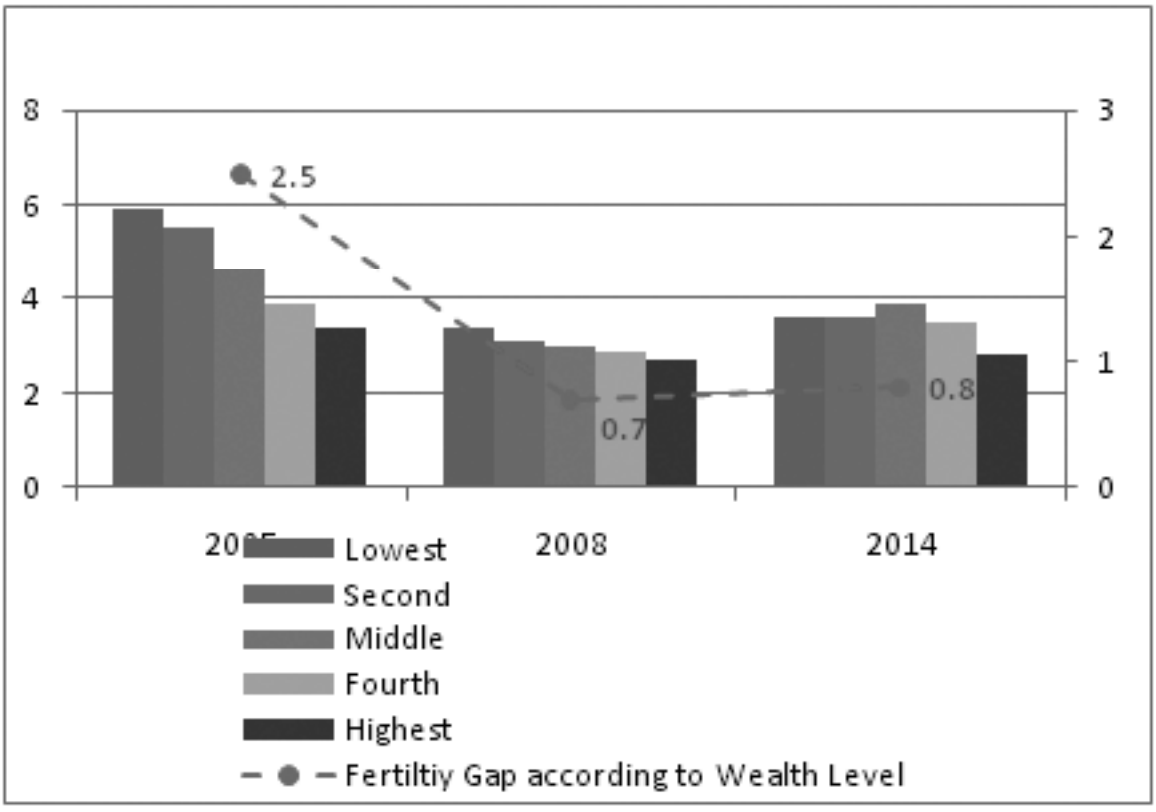


Figure 8: Fertility Rates According to Wealth Status and wealth-fertility Gap* in Egypt 1988-2014

*** The difference in fertility rates between Lowest and highest wealth quintiles.**

Source: EDHS 1988-2014.

child per woman in 2014. The same result is trend is depicted in figure (8), where the gap in fertility levels between the poorest and the richest wealth quintiles decreased dramatically, from 2.5 child per woman in 1988 to 0.8 child per woman in 2014. The three graphs re-inforce the conclusion that the poor performance in urban areas and among the higher educated and wealthier females is a clear reason behind this diminishing gap followed by the improved fertility behavior in the opposite groups.

To figure out the reasons behind such deterioration, we find out that there are four main possible reasons: First is the declining age at first marriage among higher educated females. As figure (9) shows, median age at first marriage decreased from 24.5 to 22.3 years old during the period 1988-2014 for the higher-educated females unlike the case with the illiterate females whose median age at first marriage increased from 16.9 to 18.6 years old during the same period. It is worth noting that Upper Egypt still suffers from very low median age at first marriage (19 years old in 2014) due to the persistent cultural habits and beliefs and poor awareness campaigns.

Second, increasing female unemployment (figure (10)) is believed to be a strong reason behind the increasing fertility. Female unemployment rates increased clearly from 11% in 1984 to 24 % in 2014. Data also shows that unemployment rates are generally higher in females with higher education levelsthan females with lower education levels(Table10).

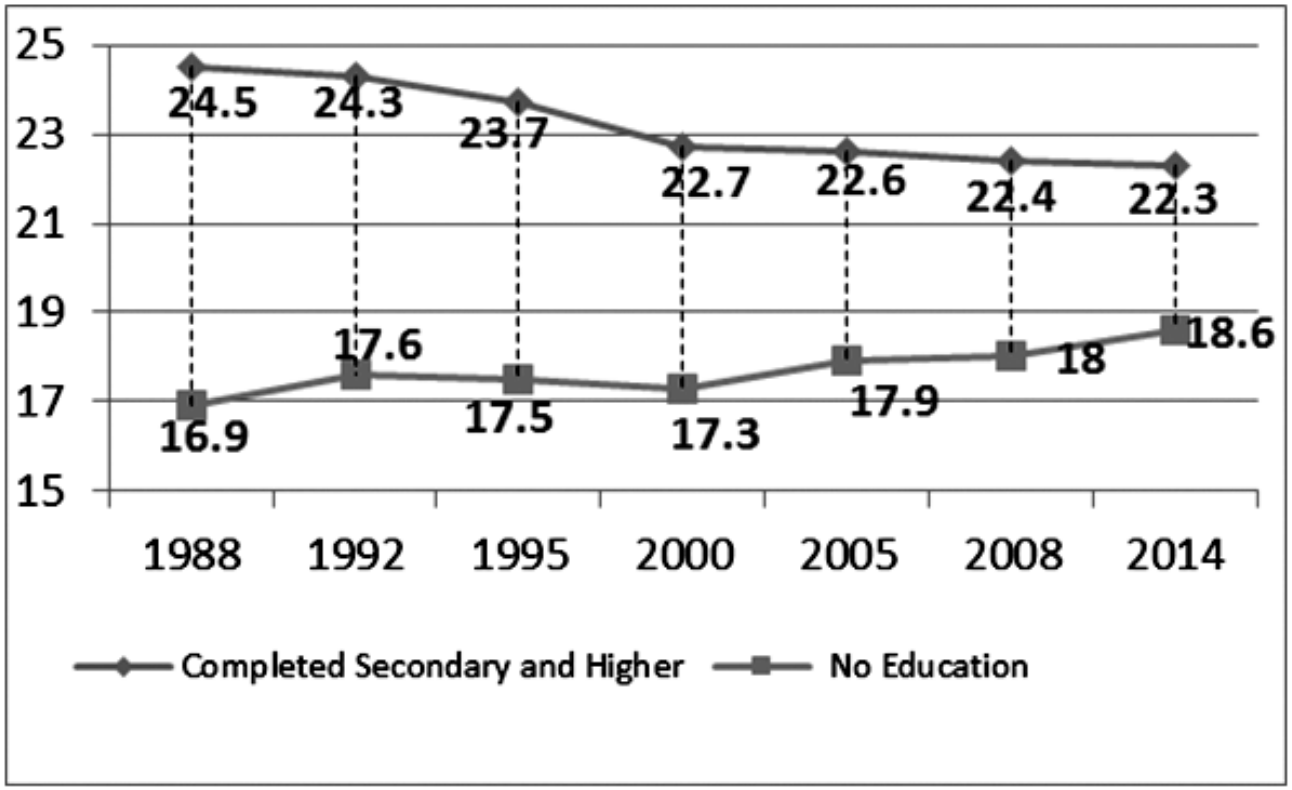


Figure 9: Median Age at First Marriage according to Education Level (years)

Source: EDHS 1988-2014.

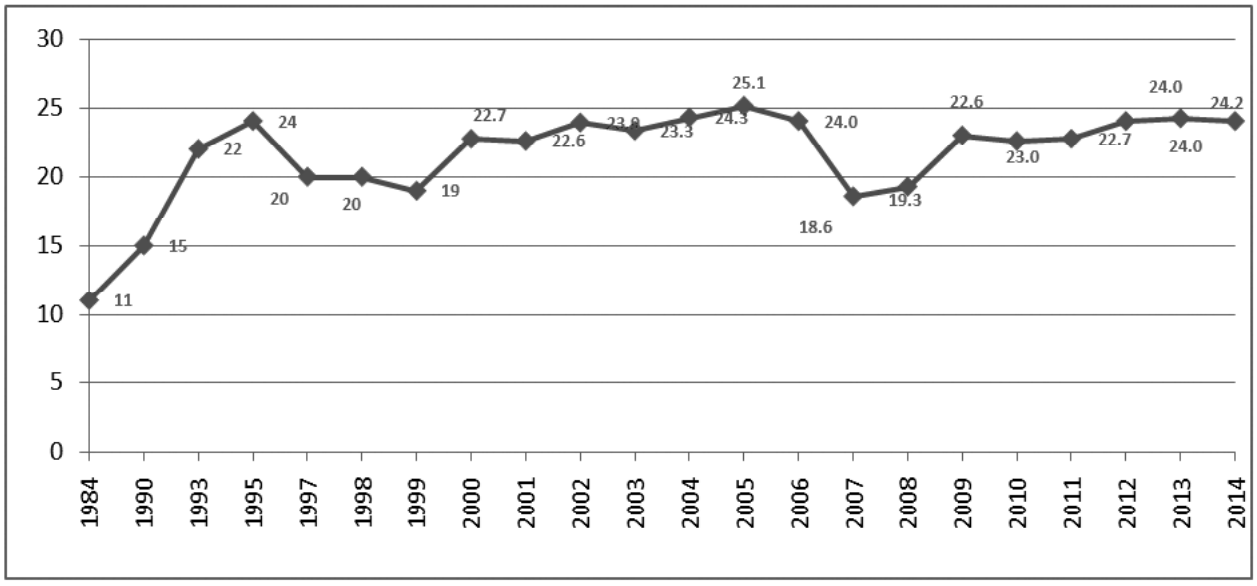


Figure 10: Female Unemployment Rate in Egypt (1984-2013) (%)

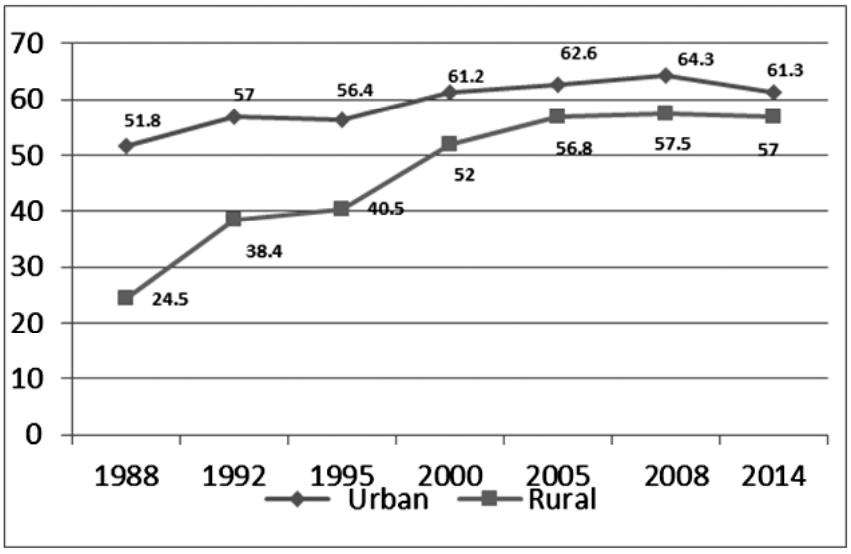
Source: CAPMAS

Table 9
Female Unemployment Rates by Level of Education (2005-2014) (%)

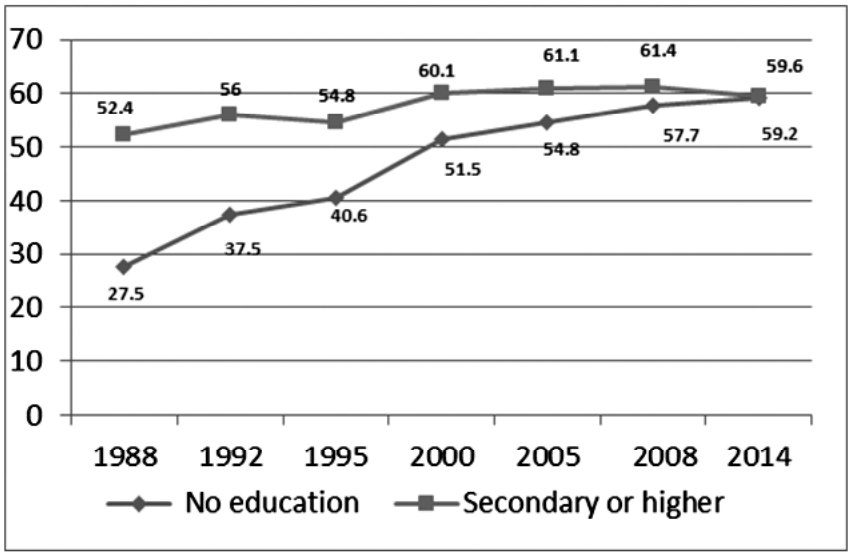
	2005	*2009*	*2010*	*2012*	*2013*	*2014*
illiterate	9.5	3	0.9	0.4	4.5	9.6
read and write	12.4	7.4	4.1	3.1	5.8	12.2
Below Intermediate	19.6	25	14.4	18.1	15.7	13
Intermediate	54.6	37.2	33.9	37.6	36.3	34.5
Above intermediate and below University	53.3	31	34.3	25.8	23.1	23.1
University or above	49.6	30.5	33.7	32.6	34	31.6
total	51.3	23	22.6	24.1	24.2	24

A third possible reason behind the deterioration in fertility levels is the worsening trends in contraceptive use across higher educated females as well as females living in Urban areas as opposed to other groups (figure 11). In addition to poor awareness and weak targeted interventions to these groups, we also argue, though there is not enough evidence, that the increasing ability of relatively well-off females to provide child care alternative which decreased the trade-off relation between work and childbearing is also a possible reason behind the increasing fertility among these groups.

We conclude from the above analysis that the process of declining fertility in Egypt has been very slow since 1988 till today, with a clear setback in the recent years where fertility rates reversed in an increasing trend. Microanalysis indicated that these worsening trends in fertility could be attributed to specific groups. Opposite to the mainstream arguments claiming that the poor and illiterate are the most contributing groups to poor fertility behaviors in Egypt, our microanalysis showed that in many situations, females living in urban areas, higher-educated and wealthier females contributedsignificantly to this poor fertility



(a)



(b)

Figure 11: Current Use of Contraception among Currently Married Women by Residence and Education Level (%)

Source: EDHS 1988-2014.

behavior throughout the period under investigation. Lack of proper targeted campaigns as well as high unemployment levels among such groups are believed to be key reasons behind these results.

While the above analysisfocused on the long-term trends in demographic variables and in fertility behavior since end eighties of the previous century, the next section will draw specific attention to the short run dynamics that took place in the demographic process in Egypt during the recent economic and political crisis.

The Short run dynamics of demographic transition: the implications of political and economic instabilities on the demographic transition.

Literature presented in section I highlighted that during times of economic and political downturns, demographic indicators could deviate, positively or negatively, from long-run trends. This argument could also be verifiedby the Egyptian trends in the recent years following January 25th revolution. Demographic figures sustained a worsening trend since the 2011,as indicated by the highly rising birth and fertility rates. Although it is still too early to accurately investigate the real impact of the recent economic and political downturns on demographic indicators and transition in Egypt, several factors are argued to have contributed to this phenomenon.First, the increasing female unemployment that accompanied the overall economic downturn. The recent crisis has led to an increase in female unemployment, from 22.6% in 2010 to 24.2 in 2013 (CAPMAS). This can be a possible factor contributing to the increasing fertility during this period as it has led to a lower opportunity cost of childbearing for working mothers.

Second is the declining public investment and development assistance to the family planning sector and increasing contraceptive prices. It is worth noting that family planning programs and campaigns in many developing countries, where Egypt is of no exception, are highly dependent on international development assistance and aid programs. Obstructing such programs in light of recent political dynamics directly affected the sustainability and effectiveness of family planning programs. Following January 25th revolution, a number of donors have suspended their development assistance to Egypt with the fluctuating and vulnerable economic and political situation. For example, USAID (the main development partner to Egypt in the field of family planning) annual family planning disbursements declined from $31 million in 2009 to $ 3 million in 2012 according to recent official data issued by Ministry of International Cooperation Decode Unit[13]. Despite the fact that Egypt has restored its economic and political relations with many donor countries and institutions, family planning and health programs in general were never back to the previous pre-revolution levels. On the other hand, the share of public investments directed to family planning sector decreased from 0.33% in 2010/2011 to 0.07% in 2013/2014[14]. There was a general slackening in the family planning policies in Egypt in the recent years as a result of the country's shifting priorities towards higher urgencies.

Third, although there is no clear evidence is provided here, Egyptian pound devaluation is also argued to be one of the contributing factors to worsening demographic performance since 2011 due to its known impact on the prices of imported contraceptives. This problem is expected to exacerbate with the recent foreign exchange crisis that is taking place in Egypt since the first half of the year 2016. Finally, literature argue that during economic and political crises, marriage rates might tend to decline with the increasing uncertainty about the economic future, the rising inflation and the general weak performance of the economy. However, this didn't happen in Egypt. During the crises, marriage rates showed a constant and sometimes a slightly increasing trend. Rates increased from 11% in 2010 to 11.2% in 2012 then to 10.8 % in 2013 according to CAPMAS official figures.

The above arguments indicate that, in the case of Egypt, demographic responses to the crises are countercyclical. This doesn't only explain the reasons behind the recent rise in fertility rates but also foretells a further worsening in the demographic transition process if quick and efficient actions weren't put into work.

Demographic transition and Inclusive Development in Egypt: Conclusions and Policy Recommendations

The above analysis and arguments lead us to a set of important conclusions. First, there is a clear slowdown in demographic transition in Egypt during the last two decades, and with worsening trends in the recent years; particularly those following January 25th revolution. Second, the non-uniform demographic responses to changes in economic condition are clearly depicted in the Egyptian situation. Empirical investigation showed that there is a relation between demographic transition and level of development in Egypt, where improving living conditions lead to a speedier decrease in dependency rates. However, this finding couldn't be generalized to all geographical regions neither to all wealth quintiles. Demographic responses to changing socioeconomic conditions are proven to vary widely across different socioeconomic and geographical groups. The same variation was clearly evident in the fertility behavior across the different groups. The possible reasons behind these variations could be the disparities in development outcomes across, and within, different geographical regions. Wealth index data indicate that although there was some improvement in socioeconomic conditions during the period 1988-2014, however, this improvement wasn't evenly distributed across all socioeconomic groups.This uneven development pattern affectedthe speed of demographic transition among different socioeconomic groups.

Moreover, results showed that households in some geographical areasare more elastic in adjusting their child dependency preferences with moving to a higher wealth quintile than other ones. Finally, the high disparities in unemployment rates across different educational levels can also be a justification for the high dissimilarities in fertility and dependency behaviors across different groups.

Findings also revealed that gaps in the speed of demographic transition shrank in the favor of the poorer and less educated. Poor and unwanted fertility behaviors that contributed sharply to the slowing demographic transition came mainly from the urban areas, higher-educated females, and higher socioeconomic groups. These results are considered unconventional compared to the *longstanding mainstream* arguments that used to claim that the poor, uneducated, and rural population is the main contributors to the population growth in Egypt.

The recent economic and political crisis has possibly contributed to the worsening of the demographic transition process in Egypt. Possible reasons behind that are the decline in spending on family planning programs, rising prices and currency devaluation, increasing female unemployment and the general set back in population-related policies and campaigns. We argue that the continuation of these trends will not only postpone Egypt's potential opportunity to enter the second demographic window, but shall also put further pressures on the country to fulfill the needs of the increasing cohorts of dependent children; constituting an added threat to the economic and political stability of the country.

With the Egyptian government announced intention to adopt an inclusive growth approach (MOP, 2015), there is a pressing need that current and future reform policies and vision would include the so long forgotten demographic-economic dimension. Economic and social policies should be designed in a way that indulges demographic dimensions, including both (1) speeding up demographic transition to enter the demographic window and (2) benefiting from the potential dividends of the different stages of this window. The Egyptian government new Sustainable Development Strategy (SDS) targets to achieve an annual growth rate of 7% till 2030 following the recovery from the current crisis (MOP, 2015). East Asian

experiences prove that such rate is achievable given the potential dividends of the demographic window. Yet it is conditional to entering the window phase and setting the suitable policy mix to maximize the dividends of this window.

We presented different scenarios for Egypt to enter the demographic window and benefit from its successive dividends. We provided the needed fertility rates that would make this process possible. In this regard we recommend *renovating the current population policies into a rather more comprehensive system of fair and equitable inclusive development*. As defined by the world Bank, inclusive growth require the empowerment of all citizens to equal opportunities to share in growth; through providing the needed health and education services equally for all citizens (World Bank, 2009). This is directly related to the first dividend of the demographic window, where Egypt needs to support the development of basic health and education needs for the population in dependency ages and the young cohorts; on order to prepare them for the next window.

Inclusive development concept also involves absorbing the increasing population into the labor market through empowering the labor-generating sectors and increasing their share in growth during periods of growing working population, integrating the informal sector in the economy and encouraging female employment by eliminating all discriminatory practices. This is directly relevant to the Egyptian situation, where there is a need to empower labor–absorbing sectors, such as the agriculture sector, to increase its share in growth and absorb more labor. Informal sector integration into the economy is crucial given its important contribution to the economy and labor force. Finally, male-female unemployment gap is an issue not of less importance and relevance to the Egyptian case. Radical measures to minimize the current gaps are also crucial, not only to speed up demographic transition as mentioned previously, but also to achieve "fair and equitable" inclusive growth.

Egypt needs to *introduce new non-traditional population policies, inspired by successful country experiences*. Fiscal interventions in the form of conditional Cash Transfers (CCTs) and non-traditional awareness campaigns such as Brazilian Soap Operas were found to have a high impact on achieving family-planning targets in several Latin American countries such as Brazil and Mexico (Darney at al., 2013; Barber and Gerlter, 2008). Revisiting the current outdated population policies in Egypt is now a must, in light of their proven failures and given the changing domestic and global dynamics.

We also recommend i*ncreasing political and religious support to family planning programs*. In a country like Egypt, family planning has been a controversial issue among different religious groups and streams. There is a pressing need to reach a consensus among all groups on the importance of family planning and the small-family concept for the economy and for Egyptians. One of East-Asian countries key success factors was obtaining this consensus despite the known religious and ethnic heterogeneity in these countries.

As explained earlier, our empirical results showing clear disparities in demographic variables indicate the need to *design specific targeting policies for the groups found to have the highest impact on the speed of demographic transition in Egypt*. In addition to the Marco-policies implemented on the national levels, specific groups that were found to be the main contributors to the slow demographic transition needs more specific interventions. For example, high wealth quintiles in urban governorates as well as middle-class in Urban Egypt require intensified population policies and improved access to family-planning tools; to overcome their deteriorating performance in this regard. Rural Upper Egypt still needs more effective awareness campaigns related to

early marriage hazards and its consequences. Moreover, high-school and university educated females need more targeted interventions to improve their fertility behavior that has clearly worsened in the recent years. This category as well needs also higher attention in the employment policy; since their increasing unemployment rates is a possible reason behind the worsening fertility behavior. Finally, targeted development policies to poorer families in general, and in Upper Egypt in particular, are expected to have a high impact on their dependency behavior given the depicted high elasticities of these groups to amend their dependency behavior with improved living conditions.

In general, Egypt needs to adopt a new inclusive population policy that is based on integrating population dimensions into development frameworks and allow for the two-way relation between population and development dynamics; in a way that would speed up Egypt entrance into the second demographic window and helps the creation of the expected dividends of this important stage.

NOTES

1. For a brief history of demographic transition theory please see: Caldwell (1976), Szerter (1993, 1996) and Kirk (1996).
2. Literature such as Ven and Smits (2011), Pool (2004), Majdzinka (2014), and Saad (2011) have used the terms demographic window, dividend and gift interchangeably to roughly refer to the period where the country witness a decline in dependency rates and a resulting increase in working age population.
3. Proxied by the difference between population growth rate and working population growth rate.
4. The empirical investigations account for 1-2 year lags between the economic indicators and the demographic responses.
5. Number of children below 15 years divided by number of households.
6. Number of children below 15 years divided by adults aging 15-64.
7. Bloom et al (2012) argues that although child dependency rates is the famous indicator relevant literature, "Mean number of Children per household" could be more suitable in the case of micro investigation on household level.
8. The wealth index was designed using factor analysis for the EDHS datasets 1988-2014 and applying DHS wealth index calculation methodology.
9. Statistical description of the used sample is found in Annex (3)
10. We apply the same hypothesis of Bloom et al (2012) on the Egyptian case.
11. Variables were checked for multicollinearity and correlation.
12. The finding is consistent with Bloom et al (2012) findings; that the change in dependency is non-uniform across different socioeconomic status over time.
13. Egyptian Ministry of International Cooperation. Unpublished Data.
14. Egyptian Ministry of Planning, Monitoring and Administrative Development. Unpublished Data.

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ANNEX

Annex 1
Main literature definitions of demographic window

	Author	*Definition*	*Determinants of Demographic Window*	*Comments on the Definition*
1.	Ven and Smits, 2011: 5	• "A demographic window of opportunity is created by the process of the demographic transition. This demographic window is the period in which the working-age population is growing and the young cohort decreasing, while the old cohort is still small. The small groups of young and old population exert relatively low costs on society and with the large group of working-age population there is an opportunity for an increase in per capita output. The increased per capita output made possible due to the window of opportunity is called demographic dividend"	1. working age population 2. dependency	• The definition highlighted the difference between entering the window and utilizing its dividends • The definition mentioned only one channel where the window affects the economy which is the labor force. • The definition didn't specify specific timings for entering and exiting from the demographic window.
2.	United Nations, 2004:2 (Definition was also used in: Hoseini, 2012: 11)	• "A period labeled here the demographic window, when the proportion of children and youth under 15 years falls below 30 per cent and the proportion of people 65 years and older is still below 15 per cent". • "United Nations Population Division defined window of opportunity as a period in which the ratio of under 15 population reaches to less than 30 percent of the total population and the ratio of 65 years and older population is still less than 15 percent (UN, 2004). Since, the change in the elderly ratio is insignificant and their share is still less than 15 percent of the total population, with a reduction relative to the share	1. population below 15 years 2. population above 65 years 3. dependency rates	The definition assumed that to enter the window, total dependency rates have to decline to below 50% and population below 15 years and above 65 years also decline to below 30%. The definition doesn't take into account the possible channels of effect of the demographic window. It focuses on just one stage of the window where its effect is only through the increasing working population. The definition doesn't include the two other periods where the window can affect the economy through savings or human development.

(*contd...Table Annex. 1*)

	Author	*Definition*	*Determinants of Demographic Window*	*Comments on the Definition*
		of under 15 population, the ratio of working age population (15-64 years) will increase rapidly. In these circumstances, the total age dependency ratio reaches to less than 0.5 and potentially the condition looks very favorable for an economic development. Accordingly, the demographers know the population explosion as a God-given gift hat can change it to a population bonus. If this opportunity managed properly, it can help the country develop, otherwise, will be turned over to a big obstacle for development".		
3.	Pool, 2004	• "Societies going through a series of age structural changes. These phases are determined by the relative weights of each of the major life-cycle stages, measured by the proportions at young, intermediate or older ages. At an early stage the population is disproportionately weighted towards childhood; at the middle phase the working ages dominate; and at a late stage the oldest ages dominate. The "demographic dividend" arises when the society is at a middle phase and dependency ratios are low".	1. working age population 2. dependency rates	• The definition is general and doesn't specify specific points for entering and exiting the window. The definition mixed between the terms window and dividend
4.	Lee and Mason, 2006	• "Industrial countries have largely completed what is called the "demographic transition"—the transition from a largely rural agrarian society with high fertility and mortality rates to a predominantly urban industrial society with low fertility and mortality rates. At an early stage of this transition, fertility rates fall, leading to fewer young mouths to feed. During this period, the labor force temporarily grows more rapidly than the population dependent on it, freeing up resources for investment in economic development and family welfare. Other things being equal, per capita income grows	1. Fertility rates 2. Dependency Rates	• The definition mixed between entering the window and utilizing the possible dividends. • The definition restricted demographic transition to industrial countries only. • The definition didn't specify timings for entering and exiting the window.

(*contd...Table Annex. 1*)

	Author	*Definition*	*Determinants of Demographic Window*	*Comments on the Definition*
		more rapidly too. That's the first dividend."…"But a second dividend is also possible. A population concentrated at older working ages and facing an extended period of retirement has a powerful incentive to accumulate assets—unless it is confident that its needs will be provided for by families or governments. Whether these additional assets are invested domestically or abroad, national income rises."		
5.	(UN, ECA, 2013: 4)	• "As generally defined, the demographic dividend occurs when falling birth rates change the age distribution, so that more resources could be allocated to investments in human capital, to meet the needs of the younger generations, and for investment in economic development and family welfare. In countries at the beginning of a demographic transition, where mortality and fertility rates are beginning to fall, such as South Central Asia and many countries in Africa, there is an opportunity for governments to capitalize on the impending demographic transition, where the number of adults of working age grows large relative to the dependent population, and potentially acts as a major economic spur. However, if the appropriate policy environment is not in place, particularly to educate and provide appropriate skills training for the youth who are the productof pre-transition, high fertility, unemployment and instability may be the result, and health, education, and social welfare systems may undergo unbearable strain"	1. birth rates 2. mortality rates 3. percentage of working population to dependent population	• Opposite to what the definition claims, the main determinant of entering the demographic window is the dependency rate; since it's the only variable that affects the age structure. Dependency rates is affected by the differences in rates of decline in birth and morality rates. Thus, we need to differentiate between two things: 1. When calculating the window period, the main relevant variable is dependency rate. 2. On the other hand, when investigating the determinants that affect dependency, we analyze fertility as one of the factors that affect dependency but it is not the only factor. Other factors affecting dependency include population momentum and other economic variables include business cycle. • The definition highlighted the importance of education policies to prepare the cohort that will participate in the window. • The definition mixed between the demographic window and the demographic transition.
6.	Saad (2011: 43, 62)	"These changes in age structure mark the onset of a period in which the proportion of people in potentially productive	1. Dependency rates.	The definition classified the demographic dividend into stages in a way that can be close to Bloom's argument

(*contd...Table Annex. 1*)

Author	*Definition*	*Determinants of Demographic Window*	*Comments on the Definition*
	ages grows steadily relative to the number of people in potentially unproductive (inactive) ages. Thisperiod, known as the "demographic dividend," "demographic bonus," or "demographic window of opportunity," creates a situation that is particularlyconducive for development, because it increases the possibility of saving and investing in economic growth"."..the period corresponding to the demographic dividend has been subdivided into three phases. In the first phase, the dependency ratio declines but is still fairly high (above two-thirds, that is, two persons in dependent-age groups for every three persons in working-age groups). In the second phase, the dependency ratio falls below two-thirds and continues to decrease. In the third and final phase, the dependency ratio begins to rise as the proportion of older people increases, but is still below two-thirds. The two thirds cut-off point was chosen arbitrarily to serve as an illustr-ative benchmark.		about the channels of effect of demographic dividend in the economy. The definition mentioned dependency rates as the only determinant of entering and exiting from the dividend.

Annex 2
Dependency Rates and Age Structure Projections for Egypt

Year	*Medium Fertility*			*High Fertility*			*Low Fertility*			*Constant Fertility*		
	Depend-ency rate	*Popul-ation less than 15 years*	*Popul-ation above 65 years old*	*Depend-ency rate*	*Popul-ation less than 15 years*	*Popul-ation above 65 years old*	*Depend-ency rate*	*Popul-ation less than 15 years*	*Popul-ation above 65 years old*	*Depend-ency rate*	*Popul-ation less than 15 years*	*Popul-ation above 65 years old*
1950	73.5	39.3	3.0	73	39.3	3.01	73.5	39.3	3.0	73.5	39.3	3.0
1955	76.8	39.9	3.5	77	39.9	3.53	76.8	39.9	3.5	76.8	39.9	3.5
1960	83.9	41.8	3.9	84	41.8	3.87	83.9	41.8	3.9	83.9	41.8	3.9
1965	85.1	41.9	4.1	85	41.9	4.08	85.1	41.9	4.1	85.1	41.9	4.1
1970	85.8	41.9	4.2	86	41.9	4.23	85.8	41.9	4.2	85.8	41.9	4.2
1975	83.0	40.9	4.4	83	40.9	4.40	83.0	40.9	4.4	83.0	40.9	4.4
1980	81.2	40.3	4.5	81	40.3	4.53	81.2	40.3	4.5	81.2	40.3	4.5
1985	79.7	39.7	4.6	80	39.7	4.64	79.7	39.7	4.6	79.7	39.7	4.6
1990	79.5	39.5	4.8	80	39.5	4.78	79.5	39.5	4.8	79.5	39.5	4.8

(*contd...Table Annex. 2*)

Year	*Medium Fertility*			*High Fertility*			*Low Fertility*			*Constant Fertility*		
	Dependency rate	*Population less than 15 years*	*Population above 65 years old*	*Dependency rate*	*Population less than 15 years*	*Population above 65 years old*	*Dependency rate*	*Population less than 15 years*	*Population above 65 years old*	*Dependency rate*	*Population less than 15 years*	*Population above 65 years old*
1995	75.2	37.8	5.1	75	37.8	5.11	75.2	37.8	5.1	75.2	37.8	5.1
2000	68.8	35.4	5.3	69	35.4	5.33	68.8	35.4	5.3	68.8	35.4	5.3
2005	61.2	32.5	5.5	61	32.5	5.46	61.2	32.5	5.5	61.2	32.5	5.5
2010	58.7	31.5	5.5	59	31.5	5.49	58.7	31.5	5.5	58.7	31.5	5.5
2015	58.2	30.9	5.9	60	31.5	5.87	56.6	30.2	6.0	58.8	31.1	5.9
2020	57.0	30.0	6.3	61	31.7	6.15	53.1	28.2	6.5	59.2	31.0	6.2
2025	54.7	28.3	7.1	61	31.1	6.79	48.2	25.1	7.4	59.0	30.2	6.9
2030	52.2	26.4	7.9	59	29.6	7.51	45.2	22.7	8.4	58.5	29.3	7.6
2035	50.5	24.8	8.7	57	28.2	8.11	43.7	21.0	9.4	58.1	28.6	8.2
2040	49.4	23.7	9.3	56	27.2	8.52	43.1	19.8	10.3	58.0	28.2	8.5
2045	49.9	22.8	10.5	56	26.7	9.35	43.6	18.5	11.8	59.5	28.0	9.3
2050	51.8	21.8	12.3	58	26.2	10.70	45.6	17.1	14.2	62.3	27.8	10.5
2055	53.8	20.7	14.3	60	25.3	12.13	48.4	15.6	17.0	64.7	27.5	11.8
2060	54.4	19.6	15.6	60	24.4	12.93	50.4	14.3	19.1	65.4	27.2	12.4
2065	55.2	18.8	16.8	59	23.6	13.51	53.0	13.4	21.2	65.7	27.0	12.7
2070	56.4	18.2	17.9	59	23.1	13.96	56.5	12.8	23.3	65.9	26.9	12.9
2075	58.8	17.7	19.4	60	22.8	14.63	62.2	12.2	26.2	66.6	26.8	13.2
2080	61.5	17.2	20.9	61	22.4	15.68	67.1	11.6	28.6	67.4	26.7	13.6
2085	63.9	16.6	22.3	63	22.0	16.77	71.0	11.0	30.5	68.1	26.5	14.0
2090	65.8	16.2	23.5	65	21.5	17.70	73.9	10.5	32.0	68.6	26.4	14.3
2095	67.6	15.9	24.5	66	21.2	18.40	77.2	10.2	33.3	69.0	26.2	14.6
2100	69.7	15.6	25.4	67	21.0	19.04	81.3	10.0	34.8	69.5	26.2	14.9

Source: UN DESA Annex (3): Statistical Description of the used sample

The sample 1988-2014 constitutes 116717 households distributed across 5 geographical districts: (1) Urban governorates, (2) Urban lower Egypt, (3) Rural Lower Egypt, (4) Urban Upper Egypt and (5) Rural Upper Egypt. We excluded frontier governorates since they were not included in EDHS samples prior to 1995 survey.

Table A3.1
Households according to Geographical Distribution

Geographical Regions	*Number of Households*
Urban Governorates	26445
Urban Lower Egypt	14160
Rural Lower Egypt	28680
Urban Upper Egypt	15159
Rural Upper Egypt	30347
Frontier Governorates	5487
Not Classified	1926
Total Sample	122204

Source: EDHS 1988-2014.

Analyzing the sample indicates that average household is around 5.1 person divided into 3 adults in the working age (15-64), 1.8 child below 15 years and 0.2 adult above 65 years old.

Table A3.2
Description of the sample

	Number of observations	*Mean*	*Median*	*Standard Deviation*	*Minimum*	*Maximum*
Males below 15 years	116717	.940	1	1.11	0	14
Females below 15 years	116717	.900	1	1.11	0	14
Males 15-64	116717	1.52	1	1.13	0	15
Females 15-64	116717	1.52	1	0.97	0	21
Males above 65	116717	.100	0	0.31	0	3
Females above 65	116717	.100	0	0.30	0	4
Number of Households	116717	5.08	5	2.74	1	42

Source: Calculated from EDHS 1988-2014.