

# Women and Work in Egypt: The Effect of the Election of the Muslim Brotherhood on Female Labor Force Participation

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## Abstract

In this paper, I analyze how the rise to power of the Muslim Brotherhood, marked by increased parliamentary power in late 2006 due to unprecedented success in the 2005 elections, impacts female labor force participation in districts in which Muslim Brotherhood candidates won compared to those in which they did not win. I use a difference in differences estimation strategy, using both district and individual fixed effects. Using data from the 1998, 2006, and 2012 Egyptian Labor Market Panel Survey and district-level voting data, I match district-level electoral outcomes to individual labor market variables. I find that compared to women in non-Muslim Brotherhood supporting districts, women in Muslim Brotherhood supporting districts show a generally insignificant change in likelihood of labor force participation following the Muslim Brotherhood's parliamentary success. The lack of a differential trend in female labor force participation for women in Muslim Brotherhood supporting districts holds for most subpopulations and when a Heckman correction is used. These results suggest that the Muslim Brotherhood's rise to power cannot explain the decline in female labor force participation observed in Egypt.

**Keywords:** labor force, women, politics, Egypt, development

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## **Key to commonly used acronyms**

ELMPS: Egyptian Labor Market Panel Survey

DFE: district fixed effects

IFE: individual fixed effects

MB: Muslim Brotherhood

LFP: labor force participation

# Introduction

Lack of female labor force participation can hinder a country's economic growth and development (Elborgh-Woytech et al. 2013). Egypt has one of the largest gender gaps in labor force participation, which the IMF projects could be costing it a potential 34 percent gain in GDP. Despite increasing rates of female education, women's labor force participation declined in Egypt from 2006 to 2012. Of the many Egyptian women who do participate in the labor force, many engage in subsistence work, working out of necessity in order to support their families. Research has investigated the determinants of female labor force participation in Egypt, but it is also important to understand the forces behind the recent decrease in female labor force participation.

The Muslim Brotherhood in Egypt heavily restricts women's ability to hold leadership positions in its organization and its political parties. The Muslim Brotherhood places a large emphasis on the woman's role in the family, especially as a mother. In 2005, the Muslim Brotherhood experienced its largest electoral victory, scoring 88 seats in Egypt's parliament under the Mubarak regime. During this time, the authoritarian Mubarak regime was known to punish successful opposition forces with violence, intimidation, and by withholding government resources. When the Muslim Brotherhood gains government power in Egypt, we either expect Muslim Brotherhood-supporting women to participate less in the labor force due to the expectation that they prioritize their roles as mothers, or to participate more in the labor force due to economic necessity. If groups who support the Muslim Brotherhood are subject to economic punishment<sup>1</sup> by the Mubarak regime, we expect that the women in these groups will work more in order to compensate for loss in welfare. Alternatively, if the Muslim Brotherhood wins in a district and Muslim Brotherhood parliamentarians are able to impose their social norms discouraging women from working, or provide social services to their constituents, then we expect that women in the groups that supported the Muslim Brotherhood do not participate increasingly in the labor force. This paper explores both hypotheses by exploiting the rise of the Muslim

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<sup>1</sup>Mainly by the withholding of government resources, as studied by Blaydes (2010) and discussed in the literature review.

Brotherhood to power after its successful 2005 parliamentary election on women's labor force participation. This paper uses a difference in differences estimation strategy.

The timeline that I exploit in this paper is as follows. In November and December of 2005, the Egyptian parliamentary elections occurred. The newly elected parliamentarians did not take office until mid-2006. Meanwhile, the Egyptian Labor Market Panel Survey (ELMPS) took place in early 2006. The labor market and demographic data collected in the ELMPS thus represents the state of Egypt before the newly elected parliament took office.

Between 2006 and 2012, the Mubarak regime acted with heightened hostility towards the Muslim Brotherhood through political intimidation, the media, and physical harassment. The 2012 wave of the ELMPS took place in early 2012. In July of 2012, Mohamed Morsi, of the Muslim Brotherhood, was elected president of Egypt. Thus, the 2012 ELMPS represents the state of Egypt following the heightened harassment of the Muslim Brotherhood by the Mubarak regime and before the election of a Muslim Brotherhood candidate to the presidency. Therefore, the treatment that I exploit is the fact that between 2006 and 2012, the Muslim Brotherhood gained parliamentary power and simultaneously experienced obstruction of its power by the Mubarak regime.

While the decline in female labor force participation in Egypt has been studied by sector, based on women's characteristics, and based on some political events, it has not been studied in relation to the Muslim Brotherhood. Previous studies of geographic differences in female labor force participation in Egypt have been conducted on a governorate, not a district-level, jeopardizing the precision of their estimates due to the heterogeneity within governorates. Egypt has 26 governorates comprising over 300 districts. Consequently, exploiting districts as the geographic unit of interest allows for a more robust analysis. This paper uses the identification characteristic of Muslim Brotherhood support on a district-level in an attempt to predict the effect of Muslim Brotherhood support on differential labor force participation outcomes.

Using a difference in differences regression strategy, including individual and district fixed effects, I analyze the impact of living in a Muslim Brotherhood-supporting district

and being in 2012 versus 2006 and 1998 on female labor force participation. I find that being in a district that supported the Muslim Brotherhood in 2005 does not, in general, predict the change in female labor force participation in 2012. By most estimation methods, with the exception of separate population groups for education level and marital status, district-level Muslim Brotherhood support cannot explain the decline in female labor force participation that occurred in Egypt from 2006 to 2012.

## Literature Review

### **Economic factors and women's labor force participation**

Gender gaps in labor force participation can hinder a country's economic growth. A macroeconomic model created by EU economists predicts that an increase of 5 percent in female labor force participation in Southern Mediterranean countries could result in a cumulative 1.3 percent increase in GDP in these countries between 2015 and 2030 (Tsani et al. 2012). According to the International Monetary Fund, raising the female labor force participation rate to male levels in Egypt would result in a 34 percent increase in GDP. In a World Bank paper on labor inequality, increases in women's labor force participation were correlated with improved welfare outcomes and efficiency on a country level (Tzannotos 1999). Social norms, in addition to explicit discrimination in developing countries can discourage women from participating in the labor force (Tsani et al. 2012). Influential social norms that prevent women from participating in the labor force include institutional framework, religious customs, and social constraints on women's freedom (Christian and Juttig 2005).

Individual characteristics, in addition to societal factors, affect female labor force participation decisions. Using data for 70 nations from 1965 to 1970, Pampel and Tanaka (1986) find that family size, female education, the adult sex ratio, economic dependency, and labor force growth all influence female labor force participation around the world. In addition, Pampel and Tanaka (1986) find that in the initial phase of economic development, men benefit disproportionately from industrialization and women's labor force

participation does not increase until a nation moves beyond industrialization, which may apply to rural areas in Egypt. In the literature to date, Egypt's recent decline in female labor force participation between 2006 and 2012 remains unexplained. Researchers have attempted to explain the trend using a variety of socio-political events, but have yet to study the decline in female labor force participation in the context of the Muslim Brotherhood's electoral success in late 2005. Let us consider the Muslim Brotherhood's rise to parliamentary power and its subsequent treatment by the Mubarak regime, which occurred in the background of the decline in female labor force participation.

## **The Brotherhood and Egypt's 2005 elections**

In 2005, the authoritarian Mubarak regime controlled Egypt, and many citizens relied on the corrupt state both for jobs and for government benefits. The Egyptian parliament is an extremely influential body, and 2005 was the year in which the Muslim Brotherhood won the most parliamentary seats. Despite the authoritarian government, Egyptian parliamentary elections are generally competitive and serve as indicators of support for the regime (Blaydes 2008). Egypt's 2005 parliamentary elections included three rounds of voting, separated geographically, with both an initial and a runoff election in each of the three large rounds. Federal judges traveled to each voting district to supervise the elections and ensure fairness (Carter Center 2013; Masoud 2014). Within each voting district, Egyptian law requires that 50 percent of seats go to "farmers" or "peasants" in order to ensure their representation in government (Carter Center 2013).

The Mubarak regime historically used elections to determine whom to favor in distributing public goods and resources and to gauge each voting district's support for the regime as well as each individual parliamentarian's strength (Blaydes 2010). Blaydes (2008) argues that parliamentary seats allow members of Egypt's political elite to access benefits such as expedited business licenses, the opportunity to sell jobs and political appointments in exchange for bribes, streamlined state bank loans, and immunity from charges of corruption. The benefits of parliament, namely immunity from charges of corruption and business-related advantages, encourage elite business-oriented Egyptians,

including Muslim Brotherhood members, to run for parliament (Blaydes 2008). In and outside of Egypt's parliament, the Muslim Brotherhood has been a significant force of political opposition. The Muslim Brotherhood uses political power and the influence that it can gain through government to advance its organization's goals.

The Muslim Brotherhood, since its founding in 1928, has been a prominent religious, social, and political movement in Egypt. The Muslim Brotherhood has been banned in Egypt by both the monarchy and by democratic governments. In addition, Egyptian law prohibited the formation of political parties on the basis of religion, preventing candidates from running as part of a Muslim Brotherhood party until the 2010 parliamentary elections (Carter Center 2013; Wickham 57). Nevertheless, these restrictions did not limit the success of the Muslim Brotherhood in 2005, when it captured an unprecedented 88 parliamentary seats.

On one hand, the ruling Mubarak regime, which disfavored the Brotherhood, used elections as a means to gauge and maintain support for the regime: Brotherhood victory in a district signaled the regime's weakness and potentially the need for the regime to punish that district with fewer state resources. For example, in the 1984 parliamentary election, the Brotherhood experienced its first substantial victory (12 percent of the vote). Blaydes (2010) finds that in governorates in which the Brotherhood earns a high vote share, the likelihood of receiving infrastructure investments in sewage and water decreases. Muslim Brotherhood electoral success under the Mubarak regime may result in reductions in government investment in the districts in which the Brotherhood succeeds, thus impacting the wellbeing of residents of these districts.

On the other hand, some of the Brotherhood's parliamentary candidates were members of the business elite, a common presence in Egypt's parliament who could still enjoy the benefits of corruption and the ability to offer jobs (Blaydes 2008). Moreover, recognizing the Muslim Brotherhood's victories as inevitable in regions like Alexandria, the Mubarak regime did not punish all elected Brotherhood parliamentarians (Blaydes 2008). Given the lack of public data on capital flows from the central government to the governorates and districts, punishment of the Brotherhood is difficult to quantify.

Another disadvantage that the Muslim Brotherhood faced in the elections was the Mubarak regime's strong vote buying machine. Successful election to parliament can indicate vote buying and clientelism by the ruling and opposition parties. Clientelism or vote buying is extremely common in Egypt, especially for the ruling party, in the form of cash handouts, goods, services, and favors that easily sway poor voters. Clientelism especially affects poor populations who derive more benefit from the goods or services they receive than from the ideological standpoint of the candidates they elect (Blaydes 2010; Masoud 2014). Because of the opportunities for cash, goods, or services through vote buying, higher proportions of illiterate Egyptians turned out to vote in the 2005 election (Blaydes 2010; Masoud 2014). The poor are more vulnerable to bribery, and the ruling regime is better positioned to engage in vote buying. The ruling Mubarak regime operated on a vote-buying platform, and was reported to have given goods and services such as job applications, mobile phones, and cash, in exchange for votes (Blaydes 2010; Masoud 2014). The Mubarak regime's monopoly on service provision to the poor allowed it to be the strongest vote buyer and weakened the Brotherhood's ability to engage poor voters through financial incentives (Masoud 2014). Thus, the Muslim Brotherhood's success cannot entirely be attributed to its out-doing the Mubarak regime in terms of vote buying.

Despite the strength of the Mubarak vote-buying machine, the Brotherhood engaged with voters through other means. The Muslim Brotherhood established charities and hospitals from which poor voters benefitted. Some believe that the Brotherhood gained its prominence in 2005 partially through its provision of services such as charity, healthcare, education and welfare (Masoud 2014). The Brotherhood does provide services to the poor of all religious affiliations, through a variety of Islamic charities and by providing safety-net type services to its members (Masoud 2014; Kandil 2015). At times of elections, the Brotherhood has explicitly published newspapers about the services that its candidates provide to the poor and the amount of money it has spent in certain districts (Masoud 2014). While the Brotherhood certainly could not compete with the size and networks of the Mubarak regime's vote buying machine, it did have the ability to provide social

services to poor Egyptians, who in turn may have voted for Brotherhood candidates. Egyptians overwhelmingly vote for candidates who they perceive as “helpful” rather than those who offer “good reputations” or “good programs” (Masoud 2014). Egyptian voters also evaluate political parties on their ability to provide (Masoud 2014). The Muslim Brotherhood’s electoral victories in 2005, coupled with the fact that it was known to have restrained its success due to agreements with the regime, suggest that it had a well-established, supportive voter base in the districts it won (Masoud 2014). This support may signal a network of benefits from the Brotherhood in the districts that elect its candidates.

The Mubarak regime did indeed constrain the Muslim Brotherhood’s influence in Egypt, both by directly bribing Egyptians to support the regime and by inhibiting the Brotherhood’s campaigns after 2005. In the 2010 parliamentary elections, the Mubarak regime punished the Muslim Brotherhood by physically harassing and intimidating the party and its supporters (Wickham 2013; Masoud 2014). The regime also used propaganda against the Brotherhood and published its violent harassment of the Brotherhood in the media in attempts to influence the Egyptian public (Elmasry 2013). Regardless of the mechanism through which the Muslim Brotherhood obtained support from its constituents in the parliamentary districts in which it succeeded, we expect that these districts experienced some form of punishment from the Mubarak regime.

The effect of the regime’s punishment of the Muslim Brotherhood may have impacted different constituents in different ways. In order to understand the impact on women, it is important to explore the Muslim Brotherhood’s ideology regarding women. The Muslim Brotherhood does not make explicit statements on women’s employment. The Muslim Brotherhood positions itself as a protector of the Egyptian family rather than an oppressor of women, but simultaneously does not allow women in leadership positions in its organization or the Egyptian government (Blaydes 2010; Brown and Hamzawy 2008). In the 2005 parliamentary elections, women went to great lengths to show their support for the Muslim Brotherhood, and have always played an instrumental role in recruiting both members and voters (Blaydes 2010). While the Brotherhood movement allows

women to take positions in political organizing and in the spreading of religious values, it bars them from leadership positions and political office (Antar 2006). Mohamed Morsi, the Muslim Brotherhood member and President of Egypt in 2012, believed that women could not be heads of state. The Brotherhood, historically and in 2005, believed women's rights were only to be mentioned in the context of religion and under the condition that women balance their duties to their families and to society (Aly 1982). Furthermore, the Muslim Brotherhood touts human rights but believes women should hold the positions that preserve their virtue (Khalil 2006). In 2005, only three Brotherhood candidates fielded in the parliamentary elections were women, consistent with the number of female candidates in other years. We expect that given the Muslim Brotherhood's emphasis on the female role in the household and on the importance of women maintaining virtue, they would not encourage women to participate in the labor force over taking on a role in the household. We expect that women who do participate in the labor force and are supportive of the Muslim Brotherhood participate in the labor force out of financial necessity and out of a financial duty to their family.

## **Women's labor force participation in Egypt**

The reluctance to participate in the labor force exemplified by the Muslim Brotherhood's constituents may also extend to the general female Egyptian population. Egypt has one of the largest gender gaps in labor force participation in the world. According to the World Economic Forum's Gender Gap Report in 2012, Egypt ranks 130 out of 135 in women's labor force participation. Two main definitions of labor force participation exist: the market labor force and the extended labor force. The market labor force consists of individuals who engage in, or seek, economic activity for market exchange. The extended labor force includes the market labor force as well as those who produce and process primary products for the market, for trade, and for their own consumption. Rural women in Egypt often engage in subsistence work that is not accounted for by the market labor force definition (Assad and Krafft 2013; Hendy 2015). For the purposes of this paper, I will use the extended definition of the labor force in order to ensure the

inclusion of rural women.

Following the international economic crisis of 2008 and the Egyptian Revolution in 2011, the Egyptian economy has weakened. As predicted by the aging of the large population of youth born in the 1980s into the labor force, male labor force participation increased slightly between 2006 and 2012. Contrary to this trend, however, female labor force participation decreased, even in spite of increasing levels of female education (Assad and Krafft 2013). According to Assad and Krafft (2013), who analyze trends in the Egyptian Labor Market Panel Survey (ELMPS), female extended labor force participation rates have contracted from 46.4 percent in 2006 to 34.4 percent in 2012. Hendy (2015), who analyzes trends in women's labor force participation in particular using the ELMPS, concludes that Egyptian women have been participating decreasingly in the labor force and that unemployment rates have increased for those who do participate due to a shrinking government sector, private sector discrimination, and excess female labor supply. In addition, the burden of recent privatization and globalization in Egypt has fallen heavily on women: the wage gap is three times greater in the private sector than in the public sector and gender-based segregation in the private blue-collar workplace has not decreased, so women continue to face barriers in the workforce (El-Hamidi and Said, 2008).

On the supply side, marriage, fertility, sector preferences and reservation wages can influence women's decisions to enter the labor force in Egypt. Private sector work, for instance, requires longer hours and offers fewer benefits than government work, especially for married women (Hendy 2015). According to Assad and Krafft (2013), the decline in female labor force participation is partially explained by the shrinking of the government sector and the excess supply of educated females, as the government is the largest employer of educated females in Egypt (Assad and Krafft 2013). Since the termination of an Egyptian policy guaranteeing government employment to secondary school graduates in the 1990s, employment for the educated has become less certain (Assad 1997). Hendy's (2015) analysis of the ELMPS suggests that the share of females in the public sector has declined, and the share of females in the private informal sector has decreased in urban

areas from 2006 to 2012. A smaller government sector and a discriminatory private sector can discourage women from wanting to participate in the labor force.

## **Economic analysis of labor force participation in Egypt**

The decision to enter the labor force also varies by individual characteristics. Although they do not focus on labor force participation, Assad and El-Hamidi (2009) study the determinants of women's employment in Egypt. Assad and El-Hamidi (2009) categorize women's employment in four ways: non-wage agricultural labor, regular wage work, casual wage work, and non-agricultural non-wage work. Using a multinomial logit model, the authors find that a woman's probability of employment differs based on her individual characteristics and her type of employment, and caution against grouping women into one bloc.

The authors find that the most salient predictors of a woman's type of work and her decision whether to work are education level, age, marital status, work status of her male household members, and her status in the household (Assad and El-Hamidi 2009). Female wage work is much more common in urban areas than rural areas, wage workers tend to be younger than non-wage workers, are more likely to come from households in which there are also male wage workers, and are more likely to have a secondary education (Assad and El-Hamidi 2009). Common examples of wage work include government work, such as teaching, clerical work, or health work. Common non-wage work includes agriculture, family enterprises, and trade (Assad and El-Hamidi 2009). Increased education decreases the likelihood of non-wage work, and age increases the likelihood of work until age 30, while the trend reverses at age 40 (Assad and El-Hamidi 2009). Rural women are more likely to participate in the labor force than are urban women under the extended definition, because many of them engage in subsistence activities, and education level does not significantly impact participation in rural areas, but it increases likelihood of participation significantly for urban areas (Hendy 2015; Assad and El-Hamidi 2009). The authors find that being unmarried increases likelihood of labor force participation by almost 100 percent for urban women and 25 percent for rural women (Assad and

El-Hamidi 2009). Once married, marriage does not strongly affect a woman's type of work, except that ever-married women are more likely to work in government and never-married women are more likely to work in private, informal labor (Hendy 2015). Women are more likely to participate in the labor force if there's a farmer in their family, and are less likely to work in non-wage non-agriculture as the income from their male household members increases (Assad and El-Hamidi 2009). These trends support the notion that urban and rural women exhibit different trends in labor force participation.

In urban versus rural areas, we expect that the effect of the Muslim Brotherhood's election to parliament will differ. We also expect that women in Muslim Brotherhood-supporting districts with systematically different rates of education or marriage will experience differing changes in labor force participation.

## **Economic analysis of cultural and political influences on labor force participation**

Recent studies of the ELMPS have attempted to exploit recent cultural phenomena to explain trends in female labor force participation. For example, recent unrest in Egypt has affected the determinants of female labor force participation. El-Mallakh et al. (2015) analyze the effect of the protests of the 2011 Egyptian Revolution in particular on female labor force participation by using the number of martyrs on a governorate level as a proxy for intensity of protests. They find that women's labor force participation increased in the aftermath of the 2011 revolution in areas in which protesting was more concentrated, especially for women whose families were in the lowest two income quartiles (El-Mallakh et al. 2015). On average, a one standard deviation increase in number of "martyrs," or people killed in protests, leads to a 13 percentage point increase in likelihood of labor force participation by their estimates. They hypothesize that women in these areas entered the labor force in order to replace the men in their families who were protesting or who died protesting, and that a negative income shock from protesting overpowers the social norms that discourage women from working (El-Mallakh et al. 2015). In other words, female labor force participation may have acted as insurance

against idiosyncratic risks within a family, given the volatility in male working hours and income caused by participation in the protests and the effects of having concentrated protests in a geographic area. They find that with increased intensity of protests, both women's employment and unemployment increase (El-Mallakh et al. 2015). El-Mallakh et al. (2015) also find a slight (-0.003 percentage point) decline in female labor force participation in their overall sample between 2006 and 2012 using the ELMPS, but an increase in labor force participation in governorates in which the revolution was more concentrated. The governorate-level analysis in this study inhibits accuracy, as it is difficult to make inferences on a governorate level due to heterogeneity in the explanatory variable, protest intensity. However, it provides insight into the way in which recent political phenomena affect female labor force participation.

In an attempt to analyze how social norms affect female labor force participation, Nazier and Ramadan (2016) tabulate data on opinion questions regarding women's empowerment from the 2012 ELMPS and find that Egyptian women's labor force participation decisions are correlated with women's beliefs on empowerment at a governorate level. Nazier and Ramadan (2016) find that 26 percent of women believe that women should be financially autonomous and on average, 40 percent believe that a man can beat his wife (Nazier and Ramadan 2016). In their sample, 26 percent of Egyptian women are in the labor force, presumably under the extended definition (Nazier and Ramadan 2016). Nazier and Ramadan find no effect of number of children or education level on labor force participation in general. They find that community beliefs and norms, however, play an important role in determining whether women participate in the labor force. Nazier and Ramadan (2016) find that for a given governorate, belief that a woman who holds a full time job cannot be a good mother and that a man can beat his wife are negatively correlated with labor force participation and belief that women should be financially autonomous is positively correlated with labor force participation (Nazier and Ramadan 2016). Interestingly, the belief that female circumcision should continue is also positively correlated with female labor force participation (Nazier and Ramadan 2016). Given that community norms may differ in Muslim Brotherhood-supporting areas, labor

force participation may respond to this difference. The heterogeneity of social norms within each governorate, however, necessitates a further study of these results.

Recent studies suggest that political unrest and social norms, both of which likely systematically differ in Muslim Brotherhood supporting districts, affect female labor force participation. It thus makes sense to investigate the effects of political and religious shifts in power on women's labor force participation decisions. We expect that district-level support for the Muslim Brotherhood affects female labor force participation in one of two ways:

(1) The Mubarak regime economically punishes Muslim Brotherhood supporting districts, leading to an increase in female labor force participation because females enter the labor force in order to compensate for negative income shocks experienced by males in their households, or

(2) Women do not join the labor force after their Muslim Brotherhood-supporting district is punished by the Mubarak regime because the Muslim Brotherhood imposes its cultural norms of discouraging women to work once it gains parliamentary seats in a district. In addition, strong social and charity networks in Muslim Brotherhood supporting districts may alleviate the need for women to enter the labor force following negative income shocks to their households.

## Data

### Ideal data

Ideally, I would be able to match an individual's degree of Muslim Brotherhood support, measured by membership and by whether the individual votes for Muslim Brotherhood candidates, with the electoral success of the Muslim Brotherhood in the individual's district as well as the individual's labor market outcomes. This data would allow me to measure whether Muslim Brotherhood parliamentary power in a district differentially affects its members and strong supporters. In the absence of this data, I instead use

the ELMPS and voting data from the 2005 parliamentary elections. These two sources provide information on individual labor force participation, demographic characteristics, and geographic voting patterns. I explain my methods for matching voting data and labor market data later in this section.

## The Egyptian Labor Market Panel Survey

The main source of data in this paper is the Egyptian Labor Market Panel Survey (ELMPS), conducted in 1988, 1998, 2006, and 2012. The ELMPS surveys nationally representative samples of the population in each of Egypt's 26 governorates. The survey includes a variety of questions on demographic characteristics, employment patterns, family characteristics, and migration. The ELMPS also records geographic identifiers, which I match with election data. In this paper, I will focus on the 1998, 2006 and 2012 surveys. The 1998 round allows me to check for time trends, and I use the 2006 and 2012 rounds due to their proximity to the Muslim Brotherhood's rise to parliamentary power.

Of the 49,186 individuals surveyed in 2012, 22,780 were also in the 2006 survey. According to the Assad and Krafft (2013), two kinds of attrition occurred from 2006 to 2012: (1) if enumerators were unable to locate households in 2012, and (2) if household members died or relocated. The first type of attrition occurred at a rate of 14 percent, while the second occurred at a rate of 30 percent, by Assad and Krafft's calculations. Researchers at the Egyptian Central Agency for Public Mobilization and Statistics (CAPMAS) accounted for the attrition by placing weights on the population in the 2012 round. I discuss the potential problems with attrition and how I correct for them in my Robustness section.

For my analysis, I begin with the panel dataset including only 2006 and 2012 data, and manipulate the 1998 data separately for a variety of reasons<sup>2</sup>. In order to ensure that the sample includes only individuals who are of labor force participation age, I trim the sample by deleting observations for those who are not within the 16-64 age range in

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<sup>2</sup>The panel data is collected both by individual and by round, such that one dataset counts each individual multiple times but does not match on ID, and another counts each individual as one observation and records his or her information for each year as a different variable, including ID. I use a combination of both.

both time periods. Due to enumeration problems, some of the individuals in the sample mistakenly reported their age or date of birth in one or both time periods, so I drop their observations. Because I use birth year as a measure of age, my sample includes individuals born in 1990 who did not yet turn 16 when the survey was administered, so I drop observations for those who were 15 in 1990. This trims my sample by 1,438 observations. In addition, I also drop 64 observations for those whose gender changes between survey rounds. At this point, I append the 1998 data to the sample, trimming accordingly for age and gender changes. Ultimately, I use a sample of 51,879 observations and 35,491 individuals. Of the individuals, 6,498 are observed in all three time periods, 5,601 are observed in 1998 only, 3,040 are observed in 2006 only, 8,194 are observed in only 2006 and 2012, and 3,678 are observed in only 1998 and 2006. The combination of individuals observed in all three time periods, in two time periods, and in one time period allows for both individual fixed effects analysis and cross-sectional analysis with district fixed effects.

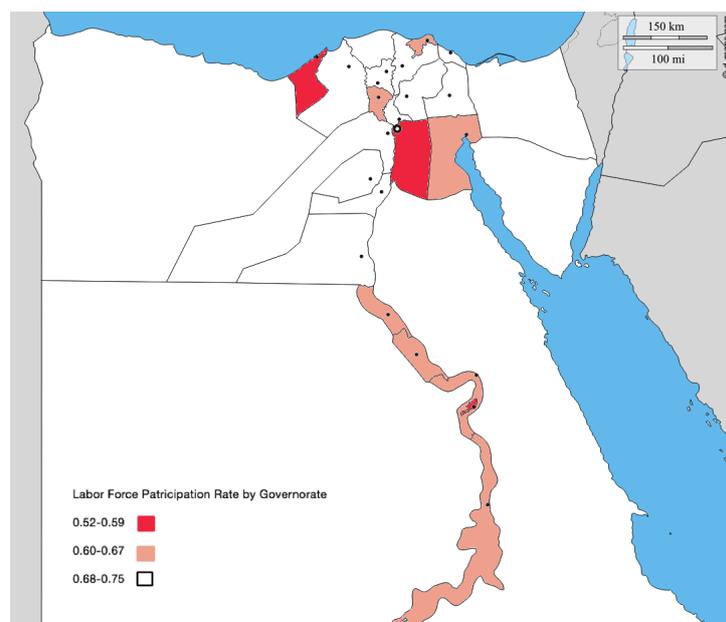
From my analysis, 6,327 individuals moved districts between 2006 and 2012. Among those, 2,190 are from Muslim Brotherhood supporting districts and 4,137 are from non-Muslim Brotherhood supporting districts. A net of only 44 individuals in the panel migrated from non-Muslim Brotherhood supporting areas to Muslim Brotherhood-supporting areas, making inter-district migration insignificant to the treatment variable. In my robustness section, I also account for movement between districts, regardless of Muslim Brotherhood support.

The ELMPS includes variables on individuals' demographics, education, labor force participation, occupation type, employment status, marriage and family characteristics. Figure 1 shows labor force participation rates on a governorate level, with labor force participation rates increasing as the shade of the governorate gets lighter. As expected, governorates that are more urban, like Cairo and Suez, have lower proportions of labor force participation. The governorates with the highest rates of labor force participation tend to be rural. In addition to the variables in the ELMPS, I generate variables to measure average unemployment and labor force participation on a district-level. I also create

a variable that measures network strength, by measuring the proportion of individuals who receive their jobs through friends and relatives.

I choose to use labor force participation as the outcome variable because the decision to participate in the labor force is more in an individual's control than employment. Egypt's economic climate and the international economic recession that occurred between 2006 and 2012 had an adverse impact on employment, so employment outcomes in Egypt reflect the macroeconomic forces in the country rather than the individual characteristics that predict employment. While unemployment is only calculated for those in the labor force, and can thus give us an idea of who gets hired, I am interested in who makes the decision to work. Furthermore, the decision to enter the labor force can reflect cultural norms: if women are expected to stay at home and care for their children, or are expected not to work after marriage, this decision is reflected in labor force participation, whereas an unemployed woman after marriage might be a sign of discrimination or factors external to her own decision. The analysis could be conducted using unemployment or hours worked as the left hand variables, for example. I address these options in my robustness section.

Figure 1: Labor Force Participation by governorate

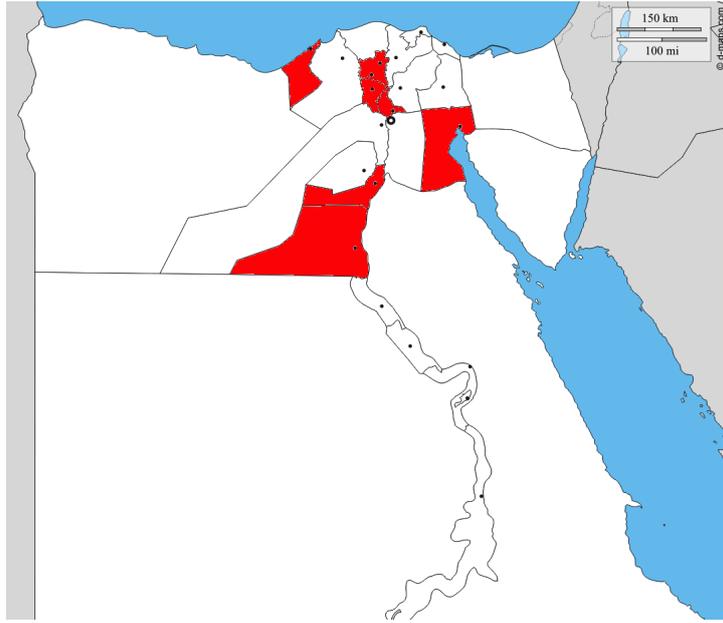


## Voting data

In order to classify districts in Egypt as “Muslim Brotherhood supporting,” I use voting data from the 2005 parliamentary elections. I chose the 2005 parliamentary elections because 2005 was the year in which the Muslim Brotherhood saw the largest gains in political power, despite the fact that they were banned from running as a party and instead ran as independent candidates. In addition, barring the slight interference of the Mubarak regime with the third round of election results in 2005, this election was much more free and fair than most others in Egypt’s history.

I obtained my voting data from Professor Lisa Blaydes in Stanford’s Political Science department. The data she provided lists each Muslim Brotherhood member who won a parliamentary seat by name, and lists the voting district in which he won as well as the governorate in which the voting district is located. The data show that 88 Muslim Brotherhood candidates won in 86 districts. Professor Blaydes also provided me with a document recording each of Egypt’s 444 elected parliamentary seat winners, categorized by governorate, voting district, and party, which I use to verify the Muslim Brotherhood winners by name. Neither document is currently publicly available. Figure 2 shows Muslim Brotherhood supporting governorates in red. Comparing Figure 2 to Figure 1 above, there is no clear link between labor force participation rate and governorate-level Muslim Brotherhood support, which reinforces the need for analysis at the more granular district level.

Figure 2: Labor Force Participation by governorate



## Merging voting and panel data

In each of Egypt's 222 voting districts, there are 2 parliamentary seats. If a Muslim Brotherhood member was elected to at least one seat in a voting district, I classify the district as supportive, as literature indicates that the Brotherhood establishes a presence and a rapport with the local population in a district before fielding a candidate (Wickham 2013). Next, I match the Arabic names of these voting districts, using both text matching on Excel and manual observation, to the geographic districts used in the Labor Market Panel Survey. The survey includes 353 geographic districts, while there are only 222 voting districts. I match voting districts to geographic districts with the same name, noting that some voting districts encompass more than one geographic district. This method is imperfect and is guaranteed to underestimate support for the Muslim Brotherhood in Egypt. While 86 out of 222 voting districts supported the Brotherhood, only 87 out of 353 geographic districts are coded as supportive of the Muslim Brotherhood. I chose to remain conservative in case, for example, the subset of the voting district that picked a Muslim Brotherhood candidate is concentrated in one geographic district within that voting district.

## Weaknesses of the data

My data poses some issues for empirical analysis. First, the datasets do not allow for perfect matching of voting districts to geographic districts, so not every district that elected a Muslim Brotherhood candidate to parliament maps to a geographic district in the ELMPS. Because there are more geographic than voting districts, the number of Muslim Brotherhood supporting districts may be underestimated in my analysis. Second, the data allows for an estimation of Muslim Brotherhood support on a district-level, so all individuals living in a district that elected a Muslim Brotherhood candidate to parliament in 2005 are classified as Muslim Brotherhood supporting, regardless of their individual vote. Given that average voter turnout in the 2005 parliamentary election was 23 percent (International Republican Institute 2005), this measurement of support might overestimate individuals' support for the Muslim Brotherhood. By classifying support for the Muslim Brotherhood on a district-level, I cannot account for variation in Muslim Brotherhood support or engagement with the Muslim Brotherhood within a district. Thus, it is possible that my estimated effects of district-level Muslim Brotherhood support on individual labor force participation are not completely accurate.

The ELMPS also poses threats to my difference in differences analysis. The lack of pre-periods and lack of frequency of the panel data make it difficult to infer what the trends in labor force participation would have been in the absence of the Muslim Brotherhood's success. I use three time periods, 1998, 2006, and 2012, in an attempt to account for inherent trends in labor force participation, but my data may be missing changes in labor force participation between each survey round. Another threat to the difference in differences analysis is the attrition from the panel. This threatens my estimation of linear time trends. The composition of the pre-period and post-period samples would ideally be comparable. This way, we can infer that differences in labor force participation between the two time periods are due to the treatment and not to selection into the sample. Attrition can violate this assumption. In order to account for the attrition, I attempt to use a Heckman correction, discussed in my robustness section.

In addition, while the ELMPS measures a variety of employment, migration, and

demographic outcomes, many of these variables are missing for a large majority of the respondents, which hinders my analysis. For example, most respondents did not answer questions on women's empowerment and women's working conditions.

## **Summary statistics**

Table 1 shows the summary statistics for variables that might explain labor force participation, by district Muslim Brotherhood support. The first two columns show the mean and standard deviation of each variable for Muslim Brotherhood supporting districts, and the third and fourth column display the same information for non-Muslim Brotherhood supporting districts. The fifth and sixth columns show the magnitude of the difference in means (for Brotherhood supporting versus non-supporting) for each variable as well as whether the difference is significant by a t-test for difference in means.

The variables on which Muslim Brotherhood supporting versus non-supporting districts vary the most are urbanicity and wealth decile. Muslim Brotherhood supporting districts are 14 percentage points more likely to be urban, and those who live in Muslim Brotherhood supporting district are on average 0.34 wealth deciles higher on the country's wealth distribution. Other notable differences include the fact that those in Muslim Brotherhood supporting districts are 3 percentage points less likely to be highly educated (2 percentage points for women) and people in Muslim Brotherhood supporting districts spend more hours on both subsistence and market work.

I will discuss the implications of the baseline differences in means between Muslim Brotherhood supporting and non-supporting districts, and how I control for them, in my Methodology section.

## **Methodology**

### **Estimation models**

I display each model first in its basic form, and second including the time trends and fixed effects controls used in my analysis.

Table 1: Summary Statistics at baseline

	MB districts		non MB districts		Difference	Differences significant?
	mean	sd	mean	sd		
Urban	0.64	0.48	0.50	0.50	0.14	YES
Wealth decile	5.73	2.84	5.39	2.87	0.34	YES
LFP	0.62	0.49	0.65	0.48	0.03	YES
Total Wages (3-month)	1756.14	2302.89	1698.35	1961.49	66.79	NO
Married	0.60	0.49	0.61	0.49	0.01	NO
High schooling	0.42	0.49	0.45	0.50	0.03	YES
District unemployment	0.08	0.04	0.08	0.05	0.0	YES
Female X Wealth decile	2.88	3.51	2.71	3.39	0.17	YES
Female X LFP	0.21	0.41	0.24	0.43	0.03	YES
Female X Married	0.32	0.47	0.33	0.47	0.01	NO
Female X High schooling	0.23	0.42	0.25	0.43	0.02	YES
Female X district unemployment	0.04	0.05	0.04	0.05	0.0	YES
Network Strength	0.09	0.28	0.07	0.26	0.02	YES
Hours Market work	48.52	15.75	48.47	16.92	0.05	NO
Hours Subsistence work	45.62	19.62	42.33	22.10	3.29	YES
Leave MB district	0.02	0.15	0.00	0.00	0.02	YES
Move to MB district	0.00	0.00	0.02	0.12	0.02	YES
Observations	7663		13904		21567	

## Difference in Differences with District Fixed Effects

My basic model is a difference in differences regression using district fixed effects<sup>3</sup>:

$$y_{idt} = \beta_0 + \beta_1 Female_i + \beta_2 Post_t + \beta_3 Female_i * Post_t + \beta_4 Post_t * MBdistrict_d + \beta_5 MBdistrict_d * Female_i + \beta_6 MBdistrict_d * Female_i * Post_t + \lambda_d + \epsilon_{idt}$$

Including my controls for linear time trends and for age fixed effects, the regression is as follows:

$$y_{idt} = \beta_0 + \beta_1 Female_i + \beta_2 Time_t + \beta_3 Post_t + \beta_4 Post_t * MBdistrict_d + \beta_5 Time_t * MBdistrict_d + \beta_6 Time_t * Female_i + \beta_7 MBdistrict_d * Female_i + \beta_8 Time_t * MBdistrict_d * Female_i + \beta_9 MBdistrict_d * Female_i * Post_t + \lambda_d + i.age_i * Post_t \delta_1 + i.age_{it} * MBdistrict_d \delta_2 + X_i \gamma + \epsilon_{idt}$$

## Difference in differences with individual fixed effects

With individual fixed effects, the observable individual elements that remain constant across time periods are invariant in the regression and thus drop. In addition, with individual fixed effects, the regression is over-specified if I include age fixed effects. Thus, I drop the age fixed effects and control for age alone rather than for age fixed effects. I maintain my linear time trends controls.

The general regression with individual fixed effects is as follows:

$$y_{idt} = \beta_0 + \beta_1 Post_t + \beta_2 Post_t * MBdistrict_d + \beta_3 Post_t * Female_i + \beta_4 MBdistrict_d * Female_i * Post_t + \lambda_i + X_i \gamma + \epsilon_{idt}$$

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<sup>3</sup>Note that the MB district coefficient drops here because I use district fixed effects

Including my controls for linear time trends, the regression becomes:

$$\begin{aligned}
y_{idt} = & \beta_0 + \beta_2 Time_t + \beta_3 Post_t + \beta_4 Post_t * MBdistrict_d + \beta_5 Time_t * MBdistrict_d \\
& + \beta_6 Time_t * Female_i + \beta_8 Time_t * MBdistrict_d * Female_i + \\
& \beta_9 MBdistrict_d * Female_i * Post_t + \lambda_i + X_i \gamma + \epsilon_{idt}
\end{aligned}$$

Where  $X_i \gamma$  is a vector of controls, identified in the Results section.

Where  $y_{idt}$  is labor force participation.

- Post is an indicator for the individual's presence in the 2012 survey round.
- Female is an indicator for females.
- MB district is an indicator for living in a district that supported the Muslim Brotherhood in the 2005 elections
- The variable  $\lambda_i$  indicates individual fixed effects, and the variable  $\lambda_d$  indicates district fixed effects.
- My coefficient of interest is the coefficient to MB district\*Female \*Post, which measures the incremental change in likelihood of labor force participation experienced by people who satisfy the triple interaction: women in Muslim Brotherhood supporting districts in 2012. A significant positive coefficient would suggest that women in Muslim Brotherhood supporting districts saw an incrementally increased likelihood of labor force participation compared to those in non-supporting districts. A significant negative coefficient would suggest that women in Muslim Brotherhood supporting districts saw an incrementally decreased likelihood of labor force participation compared to those in non-supporting districts.
- The  $Time_t$  variables account for linear time trends.
- Each set of  $i.var$  variable accounts for age fixed effects. I include these variables in order to account for inherent differential trends in labor force participation over time

based on age, or birth year. I interact these fixed effects dummies with the treatment variable in case, perhaps, Muslim Brotherhood norms or labor force participation opportunities in Muslim Brotherhood supporting districts affect those in different age cohorts differentially.

## **Identification strategy**

Because the “treatment”–district support for the Muslim Brotherhood in the 2005 elections–did not occur randomly in Egypt, I need quasi-experimental methods to estimate the effects of the election of the Muslim Brotherhood to parliament on women’s labor force participation. To do this, I use a difference in differences estimation strategy, which allows for the comparison of the effect of an exogenous change or event on a treatment and control group over time. I exploit the fact that the Muslim Brotherhood experienced huge gains in electoral support in 2005 and subsequently suffered punishment from the Mubarak regime between 2006 and 2012, and I investigate the average estimated effect of living in a Muslim Brotherhood-supporting district in 2005 on a woman’s labor force participation in 2012. For robustness, I use individual and district fixed effects, linear time trends, detrended difference in differences, and a Heckman correction.

## **Reverse causality and endogeneity**

Because of the inherent differences between Muslim Brotherhood supporting and non-supporting districts, we must consider the case that females who hold beliefs that make them less likely to participate in the labor force were compelled to vote for the Muslim Brotherhood because of their beliefs. In this case, lack of female labor force participation would have caused people to vote for the Brotherhood and not the other way around. I rule out this possibility by noting that the districts and governorates that support the Muslim Brotherhood change from election to election<sup>4</sup> regardless of trends in labor force participation, so support for the Muslim Brotherhood cannot solely depend on district characteristics that also predict labor force participation. A strong Muslim

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<sup>4</sup>Based on data from AlJazeera, Jadaliyya, and Wikipedia

Brotherhood presence can signal strong Muslim Brotherhood campaigning in a district, but does not necessarily mean that the district's inhabitants support the Brotherhood's culture. While I addressed the claim that labor force participation tendencies could cause individuals to vote for the Muslim Brotherhood, I did not address the potential endogeneity problem.

Districts that support the Muslim Brotherhood in parliamentary elections are inherently different from those that do not, and some of the characteristics on which they differ are also predictors of labor force participation. Urbanicity, for example, is both highly correlated with support for the Muslim Brotherhood and labor force participation, so I must account for the fact that Muslim Brotherhood support can affect labor force participation through urbanicity. In order to do so, I control for urbanicity and conduct my regressions separately on urban and rural populations. Other characteristics that differ significantly for Muslim Brotherhood supporting and non-supporting districts and are also predictors of labor force participation include district-level unemployment and education level. I address these characteristics in a similar manner to the manner in which I address urbanicity: by controlling for them in my regression and by interacting them with linear time trends. I recognize, however, that these inherent differences pose a significant threat to my analysis.

## **Parallel trends**

The parallel trends assumption must hold for a simple difference in differences estimation. The assumption dictates that both the "control group," in this case people in non-Muslim Brotherhood supporting districts, and the "treatment group," in this case people in Muslim Brotherhood supporting districts, exhibit similar trends in terms of our outcome variable, labor force participation, before the "treatment" occurs. If the two groups indeed exhibit parallel trends, then we expect that there is no significant difference in women's labor force participation for those living in districts that elected Muslim Brotherhood candidates to parliament in 2005 versus those who are not in the period before 2005. I use data from the ELMPS from 1998 and 2006 to test this theory, assuming

random attrition and noting that the 1998 survey over-sampled urban households (Assad and Krafft 2013).

To empirically test for the inherent differential trends in labor force participation for women in Muslim Brotherhood supporting versus non-supporting districts, I conduct a difference in differences analysis using my “pre” period data from the 1998 and 2006 ELMPS. Table 2 displays the results of this analysis, using the cross-sectional sample and the panel sample of individuals present in both time periods using individual fixed effects. Figures 3, 4, and 5 show the time-trends in labor force participation for individuals over all three time periods, using the entire cross-sectional sample. The time-trends indicate a differential change in labor force participation by Muslim Brotherhood support that occurred throughout Egypt: labor force participation rates increased for men from 1998 to 2006. Rates decreased slightly for women by the cross-sectional estimation and increased slightly for women by the individual fixed effects estimation. While trends in men’s labor force participation do not appear to differ by Muslim Brotherhood support (the coefficient to MB district X in 2006 is insignificant), trends in female labor force participation do appear to differ by Muslim Brotherhood support. From 1998-2006, female labor force participation in Muslim Brotherhood supporting districts increases faster than that in non-Muslim Brotherhood supporting districts. This trend is significant by the cross-sectional analysis but not by the individual fixed effects analysis. It is important to account for this differential trend in the data, so that we do not attribute the change in female labor force participation to the Muslim Brotherhood’s rise to parliamentary power. Table 12 in Appendix A shows the initial district fixed effects regression in column 1 and individual fixed effects regression in column 2. These are the results for regressions using only 2006 and 2012 data, and thus not accounting for time trends. Note that there is a significant trend for the coefficient of interest by the district fixed effects model, and by the individual fixed effects model at the 0.10 level.

In my analysis, I will include the 1998 data and use linear time trends, and year and age fixed effects to control for the pre-existing differential trends in labor force participation between my “treatment” and “control” groups. I also use linear time trends

interacted with each control variable to ensure that I take into account the way in which each variable changes over time.

I choose to use linear time trends interacted with controls and with the treatment in order to account for the inherent trends in labor force participation over time and to essentially “detrend” the labor force participation trends that occur in the absence of the treatment. My specifications above and in my results section use this linear time trends strategy. However, this can be done using a detrended difference in differences strategy in which I subtract the predicted labor force participation for individuals in 2012, based on the trends shown in 2006, from their actual labor force participation in 2012, and estimate my model using the difference in observed and predicted labor force participation. This is an equally valid specification, and is discussed in the Robustness section.

Table 2: Check for Parallel trends in the “Pre” Period

	(1)	(2)
	LFP-whole sample	LFP-individual FE
	$\beta$ / SE	$\beta$ / SE
MB district X Female X in 2006	0.056** (0.020)	0.033 (0.024)
MB district X in 2006	-0.004 (0.014)	-0.008 (0.017)
Female X in 2006	-0.062** (0.012)	-0.181** (0.014)
in 2006	0.055** (0.009)	0.190** (0.010)
Constant	0.777** (0.007)	0.565** (0.004)
Observations	35295	31302
ymean	0.628	0.635

\*  $p < .05$ , \*\*  $p < 0.01$ . Standard errors in parentheses.

Figure 3: Labor Force Participation 1998-2012

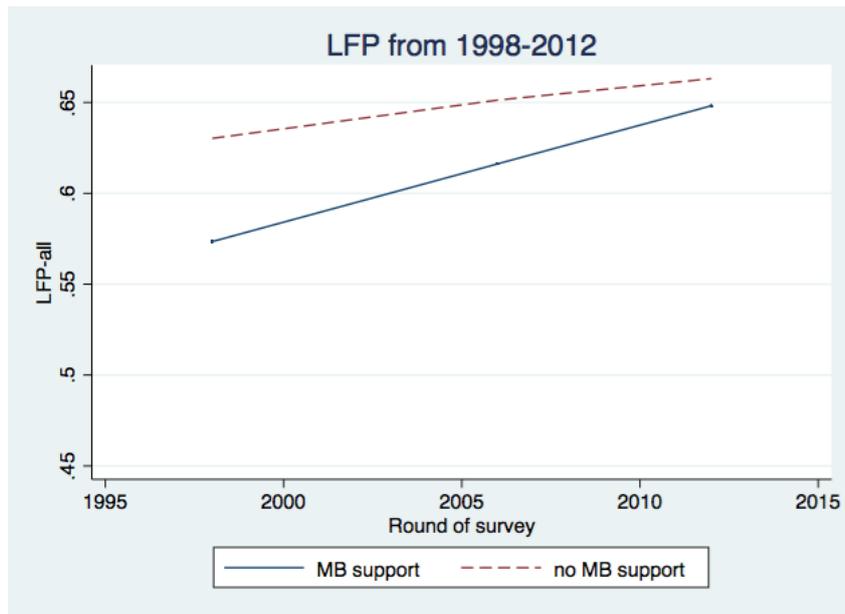


Figure 4: Women's Labor Force Participation 1998-2012

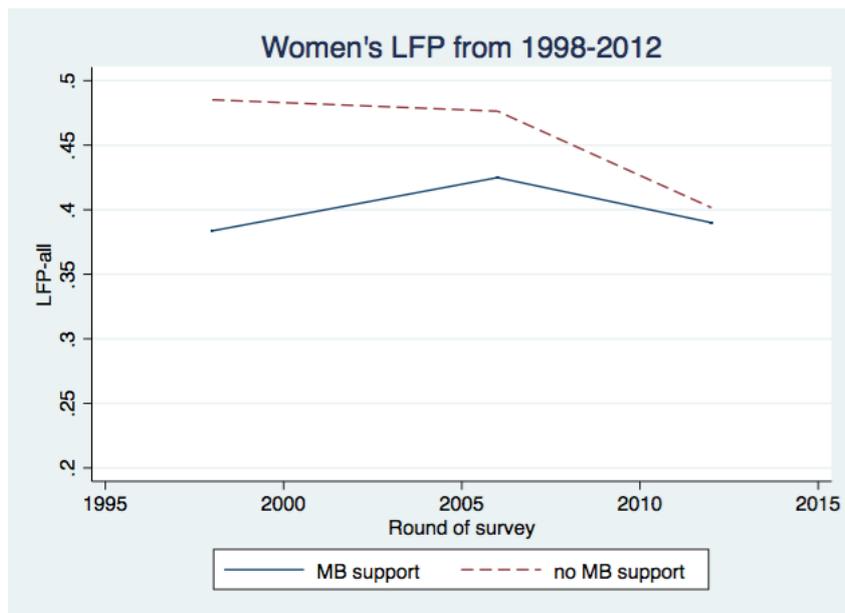
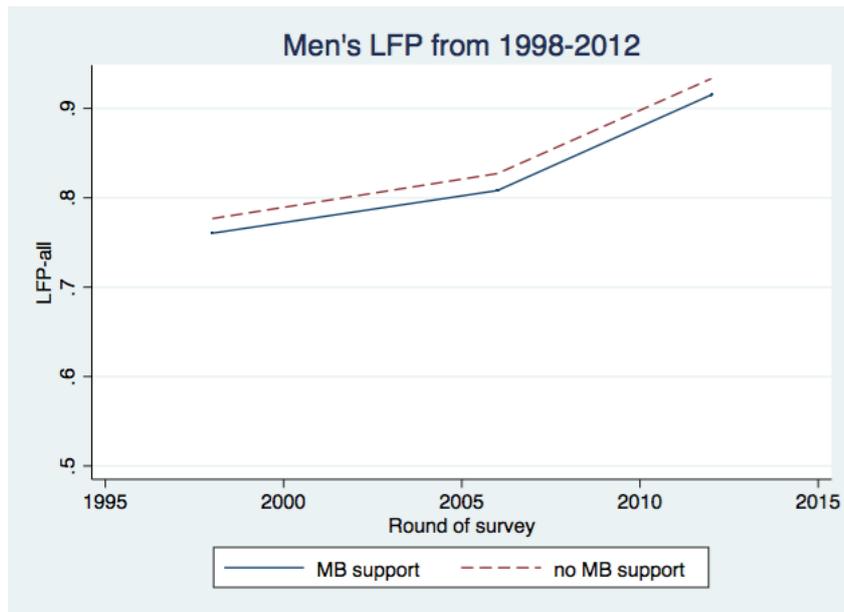


Figure 5: Men's Labor Force Participation 1998-2012



## Individual fixed effects versus cross-sectional analysis with district fixed effects

The ELMPS panel data is unbalanced, and attrition after the 2006 survey round is nonrandom on some characteristics. The individual fixed effects model includes the individuals who are present in both survey rounds, and, due to differential attrition, under-samples female labor force participants in non-Muslim Brotherhood supporting districts. This potentially underestimates the gap in Brotherhood supporting and non-supporting female labor force participation in 2012. The individual fixed effects model cannot account for selection into the panel. The individual fixed effects model instead controls for observable idiosyncratic differences that remain the same across time. The cross-sectional model cannot account for these idiosyncratic differences unless they are included as controls, but it does allow for a cross-sectional analysis of labor force participation using the entire ELMPS sample. The cross-sectional model therefore does not drop individuals who attrite from the survey. If women in non-Muslim Brotherhood supporting districts are indeed valid controls for those in Muslim Brotherhood supporting districts, then the cross-sectional model can yield an accurate estimate. In addition, the use of district fixed effects can also increase the cross-sectional accuracy.

Lechner et al. (2015) compare the advantages and disadvantages of cross-sectional versus fixed effects models on unbalanced panel data (Lechner et al. 2015). When nonrandom attrition affects the sample, fixed effects may avoid biases that affect the cross-sectional model due to confounding of the common support assumption.

Because I can use the 1998 data and control for time fixed effects, I am able to use the cross-sectional data. Thus, I conduct fixed effects analyses using time fixed effects, district fixed effects, and individual fixed effects. Keeping in mind the advantages of individual fixed effects, I note that the individual fixed effects models may be more accurate than the district fixed effects models in my paper.

## Results

In my results section, I focus on the coefficient of interest identified in the Methodology section. This is the coefficient to the triple interaction: MB district\*Female\*Post. I focus on this in particular because it captures the additional trend in labor force participation impacting females in Muslim Brotherhood supporting districts in 2012. Other coefficients capture trends in labor force participation that have already been studied: women are less likely to participate in the labor force in Muslim Brotherhood supporting districts and women all over Egypt are less likely to participate in the labor force in 2012. I am interested in women in 2012 who also live in Muslim Brotherhood districts, and center my discussion around the coefficients for these women.

## Identifying controls

Before conducting my analysis, I use a probit regression of labor force participation on explanatory variables that traditionally predict labor force participation in my sample to determine which variables to include as controls. Table 3 presents the results of this regression. Column 1 shows the results of the regression on my full sample and column 2 shows the results for females only, both using 2006 as the baseline period. All of the explanatory variables in my regression are significant predictors of labor force participa-

tion. Being female has a strong negative impact on labor force participation. Urbanicity significantly decreases likelihood of labor force participation, especially for women, and age and years of schooling significantly but only slightly increase the likelihood of labor force participation. Being married increases the likelihood of labor force participation overall but decreases the likelihood of labor force participation for women. Household wealth decile significantly decreases the likelihood of labor force participation overall but increases the likelihood for women, meaning that women in wealthier households are more likely to be in the labor force in the sample. District-level average unemployment significantly reduces the likelihood of labor force participation for everyone. Given that these explanatory variables are significant, I can include these predictors in my vector of controls in my estimation models in order to isolate the effect of the “treatment,” district-level support for the Muslim Brotherhood, on women’s labor force participation.

I control for these characteristics in two ways: (1) I cut the data by each characteristic, such that I estimate the effects of Muslim Brotherhood support on female labor force participation separately for the urban and rural population (and similarly for highly educated versus not highly educated populations, etc.) and (2) I include interacted controls with the time trend variable, so that in each regression I can account for the effects of urban\*time, married\*time, high education\*time, and district unemployment\*time, and isolate the effect of Muslim Brotherhood support on women’s labor force participation. This way, I can account for changes in the control variables, such as years of schooling or marital status, over time. For the purposes of this paper, my tables only display the most relevant coefficients. I do not display the coefficients to the predictors in Table 3 because they are already shown to be significant.

Table 3: Salient Predictors of Labor Force Participation

	(1)	(2)
	LFP-all	LFP-women
	$\beta$ / SE	$\beta$ / SE
Female	-1.158** (0.020)	
Years of School	0.035** (0.002)	0.046** (0.003)
Married	0.376** (0.022)	-0.061* (0.029)
Age	0.032** (0.001)	0.029** (0.001)
Wealth decile	-0.075** (0.004)	-0.045** (0.006)
District unemployment	-2.261** (0.223)	-1.777** (0.316)
Urban		-0.624** (0.030)
Constant	0.121** (0.041)	-0.607** (0.051)
Observations	21265	10661
ymean	0.641	0.460

\*  $p < .05$ , \*\*  $p < 0.01$ . Standard errors in parentheses.

## Overall Effects

I begin by running a regression of labor force participation on my right hand variables, with and without controls, for the entire population in my sample. I perform this regression with both district and individual fixed effects. Columns 1 and 3 display district fixed effects results, and columns 2 and 4 display individual fixed effects results. I find that on average, living in a district that supported the Muslim Brotherhood in the 2005 parliamentary elections is correlated with an incrementally smaller likelihood of labor force participation for women in 2012 by the district fixed effects estimation. By the individual fixed effects estimation, women in Muslim Brotherhood supporting districts were slightly more likely to participate in the labor force in 2012 than in 2006. Neither of these estimated effects is significant, which suggests that district-level Muslim

Brotherhood support cannot explain the trend of decreased female labor force participation in Egypt. In addition, the coefficients to “MB\*Post,” which indicate the change in male labor force participation in Muslim Brotherhood supporting districts in 2012, are insignificant as well. This provides further evidence to support the notion that labor force participation trends did not differ significantly between Muslim Brotherhood supporting and non-supporting districts. By all estimations, the impact of district-level Muslim Brotherhood support on female labor force participation in 2012 is within the range of one percentage point.<sup>5</sup>

Table 4: Overall Estimated Effects; Linear Time Trends and District Fixed Effects

	(1)	(2)	(3)	(4)
	General-DFE	General-IFE	General-DFE, controls	General-IFE, controls
	$\beta$ / SE	$\beta$ / SE	$\beta$ / SE	$\beta$ / SE
Female	-0.301** (0.021)	0.000 (.)	-0.290** (0.021)	0.000 (.)
Post	-0.083 (0.081)	-0.157** (0.014)	-0.003 (0.082)	0.420** (0.037)
MB*Post	0.030 (0.018)	0.001 (0.025)	0.033 (0.018)	0.006 (0.026)
Female*Post	-0.151** (0.029)	0.008 (0.039)	-0.152** (0.029)	-0.006 (0.040)
MB*Female * Post	-0.011 (0.045)	0.002 (0.060)	-0.012 (0.045)	0.005 (0.062)
Observations	51435	19323	51435	19323
ymean	0.638	0.679	0.638	0.679

\* p < .05, \*\* p < 0.01. Standard errors in parentheses.

## By urbanicity

Table 5 presents the same regressions, dividing the Egyptian population by urbanicity. I perform this analysis for two reasons: (1) urban women are significantly less likely than rural women to participate in the labor force and (2) urban districts are significantly more likely to support the Muslim Brotherhood in the 2005 elections. Thus, I expect a

<sup>5</sup>For the remaining regressions, I include controls for age, wealth decile, high versus low schooling, urbanicity, marital status, and district-level unemployment, all interacted with time to account for linear time trends in these variables. I will not display the control coefficients in the tables below.

differential effect of the election of the Muslim Brotherhood to parliament on urban and rural women's labor force participation. Column 1 displays the results of the district fixed effects regression, and column 2 displays the results of the individual fixed effects regression for the urban population. Columns 3 and 4 display the results of the regressions for the rural population; column 3 uses district fixed effects and column 4 uses individual fixed effects. The results show that none of the coefficients of interest are significant. The coefficients to the interaction of district Muslim Brotherhood support, gender, and time, however are different in magnitude than they were in the general regression. In the individual fixed effects regression for the rural population, in column 4, the magnitude of the change in female labor force participation is a negative 13.4 percentage points, much higher than the range of negative 1 to positive 1 percentage points found in the general regression in Table 4. This suggests that although insignificant, the change in labor force participation may have affected women in rural Muslim Brotherhood supporting districts differently than it did those in rural non-Muslim Brotherhood supporting districts. In the individual fixed effects model for the rural population, the coefficient to Muslim Brotherhood\*Post is significant and estimates an 8.5 percentage point increase in labor force participation for men in Muslim Brotherhood supporting districts, offsetting the 7 percent decline in men's labor force participation in non-supporting districts in 2012. Perhaps men in rural Muslim Brotherhood supporting districts fared better than men in other parts of the country, but this trend did not affect women and did not necessitate that women enter the labor force. In general, district Muslim Brotherhood support does not differentially impact female labor force participation in urban versus rural districts.

Table 5: Estimated Effects by Urbanicity; Linear Time Trends and District Fixed Effects

	(1)	(2)	(3)	(4)
	Urban-DFE	Urban-IFE	Rural-DFE	Rural-IFE
	$\beta$ / SE	$\beta$ / SE	$\beta$ / SE	$\beta$ / SE
Female	-0.349** (0.023)	0.000 (.)	-0.214** (0.031)	0.000 (.)
Post	-0.058 (0.102)	0.513** (0.043)	-0.024 (0.150)	-0.069** (0.016)
MB*Post	0.027 (0.021)	-0.025 (0.036)	0.026 (0.027)	0.085** (0.028)
Female*Post	-0.057* (0.026)	0.042 (0.039)	-0.220** (0.047)	-0.051 (0.074)
MB*Female * Post	-0.031 (0.041)	0.040 (0.053)	-0.046 (0.078)	-0.134 (0.124)
Observations	28921	11481	22514	7842
ymean	0.593	0.646	0.695	0.729

\*  $p < .05$ , \*\*  $p < 0.01$ . Standard errors in parentheses.

## By education level

Table 6 presents the regressions for those with high versus low education. I choose to divide the population based on education because education is a significant predictor of female labor force participation: women with more years of school are inherently more likely to participate in the labor force, and thus might show a differential trend in labor force participation. Column 1 displays the results of the district fixed effects regression, and column 2 displays the results of the individual fixed effects regression for the highly educated population. Columns 3 and 4 display the results of the regressions for the poorly educated population; column 3 uses district fixed effects and column 4 uses individual fixed effects. I define “high education” as 10+ years, and “low education” as under 10 years. The coefficients of interest are once again similar to those in the general regression but with higher magnitude: in all cases, district support for the Muslim Brotherhood is correlated with a change in female labor force participation of within the range of negative 10 to positive 10 percentage points. Highly educated women in Muslim Brotherhood supporting districts show an increase in labor force participation, while

those with low education show a decrease in labor force participation in 2012. By the district-level fixed effects model for the low education population, shown in column 3, the coefficient of interest is significant, suggesting that women with low education in Muslim Brotherhood supporting districts in 2012 experienced an average decline in labor force participation of 10 percentage points. Interestingly, men in low education Muslim Brotherhood supporting districts saw a significant increase in labor force participation, so trends differ significantly by gender. Perhaps after the rise to power of the Muslim Brotherhood, women with more education found jobs more easily than those with low education because they were more qualified.

Table 6: Estimated Effects by Education level; Linear Time Trends and District Fixed Effects

	(1)	(2)	(3)	(4)
	High education-DFE	High education-IFE	Low education-DFE	Low education-IFE
	$\beta$ / SE	$\beta$ / SE	$\beta$ / SE	$\beta$ / SE
Female	-0.407** (0.030)	0.000 (.)	-0.126** (0.019)	0.000 (.)
Post	0.094 (0.089)	0.244** (0.063)	-0.300* (0.143)	0.508** (0.051)
MB*Post	0.012 (0.027)	0.005 (0.036)	0.053* (0.022)	0.005 (0.035)
Female*Post	-0.238** (0.038)	-0.084 (0.059)	-0.033 (0.027)	0.046 (0.046)
MB*Female * Post	0.078 (0.059)	0.059 (0.090)	-0.099* (0.045)	-0.058 (0.067)
Observations	23472	9422	27963	9901
ymean	0.600	0.615	0.669	0.741

\*  $p < .05$ , \*\*  $p < 0.01$ . Standard errors in parentheses.

## By marital status

Finally, I split the sample by marital status and investigate the effects of the Muslim Brotherhood's rise to power in 2005 on female labor force participation for married versus unmarried women. Married women are inherently slightly less likely to participate in the labor force. Column 1 displays the results of the district fixed effects regression,

and column 2 displays the results of the individual fixed effects regression for the married population. Columns 3 and 4 display the results of the regressions for the unmarried population; column 3 uses district fixed effects and column 4 uses individual fixed effects. In my analysis, “married” indicates that a woman is currently married at the time of the survey, and “unmarried” indicates all other marital statuses: widowed, divorced, and never married. It is possible that unmarried women live with other male family members who provide for them financially. Table 7 displays the results of the regression when the data is cut by marital status. For both married and unmarried women, there is no significant change in labor force participation for women who live in Muslim Brotherhood supporting districts. The coefficients are all positive and insignificant, except for a negative effect in the district fixed effects model for unmarried women, shown in column 3. Due to the lack of significance, we cannot draw conclusions from these estimates<sup>6</sup>.

Table 7: Estimated Effects by Marital Status; Linear Time Trends and District Fixed Effects

	(1)	(2)	(3)	(4)
	Married-DFE	Married-IFE	Not married-DFE	Not married-IFE
	$\beta$ / SE	$\beta$ / SE	$\beta$ / SE	$\beta$ / SE
Female	-0.391** (0.025)	0.000 (.)	-0.112** (0.024)	0.000 (.)
Post	-0.048 (0.100)	0.328** (0.046)	0.093 (0.139)	0.315** (0.100)
MB*Post	0.005 (0.018)	-0.002 (0.021)	0.065* (0.033)	0.013 (0.090)
Female*Post	-0.078* (0.034)	-0.085 (0.051)	-0.154** (0.037)	0.205* (0.100)
MB*Female * Post	0.016 (0.052)	0.019 (0.070)	-0.046 (0.057)	0.057 (0.148)
Observations	33506	14045	17929	5278
ymean	0.682	0.705	0.554	0.612

\*  $p < .05$ , \*\*  $p < 0.01$ . Standard errors in parentheses.

<sup>6</sup>Note that the detrended individual fixed effects model for married women predicts a significant incremental increase in labor force participation in Muslim Brotherhood supporting districts compared to non-supporting districts. I will discuss this further in the robustness section

## Analysis

By all cuts of the data, women in Muslim Brotherhood supporting districts were not significantly differentially likely to participate in the labor force compare to women in non-Muslim Brotherhood supporting districts. However, women with low education were significantly less likely to participate in the labor force in 2012 in Muslim Brotherhood supporting districts, by an average magnitude of 6.6 percentage points by the district fixed effects model. This suggests that the only case in which district-level Muslim Brotherhood support is predictive of a change in female labor force participation is the case in which the woman has a low level of education. This finding is mitigated, however, by the fact that the same coefficient is not significant in the individual fixed effects regression. In general, the data do not support the hypothesis that female labor force participation increases in Muslim Brotherhood supporting districts in 2012 due to persecution and punishment of the Muslim Brotherhood by the Mubarak regime. The data also do not support the hypothesis that female labor force participation decreases in Muslim Brotherhood supporting districts in 2012 because of social norms and gender expectations imposed by Muslim Brotherhood parliamentarians. The results suggest the impact of the Muslim Brotherhood's rise to power in the Egyptian parliament in 2005 and its subsequent treatment by the Mubarak regime on female labor force participation is inconclusive. I discuss the implications of these findings in the Conclusion.

In the next section, I perform robustness checks on my results.

## Robustness

In this section, I check for robustness in my estimates using alternative models, the case of Cairo, and an alternative outcome variable. I begin by checking for robustness to the detrended difference in differences specification, because this is the traditional way to account for differential time trends in the pre-period and may yield more accurate results than those in my Results section. Next, I check for robustness to differential attrition using the Heckman correction model for selection into the panel. I then check for

robustness to migration effects, in case people who moved districts during the panel caused noise in the results. I also check for robustness to the exclusion of Cairo from the sample, due to Cairo's unique characteristics. Finally, I use an alternative outcome variable, hours worked, to check whether Muslim Brotherhood parliamentary power affects women in terms of labor market outcomes other than labor force participation.

## **Estimations using traditional detrended difference in differences**

As mentioned in the methodology section, another means of accounting for inherently different trends in labor force participation between Muslim Brotherhood supporting and non-supporting districts is detrending by subtraction. First, I use the coefficient of interest from the 1998-2006 data to estimate the linear time trend in female labor force participation in Muslim Brotherhood supporting districts. I use this to estimate the predicted labor force participation in 2012 for each individual, assuming this linear time trend continues. Next, I subtract the predicted labor force participation rate in 2012 from the observed rate. If the trends in labor force participation would have continued in the same manner as they did from 1998-2006, then the remaining magnitude of change in labor force participation captures the effect of the election of the Muslim Brotherhood.

Tables 13–16 in Appendix B show the results of my regressions using district fixed effects and individual fixed effects, by the same cuts of the data used in the Results section. For the most part, the results are consistent: women in Muslim Brotherhood supporting districts in 2012 did not see a differential change in labor force participation compared to those in non-Muslim Brotherhood supporting districts.

One results differs from the results found earlier by the linear time trends model. In the case of splitting the population by marital status, the coefficient of interest is significant for unmarried women by the individual fixed effect estimation, shown in column 2 of Table 16. While also positive, the coefficient was not significant nor as large in magnitude by my linear time trends specification.

## Heckman correction for differential attrition

The strongest threat to robustness in my estimation is differential attrition. In this section, I identify the predictors of attrition from the sample after the 2006 survey round. I use a Heckman selection model to correct for the attrition.

Focusing specifically on individuals who were of labor-force participating age in 2006, the attrition rate is 14 percent. I check for correlation between attrition and support of the Muslim Brotherhood and gender, as well as for differences in predictors of attrition for Muslim Brotherhood supporting districts and non-Muslim Brotherhood supporting districts. Table 17 in Appendix C displays the correlation between attrition and living in a district that supports the Muslim Brotherhood and gender and attrition. Women are on average 1 percentage point more likely to attrite while those in Muslim Brotherhood supporting districts are on average 2 percentage points more likely to attrite in our sample. The fact that Muslim Brotherhood support is correlated with a higher attrition rate implies that people in Muslim Brotherhood supporting areas were more difficult to locate in 2012, perhaps because the Muslim Brotherhood supporting population in our sample is more likely to live in urban areas and urban families are more likely to migrate or relocate.

I examine predictors of attrition for individuals in Muslim Brotherhood supporting districts and those in non-supporting districts for the working age population in Table 8. Column 1 predicts attrition for people in Muslim Brotherhood supporting districts, column 2 for people in non-supporting districts, and column 3 for the whole sample. The attrition rates from Muslim Brotherhood supporting and non-supporting districts differ. In Muslim Brotherhood supporting districts, attrition is 14.6 percent compared to 12.6 percent in non-supporting districts. Furthermore, married people are less likely to attrite in non-Muslim Brotherhood supporting districts, but marital status does not affect attrition in Muslim Brotherhood supporting districts. For non-Muslim Brotherhood supporting districts, household size is a negative predictor of attrition: those in larger households are less likely to attrite, by a magnitude of 0.4 percentage points. In order to account for this attrition, I can use a Heckman correction.

Table 8: Attrition by District Muslim Brotherhood Support

	(1)	(2)	(3)
	Attrition MB district	Attrition non MB district	Attrition overall
	$\beta$ / SE	$\beta$ / SE	$\beta$ / SE
Female	-0.024 (0.013)	-0.014 (0.010)	-0.018* (0.008)
Age	-0.004** (0.000)	-0.003** (0.000)	-0.003** (0.000)
LFP	-0.003 (0.015)	0.002 (0.010)	-0.000 (0.009)
Urban	0.139** (0.011)	0.100** (0.007)	0.114** (0.006)
Female X LFP	0.007 (0.015)	0.005 (0.011)	0.006 (0.009)
LFP X Urban	-0.026 (0.013)	-0.015 (0.009)	-0.020** (0.007)
Married	-0.004 (0.007)	-0.032** (0.005)	-0.022** (0.004)
Household size	-0.001 (0.001)	-0.004** (0.001)	-0.003** (0.001)
Constant	0.217** (0.017)	0.225** (0.012)	0.224** (0.010)
Observations	13173	24370	37543
ymean	0.146	0.126	0.133

\*  $p < .05$ , \*\*  $p < 0.01$ . Standard errors in parentheses.

The Heckman correction requires the use of an instrumental variable to explain attrition. By the exclusion restriction, the variable must be correlated with attrition but uncorrelated with the outcome variable, labor force participation. In my dataset, I use household size as the variable for predicting attrition, because of its correlation: the larger the household, the lower the likelihood of attrition. Larger households are perhaps easier for enumerators to locate. Furthermore, it is unlikely that all household members will die or move between survey rounds in a large household. However, each marginal household member does not affect the outcome variable, labor force participation, and women's labor force participation in Egypt does not appear dependent on household size. Thus, using household size to explain attrition, or selection into the second round of the

panel, I conduct a Heckman correction.

The results of the Heckman correction in Table 9 suggest that when we attempt to account for attrition, the coefficient of interest remains insignificant and small in magnitude. The magnitude of the coefficient of interest is small, suggesting that women in Muslim Brotherhood supporting districts in 2012 would have been 1-2 percentage points more likely to join the labor force if we could observe the people who attrited after the 2006 survey round. Because the Heckman correction results do not differ greatly from my general results, I disregarded the selection bias into the panel when discussing my results in the section above.

Table 9: Estimated Labor Force Participation with Heckman Correction

	(1)
	LFP
	$\beta$ / SE
MB district X Female X Post	0.017 (0.014)
Female X Post	-0.503** (0.009)
MB district X Post	-0.016 (0.010)
Post	0.261** (0.007)
Total no. of Individuals in the Household	0.008* (0.003)
Female	0.495** (0.014)
Observations	43134
ymean	0.647

\* p < .05, \*\* p < 0.01. Standard errors in parentheses.

## Migration effects

To check for robustness to migration, I re-run my general regressions, dropping those who moved districts from my sample. The results in Table 10 suggest that the coefficient of interest is robust to migration effects. Column 1 uses district fixed effects and column 2 uses individual fixed effects. Restricting the sample to only those who

remain in the same voting district during all three time periods yields coefficients of the same magnitude as those produced when I use the full sample: a negative insignificant coefficient in the district fixed effects regression and a positive insignificant coefficient in the individual fixed effects regression. These results suggest that individuals who migrated in the sample did not significantly affect the results.

Table 10: Estimated Results; Migrants Excluded

	(1) General, exclude migrants $\beta$ / SE	(2) General-IFE, exclude migrants $\beta$ / SE
Female	0.000 (.)	-0.304** (0.021)
Post	-0.157** (0.015)	-0.088 (0.082)
MB*Post	0.002 (0.026)	0.028 (0.018)
Female*Post	-0.001 (0.041)	-0.170** (0.029)
MB*Female * Post	0.009 (0.062)	-0.004 (0.045)
Observations	18221	49479
ymean	0.683	0.639

\*  $p < .05$ , \*\*  $p < 0.01$ . Standard errors in parentheses.

## Cairo

I perform the same general regressions discussed in the results section, dropping Cairo from the sample. As Egypt's largest and most densely populated city, and as the center of many government operations and much government employment, Cairo is a unique environment that might bias the results. In addition, the poorest Egyptians in Cairo can beg for money on the streets rather than join the labor force, an opportunity that does not exist in rural areas. Per Table 11, the results of the regressions, excluding Cairo, yield virtually the same coefficients as those in the overall regression. The coefficients of interest are consistent with prior results for the district fixed effects in column 1 and the individual fixed effects in column 2. Muslim Brotherhood supporting women outside

of Cairo do not experience a significant change in labor force participation in 2012<sup>7</sup>The results suggest that the inclusion of Cairo in the sample does not skew the estimation of the effect of the Muslim Brotherhood’s parliamentary electoral success on women’s labor force participation.

Table 11: Estimated Effects Excluding Cairo; Linear Time Trends and District Fixed Effects

	(1)	(2)
	No Cairo-DFE	No Cairo-IFE
	$\beta$ / SE	$\beta$ / SE
Female	-0.264** (0.021)	0.000 (.)
Post	-0.030 (0.092)	0.420** (0.040)
MB*Post	0.036 (0.019)	0.016 (0.025)
Female*Post	-0.164** (0.030)	-0.014 (0.043)
MB*Female * Post	-0.021 (0.047)	-0.006 (0.067)
Observations	45148	17283
ymean	0.651	0.691

\* p < .05, \*\* p < 0.01. Standard errors in parentheses.

## Using work hours as an outcome variable

In order to test how the parliamentary electoral victories of the Muslim Brotherhood affect working Egyptian women, I conduct my same analysis using usual number of hours worked per week as my outcome variable, both for market work and for subsistence work. I use number of hours worked as my outcome variable to address the concern that perhaps Muslim Brotherhood norms and effects are more influential on working habits than on labor force participation decisions. The results of this regression are displayed in Appendix D. One important difference between this regression and the previous labor force participation regression is that usual number of hours worked is a continuous

<sup>7</sup>I cannot estimate the same model for Cairo only, because there are not enough observations and the model is over-specified.

variable, so the coefficients here measure the estimated effect of living in a district that elected a Muslim Brotherhood member to parliament in 2005 on number of hours worked per week, not on likelihood as before. In addition, I use “usual” number of hours worked per week to allow respondents who were not working during the week of the survey to have valid observations, although this may threaten the accuracy of the hours, as self-reported hours worked might not be reliable. Finally, I include estimates for market work and for subsistence work because rural women are significantly more likely to engage in subsistence work.

Table 18 shows the estimated coefficients to number of hours worked per week. Columns 1 and 2 show the estimated effects on market hours worked per week; column 1 used individual fixed effects while column 2 uses district fixed effects. Columns 3 and 4 show the estimated effects on subsistence hours worked per week; column 3 uses individual fixed effects and column 4 uses district fixed effects. For both subsistence and market work, the number of hours worked decreases for women in Muslim Brotherhood supporting districts, but the coefficient is only significant in the OLS mode, not the fixed effects model. Because Muslim Brotherhood supporting districts are more likely to be urban, we expect that women in Brotherhood-supporting districts work fewer subsistence hours. The general decline in number of hours worked for women in Muslim Brotherhood supporting areas perhaps explains why women are decreasingly in the labor force: if women who are in the labor force have fewer opportunities to work, then fewer women will join the labor force in anticipation of the lack of opportunity. However, given the weak significance of the estimates, we cannot conclude that the rise of the Muslim Brotherhood to parliamentary power has influenced the number of hours worked for already working women.

## **Conclusion**

Female labor force participation in Egypt has decreased markedly from 2006 to 2012. Lack of women’s labor force participation can have adverse effects not only on gender

equity but also on economic efficiency and welfare within a country. In an attempt to explain the causes behind the decline in female labor force participation, I estimate the effect of the unprecedented success of the Muslim Brotherhood in the 2005 parliamentary elections, and its subsequent treatment by the Mubarak regime, on female labor force participation in Egypt.

There are two possible competing effects. On one hand, female labor force participation in Muslim Brotherhood supporting districts may increase following the Muslim Brotherhood's rise to power due to women entering the labor force out of financial necessity. For those women who do work, the election of the Muslim Brotherhood is correlated with a decrease in average hours worked, suggesting that the financial rewards of entering the labor force may be limited.

On the other hand, female labor force participation could decrease following the Muslim Brotherhood's rise to power. Additionally, social norms imposed by Brotherhood parliamentarians may discourage women from entering the labor force. Furthermore, Brotherhood-operated social safety nets might provide a basic livelihood for families in districts that supported the Brotherhood, making female labor force participation for income purposes unnecessary.

I find that both in my overall model and by various cuts of the data, female labor force participation in Muslim Brotherhood supporting districts does not change significantly compared to for those in non-Muslim Brotherhood supporting districts. Although insignificant, my estimated coefficients measuring the impact of district-level Muslim Brotherhood support on female labor force participation in 2012 vary in sign from negative to positive and in magnitude from negative 10 percent to positive 8 percent across various specifications of the model. Because of the lack of significance of these estimates, the effect of district Muslim Brotherhood support is inconclusive. On average, for the overall sample, the effect varied from negative 1 percent to positive 1 percent depending on whether district or individual fixed effects are used.

Women in Muslim Brotherhood supporting districts may enter the labor force out of necessity. If the Mubarak regime punishes districts that elected Muslim Brotherhood

parliamentarians, either by withholding public funding or by obstructing Muslim Brotherhood charities and social safety nets, then families in Muslim Brotherhood supporting districts might experience negative income shocks. Women might enter the labor force in order to compensate for these negative income shocks that their families face. Contrarily, given the conservative attitude of the Muslim Brotherhood towards women's leadership and a woman's place in society, the Muslim Brotherhood may attempt to impose social norms that discourage female labor force participation in districts that it controls.

The results show, however, that the Muslim Brotherhood's rise to power did not significantly change female labor force participation patterns in the districts that the Muslim Brotherhood controls through parliament. Perhaps gaining parliamentary support and receiving subsequent punishment by the Mubarak regime do not change labor market conditions or cultural norms for women in Muslim Brotherhood supporting districts. These districts differ from non Muslim Brotherhood supporting districts on other characteristics, such as urbanicity. It is possible that urbanicity may be more influential in determining labor force participation than the potential mechanisms through which the Muslim Brotherhood affects female labor force participation. Thus, when the Muslim Brotherhood gained power in certain districts, its power did not affect the way in which females participated in the labor force.

These findings add to the literature that investigates determinants of the recent decline in female labor force participation in Egypt. They build on literature that suggests that protest intensity is correlated with increased female labor force participation and that beliefs about women's empowerment can predict female labor force participation. This study was the first to apply district-level political data to the ELMPS. More research on the connection between political events and female labor force participation must be conducted.

Further research is also needed in order to confirm the lack of impact of the Muslim Brotherhood's parliamentary success on female labor force participation. Future research could employ more sophisticated controls and use more frequent panel data in order to include more than just two time periods in the analysis. Furthermore, future research

could identify a clearer treatment: choosing one specific event that signals the Muslim Brotherhood's rise to power, rather than using the 2005 election and the Brotherhood's subsequent treatment over a six year period. This would allow for a cleaner difference in differences estimation. Identifying the true effect of the Muslim Brotherhood's rise to power on female labor force participation can contribute to ongoing research on the causes behind recently declining female labor force participation in Egypt.

In order to understand the mechanisms through which the Muslim Brotherhood's rise to parliamentary power affected female labor force participation, further research should also include district-level data on capital flows from the central Mubarak regime's government to each district as well as surveys on cultural factors and beliefs about women's empowerment. This would help us understand exactly how the Muslim Brotherhood's use of parliamentary power and punishment by the Mubarak regime influence female labor force participation decisions. If the effect of Muslim Brotherhood parliamentary power on female labor force participation indeed does not exist, then more further investigation of the forces behind Egypt's declining female labor force participation must be conducted. The use of district-level variation in this paper is a start.

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# Appendices

## A Initial Regression-no control for time trends

Table 12: Estimated Effects; No Controls for Time Trends

	(1)	(2)
	LFP-DFE	LFP-IFE
	$\beta$ / SE	$\beta$ / SE
MB district X Female X Post	0.036*	0.032
	(0.018)	(0.017)
Female X Post	-0.178**	-0.198**
	(0.011)	(0.010)
MB district X Post	0.003	0.001
	(0.010)	(0.010)
Post	0.102**	0.103**
	(0.006)	(0.006)
Constant	0.831**	0.650**
	(0.005)	(0.003)
Observations	37543	32542
ymean	0.649	0.654

\*  $p < .05$ , \*\*  $p < 0.01$ . Standard errors in parentheses.

## B Detrended Difference in Differences

Table 13: Estimated Effects; Detrended Difference in Differences

	(1)	(2)	(3)	(4)
	General-DFE	General-IFE	General-DFE, controls	General-IFE, controls
	$\beta$ / SE	$\beta$ / SE	$\beta$ / SE	$\beta$ / SE
MB district X Female X Post	0.003 (0.022)	-0.011 (0.017)	-0.014 (0.017)	0.002 (0.022)
Female X Post	-0.089** (0.014)	-0.150** (0.010)	-0.145** (0.010)	-0.097** (0.014)
MB district X Post	0.032** (0.011)	0.038** (0.009)	0.026** (0.009)	0.020 (0.012)
MB district X Female		-0.000 (0.011)	-0.002 (0.011)	
Observations	12864	37489	37487	12862

\*  $p < .05$ , \*\*  $p < 0.01$ . Standard errors in parentheses.

Table 14: Estimated Effects by Urbanicity; Detrended Difference in Differences

	(1)	(2)	(3)	(4)
	Urban-DFE	Urban-IFE	Rural-DFE	Rural-IFE
	$\beta$ / SE	$\beta$ / SE	$\beta$ / SE	$\beta$ / SE
MB district X Female X Post	-0.032 (0.026)	-0.057 (0.041)	-0.032 (0.026)	0.005 (0.027)
Female X Post	-0.209** (0.014)	-0.145** (0.022)	-0.209** (0.014)	-0.044* (0.018)
MB district X Female	0.050** (0.018)		0.050** (0.018)	
MB district X Post	0.046** (0.013)	0.077** (0.019)	0.046** (0.013)	0.012 (0.015)
Observations	17767	5251	17767	7611

\*  $p < .05$ , \*\*  $p < 0.01$ . Standard errors in parentheses.

Table 15: Estimated Effects by Education; Detrended Difference in Differences

	(1)	(2)	(3)	(4)
	Low education-DFE	Low education-IFE	High education-DFE	High education-IFE
	$\beta$ / SE	$\beta$ / SE	$\beta$ / SE	$\beta$ / SE
MB district X Female X Post	-0.071** (0.023)	-0.046 (0.032)	0.046 (0.024)	0.037 (0.033)
Female X Post	-0.116** (0.014)	-0.069** (0.020)	-0.194** (0.014)	-0.120** (0.021)
MB district X Female	0.045** (0.015)		-0.068** (0.017)	
MB district X Post	0.036** (0.011)	0.032* (0.016)	0.019 (0.015)	0.016 (0.019)
Observations	21181	6690	16306	6172

\*  $p < .05$ , \*\*  $p < 0.01$ . Standard errors in parentheses.

Table 16: Estimated Effects by Marital Status; Detrended Difference in Differences

	(1)	(2)	(3)	(4)
	Not married-DFE	Not married-IFE	Married-DFE	Married-IFE
	$\beta$ / SE	$\beta$ / SE	$\beta$ / SE	$\beta$ / SE
MB district X Female X Post	-0.008 (0.034)	0.175* (0.083)	0.000 (0.018)	0.009 (0.026)
Female X Post	-0.140** (0.022)	-0.144* (0.062)	-0.081** (0.011)	-0.062** (0.016)
MB district X Female	0.059** (0.020)		-0.039** (0.013)	
MB district X Post	0.028 (0.021)	-0.081 (0.059)	0.015 (0.008)	0.012 (0.013)
Observations	12020	2626	25467	10236

\*  $p < .05$ , \*\*  $p < 0.01$ . Standard errors in parentheses.

## C Attrition

Table 17: Predictors of Attrition

	(1) attrition $\beta$ / SE
MB district	0.031** (0.006)
Female	-0.018** (0.006)
Constant	0.233** (0.005)
Observations	21447
ymean	0.235

\*  $p < .05$ , \*\*  $p < 0.01$ . Standard errors in parentheses.

## D Hours worked as the outcome variable

Table 18: Estimated Effect of Muslim Brotherhood Support on Hours Worked per Week

	(1)	(2)	(3)	(4)
	Market hours	Market hours	Subsistence hours	Subsistence hours
	IFE	DFE	IFE	DFE
	$\beta$ / SE	$\beta$ / SE	$\beta$ / SE	$\beta$ / SE
MB district X Female X Post	-0.323 (1.391)	-1.869 (1.113)	-1.787 (1.535)	-3.205** (1.221)
Female X Post	0.934 (0.905)	0.843 (0.687)	-1.378 (0.890)	0.491 (0.711)
MB district X Post	0.387 (0.673)	0.826 (0.566)	0.668 (0.725)	0.913 (0.602)
Post	2.616 (1.833)	1.245 (1.028)	5.142** (1.936)	3.858** (1.103)
MB district X Female		0.682 (0.699)		6.540** (0.781)
MB district		0.000 (.)		0.000 (.)
Constant	50.477** (6.291)	50.917** (0.651)	50.667** (6.532)	48.557** (0.679)
Observations	17253	19780	19911	22680
ymean	47.492	47.814	43.455	43.843

\*  $p < .05$ , \*\*  $p < 0.01$ . Standard errors in parentheses.