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SOCIALIZED HEALTHCARE AND WOMEN’S FERTILITY DECISIONS

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ABSTRACT

This paper examines the effect of a nationwide healthcare reform implemented in Turkey on women’s fertility decisions. The Family Medicine Program (FMP), introduced in 2005, provided a wide-range of primary healthcare services, free of charge, and achieved universal access by matching each citizen to a specific family physician, who operates at neighborhood clinics, called Family Health Centers, on a walk-in basis. Although reducing fertility was not specified among the goals of the reform, reproductive-health and family-planning services have been covered under the FMP. To establish causality, we exploit the staggered rollout of the FMP implementation across Turkish provinces over time using a difference-in-differences estimation strategy. Our estimates indicate that the FMP significantly reduced childbearing among both teenagers and women ages 20-29. These results can be explained by increased access to and reduced cost of reproductive-health and family-planning services. However, the patterns in which the program effect has evolved over time differs between the two groups of women in a way that provides additional insights about the mechanisms. For teenagers, the FMP had a direct effect on childbearing, reflected by an immediate and rapidly-increasing pattern, which is not surprising given the broad agreement about the negative consequences of teenage childbearing among government and public health officials, including those in Turkey. For women ages 20-29, however, the program had a gradual and slowly-increasing effect, which is consistent with an empowerment channel. This should be interpreted as an unintended consequence of the program because, if anything, Turkey is a country where the government’s position is to encourage fertility behavior and discourage birth control practices among women at prime childbearing ages.

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1. Introduction

Of the many developing countries that have implemented major healthcare reforms over the last several decades, Turkey is unique in that it is the only country that has pursued and successfully established a socialized healthcare system.[1] Turkey now has universal healthcare coverage in place that extends primary health services to all of its citizens. Furthermore, these services are provided to everyone regardless of income and under a free-of-charge and single-payer system that is fully financed and administered by the central government. The pursuit of universal health coverage began in 2003 when the government embarked a large-scale health transformation program with the objective of achieving universal basic health coverage, reducing inequities in access to healthcare, and addressing inefficiencies in the delivery and financing of health services (Atun et al., 2013; Atun, 2015; Yasar, 2011). At the heart of this transformation lies the Family Medicine Program (FMP hereafter), which covers a wide range of services, including diagnostic, curative, and rehabilitative care as well as family-planning, reproductive health and counselling services. Under the FMP, each Turkish citizen is matched with a family physician, who offers a range of healthcare services in neighborhood clinics called Family Health Centers (FHC) that operate on a walk-in basis. The program was first initiated as a pilot in 2005 in the province of Duzce, and then gradually expanded to cover citizens in all 81 provinces by the end of 2010. By 2017, there were over 25,000 family physicians – all public employees – in 7,774 FHCs.[2]

As a result of the FMP implementation, healthcare access for Turkish citizens has improved dramatically (Worldbank, 2018). Studies have shown that the FMP has also led to marked improvements in the quality of and access to basic health services, especially among low income populations as well as those who are among the most vulnerable, including

[1] Reforms implemented in countries like Brazil, Indonesia, Mexico, Peru, Philippines, and Thailand have been successful to varying degrees, but in essence, they are still staggered systems of coverage with more restricted benefits and access for lower-income groups.
[2] See http://ailehekimligi.gov.tr.

pregnant women, new mothers, infants, and the elderly (World Health Organization, 2012a, 2012b; Yasar, 2011). Furthermore, outpatient physician visits per capita have more than doubled, growing from 3.1 visits annually in 2002 to 8.2 visits in 2013 (Worldbank, 2018). As a result of these improvements, there have been visible increases in patient satisfaction and healthcare utilization (Akturk et al., 2015; Baris et al., 2011; World Health Organization, 2008). Importantly, the program has helped to greatly reduce the mortality rates among infants and the elderly (Cesur et al., 2017a).

In this paper, we examine the impact of the FMP on women's fertility decisions. At first glance, the consideration of a possible link between the FMP and birth rates may come as a surprise since influencing women's fertility behavior was never articulated as a program goal. Yet, there are several reasons why such a relationship may be anticipated. For example, reproductive-health and family-planning services, which are included under the FMP, may directly influence fertility behavior. Prior to the FMP, reproductive-health and family-planning services were primarily provided by midwives and nurses in small healthcare units, called health houses, but the personnel in these settings usually lacked adequate training and resources to treat reproductive-health problems, prescribe medications, and refer patients to gynecologists or other specialists (Aarendonk and Maeseneer, 2011; Erbil and Bostan, 2010; Yanikkerem et al., 2006). Shortages of basic contraceptives were common, and only 10 percent of health insurance beneficiaries received adequate family-planning services (Sine et al., 2004)[3]. Under the FMP, family physicians have been able to provide a broad range of counseling and reproductive-health services, including oral contraception and prophylactics[4], pregnancy testing, gynecological exams, as well as family counseling, and sexual education (Karaca et al., 2009; Mehmetoglu et al., 2010; Symposium Report, 2010). Additionally, curative services, including essential obstetric care (e.g., administering antibiotics), abortion

[3] http://turkey.unfpa.org/topics/family-planning.
[4] Contraceptives, such as birth control pills and condoms are fully covered, whereas intrauterine devices (IUD) are provided at a subsidized price (Bernar-Dilbaz, 2010; Karaguzel, 2006).

services, and management of sexually transmitted infections and reproductive system cancers (e.g., cervical cancer) are also available to all women.[5] To ensure service quality and effectiveness, family physicians are required to complete training in family planning, reproductive health, essential obstetrics and gynecology, and youth reproductive health (Aarendonk and Maeseneer, 2011; Entre Nous, 2007; Symposium Report, 2010). Importantly, all these services are provided to the public with no out-of-pocket costs.

Accordingly, the FMP has led to a decrease in the cost of childbearing as well as the healthcare costs associated with raising young children. On the one hand, the reduction in these costs might have then encouraged more women to become mothers or mothers to have more children, at least among households wherein the cost of children is a relevant factor in fertility decisions. On the other hand, the increased availability of family-planning services, such as contraceptives, reproductive-health services, and sexual education, might have led to either reduced childbearing or a shift in the timing of childbearing towards older ages, especially among women who lacked access to or awareness and knowledge of such services. Finally, because the FMP improved child health (Cesur et al. 2017a), the reform might have induced a quantity-quality trade-off, which might have led to a reduction in fertility (Becker, 1960).

However, the ambiguity in the relationship between the FMP and birth rates inferred from the discussion above is likely to apply only to women who are at their prime reproductive ages. For younger women, particularly teenagers, the relationship is likely to be negative. First of all, teenage pregnancy is universally accepted by public health officials as a public health and social problem associated with a myriad of negative consequences for both teenage mothers and their children and Turkey is no exception.[6] Moreover, adolescent pregnancy is

[5] Obstetricians and gynecologists (ob-gyns), family physicians, and certified general practitioners (GPs) are legally permitted to provide clinical abortion services, and termination of pregnancy is mainly surgical (vacuum aspiration) (Akin et al., 2012).

[6] The World Health Organization (2016) report that complications during pregnancy and childbirth are the leading cause of deaths globally for 15-19-year-old girls. The risk of maternal death is twice as high for girls ages 15 to 19 as for women in their 20s, and five times as high for girls ages 10 to 14 (Smith et al., 2009). Children born to teenage mothers have lower birth weights, increased risk of hospitalization, less supportive home environments, poorer cognitive development, and are more likely to become teenage mothers themselves (Botting et al., 1998; Wellings et al., 1999). Furthermore, compared to peers not experiencing childbearing, teenage mothers are

often unintended rather than an intentional decision based on consideration of benefits and costs. Access to reproductive-health and family-planning services can therefore reduce these unintended pregnancies. The FMP provided most women and adolescent girls with an opportunity to have access to any type of reproductive-health services and education that had not previously existed. Moreover, family physicians are in a unique position to provide medically accurate information to young women as well as their parents to encourage them to make healthy life choices, and they can do so with a sense of authority. Any interaction with a family physician, even a visit for sore throat or immunization, may then lead to conversations about adolescent growth and development, sexuality, birth control, protection against sexually transmitted infections, and other issues related to reproductive health. Such interactions may also lead to changes in life choices about when to become sexually active and use contraception, as well as the ability to obtain and use contraception when these choices are made.

It has been widely documented that access to healthcare is imperative to women's empowerment, which would give them the ability to make strategic decisions for themselves (Lee and Finlay, 2017; Shaw, 2006).[7] Then it is conceivable to think that the FMP might have ultimately led to the empowerment of Turkish women, enabling them to avoid pregnancy at young ages. As women become more empowered and acquire knowledge and resources, they are expected to make strategic life decisions in a more informed manner and in ways that could result in positive health outcomes for themselves and their children (Kabeer, 2002).

Studying the impact of a healthcare reform on women's fertility decisions is particularly important in the context of a conservative society like Turkey, in which women are largely disadvantaged and disempowered, and experience high fertility rates. The World Economic

more socially isolated, have worse mental health, have less educational and employment opportunities, and hence, are more often welfare dependent (Angrist and Evans, 2000; Ashcraft et al., 2013; Chevalier and Viitanen, 2003; Fletcher and Wolfe, 2009; Holmlund, 2005; Hotz et al., 2005; Klepinger et al., 1999).

[7] Empowerment is described as the process of change wherein an individual with prior inability to choose has the access and freedom to make choices (Kabeer, 2005). For young women, it is the process by which these women gain power and control over their own lives and acquire the ability to make strategic choices.

Forum, for example, ranked Turkey at 105th among 115 countries in comprehensive gender equality in 2006, and according to the United Nations, teenage fertility rate was 45 births per 1,000 women ages 15-19 in 2005 prior to the FMP.[8] Premarital and extramarital sex are highly stigmatized, and girls are often married at young ages, especially in rural areas, in order for parents to prevent premarital sexual activity of daughters. For instance, seven percent of girls ages 15-19 are already married and 26 percent of women ages 15-49 report being married as a child (Turkish Population and Health Research, 2013). Moreover, prior to the FMP, most adolescent girls lacked basic knowledge regarding reproductive health and family planning (Ege et al., 2014). Whether or not a healthcare reform can be effective in reducing teenage childbearing and empowering women more generally in the context of a society, where marriage and fertility choices, and even premarital relations, are highly constrained, is of significant interest to both academics and policy makers.

In order to obtain a causal estimate of the impact of the FMP on childbearing, we exploit the staggered implementation of the FMP across Turkish provinces and over time in a difference-in-differences framework. Our results provide robust evidence in support of a negative causal relationship between the FMP implementation and birth rates among both teenagers and women ages 20-29. Moreover, the relationship appears to follow a dynamic pattern with an immediate and growing effect for teenagers and a gradual and slowly-increasing effect among women ages 20-29. The pattern for teenagers is not surprising and would likely be appreciated by the Turkish public health officials and program administrators. After all, reducing teenage fertility is a desirable goal in most societies including Turkey where decisions regarding marriage and childbearing are still constrained by a set of conservative institutions to a large extent. However, the finding for women ages 20-29 may come as a surprise and could be interpreted as an unintended consequence of the program. In fact, Turkey is a country where the highest-ranking government officials, most importantly the President himself, frequently

[8] http://hdr.undp.org/en/content/adolescent-birth-rate-women-aged-15-19-years-births-1000-women-ages-15-19.

make public statements, encouraging women to have at least three children, describing birth control as a threat to country's lineage, and blaming birth control advocates for hindering the country's economic development prospects (Yeginsu, 2014).

The rest of the paper is laid out as follows. In Section II, we provide a summary of the relevant literature. We provide a brief description of the history of the FMP in Section III. We then discuss the data in Section IV and the estimation strategy in Section V, followed by the results in Section VI. We end the paper with conclusions in Section VII.

II. Overview of Literature

In the context of developed countries (especially the United States), several studies investigated the role of various health reforms on fertility with mixed findings. For example, Lovenheim et al. (2016) found that the expansion of school-based health centers reduced teen birth rates, while Apostolova-Mihaylova and Yelowitz (2018) showed that a health insurance reform in Massachusetts led to increased fertility among married women and decreased fertility among unmarried women. Kearney and Levine (2009) studied the effect of an expansion in family-planning services, showing that such services reduced fertility, especially among teenagers. Studies focusing on Medicaid expansions also produced mixed results. For example, Bitler and Zavodny (2010) showed that Medicaid expansions increased fertility (among women without high school diplomas) while DeLeire et al. (2011) documented a non-robust relationship.

The evidence obtained from studies focused on health reforms implemented in developing countries is much more limited. One exception is Rocha and Soares (2010) who found that the Family Health Program in Brazil (PSF) reduced fertility for women between the ages of 31-40, but not for women between the ages of 18-30 or 41-55. While expanding family-planning and reproductive-health services was an initial priority of the PSF program, it should be highlighted that this aspect of the program—namely the Comprehensive Women's Health

Assistance Program (PAISM)—was not fully implemented due to a lack of political will, and this priority was not fulfilled as contraception and other family-planning services remained unavailable and physicians did not receive training in family planning (De Bessa, 2006; Pierre and Clapis, 2010). Studying the effect of the FMP, which has been successful in fulfilling this priority, thus represents an important opportunity to shed light on the role of health interventions in the context of a developing country.

The present paper adds to the literature by investigating the effect of a primarily supply-side health intervention implemented in Turkey on fertility decisions. The FMP extended primary and reproductive healthcare services to the entire population under a free-of-charge and single-payer system that is fully financed and administered by the central government. A unique component of the FMP, which distinguishes it from most other interventions studied in the literature, is the assignment of every Turkish citizen, regardless of income, to a specific family physician, who provides basic healthcare services including sexual and reproductive health services in easily accessible walk-in clinics located within the local neighborhoods.

III. Brief History of the Family Medicine Program

Prior to the FMP, the healthcare system in Turkey was highly fragmented and characterized by uneven health coverage and access, high out-of-pocket costs to patients, and inefficiencies in the allocation of resources. The "Greed Card" program covered the poor, but included only basic inpatient treatments in public facilities (typically centralized hospitals).[9] Among the various types of health coverage, there was wide variation in terms of benefits coverage, out-of-pocket expenses and co-pays related to services, and the set of eligible healthcare providers (Atun, 2015; Robila, 2013). Moreover, many important health services were prohibitively costly and many individuals in rural areas lacked access to professional

[9] The "Green Card" program launched in 1992 was the flagship social protection mechanism that targeted poor, but covered only inpatient treatment costs of the eligible beneficiaries in public facilities until 2004.

healthcare providers, and dispensaries and healthcare personnel lacked adequate resources, such as medication and equipment (OECD, 2008).

In 2005, the Turkish Ministry of Health launched the FMP as a pilot in the province of Duzce, and gradually expanded the program to all 81 provinces by the end of 2010.[10] The FMP harmonized the patchwork of health-coverage programs, providing universal and free coverage to all citizens regardless of occupation or income. The primary benefits package included a wide range of health services, and importantly, assigned each citizen to a specific family physician that provided primary healthcare services free of charge.

Family Health Centers (FHCs) and Community Health Centers (CHCs) are the primary channels of the delivery of the FMP services. The FHCs are the primary care clinics where a wide range of primary care services are provided by family health teams comprised of at least one family physician and other healthcare personnel including nurses and midwives. More importantly, the FHCs are easily accessible clinics located within the communities where assigned citizens reside, and citizens are not required to schedule an appointment or hold any type of health insurance. The CHCs, on the other hand, are the centers that usually provide logistical support to family physicians for public health services such as vaccination campaigns, health promotion and education services, and environmental and occupational health services. Moreover, the CHCs collect statistical data on public health services, and monitor and evaluate the effectiveness of health services provided by the FHCs**.** Both the FHCs and CHCs are administered under the supervision of the Provincial Health Directorates that are in charge of planning and provision of health services at provincial level.

Family physicians are public employees, who are recruited from existing general practitioners, specialists within both the private and public sectors, and recent graduates from medical schools (Worldbank, 2013). In order to ensure that family doctors provide quality care, a number of measures are put in place. For example, physician pay is based on capitation.

[10] A detailed description of the FMP can be found in Cesur et al. (2017a).

Moreover, a performance-based payment scheme is integrated into the capitation payment system (OECD, 2014; Worldbank, 2013). In particular, family physicians are required to meet pre-defined performance (activity) targets in maternal and child health, such as immunization and antenatal care. Failure to meet these targets have ramifications such as a salary deduction of up to 20 percent as well as contract termination in repeated failures. Furthermore, contracts include a point-based warning and admonition system for violations of 35 pre-defined indicators, such as abiding with working hours, and maintenance and security of patient health records. Physicians with points exceeding 100 within a contract period have their contracts terminated and are not allowed to apply for a new contract.[11]

Appendix Table 1 shows the year of implementation of the FMP as well as the number of citizens per family physicians for each province in 2017. According to the goals set by the Turkish Ministry of Health, the program aims to provide one family physician for every 3,500 persons in each province. There is evidence to suggest that the targets were met rather quickly and exceeded in some cases (Dogac et al., 2014; Öcek et al., 2014; Tirpan, 2010; Worldbank, 2013).[12] For example, as illustrated in Appendix Table 1, the average number of citizens per family physician as of 2017 is 3,217, which is remarkably close to the target rate.

IV. Data

Information on the FMP was obtained from the Public Health Institution of Turkey (PHIT), and data on birth rates over a period between 2001 and 2017 come from the Turkish Statistical Institute (TurkStat). Our main analysis focuses on the birth rates among women in two age categories: (i) teenagers who are between ages 15 and 19; and (ii) women in prime

[11] Additionally, an internet-based platform is established for family physicians to maintain a database on maternal and child health activities, such as vaccinations and antenatal care to the Health Information Systems Directorate at the Ministry of Health. Auditors from CHCs assess compliance and quality of services provided by FHCs at least once every six months, and family physicians are randomly selected for performance audits every month, which includes audits of health services administered to a randomly selected 10 percent of patients. Finally, to provide ongoing training, an internet-based open platform was established for physicians to interact with each other and to facilitate peer-to-peer learning, which has served to improve quality of services (Worldbank, 2013).

[12] See also http://ailehekimligi.gov.tr/sk-sorulan-sorular/personel-cin.html.

childbearing age, who are between ages 20 and 29. These age-specific birth rates reflect the number of births per 1,000 women in the associated age group.

We account for a host of time-varying determinants of childbearing in our econometric analysis. These covariates are measured either at the provincial or sub-regional level on an annual basis.[13] Per capita GDP, the number of motor vehicles per 1,000 persons, and the share of governing party seats in the Turkish Parliament in the most recent general election are measured at the province level, while unemployment rate and the percentage of the population with high school and college degrees are measured at the sub-regional level.[14,15] Information on province age-specific populations comes from the TurkStat.[16]

Descriptive statistics on birth rates and the covariates are presented in Table 1. The mean birth rate among teenagers is 34.02 per 1,000, which goes up to 120.51 among women ages 20-29.[17] Note that these birth rate figures accord well with other sources like OECD.[18] Interestingly, as shown in columns 2 and 3, conditioning on the FMP status indicates that birth rates among both groups of women are higher in the subsample prior to the introduction of the FMP program.

As shown in Table 1, the time-variant province characteristics also vary considerably between province-year observations with and without the FMP. For example, the observations with the FMP appear to have a higher number of motor vehicles per capita, and higher income and education. The pattern in these differences suggests that the pace by which the FMP has

[13] The TurkStat classifies Turkey into 12 regions and 26 sub-regions in addition to 81 provinces. These regional and sub-regional classifications are generated for statistical purposes based on geographic proximity and socio-economic similarities within the associated region. The TurkStat collects and processes data from different sources on a variety of topics including demographic characteristics and health. See http://www.turkstat.gov.tr for more information.

[14] Between 2001 and 2017, Turkey had five general elections (2002, 2007, 2011, June 2015, and November 2015), in which the members of the Grand National Assembly of Turkey were elected.

[15] We also include binary indicators representing missing observations for each control variable.

[16] The information on province populations and age compositions from the TurkStat refer to the years 2000 and 2007-2017. Because no Census was administered in the period 2001-06, the associated province populations for these years are imputed using a linear growth rate.

[17] In supplementary analysis, we also estimate models for the birth rate among women between ages 30 and 39. The mean birth rate among this group is 66.64.

[18] See OECD Family Sources Database www.oecd.org/social/family/database.

expanded is positively associated with urbanization and economic development. On the one hand, this may seem surprising given higher average incomes and better access to healthcare observed in more urban areas. On the other hand, there is evidence that health outcomes are negatively associated with living in urban areas, especially in developing countries, due to deleterious factors, such as stress and pollution (Health Effects Institute, 2010; McGranahan and Murray, 2003). Furthermore, these patterns are also consistent with high levels of income inequality in urban areas as well as the persistent trends in "urbanization of poverty" in the developing world (Ravallion et al., 2007). Additionally, Cesur et al. (2017b) show that air pollution is an important factor responsible for the higher infant mortality rates in urban Turkish provinces. In another recent paper, the same authors document a similar pattern for the adult and the elderly mortality rates as well (Cesur et al., 2018).

V. Estimation Strategy

Our goal is to obtain estimates of the causal impact of the FMP on birth rates among teenagers and women in prime childbearing age. Achieving this goal is complicated due to potential endogeneity bias that might be caused by non-random implementation of the FMP. It is important to note that, when the central government launched the FMP in 2005, it did so with a clear and decisive goal to ultimately establish a healthcare system with universal coverage. This goal was accomplished when the program was expanded to all 81 Turkish provinces by the end of 2010. Therefore, there is no concern about selection bias in our context that might stem from only a subset of provinces instituting the program due to some unobserved factors having to do with birth rates. However, there may still be endogeneity with respect to the order in which the FMP was rolled out over time. For instance, if the order in which the program was launched is related to differences in pre-existing trends in fertility rates across provinces then the relationship between the FMP and birth rates would be confounded, resulting in biased estimates. More specifically, if reducing teenage pregnancy were among the goals to be achieved by FMP, then provinces with a relatively high teenage birth rate at the baseline might have been given priority. In that case, the estimates could be biased upward. As explained earlier however, we can confidently rule out this possibility as there is not even a hint of evidence to indicate that such motives played a role in the program implementation.

While the timing and location decisions for the FMP had not been strategically determined in a way to accomplish some policy goal with respect to fertility rates, the program does not appear to have been implemented in a random manner either. As illustrated in Table 1, there is considerable variation in observable characteristics between province-year observations with and without the FMP. For example, as shown in columns 2 and 3 of Table 1, the pattern between the two groups indicates that provinces that appear to be more urban, more economically developed, and with more educated populations have deployed their FMP earlier than other provinces. This is not surprising because trained healthcare personnel as well as physical and organizational structures that are required for a well-functioning FMP are more likely to be already in place or easier to establish in more urban, educated, and economically developed provinces. If province characteristics such as urbanicity, education, and economic development are correlated with pre-existing trends in birth rates, then an approach that relies on comparing differences in birth rates across provinces with and without the FMP at different points in time would reflect a relationship that is confounded by these characteristics.

Given these considerations, our baseline approach to estimating the causal relationship between the FMP and birth rates is to follow Cesur et al. (2017a) by implementing a difference-in-differences strategy. This strategy exploits the temporal and spatial variation in the implementation of the FMP across Turkish provinces and can be expressed formally by the following regression equation:

$$BR_{rpt} = \alpha_0 + X_{rpt}\alpha_1 + \alpha_2 FMP_{rpt} + \delta_{r*t} + \lambda_p + \varphi_p t + \varepsilon_{rpt}, \qquad (1)$$

where BR_{rpt} is the number of births per 1,000 women at ages either 15-19 or 20-29 living in province p in region r in year t. The FMP_{rpt} is the corresponding binary indicator for whether the province has an FMP in place, and X_{rpt} represents a vector of time-varying characteristics measured at either the province or region level that are described in the previous section.

To capture the impact of confounding factors, equation (1) is supplemented with a series of additional variables. In particular, the δ_{r*t} represents region-by-year fixed effects, which would capture any common trends and shocks to birth rates that might occur either at the national or regional level (Cesur et al., 2017a). For example, any regional or nationwide investments made by the central government in an effort to improve health or economic conditions would be captured by these fixed effects.[19] The λ_p represents province fixed effects that would account for any time-invariant differences between provinces.[20] For instance, if the adoption of the program is correlated with some pre-existing provincial factors, such as initial fertility rates or infant health, then the province fixed effects would account for such factors. Therefore, the identification of the treatment effect in equation (1) comes from the variation in birth rates *within* provinces rather than comparisons between different provinces.

The key identifying assumption in the difference-in-differences framework expressed in equation (1) is that birth rates across provinces would have trended in a parallel fashion in the absence of the FMP. One possible threat to this assumption is that provinces that had been already making health-related investments might have been able to institute their FMP earlier than other provinces that had been relatively slow in meeting the personnel and infrastructure requirements necessary for the program to take off. To the extent that these pre-existing differences in trends associated with health-related investments are correlated with both the adoption of the FMP and birth rates, the estimates could be biased. To guard against such bias, we also explore specifications with province-specific linear trends in equation (1). These trends

[19] There have been a number of significant health and non-health related policies and programs introduced by the central government at the national level during our analysis period. For example, an air ambulance service was introduced in 2008 and mobile pharmacy services were established in 2009 with the goal of improving access to medical care in rural areas. Some other examples include a national tracking system, which was introduced in 2009, and taxes for alcohol and cigarettes, which were raised significantly in 2010. The influence of these factors could be captured by region-by-year fixed effects.

[20] Note that any differences in birth rates across provinces that are due to other factors, such as cultural, religious, and traditional practices are likely to remain unchanged during our analysis period. Therefore, their effects are also likely to be captured by province fixed effects.

represented by $\varphi_p t$ would capture the impact of any difficult-to-observe factors that are trending linearly at the province level.[21] Finally, ε_{rpt} is the idiosyncratic error term. All the regressions are weighted by province population for the relevant age category.[22] Note that we cluster standard errors at the province level to account for arbitrary forms of heteroskedasticity and serial correlation within provinces over time (Bertrand et al., 2004).

It is important to recognize that the model specified in equation (1) imposes the assumption that program effect remains the same over time. This may be too strong of an assumption because it may take some time before FHCs within which family physicians and other healthcare personnel provide their services become sufficiently staffed and equipped. Relatedly, establishing a steady relationship between family physicians and the citizens designated to them is also likely to be a time-consuming and effortful process, involving the steps of identifying and registering these individuals, conducting initial health screening and evaluations, and gaining their trust by creating an environment in which individuals feel welcome and secure. In short, the program may become fully operational in all neighborhoods within a province only gradually. Accordingly, a more flexible specification that allows the program impact to vary over time is likely to capture a more realistic representation of the relationship between the FMP and birth rates. One way to allow the effect to vary over time is to replace the binary FMP indicator in equation (1) with an index variable representing the number of years the program has been in place. This equation could be specified as follows:

$$BR_{rpt} = \alpha_0 + X_{rpt}\alpha_1 + \alpha_2 Years\_since\_FMP_{rpt} + \delta_{r*t} + \lambda_p + \varphi_p\, t + \varepsilon_{rpt}. \quad (2)$$

[21] We also estimated our models controlling for province-specific quadratic trends. The results obtained from these models are very similar to those presented in this paper. They are available from the authors upon request.
[22] The results from unweighted regressions are qualitatively similar to those presented in this paper, though the coefficients are somewhat less precisely estimated. This is not surprising because there are several very low-densely populated provinces, for which the impact of the FMP is not representative of the program effect more generally. This is because the key operational feature of the FMP entails an initial contact between a family physician and each citizen, which presumably progresses into a continuous and long-term relationship with regular checkups performed at neighborhood clinics. This relationship is likely to be more challenging to establish in these sparsely populated provinces. Therefore, not employing population weights would place undue influence on these small provinces in estimating the average effect of the FMP on the overall population. In fact, when we exclude these sparsely populated provinces from the analysis, the estimates become robust to not using weights.

In equation (2), α_2 represents the marginal effect of the FMP on BR for every year. While the specification in equation (2) allows the effect to evolve over time, it is still restrictive as it imposes the relationship to evolve linearly. This could be especially unrealistic for the program impact pertaining to women ages 20-29 for whom we expect little or no effect initially and stronger effects later on. A more flexible approach would be to specify a non-parametric model, in which the treatment variable is defined as separate binary indicators for various years lapsed since the implementation of the FMP. This could be expressed by the following equation:

$$BR_{rpt} = \alpha_0 + X_{rpt}\alpha_1 + \sum_{k=0}^{4+} \beta_k \text{ k\_years\_since\_FMP}_{rpt} + \delta_{r*t} + \lambda_p + \varphi_p t + \varepsilon_{rpt}, \qquad (3)$$

where the program is allowed to have a different impact in the year of its introduction and each of the first four years after its launch.[23]

It is worth noting that if the set of fixed effects and trends included in our empirical model indeed capture all the confounding factors, then inclusion of time-varying provincial or regional characteristics into the model should not affect the program impact in any appreciable way. One way to test this is to consider pairwise correlations between these characteristics that are likely to be related to both birth rates and the treatment variables described in equations (1), (2), and (3), and examine how these correlations vary as we successively control for the fixed effects and the trend terms described above. The results from this analysis are presented in Tables 2A, 2B, and 2C with each using the FMP treatment variable specified in equations (1), (2), and (3), respectively. Note that each cell in these tables correspond to an estimate from a separate regression. As illustrated in Table 2A, province-year observations with and without the FMP differ significantly from each other on a number of dimensions, including unemployment rate, number of vehicles per 1000 persons, per capita income, percent of population with a high school and college degree, and the share of the members of the parliament from the governing party representing the province at the general assembly. The

[23] Note that k takes on the value of 0 for the year of implementation and 1, 2, 3, 4 for the following four years. The specification in equation (2) restricts the FMP impact to remain constant after four years of implementation.

overall evidence emerging from Table 2A indicates that the presence of the FMP is positively associated with the degree of urbanicity and economic development. However, most of these differences are eliminated once we control for time-varying differences across regions in column 2 through region-by-year fixed effects. But it is really when we account for permanent differences across provinces through province level fixed effects in column 3 that all of these characteristics become unrelated to the FMP. Furthermore, the estimates are robust to province-specific linear trends as shown in column 4. When we repeat this exercise using the treatment variables described in equations (2) and (3), the overall pattern remains the same as displayed in Tables 2B and 2C. Specifically, province characteristics are significantly and sizably related to the number of years that the program has been in place in a province, suggesting a more rapid adoption of the FMP in provinces that are more urban and economically developed than other provinces. But again, this pattern disappears once we control for fixed effects and trends.

Next, we provide more formal evidence on the validity of our identification strategy by performing an event-study analysis.[24] This analysis enabled us to trace out differences in birth rates between provinces with and without the FMP in the periods leading up to and following the establishment of the program. To do so, we estimate an augmented version of equation (3), in which we include both the lead and lagged values of the FMP indicator in the model. If the indicators for periods leading up to the program turn out to be statistically significant in this analysis, this would serve as evidence that the program might have evolved in a way that is correlated with some characteristics of the dependent variable, which would be a violation of the parallel trends assumption. Figure 1 displays the estimates from the event-study analysis separately for the birth rate among teenagers and women ages 20-29 along with the 95 percent confidence interval. As shown in the figure, there is no evidence, at least statistically, of any systematic changes in birth rates at the province level in the years prior to the launch of the

[24] See Jones and Ziebarth (2018), Bartel et al. (2018), Buckles and Hungerman (2018), Chen et al. (2018), Gershenson and Tekin (2018) Waddington and Berends (2018) for examples.

FMP. In particular, all of the placebo (lead) indicators of the FMP are statistically insignificant. In sum, the results from the event-study analysis bolster our confidence in the ability of our empirical strategy to deal with these issues.

VI. Results

Table 3 presents results from the regression model specified in equation (1) estimated separately for the birth rate among teenagers in column 1 and the birth rate for women ages 20-29 in column 2. The estimates in panel I that are obtained from a regression with no controls indicate that the FMP is negatively related to the birth rates for both groups of women. As expected, this pattern is consistent with the differences in raw means in birth rates between province-year observations with and without FMP as shown in Table 1. In panels II and III, we account for any time varying unobservable factors that might influence birth rate at the national or regional levels. Doing so causes the estimates for both the teen birth rate and the birth rate among women ages 20-29 to remain negative and statistically significant. Interestingly, the estimate on teen birth rate becomes smaller while the opposite is true for the older age women.[25] However, it is when we control for the time-invariant differences across provinces in panel IV that the estimates change dramatically. In particular, both estimates are substantially reduced in both magnitude and standard error. According to the point estimates, the FMP is associated with a decline of 1.657 births per 1,000 teenagers and an increase of 0.745 births per women ages 20-29, though the latter estimate is not statistically significant. Moreover, both estimates remain robust to controlling for province-specific linear time trends in panel V. Finally, panel

[25] A number of factors may be responsible for these patterns. For example, the Civil Code Law of 2002, which raised the legal marriage age from 15 to 17 years and the Child Protection Law of 2005, which identified children as individuals below 18 years of age might have played a role in reducing fertility. Furthermore, the expansion of the FMP coincided with periods of robust economic growth experienced during most of the 2000s and the government's initiatives to increase education, most of which might have benefitted girls (Cin and Walker, 2016). The opposite pattern observed for the women ages 20-29 might have to do with the massive wave of welfare programs launched by the ruling AKP party and the discourse that emphasizes more traditional family behaviors and pronatalism openly advocated by President Erdogan (Aksoy and Billari, 2018; Greulich et al., 2016). As a consequence of these views and policies, the fertility decline in Turkey, which started in 1960s has stalled and subsequently slightly reversed under the AKP's rule (Aksoy and Billari, 2018).

VI of Table 3 displays estimates obtained from a specification that includes a set of time-varying province characteristics in addition to all those fixed effect and trend terms. As shown in the table, the estimate on teenage birthrate shifts little in response to the inclusion of these variables. According to the point estimate, the FMP is associated with a decline by 1.578 births per 1,000 teenagers on average, which translates into an effect size of about 4.63 percent calculated at the mean of teenage birth rate. The estimate for the FMP among women ages 20-29 changes sign between panels V and VI, which might look peculiar at first. However, the estimates are statistically insignificant and economically inconsequential in both cases, especially considering the fact that this is the most fertile age group to begin with. For example, the estimate in the last panel implies that the FMP is associated with a decline of 0.374 births per 1,000 women ages 20-29 or an effect size of 0.31 percent. Our identification strategy assumes that the fixed-effects specified in Panels II to IV sufficiently capture the influence of confounding factors and any remaining variation in birth rates is orthogonal to the FMP. Therefore, it is comforting that the estimates are essentially robust to controlling for time-varying province characteristics. This is also a finding that supports the pattern obtained in Tables 2A and 2B.

The estimates shown in Table 3 are derived from a specification that constrains the effect of FMP on birth rates to be the same in all years after the introduction of the program. For reasons explained earlier, this assumption may be too restrictive and mask important dynamics in the actual relationship between the FMP and birth rates. The results from the estimation of equations (2) and (3), which allow such a dynamic relationship are presented in Table 4. The upper panel presents the estimate on "years since FMP" variable specified in equation (2) and the lower panel shows estimates on binary indicators of FMP representing various years lapsed since the launch of FMP as expressed in equation (3). As shown in the upper panel, each year of FMP is associated with a decline in birth rate for women in both age groups. According to the point estimates, each year of FMP implementation is associated with a 1.067 reduction in births per 1,000 teenagers and a 2.049 reduction in births per 1,000 women ages 20-29, respectively. In contrast to the pattern in Table 3, both estimates are statistically significant.

While the evidence shown in the upper panel of Table 4 points to a pattern in which the FMP appears to be effective in reducing birth rates among women in both age groups, this may still not be reflective of the actual effect if the true relationship is nonlinear, which is especially likely for older women. This is exactly what we observe when we focus on the estimates obtained from the non-parametric specification. As shown in the bottom panel of Table 4, the impact of FMP on birth rate among teenagers is negative and significant as soon as the program is launched with the effect getting stronger over time, a pattern consistent with the estimate on the upper panel. For example, in the year of its implementation, the program is expected to reduce teen birth rate by about 1.139 birth per 1,000 teenagers. This impact increases to 2.159 births in the first year after the introduction of the FMP, 2.735 births in the second year, 2.840 births in the third year, before reaching 3.354 births (9.99 percent) on average in the fourth year and after. Turning next to the estimates for women ages 20-29 shown in column 2, the importance of the dynamic nature of the relationship becomes much more apparent. Specifically, it looks like the program has little effect on the birth rate among women in this age group in the year of its introduction. However, starting with the first year after its introduction, it appears to cause the birth rate to decline with the effect becoming more significant both statistically and economically. For example, the women ages 20-29 reduce their birth rate by 3.963 births (3.28 percent) per 1,000 women in the third year after the launch of the program and another 4.226 births (3.50 percent) in year four and afterwards. This gradually strengthening pattern is consistent with our prior that the underlying relationship between the FMP and birth rates is one in which the effect accumulates over time. Furthermore, it is not surprising that the more immediate impact of the program is on the birth rate among teenagers than those women of prime childbearing age. First and most importantly, the teenage childbearing is a public health and social problem, while the childbearing among women ages 20-29 is not. It is therefore expected that the family physicians and other healthcare personnel employed under the FMP must have prioritized the engagement of teen pregnancy prevention efforts such as provision of educational material and counselling, among other services. In contrast, any relationship for the women ages 20-29 is more likely to evolve over time due to an indirect influence. For example, improved health and ability to control over fertility might have enabled these women to gain increased self-efficacy, make life-enhancing decisions, and obtain control over resources - a development often termed as "empowerment" (Lee and Finlay, 2017; Kabeer, 2001; Malhotra et al., 2002; Shaw, 2006). With women gaining access to improved reproductive-health services, fertility behavior might have changed due to an increase in the opportunity cost of time-intensive activities, resulting in higher labor force participation, a delay in the first birth, an increase in spacing between births, or avoidance of having children at an earlier age (Becker, 1981; Canning and Schultz, 2012; Lee and Finlay, 2017; Schultz, 1981; Porter and King, 2012; Prata et. al, 2017; Upadhyay et al., 2014). However, consequences of this process or the empowerment of women with respect to childbearing are expected to occur rather slowly as empowerment itself is a process that unfolds gradually over time (Cornwall, 2016). Overall, the picture revealed by Table 4 underscores that the relationship between FMP and birth rates is one that evolves non-linearly over time, a pattern that cannot be captured properly by a binary indicator or a linear relationship. Therefore, going forward, we focus the discussion on the results obtained from equation (3).

Next, we address the question whether the dynamic pattern in the relationship between the FMP and birth rates illustrated in Table 4 is related in any way to the initial levels of birth rates. This is especially a relevant question for teenage birth rates because, even in the case of constant treatment intensity, i.e., program resources including the efforts put by family physicians are equally distributed across provinces, areas with high birth rates initially might have experienced a more rapid decrease in childbearing. This is simply because the population of young women benefitting from the FMP would include a larger proportion of teenagers at risk of pregnancy. To test this question, we estimate the specification in equation (3) separately for provinces with birth rates below and above the median. As shown in Table 5, the effects are primarily driven by the reductions in birth rates in provinces with relatively high baseline birth rates prior to the establishment of the program. Although this pattern appears to be the case for birth rates among both teenagers and women ages 20-29, the estimates are only significant for the former group. The results shown in Table 5 suggest that the FMP effect has worked towards reducing geographical disparities in birth rates, especially among teenagers.

Next, we attempt to obtain an estimate of the marginal productivity of a family physician. The assignment of each Turkish citizen to a unique family physician is arguably the most important and distinctive operational feature of the FMP. It is really through the relationship established by these physicians that women must feel comfortable talking about their reproductive health issues, seek sexual education and counseling, and obtain contraception. One way to estimate the marginal productivity of a family physician is to regress birth rates on the number of physicians along with other control variables. However, this is likely problematic due to the potential endogeneity of the actual number of family physicians. As shown in Appendix Table 1, there is considerable variation in the number of citizens served by a family physician across provinces. In fact, a closer look reveals that many of the more urban and populous provinces like Adana, Ankara, Izmir, and Istanbul have more citizens per physician than some of the rural and remote provinces like Ardahan, Artvin, Bayburt, and Yozgat. This suggests that there are likely other factors associated with the degree to which the FMP becomes fully operational within a province besides the task of meeting a pre-determined goal. For example, the fact that citizens living in dense, urban areas are likely to have other avenues available to them, such as public and private hospitals and health polyclinics, and doctors' offices, might have been factored into the decision to recruit family physicians.

Additionally, security concerns due to civil unrest and terrorism might have slowed down the progress in efforts to fully staff the program in certain provinces (Cesur et al., 2017a).

To guard against potential bias from the endogeneity of the number of family physicians, we implement a two-stage least squares approach, in which we use the target figure for the number of family physicians per capita as an instrumental variable (IV) for the actual number of physicians. This approach would allow us to generate a predicted number of family physician values that is only a function of exogenously determined program rules (Cesur et al., 2017a). The estimates for the first and second stages from the IV analysis are shown in Tables 6A and 6B, respectively. The estimate in Table 6A implies that every additional 3,500 citizens would result in an increase in the number of family physicians by 0.907 on average. As expected, this figure is very close to the target rate of one family physician per 3,500 citizens. The marginal productivity estimates shown in Table 6B are both negative and statistically significant (p=0.001) indicating that each family physician is responsible for a 0.804 fewer births among teens and 5.177 fewer births among women ages 20-29. These effect sizes seem plausible, especially considering that the total number of citizens served by a family physician averaged 3,217 in 2017 as shown in Appendix Table 1.

Under the healthcare model established by the FMP, family physicians operate within FHCs that are basically neighborhood clinics serving the public on a walk-in basis. The presence of an FHC in a neighborhood may then indicate the availability of a whole range of services covered by the FMP (e.g., contraception, immunization, and strep test) regardless of whether it is fully staffed or not. To assess the impact on birth rates associated with each FHC, we compiled information on the number of these clinics for each province for the analysis period and estimated regressions of the impact of this variable on births for each group of women. Note that we are not able to implement an instrumental variables strategy like in analysis for the marginal productivity of a family physician because, unlike family physicians, the FMP rules do not specify a target figure for the FHCs. Therefore, the estimates for the marginal effect of a FHC on birth rates could be subject to a potential endogeneity bias. Keeping this in mind, the estimates from this analysis are shown in Table 7. The results indicate that each additional FHC is associated with a decline of 2.876 births among teens and 13.120 births among women ages 20-29.

One potential threat to the validity of the results discussed above is the possibility of bias due to some other government program or reform that might have been implemented concurrently with the FMP. For example, if the FMP had been implemented as part of a much larger development package, then the effects obtained in our analysis might be driven by not only the FMP alone, but also some of the other services in the package. We are not aware of such a development that coincided with the FMP, and importantly, followed the same roll-out pattern as the FMP did. Nevertheless, one way to test this is to identify a set of placebo outcomes that could not possibly be influenced by the FMP, and repeat the analysis using these outcomes. To do this, we consider three outcomes including car accident rate, car accident injury rate, and suicide rate. The estimates from specifications in equations (1)-(3) using these variables as outcomes are presented in Table 8. As shown in the table, not only none of the estimates are statistically significant in any of the three panels, there is also no consistent pattern in the direction of the estimates. Taken together, the evidence emerging from this analysis lends further support to our hypothesis that the reductions in childbearing found in our analysis are driven by the FMP, and not by some other government initiative.

VII. Conclusions

The Family Medicine Program established by the Turkish government in 2005 and expanded across the entire country by 2010 has resulted in universal access to basic healthcare, enhanced equity in financing, and better financial protection. These developments were followed by a significant increase in patient satisfaction and a breadth of improvements in public health outcomes. Aside from basic provisions of preventive, curative, and rehabilitative care, the FMP also included a wide range of counselling and reproductive health services, including oral contraception and prophylactics, pregnancy testing, gynecological exams, as well as family counseling and sex education, which are available to Turkish citizens with no out-of-pocket charges. These services raise the question as to whether the program might have influenced fertility behavior of Turkish women. In this paper, we tackle this question by conducting an analysis of the impact of FMP on birth rates among teenagers and women ages 20-29. Our findings indicate that the program caused noticeable decreases in the birth rates among both groups of women. Consistent with our expectations, the decrease in birth rate among teenagers appears to be immediate and persistent over time, while women ages 20-29 experience reductions in their birth rate more gradually. The finding that the patterns in the program effect differs between the two groups of women is informative in terms of providing additional insights for the mechanisms behind these impacts. For teenagers, it is not surprising that the program effect is immediate and rapidly-increasing over time. After all, teenage childbearing is widely accepted as a public health and social problem among government officials, including those in Turkey. For women ages 20-29, however, the program had a gradual and slowly-increasing effect, which is consistent with an additional channel, namely "empowerment". This channel should be interpreted as an unintended consequence of the program because reducing fertility was never among the goals of the FMP. In contrast, Turkey is a country where the government's position is to encourage fertility behavior and discourage birth control practices among women at prime childbearing ages.

Our findings suggest that women ages 20-29, who are at their prime reproductive years, reduce their fertility behavior in response to the FMP. This result could be explained by several behaviors. First, it could reflect a permanent reduction in fertility by some of these women. Second, women in this age group may simply be delaying their decision to have a child or increasing the spacing between consecutive children. Third, it could be that these women reach their desired number of children with fewer pregnancies because of the reduction in infant mortality, also caused by the FMP (Cesur et al., 2017a). Although it is reasonable to think that all three explanations may be true to some extent, testing the degree to which each drives our findings requires more detailed data. For example, the first two explanations cannot be satisfactorily tested without data reflecting individual preferences on childbearing. That being said, we can gain some insights about the viability of the second explanation using the current research design. More specifically, if these women are, for example, delaying childbearing, then one should see an increase in their childbearing when they are older. Since we have data on the birth rates among women ages 30 and older, we can examine the FMP impact on the birth rates among these women. When we do this, the results as shown in Appendix Table 2 imply no discernable pattern one way or the other, not to mention that none of the estimates are statistically significant at conventional levels. While these results seem to indicate that the FMP had no particular effect on the fertility behavior of these women, these estimates must be interpreted with caution for two reasons. First, it is not clear how many of these women had been exposed to the FMP in their 20s. Clearly, women in their early 30s must be more likely to have been exposed to the program than women in their late 30s. However, the estimates illustrated in the second and third columns of Appendix Table 2 also show no evidence of a difference in birth rates between women in early 30s and late 30s. Finally, we perform a crude test of the third explanation by estimating our models, controlling for infant mortality along with all the variables included in our most comprehensive specification. If the FMP does not affect the number of children that a woman ultimately has, but rather allows her to reach her desired number of children in fewer pregnancies, then the program effect on birth rate should become zero or be reduced significantly once infant mortality is accounted. However, this analysis causes no appreciable change to the estimate on the impact of FMP on birth rate among these women.[26] This suggests that our finding is more likely to be driven by a change in the desired number of children rather than a change in infant mortality.

[26] Results are available from the authors upon request.

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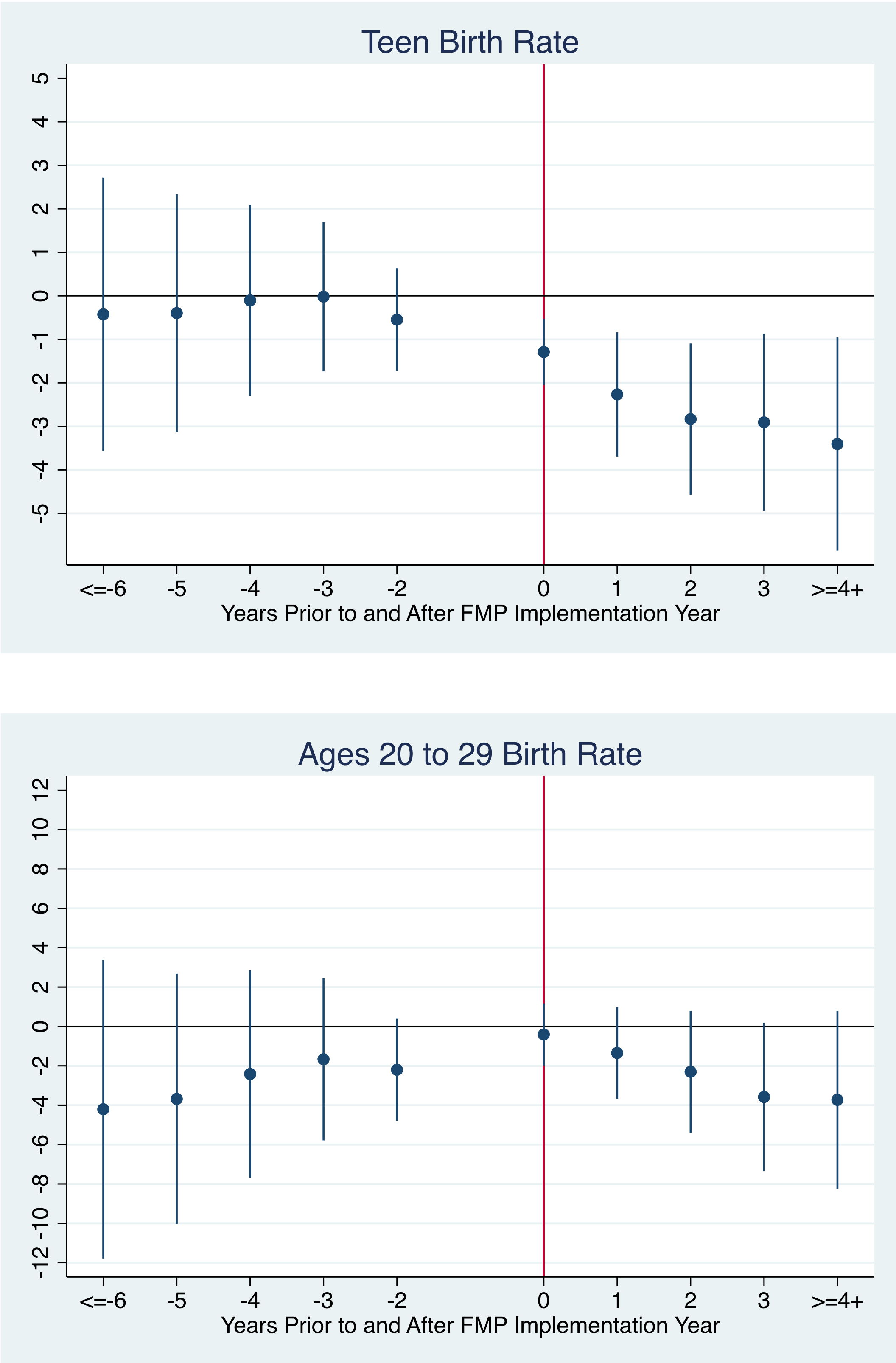
Figure 1: Event Study Estimates of the Family Medicine Program on Birth Rates



Notes: The figures display the estimates and 95% confidence intervals. The reference category is "one year prior to the implementation of the FMP."

Table 1: Descriptive Statistics by Family Medicine Program Implementation Status

Variable	Full Sample	FMP	Non-FMP
Panel I: Outcome Variables			
Teen Birth Rate	34.02	27.90	40.51
	(14.64)	(13.03)	(13.41)
Ages 20 to 29 Birth Rate	120.51	116.79	124.45
	(30.04)	(28.31)	(31.32)
Panel II: Control Variables			
Unemployment Rate	10.91	10.58	11.47
	(3.80)	(3.86)	(3.65)
	[1,134]	[736]	[398]
Per Capita GDP	17.28	24.48	9.60
	(12.76)	(13.31)	(5.79)
	[1,377]	[736]	[641]
Vehicles Per 1,000 People	195.24	236.11	151.72
	(87.26)	(82.96)	(68.75)
	[1,377]	[736]	[641]
High school Rate	18.53	21.65	13.29
	(6.04)	(4.10)	(5.08)
	[1,134]	[736]	[398]
College Rate	10.19	11.84	7.44
	(4.26)	(3.98)	(3.16)
	[1,134]	[736]	[398]
Percent Share of Governing Party Share of Seats in Parliament	0.62	0.59	0.64
	(0.17)	(0.17)	(0.17)
Observations	[1,377]	[736]	[641]

Notes: Standard deviations in parentheses and the number of observations is in square brackets. In Panel I, mean values are weighted by the associated mean number of women for the relevant age group. In Panel II, mean values are weighted by province population. *Teen Birth Rate* represents the number of births per 1,000 women in the ages 15 to 19. *20 to 29 BR* represents the number of births per 1,000 women in the ages 29 to 29.

Table 2A: Estimates of Province and Region Level Time Varying Characteristics on Family Medicine Program Indicator

Variable	(1)	(2)	(3)	(4)
Unemployment Rate	-0.091***	0.035	-0.031	-0.043
	(0.034)	(0.046)	(0.061)	(0.052)
	[1,134]	[1,134]	[1,134]	[1,134]
Per-capita GDP	0.967***	0.049	0.008	0.010
	(0.016)	(0.073)	(0.014)	(0.018)
	[1,377]	[1,377]	[1,377]	[1,377]
Vehicles per 1,000 persons	0.494***	0.085	-0.003	0.002
	(0.036)	(0.064)	(0.011)	(0.017)
	[1,377]	[1,377]	[1,377]	[1,377]
Percent High School	0.528***	0.064**	-0.021	-0.012
	(0.014)	(0.029)	(0.016)	(0.023)
	[1,134]	[1,134]	[1,134]	[1,134]
Percent College	0.498***	0.152**	0.048*	0.045
	(0.048)	(0.064)	(0.027)	(0.035)
	[1,134]	[1,134]	[1,134]	[1,134]
Percent Share of Governing Party	-0.049***	-0.006	-0.022	-0.019
Seats in the Parliament	(0.015)	(0.048)	(0.020)	(0.022)
	[1,377]	[1,377]	[1,377]	[1,377]
Controls for				
Region by Year Fixed Effects	No	Yes	Yes	Yes
Province Fixed Effects	No	No	Yes	Yes
Province Linear Trends	No	No	No	Yes

Notes: Each cell corresponds to a separate regression, where the "dependent variable" is regressed on *Family Medicine Program Indicator* conditional on control variables as indicated above. Models also control for a family medicine program year of adoption indicator. Regressions are weighted with mean province populations. Robust standard errors clustered at the province level are in parentheses and the number of observations is in square brackets. *, **, and *** indicate statistical significance at 10%, 5% and 1%, respectively.

Table 2B: Estimates of Province and Region Level Time Varying Characteristics on Years since the Family Medicine Program Implementation

Variable	(1)	(2)	(3)	(4)
Unemployment Rate	-0.016**	0.020	-0.016	-0.017
	(0.006)	(0.031)	(0.025)	(0.025)
	[1,134]	[1,134]	[1,134]	[1,134]
Per-capita GDP	0.159***	0.015	0.003	0.004
	(0.005)	(0.027)	(0.010)	(0.008)
	[1,377]	[1,377]	[1,377]	[1,377]
Vehicles per 1,000 persons	0.079***	0.034	0.003	0.001
	(0.005)	(0.024)	(0.016)	(0.008)
	[1,377]	[1,377]	[1,377]	[1,377]
Percent High School	0.068***	0.033***	0.012	0.016
	(0.002)	(0.012)	(0.016)	(0.017)
	[1,134]	[1,134]	[1,134]	[1,134]
Percent College	0.089***	0.043**	0.001	0.012
	(0.007)	(0.020)	(0.014)	(0.020)
	[1,134]	[1,134]	[1,134]	[1,134]
Percent Share of Governing Party Seats in the Parliament	-0.015***	0.010	0.018	-0.023
	(0.005)	(0.041)	(0.023)	(0.049)
	[1,377]	[1,377]	[1,377]	[1,377]
Controls for				
Region by Year Fixed Effects	No	Yes	Yes	Yes
Province Fixed Effects	No	No	Yes	Yes
Province Linear Trends	No	No	No	Yes

Notes: Each cell corresponds to a separate regression, where the "dependent variable" is regressed on *Years Since Family Medicine Program Implementation* conditional on control variables as indicated above. Regressions are weighted with mean province populations. Robust standard errors clustered at the province level are in parentheses and the number of observations is in square brackets. *, **, and *** indicate statistical significance at 10%, 5% and 1%, respectively.

Table 2C: Estimates of Province and Region Level Time Varying Characteristics on Binary Years since the Family Medicine Program Implementation Indicators

	(1)	(2)	(3)	(4)
Dependent variable: Unemployment Rate				
FMP Year 0	0.050	0.036	-0.015	-0.027
	(0.034)	(0.036)	(0.050)	(0.043)
FMP Year 1	-0.066*	0.039	-0.030	-0.044
	(0.037)	(0.050)	(0.069)	(0.063)
FMP Year 2	-0.128***	0.024	-0.069	-0.083
	(0.041)	(0.063)	(0.084)	(0.077)
FMP Year 3	-0.122***	0.036	-0.075	-0.090
	(0.040)	(0.081)	(0.094)	(0.086)
FMP Year >=4	-0.112**	0.124	-0.038	-0.044
	(0.044)	(0.154)	(0.085)	(0.083)
	[1,134]	[1,134]	[1,134]	[1,134]
Dependent variable: Per-capita GDP				
FMP Year 0	0.517***	0.040	0.011	0.013
	(0.018)	(0.057)	(0.014)	(0.017)
FMP Year 1	0.651***	0.052	0.011	0.013
	(0.025)	(0.075)	(0.018)	(0.021)
FMP Year 2	0.753***	0.058	0.003	0.005
	(0.028)	(0.099)	(0.023)	(0.025)
FMP Year 3	0.876***	0.065	-0.001	0.002
	(0.029)	(0.118)	(0.028)	(0.030)
FMP Year >=4	1.192***	0.107	0.011	0.014
	(0.021)	(0.169)	(0.037)	(0.033)
	[1,377]	[1,377]	[1,377]	[1,377]
Dependent variable: Vehicles per 1,000 persons				
FMP Year 0	0.319***	0.064	-0.001	0.003
	(0.022)	(0.048)	(0.011)	(0.015)
FMP Year 1	0.365***	0.087	-0.003	0.002
	(0.026)	(0.065)	(0.015)	(0.019)
FMP Year 2	0.409***	0.114	-0.006	0.000
	(0.028)	(0.085)	(0.020)	(0.024)
FMP Year 3	0.451***	0.138	-0.006	0.001
	(0.030)	(0.102)	(0.025)	(0.028)
FMP Year >=4	0.584***	0.203	-0.006	0.002
	(0.042)	(0.148)	(0.039)	(0.033)
	[1,377]	[1,377]	[1,377]	[1,377]
Dependent variable: Percent High School				
FMP Year 0	0.401***	0.018	-0.040*	-0.031
	(0.046)	(0.024)	(0.021)	(0.027)
FMP Year 1	0.495***	0.085**	0.005	0.016
	(0.020)	(0.032)	(0.015)	(0.025)
FMP Year 2	0.527***	0.114***	0.008	0.021
	(0.015)	(0.043)	(0.019)	(0.033)
FMP Year 3	0.524***	0.135**	0.007	0.021
	(0.017)	(0.052)	(0.023)	(0.039)
FMP Year >=4	0.563***	0.200***	0.014	0.027
	(0.021)	(0.075)	(0.034)	(0.048)
	[1,134]	[1,134]	[1,134]	[1,134]
Dependent variable: Percent College				
FMP Year 0	0.145***	0.127**	0.054*	0.050
	(0.035)	(0.053)	(0.029)	(0.037)
FMP Year 1	0.271***	0.146**	0.045	0.041
	(0.032)	(0.066)	(0.032)	(0.042)

FMP Year 2	0.339***	0.198**	0.063*	0.058
	(0.035)	(0.083)	(0.035)	(0.048)
FMP Year 3	0.453***	0.232**	0.071	0.064
	(0.039)	(0.104)	(0.044)	(0.058)
FMP Year >=4	0.663***	0.311**	0.077	0.066
	(0.057)	(0.139)	(0.054)	(0.067)
	[1,134]	[1,134]	[1,134]	[1,134]
Dependent variable: Percent Share of Governing Party Seats in the Parliament				
FMP Year 0	0.319***	0.064	-0.001	0.003
	(0.022)	(0.048)	(0.011)	(0.015)
FMP Year 1	0.365***	0.087	-0.003	0.002
	(0.026)	(0.065)	(0.015)	(0.019)
FMP Year 2	0.409***	0.114	-0.006	0.000
	(0.028)	(0.085)	(0.020)	(0.024)
FMP Year 3	0.451***	0.138	-0.006	0.001
	(0.030)	(0.102)	(0.025)	(0.028)
FMP Year >=4	0.584***	0.203	-0.006	0.002
	(0.042)	(0.148)	(0.039)	(0.033)
	[1,377]	[1,377]	[1,377]	[1,377]
Controls for				
Region by Year Fixed Effects	No	Yes	Yes	Yes
Province Fixed Effects	No	No	Yes	Yes
Province Linear Trends	No	No	No	Yes

Notes: Each cell corresponds to a separate regression, where the "dependent variable" is regressed on *Years Since Family Medicine Program Implementation* conditional on control variables as indicated above. Regressions are weighted with mean province populations. Robust standard errors clustered at the province level are in parentheses and the number of observations is in square brackets. *, **, and *** indicate statistical significance at 10%, 5% and 1%, respectively.

Table 3: The Effect of the Family Medicine Program on Birth Rates – Binary Specification

Variable	Teen BR	20 to 29 BR
Panel I: No Controls		
Family Medicine Program	-12.612***	-7.659***
	(0.578)	(1.293)
Panel II: Year Fixed Effects		
Family Medicine Program	-8.357**	-13.023*
	(3.456)	(7.770)
Panel III: Region by Year Fixed Effects		
Family Medicine Program	-8.418***	-11.331**
	(2.908)	(4.478)
Panel IV: Panel III + Province FE		
Family Medicine Program	-1.657***	0.745
	(0.575)	(1.000)
Panel V: Panel IV + Province Trends		
Family Medicine Program	-1.636***	0.086
	(0.521)	(0.982)
Panel VI: Panel V + Time Varying Controls		
Family Medicine Program	-1.579***	-0.374
	(0.518)	(1.041)
Observations	1,377	1,377

Notes: Robust standard errors clustered at the province level are in parentheses. Regressions are weighted with mean province populations for the associated age group. *, **, and *** indicate statistical significance at 10%, 5% and 1%, respectively. Time varying province characteristics include log of unemployment rate, log of vehicles per 1,000 persons, log of per capita GDP, log of percent high school, log of percent college, log of students per teacher in primary schools. *Teen Birth Rate* represents the number of births per 1,000 women in the ages 15 to 19. *20 to 29 BR* represents the number of births per 1,000 women in the ages 29 to 29.

Table 4: The Effect of the Family Medicine Program on Birth Rates – Nonlinear Specifications

Variable	Teen BR	20 to 29 BR
Years Since FMP Implemented	-1.067**	-2.049**
	(0.462)	(0.935)
FMP Year 0	-1.139**	0.163
	(0.511)	(1.196)
FMP Year 1	-2.159***	-1.225
	(0.685)	(1.167)
FMP Year 2	-2.735***	-2.442
	(0.811)	(1.479)
FMP Year 3	-2.840***	-3.963**
	(0.926)	(1.753)
FMP Year >=4	-3.354***	-4.426**
	(1.133)	(2.122)
Observations	1,377	1,377

Notes: Robust standard errors clustered at the province level are in parentheses. Regressions are weighted with mean province populations for the associated age group. *, **, and *** indicate statistical significance at 10%, 5% and 1%, respectively. Models control for the full set of covariates specified in Panel VI of Table 3. *Teen BR* represents the number of births per 1,000 women in the ages 15 to 19. *20 to 29 BR* represents the number of births per 1,000 women in the ages 29 to 29.

Table 5: The Effect of the Family Medicine Program on Birth Rates by Baseline Fertility

Variable	Teen BR	20 to 29 BR
Panel I: Below Median Baseline Fertility Sample		
FMP Year 0	0.115	0.417
	(0.619)	(1.116)
FMP Year 1	-0.495	0.847
	(0.924)	(1.670)
FMP Year 2	-0.734	0.639
	(1.042)	(2.327)
FMP Year 3	-0.808	-2.001
	(1.123)	(2.399)
FMP Year >=4	-1.202	-2.727
	(1.175)	(2.738)
Observations	680	680
Panel II: Above Median Baseline Fertility Sample		
FMP Year 0	-1.504*	1.651
	(0.815)	(2.102)
FMP Year 1	-3.215***	-1.805
	(1.102)	(2.090)
FMP Year 2	-4.057***	-2.615
	(1.326)	(2.277)
FMP Year 3	-4.244**	-3.394
	(1.691)	(2.959)
FMP Year >=4	-4.837**	-2.996
	(2.236)	(3.632)
Observations	697	697

Notes: Robust standard errors clustered at the province level are in parentheses. Regressions are weighted with mean province populations for the associated age group. *, **, and *** indicate statistical significance at 10%, 5% and 1%, respectively. Models control for the full set of covariates specified in Panel VI of Table 3. *Teen BR* represents the number of births per 1,000 women in the ages 15 to 19. *20 to 29 BR* represents the number of births per 1,000 women in the ages 29 to 29.

Table 6A: The Effect of Predicted Family Physicians on Actual Family Physicians - First Stage Estimate

Variable	# of Actual Family Physicians
Predicted # of Family Physicians	0.907***
	(0.006)
Observations	1,377

Notes: Robust standard errors clustered at the province level are in parentheses. Regressions are weighted with mean province populations for the associated age group. *, **, and *** indicate statistical significance at 10%, 5% and 1%, respectively. In addition to the full set of covariates specified in Panel VI of Table 3, and providence population is controlled for.

Table 6B: The Effect of an Additional Family Physician on Birth Rates - Instrumental Variable Estimates

Variable	Teen Births	Births among Ages 20-29
# of Family Physicians	-0.804***	-5.177***
	(0.035)	(0.150)
Observations	1,377	1,377
1st F-test	26,094	27,942
1st value	0.000	0.000

Notes: Robust standard errors clustered at the province level are in parentheses. Regressions are weighted with mean province populations for the associated age group. *, **, and *** indicate statistical significance at 10%, 5% and 1%, respectively. In addition to the full set of covariates specified in Panel VI of Table 3, and providence population is controlled for.

Table 7: The Effect of Family Health Center Density on Birth Rates

Variable	Teen Births	Births Among Ages 20 to 29
Number of Family Health Centers	-2.876***	-13.120***
	(0.194)	(0.950)
Observations	1,377	1,377

Notes: Robust standard errors clustered at the province level are in parentheses. Regressions are weighted with mean province populations for the associated age group. *, **, and *** indicate statistical significance at 10%, 5% and 1%, respectively. In addition to the full set of covariates specified in Panel VI of Table 3, and providence population is controlled for.

Table 8: The Effect of the Family Medicine Program on Placebo Outcomes

Variable	Car Accident Rate	Car Accident Injury Rate	Suicide Rate
Family Medicine Program	-3.286	-2.441	0.007
	(3.156)	(5.890)	(0.056)
Years Since FMP Implemented	1.501	2.989	0.022
	(2.788)	(4.642)	(0.029)
FMP Year 0	-2.305	-1.560	-0.053
	(2.876)	(5.439)	(0.065)
FMP Year 1	-0.869	2.534	0.049
	(4.065)	(7.576)	(0.073)
FMP Year 2	-1.813	0.117	0.041
	(6.150)	(10.451)	(0.092)
FMP Year 3	-0.525	2.829	-0.052
	(7.570)	(12.756)	(0.084)
FMP Year >=4	6.144	13.470	-0.063
	(8.681)	(14.681)	(0.098)
Observations	1,215	1,215	1,289

Notes: Robust standard errors clustered at the province level are in parentheses. Regressions are weighted with mean province populations for the associated age group. *, **, and *** indicate statistical significance at 10%, 5% and 1%, respectively. Models control for the full set of covariates specified in Panel VI of Table 3.

Appendix Table 1: Family Medicine Program Implementation Year and Population Per Family Physician in 2017

Provinces by Region	Year of Implementation	Population Per Family Physician	Provinces by Region	Year of Implementation	Population Per Family Physician
Aegean Region			*Mediterranean Region*		
Afyonkarahisar	2010	3,046	Adana	2008	3,198
Aydin	2010	3,170	Antalya	2010	3,099
Denizli	2006	3,106	Burdur	2008	3,009
Izmir	2007	3,336	Hatay	2010	3,380
Kutahya	2010	2,950	Isparta	2007	2,799
Manisa	2008	3,183	Kahramanmaras	2010	3,048
Mugla	2010	3,237	Mersin	2010	3,056
Usak	2009	3,016	Osmaniye	2008	2,948
Central Anatolia Region			*Northeast Anatolia Region*		
Aksaray	2010	3,169	Agri	2010	3,290
Kayseri	2008	3,172	Ardahan	2010	2,697
Kirikkale	2008	3,030	Bayburt	2008	2,594
Kirsehir	2008	2,895	Erzincan	2010	3,129
Nevsehir	2010	2,983	Erzurum	2008	2,786
Nigde	2010	2,939	Igdir	2010	3,043
Sivas	2010	3,091	Kars	2010	2,906
Yozgat	2010	2,907	*Southeast Anatolia Region*		
Central East Anatolia			Adiyaman	2006	2,971
Bingol	2010	3,037	Batman	2010	3,423
Bitlis	2010	3,162	Diyarbakir	2010	3,434
Elazig	2007	2,963	Gaziantep	2010	2,984
Hakkari	2010	3,404	Kilis	2010	2,963
Malatya	2010	3,026	Mardin	2010	3,163
Mus	2010	3,211	Sanliurfa	2010	3,304
Tunceli	2008	2,845	Siirt	2010	3,119
Van	2010	3,145	Sirnak	2010	2,765
East Black Sea Region			*West Anatolia Region*		
Artvin	2010	2,816	Ankara	2010	3,276
Giresun	2010	3,037	Karaman	2008	2,972
Gumushane	2006	3,403	Konya	2010	3,169
Ordu	2010	3,314	*West Black Sea Region*		
Rize	2009	3,246	Amasya	2007	2,945
Trabzon	2009	3,060	Bartin	2007	2,616
East Marmara Region			Cankiri	2008	3,154
Bilecik	2008	3,037	Corum	2008	2,888
Bolu	2006	3,032	Karabuk	2008	3,134
Bursa	2009	3,292	Kastamonu	2008	3,295
Duzce	2005	3,173	Samsun	2007	3,274
Eskisehir	2006	3,085	Sinop	2007	3,241
Kocaeli	2010	3,381	Tokat	2010	3,026
Sakarya	2010	3,345	Zonguldak	2010	3,061
Yalova	2008	3,349	*West Marmara & Istanbul*		
			Balikesir	2010	2,917
			Canakkale	2010	3,274
			Edirne	2006	3,154
			Istanbul	2010	3,422
			Kirklareli	2010	3,151
			Tekirdag	2010	3,352
			Turkey (weighted average)		3,216

Note: Information on the FMP is obtained from the Public Health Institution of Turkey.

Appendix Table 2: The Effect of the Family Medicine Program on Birth Rates of Women 30 and Older

Variable	30 to 39 BR	30 to 34 BR	35 to 39 BR
FMP Year 0	0.902	1.162	0.602
	(0.721)	(0.980)	(0.673)
FMP Year 1	0.344	0.066	0.482
	(0.749)	(1.004)	(0.678)
FMP Year 2	-0.357	-0.911	-0.026
	(0.956)	(1.241)	(0.869)
FMP Year 3	-0.822	-1.412	-0.473
	(1.077)	(1.411)	(0.958)
FMP Year >=4	-0.908	-1.493	-0.457
	(1.277)	(1.713)	(1.189)
Observations	1,377	1,377	1,377

Notes: Robust standard errors clustered at the province level are in parentheses. Regressions are weighted with mean province populations for the associated age group. *, **, and *** indicate statistical significance at 10%, 5% and 1%, respectively. Models control for the full set of covariates specified in Panel VI of Table 3. *30 to 39 BR* represents the number of births per 1,000 women in the ages 30 to 39. *30 to 34 BR* represents the number of births per 1,000 women in the ages 30 to 34. *35 to 39 BR* represents the number of births per 1,000 women in the ages 35 to 39.