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- ▶ **Islamic Law and Investments in Children:
Evidence from the Sharia Introduction in Nigeria**
- ▶ Marco Alfano

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Islamic Law and Investments in Children: Evidence from the Sharia Introduction in Nigeria

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Abstract

Islamic law lays down detailed rules regulating the upbringing of children. This study examines the effect of such rules on parental behaviour by analysing the introduction of Sharia law in northern Nigeria. The empirical strategy exploits variation across administrative areas, time and religion together with the fact that the historical homelands of some Nigerian ethnicities fall into both states that introduced Islamic laws and states that did not. Estimates show that the introduction of Sharia law increased fertility, the duration of breastfeeding and primary school enrolment. Evidence further suggests that the Sharia affected behaviour by increasing the economic returns to sons and by raising the value of conspicuous adherence to Islam.

JEL Classifications: O15, J12, J13

Keywords: Islam, Fertility, Breastfeeding, Nigeria

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1 Introduction

Sharia law, Islam’s legal system, is applied to varying degrees in around 40 countries. Economists acknowledge that religious rules or customs can influence individual or collective behaviour significantly (Iannaccone, 1998; Iyer, 2016). Empirical evidence further points to strong relationships between religion and outcomes related to children such as fertility (Iyer, 2002; Norris and Inglehart, 2004) or health (Bhalotra et al., 2010) in particular. Yet, there is still little evidence on the causal impact of religious rules on parental decisions.

This study examines the effect of Islamic laws on investments in children by focusing on a natural experiment: in 2000, 12 of the 36 Nigerian states introduced Sharia law. As a result of this sudden implementation, one part of the country was exposed first to secular and later to religious laws whereas the other was subject to secular rule only. The paper uses this unique temporal variation to identify the Sharia’s effect net of any underlying cultural or historical factors. Islamic laws not only specify numerous rules regulating the the upbringing of children, they also codify precise punishments for non-compliers. In doing so, the introduction of Sharia laws shifts parental incentives, which, in turn, is liable to affect decisions taken by the household. The focus is on three outcomes, which are both salient in the Koran as well as of particular interest to policy makers and practitioners: fertility, infant nutrition and primary schooling.

The identification strategy exploits a provision in the Nigerian constitution stipulating that Sharia law may only apply to Muslims. In a first step, I select individuals residing in the 12 states that introduced the Sharia law and compare the behaviour of Muslims and Christians over time using a difference in differences framework. Subsequently, I re-estimate the same specification for the remaining states and combine estimates in a triple differences framework. Moreover, I use an event study framework to investigate whether changes in behaviour occurred simultaneously with the introduction of the Sharia.

Estimates using information drawn from the 2003 round of the Nigerian Demographic Health Survey (DHS) show significant changes in behaviour. To analyse fertility, I model the likelihood that a woman gives birth in a given year and find that the Sharia increased the subsequent annual hazard of a birth by around 5.5 percentage points corresponding to around 30% of the pre-treatment average. I model infant nutrition by using information on the duration of breastfeeding and find an increase of around 3 months (around 18% of the pre-treatment average). Regarding education, I model the probability of a child enrolling in primary school by the legal age of entry and find a rise of 15 percentage points. This corresponds to around 34% of the pre-treatment average. The event study estimates show that changes in behaviour across the three aforementioned margins occurred *only* after the

introduction of the Sharia and *only* in the 12 states that implemented Islamic laws.

A possible concern is that the triple differences estimates do not capture the causal effect of the Sharia introduction; rather they reflect unobserved idiosyncrasies of individuals, who happen to be exposed to Islamic laws. To address this issue, I exploit the fact that state borders within Nigeria cut across the historical homelands of its ethnicities. I overlay maps drawn by Soviet ethnographers in the 1960s and the GPS coordinates of respondents to locate individuals living in those ethnic homelands which fall both into states that introduced the Sharia and states that did not. For individuals living in these *partitioned ethnicities*, I re-estimate the aforementioned triple differences specification with the addition of ethnicity dummies. By comparing respondents of the same ethnicity living either side of the border, this specification accounts for two potential sources of unobserved heterogeneity: ethnic specific customs and traditions (Michalopoulos and Papaioannou, 2014, 2013) and an individuals geographical environment (Alsan, 2015). The results for the *partitioned ethnicities* sub-sample are similar to the main results.

After estimating the effect of the Sharia on investments in children, the paper examines the pathways through which Islamic laws change parental behaviour. Although the Sharia may affect behaviour through a variety of channels, for the sake of parsimony, I focus on two. First, I examine gender differences in the economic returns to children. According to Islam, sons are the main caretakers of parents in old age, thus increasing the value of having male offspring. To investigate this pathway, I evaluate the Sharia's impact on reproductive behaviour conditional on the gender composition of children born before the Sharia. I find that women with a firstborn daughter increase fertility substantially after the introduction of the Sharia. The fertility behaviour of mothers with a firstborn son, by contrast, remains unaffected. Taken together, these findings suggest that couples adjust their reproductive behaviour in such a way as to ensure the presence of at least one son in the family.

Second, I investigate the hypothesis that the introduction of the Sharia increased the benefits of adhering to Islamic customs. In a first step, I examine whether the Sharia influenced behaviour in line with Islamic traditions and find an increase in the share of Muslims, who became active members of Mosques or who contacted a religious leader. Subsequently, I analyse whether women use reproductive behaviour to signal their adherence to Islamic customs. Islam places a high value on children, and I find that women living in areas characterised by a high Muslim population density increase their fertility behaviour as a response to the Sharia. Women living in low Muslims density areas, however, do not change their fertility rates significantly. The population density of Christians is found to be irrelevant for the Sharia's impact on fertility.

The results presented in this paper provide novel causal evidence regarding the impact

of Islamic laws on family decisions and outcomes. Economists are becoming increasingly interested in how religious aspects interrelate with socio-economic outcomes such as women's rights (Meyersson, 2014), attitudes (Clingsmith et al., 2009; Guiso et al., 2003) and public goods (Berman and Laitin, 2008). The paper contributes to these studies by highlighting a hitherto scarcely documented determinant of child welfare for the world's fastest growing religion (Pew Research Center, 2011). Indeed, in a recent overview article Iyer (2016) cites the links between religion and demography as being an under-researched topic by economists.

By linking Islamic laws to child outcomes, this analysis also relates to the growing knowledge base documenting the social (La Ferrara et al., 2012; Bassi and Rasul, 2014) and historical (Dell, 2010) influences on reproductive behaviour and children's outcomes. Finally, the results presented here document how Islamic laws increase fertility, which is often modelled as child *quantity*, along with nutrition and schooling, usually viewed as examples of child *quality*. Thus, the paper is also relevant to the large number of studies pertaining to the trade-off between child quantity and quality in high (Black et al., 2005) and low income countries (Qian, 2009; Jensen, 2012).

The paper is structured as follows. Section 2 describes the introduction of the Sharia in Nigeria, an economic rationale of its impact on parental behaviour and derives testable implications. The data and summary statistics are laid out in section 3. Section 4 describes the empirical strategy of the paper the results of which are discussed in section 5. The pathways through which the Sharia affects parental behaviour are discussed in section 6 and section 7 concludes.

2 Sharia in Nigeria

2.1 The introduction of Sharia law

Post-independence Nigeria experienced numerous regime changes. Between 1983 and 1999, the country was under military rule with a secular legal system based mainly on English common law. During this time, the only Islamic judicial institutions were the Sharia Courts of Appeal. These courts, however, had little influence. Any judgement passed by these courts could, for instance, be overruled by a federal court of appeal and decisions by the Sharia Courts of Appeal are not considered to be final (Lubeck, 2011).

In 1999, Nigeria returned to civilian rule. The newly established fourth republic granted considerable autonomy to each of its 36 states. In 2000, 12 states of the country introduced reforms, which put the legislating jurisdiction in line with the Sharia (see Ostien, 2007; for an extensive analysis). For this change to be in accordance with the Nigerian constitution, the

newly introduced Islamic laws could apply only to Muslims.¹ Panel a of figure 1 shows the states which adopted the Sharia.² It should be noted that the 1999 constitution contained numerous barriers, which successfully prevented the funding of an Islamic state in the north.³

The introduction of the Sharia was accompanied by a number of institutional changes designed to ensure the thorough application of the newly established religious laws. In a first instance, the 12 states changed their judicial system. The Sharia Courts of Appeal were officially re-introduced along with numerous inferior courts such as Area Courts, Upper Area Courts, District Courts and Upper Courts. Crucially and in contrast to the pre-1999 legal system, the judgements of these new Sharia courts were now final and could not be appealed by federal courts.⁴ In order to address the increased workload resulting from the widened scope of Sharia laws, the number of judges increased. Official data on legal personnel is not available for the years around 2000. However, Ostien (2011) collects data from various sources on the number of judges. Panel a of figure 2 reports the number of judges in the 12 Sharia states for the years 1992 and 2008. The figure shows a marked increase in the number of judges for all four court types. The rise is particularly pronounced for Upper Area Courts, which almost doubled in number. In addition to these changes, the Sharia states established *hisba* patrols, which monitored violations of Sharia law and informed the Nigerian police force.⁵

Evidence on the number of Sharia judgements suggests a marked increase in judgements based on Sharia law after 2000. Whilst it is not possible to obtain official statistics regarding judgements in Nigeria (see Human Rights Watch, 2004), Weimann (2007) collected information from various sources regarding Islamic criminal cases tried by Sharia courts (see Weimann, 2010; for more details).⁶ Panel b of figure 2 shows the number of Islamic criminal judgements issued in the 12 states, which introduced the Sharia, increased drastically from 2000 onwards. Before 2000, no Islamic criminal judgements were issued. In subsequent years, the number increases to around 40. Since not all Islamic criminal cases were reported by news outlets or NGOs, the real number of cases is likely to be substantially higher.

¹The Sharia introducing states argued that because the Sharia only applied to Muslims, forbidding to implement it would violate Muslims' constitutionally protected religious freedom.

²The states adopting the Sharia are Bauchi, Borno, Gombe, Jigawa, Kaduna, Kano, Katsina, Kebbi, Niger, Sokoto, Yobe and Zamfara state.

³The constitution maintains that all 36 states must remain secular. Moreover, any judgment by Sharia courts involving capital punishment can be overturned without appeal by either the state's chief justice or the federal court system. Finally, the federal government retains monopoly over state security and police. The northern states must thus rely on the central police force.

⁴The only exception to this being punishments that involve capital punishment.

⁵Other mandates include supervising religious celebrations and assisting with reconciliation of disputes.

⁶The author uses sources such as articles from print media, mainly from Nigeria but also from international sources. Other sources include the United Nations Integrated Regional Information Networks and reports from NGOs working in the region, e.g. BAOBAB for Womens Human Rights and Human Rights Watch.

2.2 The Sharia law

Sharia law affects numerous aspects of everyday life, such as, for instance, marriage, inheritance, diet, property rights, interest rates and punishments for crimes. The Islamic laws introduced in Nigeria are codified in the Sharia Penal Codes (SPC) (Ostien, 2011). This section focuses only on the most relevant aspects relating to family decisions (see Ostien, 2007; for a general overview of the Sharia).

Sharia law specifies detailed rules regulating the interactions between the various members of the family; these include marriages, the raising of children, maintenance in old age and inheritance rights. Islam encourages marriage and sees it as an integral part of life.⁷ Whilst married, the husband is obliged to maintain his wife to the same standard of her native family. Both husband and wife may initiate divorce. However, it is considerably easier for the husband, who only has to pronounce *talaq* three times in front of witnesses.⁸ By contrast, when the wife initiates divorce, the husband may at first refuse. In such a case, the woman must petition a court ruling to overrule her husband's wishes. After divorce, the father retains the custody of children and (after a short transition period) is under no obligation to continue maintaining his wife.

Sharia law does not specify any number of children a couple should have. Islam, however, places a high value on children⁹ and views them as a significant part of marriage.¹⁰ Abortion, however, is forbidden.¹¹ The specified punishment ranges from a fine (*ghurrah*) to lashes and an imprisonment of up to three years.¹²

The Sharia also specifies numerous obligations of parents towards their children. Immediately after birth, the mother is required to breastfeed each child for two years.¹³ Children below the age of fifteen, have the right to be looked after, protected, fed, clothed and educated.¹⁴ The punishment for neglecting children thus causing unnecessary harm as well as for denying them access to education consists of imprisonment of up to one year, a fine or both. If the neglect of parents causes the health of the child to suffer, the punishment

⁷ *And marry those among you who are single and those who are fit among your male slaves and your female slaves; if they are needy, Allah will make them free from want out of His grace; and Allah is Ample-giving, Knowing.* (Surah an-Nur, 24:32).

⁸ *talaq* means "I divorce you" in arabic.

⁹For instance: *O my Lord! Grant me from You, a good offspring.* (Koran 3:38).

¹⁰For instance: *We indeed sent messengers before you (O Muhammad), and We assigned them wives and children* (Koran 13:38).

¹¹ *Whoever voluntarily causes a woman with child to miscarry, shall, if such miscarriage be not caused in good faith for the purpose of saving the life of the woman, be punished,* Ostien 2011; SPC §206.

¹²Ostien, 2011; §209 and §213.

¹³ *The mothers shall give suckling to their children for two whole years* (Koran 2:233).

¹⁴ *Whoever having the charge or care of a child under the age of fifteen years or being in a position of authority over him wilfully ill-treats or neglects him in such a way as to cause him unnecessary suffering, or denies him access to education shall be punished,* Ostien 2011; §212.

increases to imprisonment, which may last up to five years.¹⁵ Moreover, sons and daughters should be treated equally.

Sharia law also codifies obligations of children towards their parents. In younger years, children must obey their parents. After reaching adulthood, when parents are unable to sustain themselves (either due to illness or old age), children are required to maintain their parents. The punishments for neglecting familial duties are codified as Ta'azir offences. Individuals who are able to but choose not to maintain their children or their parents in old age are classified as an *idle person*. This offence is punishable with imprisonment of up to one year and liable to caning of up to twenty lashes. The punishments for re-offenders are a prison sentence of up to two years and up to 50 lashes.¹⁶

Although under Sharia law both sons and daughters are equally responsible for their parents, Islamic marriage rules imply that sons are more likely to maintain their parents than daughters. After marriage, a woman leaves her parental family to move with her husband's and requires his permission before transferring any resources to her parents. The daughter's husband may thus veto her sustaining her parents. Moreover, a married woman is integrated in the family of her husband and takes over many caring duties for her in-laws.

Islamic inheritance rules are multifaceted and contain many special cases. The overarching rules are the following. After the death of the husband, the wife inherits a quarter of his property if she is childless.¹⁷ If the couple had children, the wife receives an eighth. Most of the remaining estate is divided amongst the children of the deceased. When allocating inheritance, male sons receive twice the share of females.¹⁸

2.3 The effect of the Sharia and testable hypotheses

This paper argues that the laws outlined in section 2.2 affect behaviour by shifting the incentives of parents regarding their children. Islamic rules regarding the maintenance of parents, for instance, increase the pecuniary returns individuals expect from their children. Alternatively, Sharia laws are likely to increase the salience of Islamic values thus affecting the attitudes of parents towards their children. Section 6 discusses the evidence on two possible pathways in more detail.

One possible way (amongst many) of illustrating the channels through which the Sharia affects parental behaviour is by using the economic model of parental decisions outlined by Schultz (1997) and Joshi and Schultz (2007). In the model, parents maximise lifetime utility

¹⁵Ostien 2011; §212 b).

¹⁶Ostien, 2011; §376.

¹⁷After funeral expenses and any remaining debts have been settled.

¹⁸*Allah commands you regarding your children. For the male a share equivalent to that of two females,* Koran (4:11)

(V), which is linearly separable and consists of two periods. In the first period (denoted as 1), individuals work and make fertility choices. In the second period (denoted as 2) they are retired and live off savings. Utility in the second period is discounted by δ . In period 1, utility is a function of consumption (C_1), leisure (L), the number of children (N) and child quality (Q). In period 2, utility depends on consumption (C_2), the number of children (N) and child quality (Q).

$$V = U_1(C_1, L, N, Q) + \frac{1}{1 + \delta} U_2(C_2, N, Q) \quad (1)$$

The budget constraint in period 1 stipulates that consumption and savings equal wage earnings, i.e. wage (w) times working hours ($1 - L$) and returns from any inherited assets (A)

$$(1 - L)w + r_A A = C_1 + S \quad (2)$$

where r_A is the interest rate on assets. Parents can save in three ways: by investing in capital, child quantity and child quality. $S = s + P_N N + P_Q Q$ where s denotes saving in capital and P_N and P_Q the prices for child quantity and child quality respectively. In period 2, the budget constraint stipulates that consumption must equal returns from savings.

$$C_2 = r_A(A + s) + r_N P_N N + r_Q P_Q Q \quad (3)$$

where r_N and r_Q denote the pecuniary returns from child quantity (N) and child quality (Q) respectively.

The introduction of the Sharia can potentially affect numerous aspects of the household model outlined by Schultz (1997) and Joshi and Schultz (2007) in equations 1 to 3. For the sake of conciseness, however, this paper focuses on three only: i) the monetary costs of children (P_N and P_Q), ii) the pecuniary returns to children (r_N and r_Q) and iii) the utility parents derive from their children ($U_1(\cdot)$ and $U_2(\cdot)$).

First, the Sharia is likely to lower the price of the quantity and quality of children (P_N and P_Q). As laid out in section 2.2, the punishments for inducing miscarriages are severe. As a result, the costs of the number of children, P_N , decrease significantly. Similarly, the punishments specified by Sharia law for not feeding or educating children also translate into a decrease in P_Q .

Second, Islamic laws are liable to increase the economic returns to the number and quality of children (r_N and r_Q). In a first instance, the requirement of children to maintain their parents in old age (along with the severe punishment for neglecting one's family) increase the future economic returns that parents expect from their offspring. Moreover, Islam's

maintenance and marriage rules influence the pecuniary returns mothers expect from their children even before they reach adulthood. Burnham (1987), for instance, points out that the resources allocated to each wife in a polygynous marriage are proportional to the number of her children. Izugbara and Ezeh (2010), moreover, provide qualitative evidence that women use high fertility rates as an insurance against divorce or their husband marrying other women. Because children remain in the custody of the father after divorce, a large number of children is likely to increase the cost of dissolving marriages for the husband. Moreover, numerous children may make it unaffordable for men to take on other wives.

The third aspect concerns the utility parents associate with their children, $U_1(\cdot)$ and $U_2(\cdot)$. The introduction of the Sharia was accompanied by a public promotion of Islamic values (Human Rights Watch, 2015). The resulting salience of Islam may have increased parents' ideal family size, which is likely to impact on fertility rates (Bassi and Rasul, 2014; La Ferrara et al., 2012).

The aforementioned changes can be summarised in three empirical implications. The introduction of the Sharia is hypothesised to i) increase fertility rates ii) increase childhood nutrition and iii) increase educational attainments of children.

It should be noted that this paper does not analyse other valid mechanisms through which reproductive behaviour can be affected. The introduction of polygamy, for instance, changes the rules of the marriage market, which may impact children as well. Alternatively, many Islamic laws are skewed in favour of men, which is likely to affect bargaining power within the household. Godefroy (2016), for instance, investigates the effect of a reform reducing Muslim's women's legal rights in Nigeria and finds an increase in fertility, especially for women, who prefer fewer children compared to their husbands. The author further argues that the reform increased the value to women of being married.

3 Data, Sample and Measurements

This study employs data drawn from the 2003 round of the Demographic Health Surveys (DHS) for Nigeria, a nationally representative survey of Nigerian households. The DHS is part of the Demographic and Health Surveys series, which is conducted in about 70 low and middle income countries around the world.¹⁹ The questionnaires collect extensive information on health, nutrition and complete birth histories of interviewed women. The DHS interviewed 7,620 women aged 15 to 49. The analyses on fertility and infant nutrition employ information from the Woman Questionnaire. In addition to interviewing women, the DHS also implements a household questionnaire, which interview usual residents of the

¹⁹The data are publicly available at measuredhs.com.

household as well as any guests. The 2003 round covered 7,225 households. Any individual between the ages 5 and 24 at the time of interview is asked about his or her school attendance and years spent in education. I use both these pieces of information combined with the current age of the child to calculate the age at which a child entered school.

Column 1 of table 1 reports summary statistics using the 2003 DHS. The total sample size of the DHS 2003 consists of 7,620 women. Around half of interviewed women, 47%, are Muslim; most of these reside in the north of the country. Female education is relatively low; 61% have completed primary education. Fertility rates in Nigeria are high. The 1999 round of the DHS reports a total fertility rate²⁰ of 5.2 children (DHS Final Report, 1999). Women interviewed under the 2003 DHS, gave birth to 2.6 children before the introduction of the Sharia in 2000.

The average duration of breastfeeding for children born before the introduction of the Sharia is 16.7. Compared to other countries in Sub-Saharan Africa this is relatively low. Data from the DHS collected for 25 countries in Sub-Saharan Africa indicates a median duration of breastfeeding of 20.7 months. Educational outcomes for children are also relatively low. For the whole of Nigeria, 43% of children due to begin schooling before the introduction of the Sharia entered school aged 6 or younger.²¹ For the same children, the average years of education by the time of interview in 2003 are 3.3.

The descriptive evidence in columns 2 and 3 of table 1 also suggests considerable differences between states that introduced the Sharia (henceforth referred to as *Sharia states*) and states that did not (henceforth referred to as *non Sharia states*). On average, women in Sharia states are predominantly Muslim, poorer and show lower educational attainment compared to their southern counterparts. Furthermore, fertility behaviour before the introduction of the Sharia differs between these groups. Before 2000, women in Sharia states gave birth to 3.2 children and in the south to 2.1 children on average. Women in the north breastfeed for longer, on average, than in the south: 17.8 months compared to 15.4. All these means are statistically different by region of residence. Educational outcomes, by contrast, are lower. In Sharia states, 29% of children due to enter school before 2000 do so aged 6 or younger. The corresponding figure for non Sharia states is 54%.

²⁰The *total fertility rate* is the average number of children that would be born to a woman over her lifetime if she was to experience the exact current age-specific fertility rates (ASFRs) through her lifetime and she was to survive from birth through the end of her reproductive life.

²¹In Nigeria, children should start school by 6.

4 Estimation framework

This paper estimates the effect of the Sharia introduction on investments in children by exploiting the fact that exposure to Islamic laws varies across three dimensions: time, an individual’s state of residence and religion. To address the issue of possible confounding factors, I further take advantage of the fact that in Nigeria administrative boundaries partition ethnic homelands. Using GPS coordinates of respondents, I select individuals belonging to ethnicities that fall into both states that introduced the Sharia and states that did not and compare their behaviour over time.

4.1 Difference-in-differences and triple differences estimators

I start by modelling behaviour as a function of individual characteristics and religion. The first stage of the identification strategy exploits a provision in the Nigerian constitution, which states that the Sharia applies only to Muslims (see section 2.1 for details). The following difference-in-differences specification focuses on states that introduced the Sharia and compares child outcomes of Muslims and Christians over time.

$$y_{ist} = \alpha_{dd} + muslim_i + \gamma_{dd} muslim_i \times post_t + X_{ist} \beta_{dd} + \phi_s + \tau_t + \epsilon_{ist} \quad (4)$$

where y_{ijst} denotes outcome y for individual i in year t in state s , $muslim_i = 1$ if individual i is Muslim and $post_t = 1$ if $t \geq 2000$. Furthermore, X_{ist} consists of time-varying covariates for the individual²²; ϕ_s and τ_t are state and year specific unobservable characteristics (so called state or year fixed effects). The reference group in this specification consists of Christians living in Sharia states.

By comparing Muslims and Christians over time, the specification in equation 4 differences out time-invariant differences between individuals belonging to these two religions in Sharia states. In order to test whether γ_{dd} identifies the effect of the Sharia, rather than spurious changes, I re-estimate equation 4 for states that did not introduce the Sharia. If the Sharia indeed impacted on parental behaviour, one would expect that Muslims change their behaviour in Sharia states (relative to Christians). In non Sharia states, by contrast, differences between Muslims and Christians should remain unchanged. To test whether the parameter estimates are statistically different across these two sub-samples, I pool all observations and estimate a triple differences specification. This specification has the advantage that it accounts for time varying differences between Sharia and non Sharia states, which

²²Covariates include education, religion, a rural dummy, birth year of mother and a dummy for marital status.

affect Muslims and Christians similarly. It is defined as follows.

$$\begin{aligned}
y_{ist} &= \alpha_{td} + muslim_i + sharia_s + muslim_i \times post_t \\
&+ muslim_i \times sharia_s + post_t \times sharia_s \\
&+ \gamma_{td} muslim_i \times post_t \times sharia_s + X_{ist} \beta_{td} + \phi_s + \tau_t + \epsilon_{ist}
\end{aligned} \tag{5}$$

where $sharia_s = 1$ if state s belongs to the group of states that introduced the Sharia. In this specification the effect of the Sharia is denoted by the coefficient γ_{td} on the triple interaction $muslim_i \times post_t \times sharia_s$. The model also controls for the pairwise interactions $muslim_i \times post_t$, $muslim_i \times sharia_s$ and $post_t \times sharia_s$. The remaining variables are defined as above.

Identification in the triple differences framework relies on the absence of time varying differences, which affect Muslims and Christians differently. To assess the plausibility of this claim, I exploit the exact timing of the Sharia's introduction and investigate whether changes in behaviour occur at the same time as the implementation of Islamic laws. For this purpose, I re-estimate equation 4 substituting $post_t$ with indicator variables for the years 1997 to 2003.

$$\begin{aligned}
y_{ist} &= \alpha_{es} + muslim_i + \sum_{\theta=t}^T \gamma_{\theta} I_{\theta} \times muslim_i \\
&+ X_{ist} \beta_{es} + \phi_s + \tau_t + \epsilon_{ist}
\end{aligned} \tag{6}$$

where $I_{\theta} = 1$ if $\theta = t, \dots, T$; the remaining variables are defined as in equation 4. In this specification, the coefficients γ_{θ} denote the difference between Muslims and Christians in the outcome variable for year θ . I estimate equation 6 for Sharia and non Sharia states separately. If the Sharia had a causal impact on behaviour, one would expect Muslim/Christian differences to change *only* after the year 2000 and *only* in Sharia states.

4.2 Partitioned ethnicities methology

This section addresses the concern that γ_{dd} and γ_{td} in equations 4 and 5 do not capture the causal effect of Sharia laws. It is possible, for instance, that the two parameters instead reflect unobservable idiosyncrasies of Muslims living in northern Nigeria.

Such unobserved differences may arise for two reasons. First, the geographical environment in the 12 northern states is very different to the rest of the country. Previous studies have shown that geography-ecology can have a significant influence on behaviour, especially in Africa. Individuals living in close proximity to each other, for instance, are likely to be

exposed to the same climate, which may impact behaviour via its effect on agricultural productivity (Alsan, 2015). Nigeria is characterised by a varied landscape and climate. The south of the country is classified as tropical rain forest and swamp forest with annual precipitations of more than 1900mm. The north, by contrast, is a Savannah with annual rainfall of between 300 and 900mm. Moreover, individuals residing in the same region share the same history (Nunn (2008) and Nunn and Puga (2012) consider slave trade). Also, different peoples adjacent to one another are likely to be exposed to similar social norms (Alesina et al., 2013), land rights (Fenske, 2013) and even ethnic diversity (Michalopoulos, 2012).

A second reason is related to the fact that individuals in Sharia and non Sharia states belong to different ethnicities. In fact, the Hausa and Fulani, the north's major ethnic groups differ in their history, languages and even physical attributes from the Yoruba and Igbo, their southern counterparts. Ethnic background has been argued to be an important determinant of culture, customs and even languages spoken (Murdock, 1959). More recent work has shown that the ethnic composition of African countries is an important influence on outcomes such as policies (Easterly and Levine, 1997), attitudes (Nunn et al., 2015) and economic growth (Michalopoulos and Papaioannou, 2013).

To address these concerns, I exploit the fact that administrative borders within Africa have been drawn in disregard of traditional ethnic homelands. Before colonialism, African leaders were concerned with ruling people rather than a particular geographical territory (Herbst, 2000). After the advent of the colonial rule, Europeans decided on the exact borders of administrative areas without accurate knowledge of the cultural and geographic entities living in those parts (Englebert et al., 2002). As a result, state borders cut across the historical homelands of some ethnicities subjecting individuals from the same cultural and historical background to different laws. Thus, a comparison of individuals living in ethnic homelands that fall into both Sharia and non Sharia states is more likely to account for unobservable characteristics than a specification which uses information on individuals from the whole country. In fact, recent studies have compared individuals living in these *partitioned ethnicities* to investigate the effect of formal institutions (Michalopoulos and Papaioannou, 2014; Cogneau and Moradi, 2014).

I allocate individuals to the historical homelands of Nigeria's ethnicities using the *Georeferencing of Ethnic Group* (GREG) dataset (Weidmann et al., 2010), which represents ethnic territories as polygons using geographic information systems. The GREG is based on data and maps from the Atlas Narodov Mira, which stems from a project by Soviet Ethnographers in the 1960s.²³ This map provides a uniform list of groups, which is valid across national and state boundaries and has been used extensively by geographers (Taylor and Hudson, 1972;

²³The data was matched to the DHS clusters using the programme Arcmap.

for instance).²⁴ Panel b of figure 1 shows the various ethnicities in Nigeria and is testament to its diversity.

Using GPS coordinates, I overlay the GREG map and the location of individuals interviewed by the DHS. After doing so, I identify individuals belonging to 5 ethnicities, the historical homeland of which lies in both states that introduced the Sharia and states that did not.²⁵ Panel c of figure 1 shows these homelands in red. Throughout the rest of the paper, these are referred to as *partitioned ethnicities*.

Columns 4 to 6 of table 1 report the characteristics and behaviour of women living in the homelands of partitioned ethnicities. Comparing column 4 (sample of partitioned ethnicities) with column 1 (the whole of Nigeria), it becomes clear that women belonging to partitioned ethnicities are quite different to the rest of the country. For instance, before 2000 women in Nigeria gave birth to an average of 2.6 children. The corresponding number for the partitioned ethnicities sample is 3.0. Further, these women are more likely to be Muslims, show lower educational outcomes and are poorer compared to the whole country. Panel C also shows that the geography of the partitioned ethnicities sample is different to the whole of Nigeria.

The figures in columns 5 and 6 show that the differences between Sharia and non Sharia states are considerably smaller for the partitioned ethnicities sample compared to the whole of Nigeria. For example, whilst the difference in fertility between Sharia and non Sharia states before 2000 is 1.1 children, the gap decreases to 0.5 when considering the partitioned ethnicities sample. The same patterns can be found for the remaining maternal characteristics in panel A as well as for the characteristics of children in panel B or geographical characteristics in panel C.

5 Results

This paper estimates the effect of the Sharia using information drawn from the 2003 round of the Demographic Health Survey (DHS) in Nigeria. The main results presented in table 2 suggest that the introduction of Islamic laws increased fertility rates, the duration of breastfeeding as well as primary school enrolment.

²⁴The GREG provides very similar information to the Murdock map used by several studies on Africa (Michalopoulos and Papaioannou, 2014; for instance). Here, the GREG is chosen because it provides very detailed information on minority groups within countries. As mentioned before, Nigeria is a very ethnically fragmented country and this precision increases the sample size considerably.

²⁵The ethnicities selected are the Bura, Bata and Tera, the Fulbe, the Jukun and Idoma, the Kanuri and the Nupe.

5.1 Fertility

Panel A of table 2 presents the first set of results regarding fertility. For the fertility analysis, I select women aged 16 to 40 at the time of interview (in 2003). The resulting sample size consists of 5,670 individuals. Each of these women contributes 7 observations, one for each year between 1997 and 2003. The resulting sample size is 39,690. The dependent variable takes the value 1 if woman i gave birth in a particular year. Because the DHS interviews women in 2003, I use detailed information on the duration of current pregnancies and code the dependent variable as equal to 1 in the year 2003 if woman i is pregnant at the time of the interview and due to give birth before 2004. Before the introduction of the reform, on average 16 percent of women give birth every year.

Columns 1 to 3 estimate the difference in differences specification outlined in equation 4 for states that introduced Sharia laws only. The parameter estimates show an increase of around 6 percentage points, which is robust to the inclusion of different sets of covariates. In column 4, I estimate the same specification for states, which did not introduce the Sharia. For this sample, fertility rates do not change. The results in column 5 compare the parameter estimates of columns 3 and 4 by pooling all women and estimating the triple differences framework laid out in equation 5. The figures suggest that the Sharia increased fertility by 5.5 percentage points, which corresponds to an increase of around 30% compared to the pre-2000 mean.

In column 6, I estimate the triple differences specification (equation 5) for the sample of women residing in ethnic homelands which fall into both states that introduced Sharia laws and states that did not. This specification also includes dummies for the ethnic homeland each woman lives in (see section 4.2 for more details). The parameter estimates show a increase of 8 percentage points. The magnitude is slightly larger but nonetheless comparable to the estimates using the whole sample in column 5. Taken together, these two results support the hypothesis that the Sharia had a positive causal impact on the probability of giving birth.

The event study estimates reported in figure 3 show that fertility rates of Muslims (relative to the ones of Christians) increase only in states that introduced the Sharia and only in the years after 2000. Panels a and b depict the point estimates (solid line) along with their 95% confidence intervals (dashed line) based on equation 6 for Sharia and non Sharia states respectively. The base year is 1997. Panel a shows that before the introduction of the Sharia, fertility differences between Muslims and Christians are very similar to the base year. In 2000, there is no change. After accounting for the duration of pregnancy, however, the estimates begin to rise. In the non Sharia sample in panel b, by contrast, the point estimates oscillate around zero.

5.2 Duration of breastfeeding

The results for the effect on infant nutrition are reported in panel B of table 2. I approximate childhood nutrition by the duration of breastfeeding. For all children born in the 5 years prior to the interview, the DHS inquires about the number of months each child was breastfed. To account for the issue of censoring, I drop all children aged less than one and half years at the time of the interview.²⁶ The resulting sample consists of 3,355 children born between 1998 and 2001. The dependent variable is the number of months a child is breastfed. If an infant is not breastfed, the dependent variable is coded as 0. For children born before the introduction of the Sharia, the average duration of breastfeeding is 16.7 months.

The difference in differences estimates indicate that in states that introduced the Sharia, the duration of breastfeeding lengthened by between 1.7 and 1.8 months. As before, the effect is robust to various specifications (columns 1 to 3). In southern states, by contrast, the duration of breastfeeding shortened by 1.3 months. The triple differences estimates in column 5 suggest that the Sharia increased the duration of breastfeeding by around 3 months. For the *partitioned ethnicities* sample, the parameter estimates are larger, around 4 months.

As before, I use information on the exact month of birth to investigate whether the change in the duration of breastfeeding occurred simultaneously with the introduction of the Sharia. For this purpose, I divide the sample of children into cohorts of 3 months birth intervals. For each subsample, I estimate the conditional difference between Muslims and Christians using the event study specification outlined in equation 6. The baseline sample consists of children born in the first 4 months available (i.e. between April and July 1998). The results in panel a of figure 4 report the estimates for states that introduced the Sharia. For this sample, conditional differences between Muslims and Christians for children born before the Sharia are relatively similar to albeit consistently higher than the base cohort. For children born after the introduction of the Sharia, by contrast, the estimates increase significantly. Panel b shows that for non Sharia states the estimates of γ_θ hardly change.

Columns 1 and 2 of table 3 show that the impact of the Sharia on the duration of breastfeeding was considerably more pronounced for girls than for boys. For sons, the triple differences estimates suggest an increase of around 15 days. For daughters, by contrast, the Sharia is estimated to have increased the duration of breastfeeding by around 5 months.

5.3 Primary school enrolment

Panel C of table 2 reports the results pertaining to primary school enrolment. I use information contained in the household questionnaire to merge children to their mothers and select

²⁶The results are stable to including all children.

children born 1989 to 1998 (aged between 4 and 13 at the time of interview). In Nigeria, the school year starts in September. Accordingly, I redefine the year of birth and recode children born after September as being born in the following year. The sample consists of 6,125 children, who enrolled between the (school) years 1993/94 and 2002/03.

To calculate the age at which each child started school, I combine information on the years of education a child completed together with his or her age at interview. Only 4% of children aged 6 to 24 repeat a year of school and less than 0.1% of children in the same age bracket drop out (DHS Final Report, 2003). Since their school starting age cannot be precisely calculated, I omit these individuals from the analysis. In Nigeria, children should enrol in school at the age of 6. For the whole country in 2003, school enrolment was relatively low, 46% of girls and 41% of boys aged 6 to 9 have never attended school (DHS Final Report, 2003).

Despite official regulations, children in Nigeria enrol in school at various different ages. To illustrate this phenomenon, I select children in school born between 1989 and 1994 (i.e. children who were due to start school before the introduction of the Sharia) and plot the distribution of the ages at which they started school in figure 5. The solid graph relates to children residing in Sharia states, the dashed to children in the rest of the country. In both samples, less than a quarter of children, who enrol in school, do so at the age of six. Almost 40% start school before that age and around a third begin school aged 7 or older. To take account of the aforementioned variation in the age at which children start school together with the legal requirement to start school at the age of six, I define the dependent variable as taking the value 1 if a child entered school between the ages of 4 to 6. For children due to enter school before the introduction of the Sharia, 43% of children entered school between 4 and 6 years old.

The difference in differences estimates in panel C of table 2 indicate that in states that introduced the Sharia, the probability of school enrolment (aged 6 or younger) increased after the Sharia by 8 to 10 percentage points. As before, the effect is robust to various specifications (columns 1 to 3). In contrast to this, the probability of school enrolment before the age of 6 hardly changed in the rest of the country after the introduction of the Sharia. The triple differences estimates in column 5 suggest that the Sharia increased the probability of children enrolling in school between the ages 4 and 6 by around 15 percentage points. For the *partitioned ethnicities* sample, the parameter estimates are slightly larger, 22 percentage points.

Finally, I use information on the exact year of birth of children (as always adjusted for the September cut off) to investigate whether changes in school enrolment occurred for children due to enter in the school year 2000/01. As before, I estimate the event study

framework outlined in equation 6. The baseline sample in this case consists of children born in the school year 1989/90, i.e. children due to start school between 1993/94 and 1995/96, depending on whether they started school aged 4, 5 or 6. The results in panel a of figure 6 report the estimates for states that introduced the Sharia. For this sample, conditional differences between Muslims and Christians for children due to enter school before the introduction of the Sharia are similar to the base year. The estimates for γ_θ fluctuate around 0 and are not statistically significant. By contrast, for children due to enter school after the school year 2000/01, the point estimates increase in size and become statistically significant. Panel b shows that for the remainder of the country, the conditional differences between Muslims and Christians remain similar to the baseline year throughout the time period under consideration.

Columns 3 and 4 of table 3 show that the impact of the Sharia on primary school enrolment was slightly larger for girls than for boys. The parameter estimate for boys is around 12 percentage points (column 3). The corresponding figure for girls is around 22 percentage points (column 4). A possible explanation for this heterogeneity is connected with the pre-treatment means reported towards the top of table 3. For children due to enter school before the introduction of the Sharia, the proportion of boys entering school aged 4 to 6 was slightly higher than for girls (0.46 for the former and 0.39 for the latter). The Sharia explicitly states that young boys and girls should be treated equally. Parents following these rules should enrol boys and girls at the same rates. Combined with pre-existing disadvantages for girls this change in behaviour would lead to a stronger effect for girls than for boys.

5.4 Robustness

This section examines the robustness of the main results of the paper laid out in table 2. A first concern is that the Sharia induced some individuals to migrate in or out of the 12 states that introduced the Sharia. If individuals' propensity to migrate is determined by unobservable characteristics, which also affect parental behaviour towards their children, the coefficient γ_{td} will erroneously attribute these differences to the effect of the Sharia.

To investigate whether migration out of Sharia states affects the results, I use information on past migration histories contained in the DHS. For the whole sample, around 18% of respondents moved to their current residence after the 2000. I drop these individuals and re-estimate the the triple differences estimates (equation 5). Column 2 of table 4 reports the parameter estimates for this sub-sample. Across panels A, B and C (analysing fertility, the duration of breastfeeding and primary school enrolment respectively) the figures are very similar when compared to the baseline estimates, reported in column 1 for reference.

Columns 3, 4 and 5 of table 4 include three different time trends. Column 3 includes religion specific time trends, column 4 a time trend, which varies between states that introduced the Sharia and states that did not, and column 5 a state specific time trend. Across all three specifications, the results are very similar to the ones of the basic specification, reported in column 1.

6 Pathways of impact

After investigating the Sharia's impact on fertility, breastfeeding and primary school enrolment, the paper presents evidence on possible pathways through which the Sharia affected parental behaviour. Section 2.3 uses Schultz's (1997) model of the household to illustrate the impact religion can have on investments in children. There are numerous channels via which the Sharia can affect individual behaviour and the section briefly discusses existing evidence on some possible mechanisms. For the sake of conciseness, however, I focus on two aspects, which are of particular interest to economists: the economic returns to children and the value of conspicuous adherence to Islamic laws and customs.

The investigation of the two aforementioned channels focuses on one outcome only: fertility. The reason for this narrow focus is related to the legal aspects of the Sharia. Islamic law explicitly specifies both that mothers should breastfeed children for a certain amount of time and that parents should enrol children in school. Moreover, the Sharia Penal Code also sets out the exact punishments for non-compliance (see section 2.2 for more details). Because of these precise rules, deviating from the prescribed behaviour is costly and thus parents are unlikely to adjust either breastfeeding or education. By contrast, the Sharia does not specify any rules regarding the number of children a couple can or should have. Consequently, any changes - at the intensive or extensive margin - are more likely to be observed in fertility choices.

6.1 Economic returns to children

Sharia law contains numerous provisions that affect the future income streams parents expect from their children. As mentioned in section 2.2, Islamic law requires adults, who earn an income, to maintain their parents in sickness or in old age. Recall that the Sharia Penal Code punishes individuals refusing to maintain their family with a prison sentence of a maximum of one year and 20 lashes. Whilst under Sharia law both sons and daughters are equally responsible for their parents, Islamic marriage rules imply that men rather than women are their parents' main caretakers. After marriage, a woman leaves her parental family to

move with her husband's. Furthermore, wives require their husbands' permission before transferring any resources to their parents.

Because of these marriage rules, the future income parents expect to receive from sons exceed to the one from daughters. A slight modification of Schultz's (1997) model can illustrate this gender gap in economic returns. For this purpose, separate the number and quality of children into the number and quality of boys and girls respectively ($N = N_B + N_G$ and $Q = Q_B + Q_G$). Moreover, assume that each of the factors N_B , N_G , Q_B and Q_G is associated with a distinct return. Under the simplifying assumptions that parents remain indifferent between sons and daughters and that the costs of raising sons and daughters are the same, the budget constraint in period 2 (equation 3) changes to

$$C_2 = r_A(A + s) + r_{NB}P_N N_B + r_{NG}P_N N_G + r_{QB}P_Q Q_B + r_{QG}P_Q Q_G \quad (7)$$

where r_{NG} and r_{NB} are the returns to the number of girls and boys and r_{QG} and r_{QB} the returns to the quality of girls and boys respectively. The remaining variables are the same as in equation 3. The fact that sons are the main caretakers of parents implies that their expect returns exceed the ones of daughters: $r_{NB} > r_{NG}$ and $r_{QB} > r_{QG}$. The implication of the two above inequalities is that parents demand more sons than daughters.

I test the above hypothesis by investigating whether the Sharia induced parents to adjust their reproductive behaviour in such a way as to increase the number of sons relative to daughters. For this purpose, I evaluate the impact of the Sharia on fertility conditioning on the gender composition of children in the family. I approximate the gender composition of a woman's offspring by the gender of her first child (Dahl and Moretti, 2008). This measure is advantageous because it only uses information from the first child. Any definition using two or more children implicitly conditions on previous fertility choices made by parents. The omission of childless women - though decreasing the sample size - is unlikely to affect the general validity of the results. In Nigeria the vast majority of women give birth at least once, only 3.3% of women aged 45-49 have never given birth (DHS Final report, 2003).

Empirically, I evaluate the impact of the Sharia for two samples: women with a firstborn daughter and women with a firstborn son. If parents respond to the Sharia by changing their fertility behaviour in order to achieve a certain number of sons, the impact of Islamic laws should be larger in the former when compared to the latter sample. In practice, I select women in Sharia states with at least one child before the observation window (i.e. 1997). For these individuals, I first estimate the difference in differences framework (equation 4) for mothers with a firstborn daughter and subsequently for women with a firstborn son. To test whether the estimates for the two subsamples are statistically different from one another, I pool all mothers in Sharia states (with at least one child before 1997) and estimate the

following triple differences specification.

$$\begin{aligned}
y_{ist} &= \alpha_{tg} + muslim_i + girl_i + muslim_i \times post_t \\
&+ muslim_i \times girl_i + post_t \times girl_i \\
&+ \gamma_g muslim_i \times post_t \times girl_i + X_{ist}\beta_{td} + \phi_s + \tau_t + \epsilon_{ist}
\end{aligned} \tag{8}$$

where $girl_i$ is a dummy taking the value 1 if woman i 's first child is female. This triple difference specification also controls for the pairwise interactions $muslim_i \times post_t$, $muslim_i \times girl_i$ and $post_t \times girl_i$. The remaining variables are the same as in equation 4.

Table 5 reports the results on the impact of the Sharia on fertility conditional on the gender of the first child. Panel A refers to women living in states that introduced the Sharia. Columns 1 to 3 estimate the difference in differences specification outlined in equation 4 for women with a firstborn daughter (born before the observation period, i.e. 1997). For these women, the parameter estimates show that the Sharia increased the probability of giving birth by around 10 percentage points, which is robust to the inclusion of different sets of covariates. Column 4 estimates the same specification for women with a firstborn son. For these mothers, reproductive behaviour does not change. The triple differences estimates based on equation 8 indicate that the effect of the Sharia was significantly more pronounced for women with a firstborn daughter than firstborn son. The point estimate is around 9 percentage points and significantly different from zero. As a further check, I re-estimate the aforementioned specifications for states that did not introduce the Sharia. Panel B of table 5 shows that for this sample, reproductive behaviour did not change significantly across any sample.

6.2 Conspicuous adherence to Islam

The second pathway of impact considered here is that the introduction of the Sharia increased the value of signalling one's acceptance of and adherence to Islam.

The introduction of Sharia laws is likely to have increased the benefits of behaving in accordance with Islamic customs for a number of reasons. A first explanation is connected with the club models of religion (see Iannaccone, 1992; for instance). These theories view religion as a club where individuals adhere to specific rules in order to participate. Alternatively, the sudden introduction of a new religious ideology may have given salience to values previously unknown. Bassi and Rasul (2014), for example, show how papal speeches affected fertility in Brazil. Such effects are likely to be particularly strong in Nigeria where the introduction of the Sharia was accompanied by the newly established hisba patrols. The mandate of

hisba officers included to ensure adherence to the Sharia as well as showing the benefits of an Islamic way of life (see section 2.1 for more details). According to these interpretations, the introduction of Sharia laws leads to the following empirical implications: i) individuals change behaviour commonly associated with Islam, ii) the change is particularly stark for Muslims living close to other Muslims and iii) the change occurs in behaviour that is observable by other Muslims.

6.2.1 Behaviour associated with adherence to Islam

As a first step, I estimate the Sharia’s effect on behaviour generally associated with Islam and find a positive impact of the Sharia on the probability of Muslim women being active members of Mosques. The data for this analysis are drawn from two rounds of the Afrobarometer for Nigeria (carried out in 1999 and 2003). Afrobarometer surveys are conducted in more than 30 African countries and collect information on attitudes towards social, religious, political and economic topics. The 1999 round interviewed 3,603 and the 2003 round interviewed 2,428 individuals aged 18 to 88.²⁷ I pool both rounds and compare behaviour in a differences-in-differences framework of the following form

$$y_{irs} = \alpha_d + \gamma_d post_r \times sharia_s + X_{irs}\beta_d + \rho_r + \phi_s + \epsilon_{irs} \quad (9)$$

where y_{irs} denotes outcome y for woman i residing in state s interviewed as part of survey round r , $post_r = 1$ if $r > 2000$ and $sharia_s = 1$ if state s introduces the Sharia. To explore whether changes in behaviour varied by an individual’s religion, I estimate the specification outlined in equation 9 for Muslims and Christians separately.

Behaviour associated with Islam is modelled using two questions: whether the respondent is a member of a Mosque or a Church²⁸ and whether the respondent contacted a religious leader.²⁹ In a subsequent step, I also explore whether the introduction of the Sharia influenced individual attitudes and focus on the question whether the respondent identifies as a Muslim.³⁰

Table 6 reports the results based on equation 9 and suggests that the introduction of the Sharia positively impacted on behaviour commonly associated with Islam. The sample consists of women aged 16 to 60 at the time of interview. The dependent variable in columns 1 and 2 takes the value one if the respondent reports being an active member of either a

²⁷The data are publicly available at afrobarometer.org and are repeated cross sections.

²⁸The exact question is *Could you tell me whether you are an active member, inactive member or not a member of a church or mosque or religious organisation?*

²⁹The exact question is *During the last 5 years, how often have you contacted a religious leader?*

³⁰The exact question is *Besides being Nigerian, which group do you feel you belong to first and foremost?*

Mosque or a Church (depending on the respondents' religion). The parameter estimates show that the Sharia increased active membership by 15 percentage points for Muslims, which corresponds roughly to a 60% increase over mean in 1999. The estimates for Christians, by contrast, are small and insignificant. The dependent variable in columns 3 and 4 takes the value one if the woman contacted a religious leader. The estimates show an increase of 13 percentage points for Muslims, which corresponds to an increase of more than 50% compared to the pre-treatment mean. The estimates for Christians are of a similar size but less precisely estimated. The results in columns 5 and 6 indicate that the Sharia had no effect on individuals' attitudes.

6.2.2 Conspicuous fertility

After analysing Islamic behaviour in general, I examine whether individuals adjust their fertility behaviour in order to signal their adherence to Islam. For this purpose, I investigate whether the impact of the Sharia was particularly strong for Muslim women living in the vicinity of other Muslims. In practice, I select women living in Sharia states only and estimate the effect of the Sharia (using equation 4) along the distribution of the population density of Muslims. As an additional check, I also estimate the same model using the population density of Christians.

I retrieve the population density of Muslims and Christians by combining data from two sources. First, information on the population density irrespective of religion is based on data provided by the Center for International Earth Science Information Network (CIESIN, 2000, 2006). The data are in GIS format and provide the number of individuals living in each square kilometre for each 30 arc-seconds. Data on religious affiliation are based on the World Religions Database (WRD, 2008). By overlaying both sources of information I retrieve the population density for Muslims and Christians separately. I divide each distribution into quartiles and estimate the difference-in-differences specification outlined in equation 4 for each one.

Panels a and b of figure 7 show the parameter estimates for the $muslim_i \times post_t$ interaction for each quartile of the Muslim and Christian population density distributions respectively. The sample consists of women in Sharia states. The circles represent the point estimates relating to the Muslim population density and the squares refer to the Christian population density; 95% confidence intervals are shown as vertical lines. The estimates show that the impact of the Sharia on fertility varies considerably with the Muslim population density (panel a). For areas with low Muslim population density (the first 3 quartiles), the Sharia only has either a small or a negligible impact on fertility. For the last quartile, however, the impact is strong and statistically significant. The estimates relating to the Christian

population density, by contrast, show no change according to the religion specific density (panel b). As a check, I also estimate the same model for states that did not introduce the Sharia. Panels c and d of figure 7 show no significant effect of the Sharia on the probability of giving birth.

A common theme of the results reported in table 6 and figure 7 is that the effect of the Sharia is strongest for behaviour, which can be observed by members of the community, who belong to the same religion. Taken together both results suggest that individuals signal their adherence to Islam by attending Mosques as well as by increasing their fertility rates.

7 Conclusion

This paper provides evidence in support of the claim that religious laws have a significant impact on parental behaviour. Triple differences estimates show that the introduction of Sharia law in northern Nigeria increased fertility, the duration of breastfeeding and primary school enrolment. Although the findings of this paper pertain to one particular case study, the results have wider, more general policy implications. For example, the insight that households adjust their behaviour in accordance with religious rules is relevant for policy makers interested in identifying interventions that improve the welfare of families. A prerequisite for any such policy is a thorough understanding of the incentives put in place by the prevailing cultural and social environment. The implication here is that in Nigeria, any policy trying to curb fertility rates should take into account the value Islam places on children. The results on the economic returns parents associate with their children further suggest that religions can have a strong impact on parental gender preferences. Another findings, which should guide policy making.

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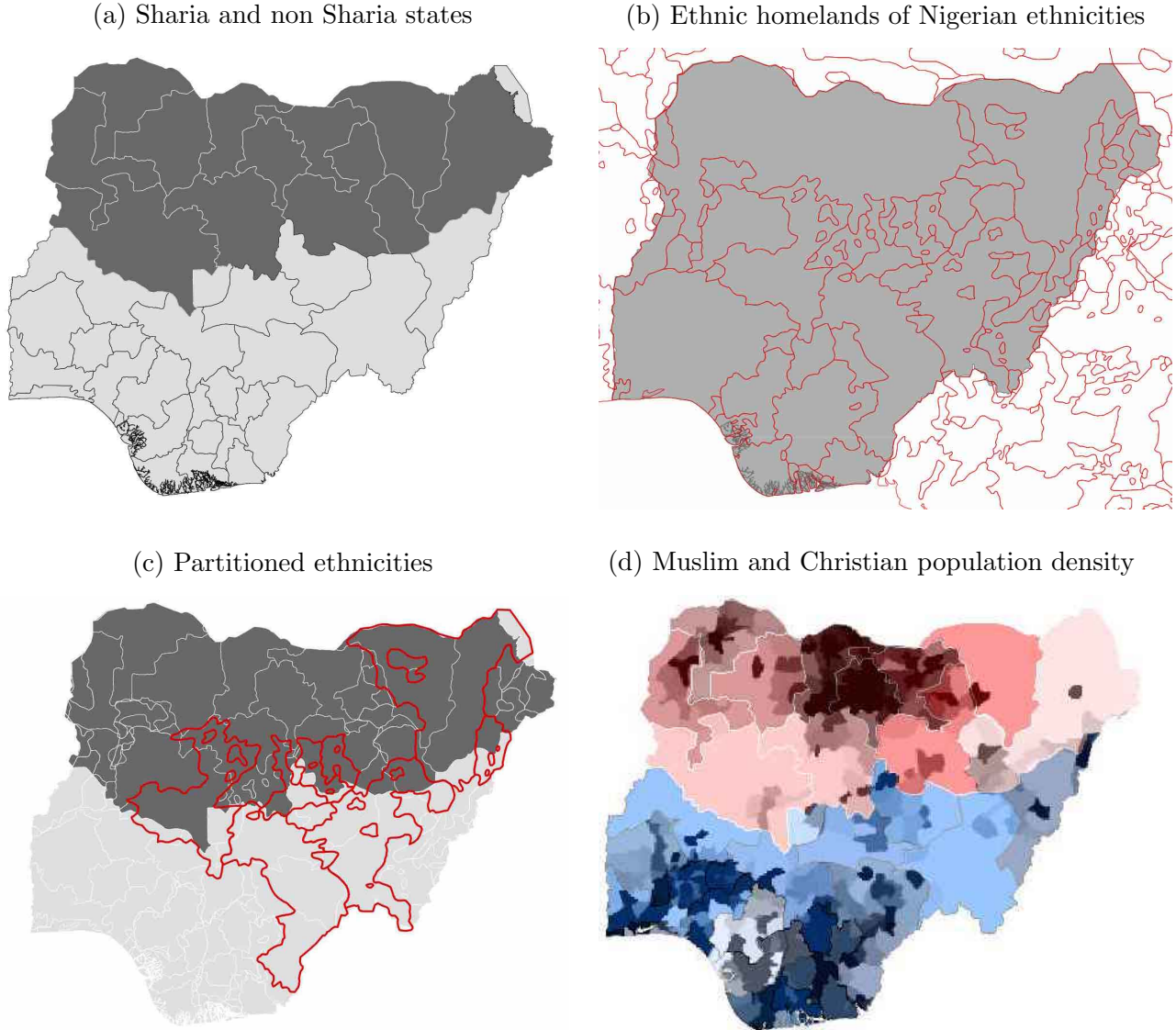
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Figures

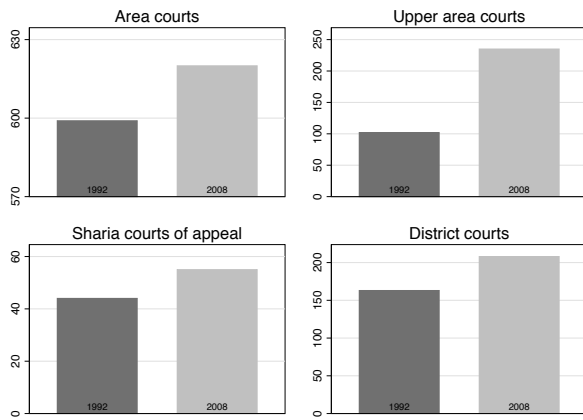
Figure 1: Nigeria - administrative borders, ethnic homelands and population



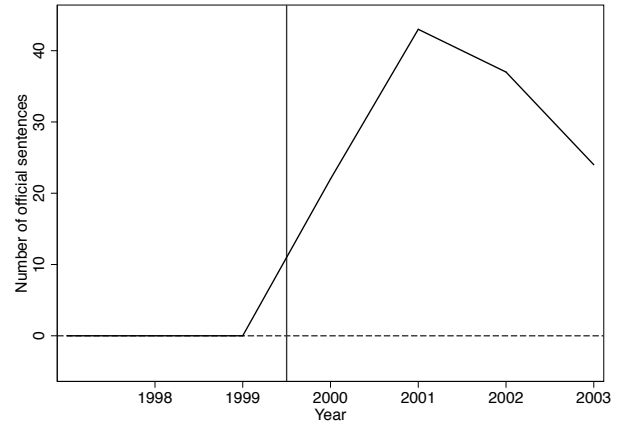
Notes: Maps report information on Nigeria's administrative areas, ethnic homelands and population density. Panel a shows the 36 states of Nigeria; states adopting the Sharia (the Sharia states) are in dark grey; these are Bauchi, Borno, Gombe, Jigawa, Kaduna, Kano, Katsina, Kebbi, Niger, Sokoto, Yobe and Zamfara. Panel b shows the historical homelands of ethnicities overlaid with the Nigerian country border. Nigerian state territory is denoted in grey; ethnic homelands are denoted as red lines. Source: Georeferencing of Ethnic Group (GREG) dataset. Panel c shows the historical homelands of Nigerian ethnicities which fall into both states that introduced the Sharia and states that did not (referred to as *partitioned ethnicities* throughout). Partitioned ethnicities, are shown as red lines, these are Bura, Fulbe, Jukun and Idoma, Kanuri and Nupe; Source: Georeferencing of Ethnic Group (GREG) dataset. Panel d shows the population density (measured as inhabitants per square kilometre) for Muslims (in red) and Christians (in blue).

Figure 2: Legislative aspects of the Sharia introduction

(a) Number of judges by court type

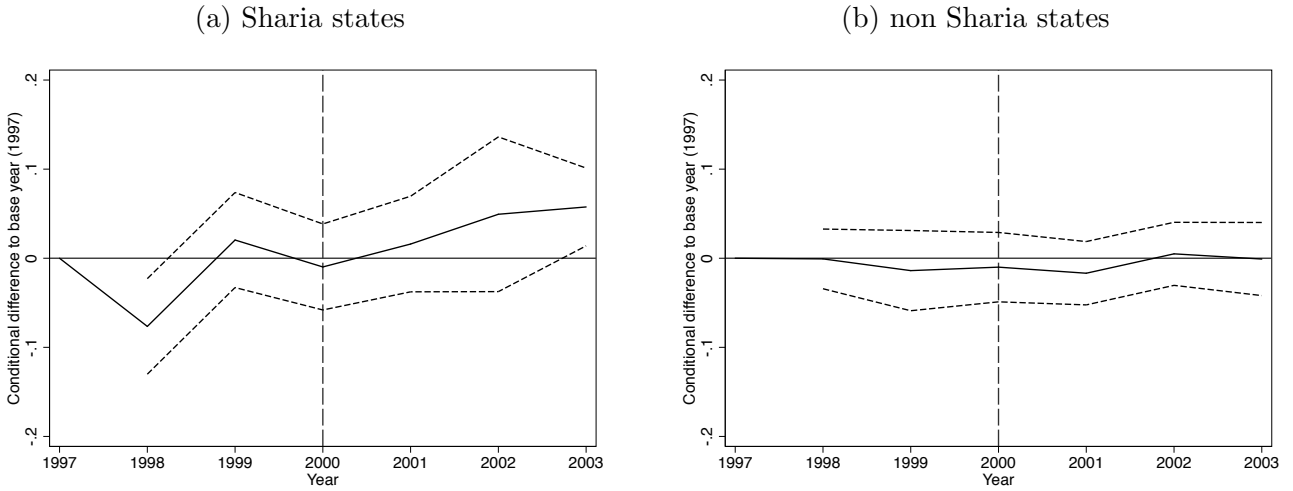


(b) Number of Sharia criminal judgements by year



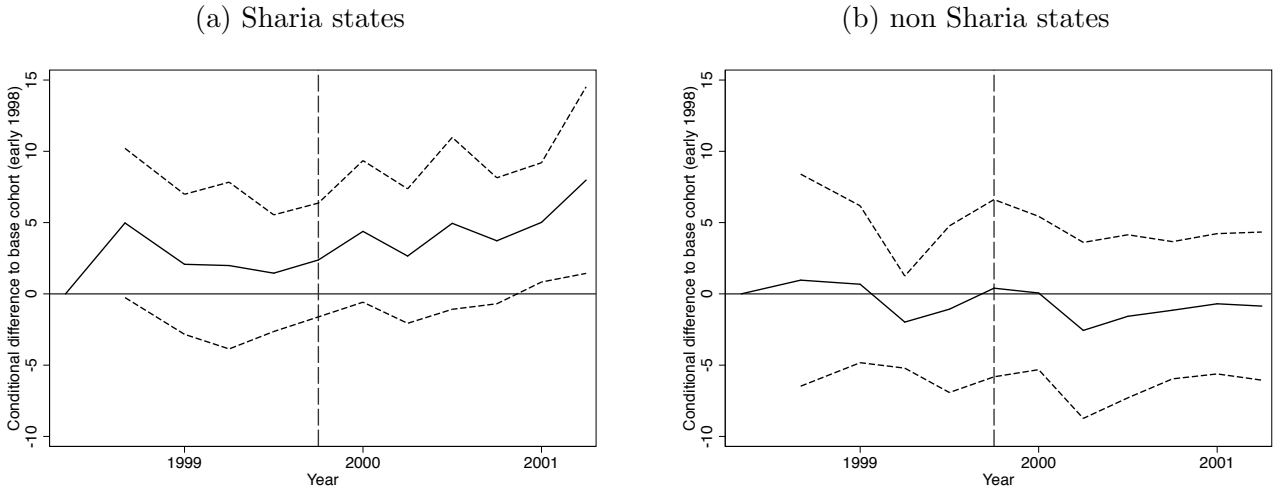
Notes: Figures report information on number of judges and number of Sharia criminal judgements before and after the introduction of the Sharia; Panel a: figure reports number of judges employed in area courts, upper area courts, Sharia courts of appeal and district courts in Sharia states for the years 1992 and 2008; information is drawn from Ostien (2011). Panel a: figure reports number of Sharia criminal judgements in Sharia states for the years 1998 to 2003; information is drawn from Weimann (2007; 2010), who uses sources such as as articles from print media.

Figure 3: Conditional Muslim/Christian fertility differences over time



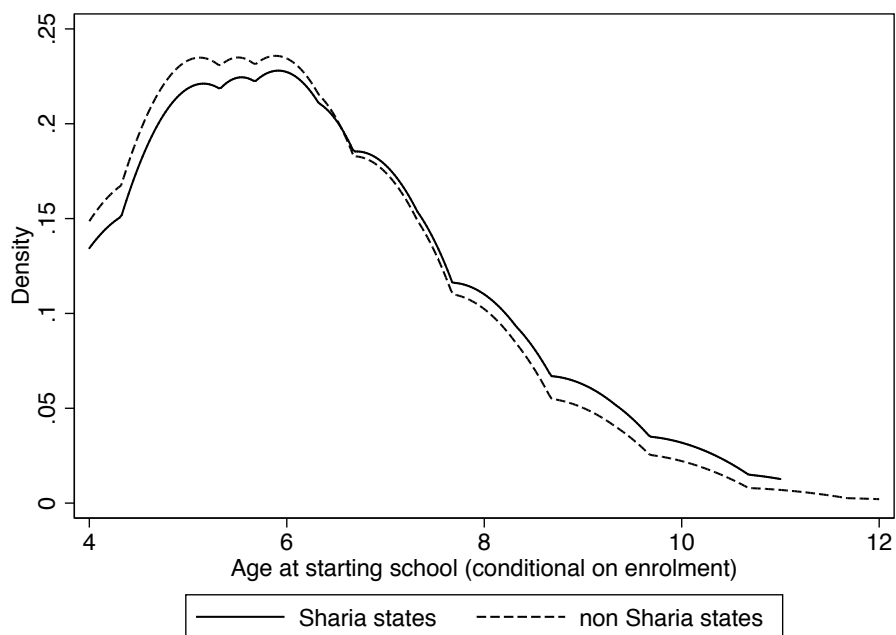
Notes: Figure shows conditional differences between Muslims and Christians by year t ; parameter estimates reported are from linear probability model; dependent variable takes value 1 if woman i gives birth in year t ; solid lines refer to coefficient estimates on interactions between *Muslim*, a dummy taking the value 1 if woman i 's religion is Islam, and I_{θ} , a vector of dummies taking the value 1 if $\theta = t$; the base year is 1997; 95% confidence intervals are shown as dashed lines; sample consists of women aged between 16 and 40 at the time of interview drawn from 2003 Nigerian DHS; mother level covariates include education, rural dummy, married dummy, number of children born by year t and dummies for birth cohort; regressions control for state-specific dummies, standard errors are clustered at the state level; panel a: the sample refers to women residing in states that introduced the Sharia; panel b: the sample refers to women residing in states that did not introduce the Sharia.

Figure 4: Conditional Muslim/Christian breastfeeding differences over time



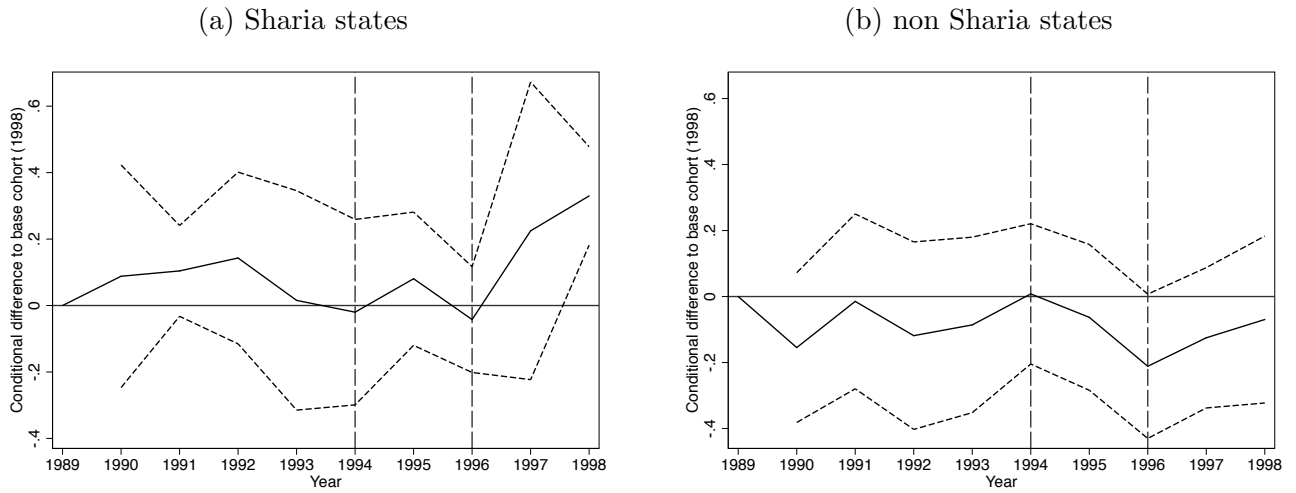
Notes: Figure shows conditional differences between Muslims and Christians by children’s year of birth; parameter estimates reported are from ordinary least squares model; dependent variable is the number of months children are breastfed; solid lines refer to coefficient estimates on interactions between *Muslim*, a dummy taking the value 1 if individual *i*’s religion is Islam, and I_{θ} , a vector of dummies taking the value 1 if $\theta = m$, where m denotes intervals of 3 months; the base cohort consists of children born between April and July 1998; 95% confidence intervals are shown as dashed lines; sample consists of children born between 1998 and 2001 drawn from 2003 Nigerian DHS; covariates include education, rural dummy, dummies for mother’s age and year of birth, gender and birth order of child; regressions control for state-specific dummies, standard errors are clustered at the state level; panel a: the sample refers to children residing in states that introduced the Sharia; panel b: the sample refers to children residing in states that did not introduce the Sharia.

Figure 5: Distribution of age at school entry - conditional on enrolling in school



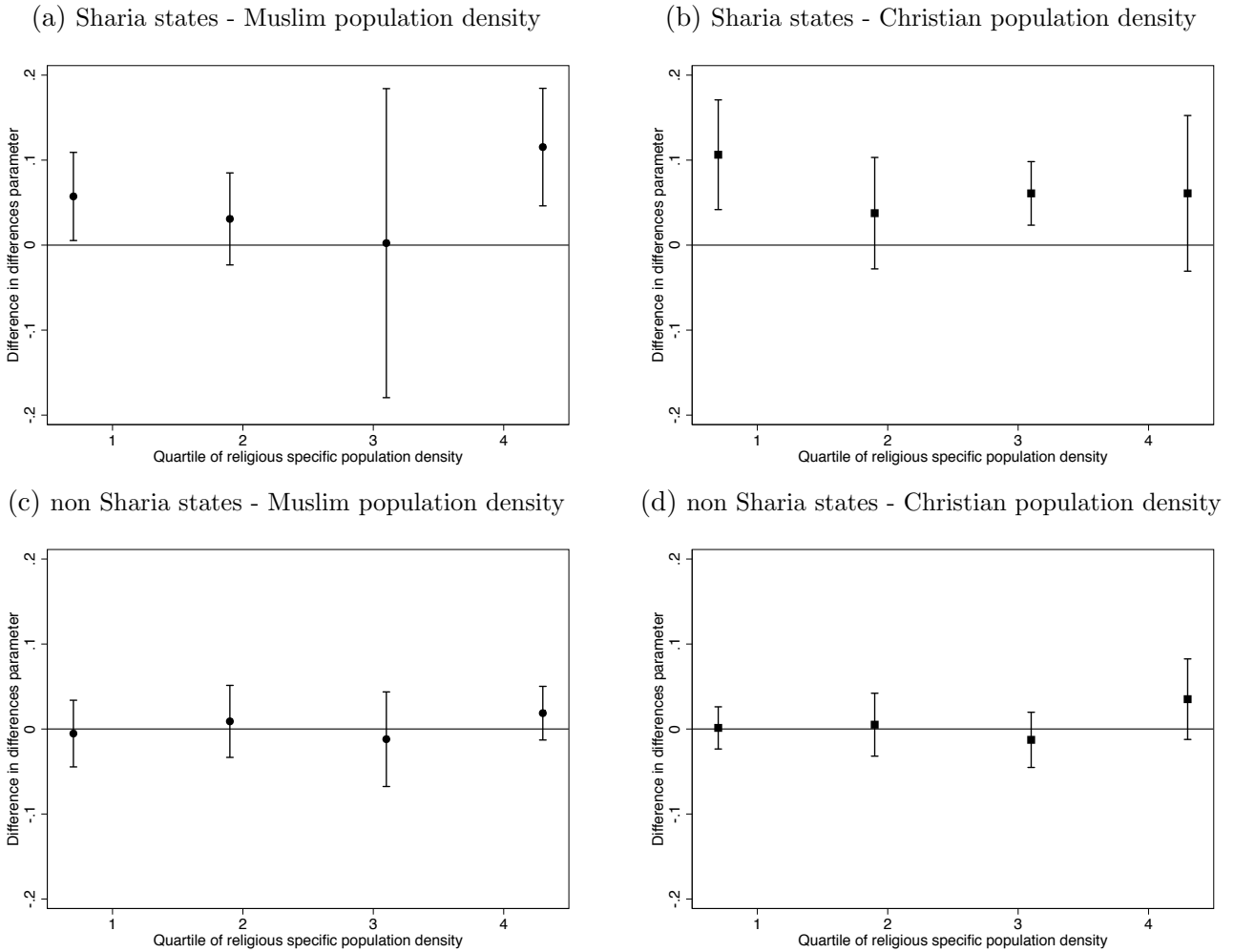
Notes: Figure shows kernel density estimates of distribution of ages at which children enrol in school; solid line refers to children residing in states that introduced the Sharia; dashed line refers to children residing in states that did not introduce the Sharia; sample consists of children that enrolled in school and born between 1989 and 1998 drawn from 2003 Nigerian DHS.

Figure 6: Conditional Muslim/Christian school enrolment differences over time



Notes: Figure shows conditional differences between Muslims and Christians by children's year of birth; years of birth have been adjusted for fact that school in Nigeria starts in September; parameter estimates reported are from linear probability model; dependent variable takes value 1 if child entered school between ages 4 and 6; solid lines refer to coefficient estimates on interactions between *Muslim*, a dummy taking the value 1 if individual *i*'s religion is Islam, and I_{θ} , a vector of dummies taking the value 1 if $\theta = t$; the base cohort consists of children born in 1989; 95% confidence intervals are shown as dashed lines; sample consists of children born between 1989 and 1998 drawn from 2003 Nigerian DHS; covariates include education, rural dummy, dummies for mother's age and year of birth, gender and birth order of child; regressions control for state-specific dummies, standard errors are clustered at the state level; panel a: the sample refers to children residing in states that introduced the Sharia; panel b: the sample refers to children residing in states that did not introduce the Sharia.

Figure 7: Effect of Sharia on fertility by religion specific population density



Notes: Figure shows effect of Sharia introduction by religious specific population density quartile; parameter estimates reported are from linear probability model; dependent variable takes value 1 if woman i gives birth in year t ; dots and squares report point estimates on interaction between *Muslim*, a dummy taking the value 1 if woman i 's religion is Islam, and *Post* is a dummy taking value 1 if $t \geq 2001$; circles or squares denote point estimates; 95% confidence intervals are shown as vertical lines; horizontal axis refers to quartile of religion specific population density (measured as inhabitants belonging to either Islam or Christianity by square kilometre); sample consists of women aged between 16 and 40 at the time of interview drawn from 2003 Nigerian DHS; panel a: quartiles refer to population density of Muslims, the sample refers to women residing in states that introduced the Sharia; panel b: quartiles refer to population density of Christians, the sample refers to women residing in states that introduced the Sharia; panel c: quartiles refer to population density of Muslims, the sample refers to women residing in states that did not introduce the Sharia; panel d: quartiles refer to population density of Christians, the sample refers to women residing in states that did not introduce the Sharia.

Tables

Table 1: Summary Statistics

	(1)	(2)	(3)	(4)	(5)	(6)
	Whole Nigeria			Partitioned ethnicities		
	All	Sharia	non Sharia	All	Sharia	non Sharia
A: Maternal characteristics						
Children born (before 2000)	2.6	3.2	2.1	3.0	3.2	2.7
Percent Muslim	47	88	20	69	84	47
Percent with primary education	61	30	81	41	33	53
Wealth quintile	3.1	2.7	3.3	2.7	2.8	2.6
B: Child characteristics						
<u>Born before 2000</u>						
Months of breastfeeding	16.7	17.8	15.4	17.0	17.6	16.1
<u>Due to enter school before 2000</u>						
Percent in school before aged 6	43	29	54	38	35	41
Years of education	3.3	2.2	4.1	2.7	2.5	2.9
C: Geography						
Percent living in rural area	60	66	56	62	62	63
Ruggedness index	0.26	0.32	0.23	0.34	0.29	0.41
Altitude in metres	357	507	256	355	407	282
Population density	953	1072	870	153	164	134
Women	7,620	3,065	4,555	1,420	827	593

Notes: Table reports summary statistics by location of current residence; all figures are drawn from the 2003 round of the Nigerian DHS; column 1 refers to the whole of Nigeria, column 2 to states that introduced the Sharia, column 3 to states that did not introduce the Sharia, column 4 refers to individuals living in ethnic homelands that fall into both states that introduced the Sharia and states that did not (so called *partitioned ethnicities*), column 5 to individuals in states that introduced the Sharia and living in *partitioned ethnicities* and column 6 to individuals in states that did not introduce the Sharia and living in *partitioned ethnicities*; months of breastfeeding are based on children born between 1998 and 1999; educational information is based on children born between 1989 and 1995; population density refers to the number of inhabitants per square kilometre.

Table 2: Effect of Sharia on fertility, nutrition and school enrolment

	(1)	(2)	(3)	(4)	(5)	(6)
Sample:	Sharia	Sharia	Sharia	non Sharia	Nigeria	Part Ethn
Panel A: Dependent variable: Birth indicator						
Mean in pre-period	0.218	0.218	0.218	0.122	0.160	0.198
Post*Muslim	0.062*** (0.01)	0.062*** (0.01)	0.057*** (0.01)	0.002 (0.01)		
Post*Muslim*Sharia					0.055*** (0.01)	0.082 * * (0.03)
Women	2,240	2,240	2,240	3,430	5,670	1,050
R squared	0.007	0.010	0.058	0.080	0.067	0.076
Panel B: Dependent variable: Months of breastfeeding						
Mean in pre-period	17.8	17.8	17.8	15.4.	16.7	17.0
Post*Muslim	1.821 * * (0.64)	1.728 * * (0.56)	1.694 * * (0.63)	-1.322 * * (0.58)		
Post*Muslim*Sharia					3.032*** (0.78)	4.097 * * (1.88)
Children	1,764	1,764	1,764	1,591	3,355	773
R squared	0.003	0.021	0.049	0.084	0.038	0.117
Panel C: Dependent variable: In school by age 6						
Mean in pre-period	0.292	0.292	0.292	0.539	0.426	0.376
Post*Muslim	0.086 * * (0.03)	0.083 * * (0.03)	0.097 * * (0.03)	-0.055 (0.04)		
Post*Muslim*Sharia					0.146*** (0.04)	0.220*** (0.07)
Children	2,947	2,947	2,947	3,178	6,125	1,282
R squared	0.028	0.122	0.189	0.132	0.142	0.198
Time dummies	no	yes	yes	yes	yes	yes
Controls	no	no	yes	yes	yes	yes

Notes: Table reports estimates for the effect of the Sharia on fertility, breastfeeding and primary school enrolment; all estimates are based 2003 DHS for Nigeria and are derived from ordinary least squares models; *Muslim* is a dummy taking value 1 if the religion of individual *i* is Islam; *Sharia* is a dummy taking value 1 if individual *i* resides in state that introduced Sharia laws; the sample in columns 1, 2, and 3 refers to states that introduced Sharia laws, the sample in column 4 to states that did not introduce Sharia laws, the sample in column 5 to the whole country, the sample in column 6 to ethnic homelands that fall into both states that introduced the Sharia and states that did not; all regressions include state dummies; standard errors are reported in parentheses and are clustered at the state level; ***, **, and * indicate significance at the 1%, 5% and 10% levels. Panel A: dependent variable takes value 1 if woman *i* gives birth in year *t*; *Post* is a dummy taking value 1 if $t \geq 2001$; each woman contributes 7 observations, one for each year between 1997 and 2003; sample consists of women aged 16 to 40 at time of interview; covariates include education, religion, rural dummy, number of children and dummies for birth cohort. Panel B: dependent variable is the number of months children are breastfed; *Post* is a dummy taking value 1 if child is born after March 2000; sample consists of children born between 1998 and 2001; covariates include education, rural dummy, dummies for mother's age and year of birth, gender and birth order of child. Panel C: dependent variable takes value 1 if child entered school between ages 4 and 6; *Post* is a dummy taking value 1 if child is born after 1995, i.e. due to enter school after 2000; sample consists of children born between 1989 and 1998; covariates include education, rural dummy, dummies for mother's age and year of birth, gender and birth order of child.

Table 3: Effect of Sharia child outcomes - by gender of child

	(1)	(2)	(3)	(4)
	Dependent variable:			
	Months of breastfeeding		In school by age 6	
Sample:	Boys	Girls	Boys	Girls
Mean in pre-period	16.5	16.8	0.46	0.39
Post*Muslim*Sharia	0.533 (1.49)	5.076*** (1.53)	0.121* (0.07)	0.215*** (0.08)
Children	1,702	1,653	3,134	2,991
R squared	0.074	0.064	0.156	0.138
Time dummies	yes	yes	yes	yes
Controls	yes	yes	yes	yes

Notes: Table reports estimates for the effect of the Sharia on breastfeeding and primary school enrolment by gender of the child; *Muslim* is a dummy taking value 1 if the religion of individual *i* is Islam; *Sharia* is a dummy taking value 1 if individual *i* resides in state that introduced Sharia laws; the sample refers to the whole of Nigeria and is drawn from the 2003 round of the Nigerian DHS; covariates include education, rural dummy, dummies for mother's age and year of birth, gender and birth order of child; all regressions include state dummies; standard errors are reported in parentheses and are clustered at the state level; ***, **, and * indicate significance at the 1%, 5% and 10% levels. columns 1 and 2: dependent variable is the number of months children are breastfed; *Post* is a dummy taking value 1 if child is born after March 2000; sample consists of boys (column 1) and girls (column 2) born between 1998 and 2001; columns 3 and 4: dependent variable takes value 1 if child entered school between ages 4 and 6; *Post* is a dummy taking value 1 if child is born after 1995, i.e. due to enter school after 2000; sample consists of boys (column 3) and girls (column 4) born between 1989 and 1998.

Table 4: Robustness

	(1)	(2)	(3)	(4)	(5)
Sample:	Nigeria	Did not migrate after Sharia	Nigeria	Nigeria	Nigeria
Panel A: Dependent variable: Birth indicator					
Mean in pre-period	0.160	0.178	0.160	0.160	0.160
Post*Muslim*Sharia	0.055*** (0.01)	0.053*** (0.02)	0.055*** (0.01)	0.055*** (0.01)	0.054*** (0.02)
Women	5,670	4,466	5,670	5,670	5,670
R squared	0.067	0.067	0.067	0.067	0.067
Panel B: Dependent variable: Months of breastfeeding					
Mean in pre-period	16.7	16.9	16.7	16.7	16.7
Post*Muslim*Sharia	3.032*** (0.78)	3.117 ** (1.36)	2.998*** (0.79)	3.053*** (0.77)	2.797*** (0.97)
Children	3,355	2,890	3,355	3,355	3,355
R squared	0.038	0.036	0.038	0.038	0.048
Panel C: Dependent variable: In school by age 6					
Mean in pre-period	0.426	0.422	0.426	0.426	0.426
Post*Muslim*Sharia	0.146*** (0.04)	0.114 ** (0.05)	0.146*** (0.04)	0.148*** (0.04)	0.149 ** (0.06)
Children	6,125	5,687	6,125	6,125	6,125
R squared	0.142	0.142	0.142	0.142	0.150
Religion specific linear time trends	no	no	yes	no	no
Treatment specific linear time trends	no	no	no	yes	no
State specific linear time trends	no	no	no	no	yes

Notes: Table reports estimates investigating the robustness of the effect of the Sharia on fertility, breastfeeding and primary school enrolment; all estimates are based on 2003 round of the Nigerian DHS and are derived from ordinary least squares models; *Muslim* is a dummy taking value 1 if the religion of individual i is Islam; *Sharia* is a dummy taking value 1 if individual i resides in state that introduced Sharia laws; the sample in columns 1, 3, 4 and 5 refers to the whole of Nigeria, the sample in column 4 excludes individuals that migrated after the introduction of the Sharia; all regressions include state dummies; standard errors are reported in parentheses and are clustered at the state level; ***, **, and * indicate significance at the 1%, 5% and 10% levels. **Panel A:** dependent variable takes value 1 if woman i gives birth in year t ; *Post* is a dummy taking value 1 if $t \geq 2001$; each woman contributes 7 observations, one for each year between 1997 and 2003; sample consists of women aged 16 to 40 at time of interview; covariates include education, religion, rural dummy, number of children and dummies for birth cohort. **Panel B:** dependent variable is the number of months children are breastfed; *Post* is a dummy taking value 1 if child is born after March 2000; sample consists of children born between 1998 and 2001 covariates include education, rural dummy, dummies for mother's age and year of birth, gender and birth order of child. **Panel C:** dependent variable takes value 1 if child entered school between ages 4 and 6; *Post* is a dummy taking value 1 if child is born after 1995, i.e. due to enter school after 2000; sample consists of children born between 1989 and 1998; covariates include education, rural dummy, dummies for mother's age and year of birth, gender and birth order of child.

Table 5: Effect of Sharia on fertility conditional on gender of first child

	(1)	(2)	(3)	(4)	(5)
Gender of first child:	Female	Female	Female	Male	All
Dependent variable: Birth indicator					
Panel A: Sharia states					
Mean in pre-period	0.322	0.322	0.322	0.305	0.313
Post*Muslim	0.098 * *	0.098 * *	0.098***	0.007	
	(0.03)	(0.03)	(0.03)	(0.02)	
Post*Muslim*Girl					0.093 * *
					(0.04)
Mothers	528	528	525	550	1,075
R squared	0.002	0.005	0.038	0.020	0.022
Panel B: non Sharia states					
Mean in pre-period	0.259	0.259	0.259	0.262	0.260
Post*Muslim	0.001	0.001	0.000	0.006	
	(0.03)	(0.03)	(0.03)	(0.02)	
Post*Muslim*Girl					-0.009
					(0.03)
Mothers	519	519	512	543	1,055
R squared	0.002	0.004	0.027	0.036	0.025
Time dummies	no	yes	yes	yes	yes
Controls	no	no	yes	yes	yes

Notes: Table reports effect of Sharia on fertility conditional on the gender of the first child; parameter estimates reported are from linear probability model; dependent variable takes value 1 if woman i gives birth in year t ; *Muslim* is a dummy taking value 1 if the religion of woman i is Islam; *Post* is a dummy taking value 1 if $t \geq 2001$; *Girl* is a dummy taking the value 1 if the firstborn child of woman i is a girl; each woman contributes 7 observations, one for each year between 1997 and 2003; sample consists of women aged 16 to 40 at time of interview drawn from 2003 round of the DHS with at least one child born before 1997; covariates include education, religion, rural dummy, number of children and dummies for birth cohort.; regressions control for state-specific dummies; standard errors are reported in parentheses and are clustered at the state level; ***, **, and * indicate significance at the 1%, 5% and 10% levels; Panel a: sample consists of women residing in states that introduced the Sharia, Panel b: sample consists of women residing in states that did not introduce the Sharia;

Table 6: Behaviour associated with Islam

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable:					
	Mosque/Church attendance		Contact religious leader		Identifies as religious	
Sample	Muslims	Christians	Muslims	Christians	Muslims	Christians
Mean in pre-period	0.239	0.689	0.236	0.403	0.375	0.102
Post*Sharia	0.147 ** (0.06)	-0.004 (0.20)	0.130 ** (0.06)	0.132 (0.08)	0.135 (0.12)	0.081 (0.10)
Women	1,264	1,602	1,261	1,601	1,254	1,594
R squared	0.139	0.043	0.051	0.061	0.054	0.059

Notes: Table reports effect of Sharia on behaviour commonly associated with Islam; parameter estimates reported are from linear probability model; sample consists of women drawn from the 2000 and 2003 rounds of the Afrobarometer; the sample in columns 1, 3 and 5 refers to Muslims, the sample in columns 2, 4 and 6 to Christians; *Post* is a dummy taking value 1 if respondent is drawn from the 2003 round of the Afrobarometer; *Sharia* is a dummy taking the value 1 if state *s* introduced the Sharia; covariates include education, religion, rural dummy, married dummy and dummies for respondent’s birth cohort; regressions control for state-specific dummies; standard errors are reported in parentheses and are clustered at the state level; ***, **, and * indicate significance at the 1%, 5% and 10% levels; columns 1 and 2: dependent variables is a dummy taking the value 1 if the respondent reports to be an active member of a religious organisation such as a church or a mosque; columns 3 and 4: dependent variables is a dummy taking the value 1 if the respondent reports to have contacted a religious leader at some point; columns 5 and 6: dependent variables is a dummy taking the value 1 if the respondent reports to identify with either Islam or Christianity (apart from being Nigerian).