Corruption and Inequality in Contraceptive Use

Arnstein Aassve, Francesco Gandolfi, Francesco Mattioli, Letizia Mencarni

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Abstract

The paper shows that corruption affects fertility dynamics in Sub-Saharan Africa. We construct a regional-level bribery measure from Afrobarometer survey data, while we use individual-level DHS data to measure contraception use and education. The probability of using modern contraception decreases as corruption within a region increases. The results confirm the strong association between education and higher use of contraception, but the interaction between bribery and education, shows that corruption fosters social inequality, as the education-driven gap in the use of modern contraceptive methods widens when corruption is high.

1 Introduction

While heavily featured in economics and development studies, so far the role of corruption has received relatively little attention among demographers, though there is a literature considering how corruption is potentially hampering the demographic transition (Farzanegan and Witthuhn, 2014). In this paper we study how the extent of corruption plays a role on fertility through the take-up of modern contraception in Sub-Saharan Africa. We present several relevant mechanisms both at the sub-national

regional and the individual level. First, at the sub-national level, there is a clear relationship between corruption and economic prosperity. This is consistent with an extensive literature in economics, that shows that corruption generally hampers economic progress mainly through inefficiency of government institutions. Thus, in so far corruption has malevolent impact on economic prosperity, and where the latter clearly affects fertility trends (Myrskylä et al., 2009), one would also expect corruption to affect fertility through several policy channels. For instance, in many places contraception is heavily dependent upon the provision of distribution centres (i.e. health stations). Corruption will necessarily channel away resources targeted for such policy initiatives. Another example concerns information campaigns, where policies are aimed at improving awareness on the benefits of birth control and potential health dangers of not using modern contraception. Whereas these mechanisms are intuitive, and may have additional effects other than corruption affecting economic prosperity, other channels are more subtle. For instance, patriarchal and hierarchical societies are in general more prone to corruption. Yet, at the same time, the more patriarchal a society is, the stronger are social norms in terms of contraceptive use, and as such, the level of hierarchy in any given society, will affect the use of modern contraceptives. In so far this is the case, the presence of corruption may not have a fully causal effect on contraceptive use - rather, part of the effect may instead be a symptom of how traditional a society is.

Contraceptive use is obviously a decision taken at the individual or couple level. One of the most important drivers at the individual level is the woman's education. Highly educated women will have stronger demand for contraception. They prefer to limit fertility, in part facilitated by their relative bargaining power - in part because of their perceived opportunity costs, which is higher than those with lower education. These decisions are however influenced by the context where the woman lives, and the conditions under which family planning decisions are made. Would corruption affect

these decisions? Highly educated women are both better informed and better resourced to access modern contraceptives. In a landscape where corruption is rife, contraception is potentially more costly, and as such, women with more resources may benefit. Moreover, highly educated women might be better equipped to maneuver corruption-ridden institutions. A more subtle mechanism lies in that corrupt societies may be more traditional. Thus, in less traditional societies, the relative effect of education may be less pronounced in term of the likelihood of using modern contraception. Again, the effect of education on contraceptive use may not be down to the level of corruption, but instead, or at least in part, driven by the fact that traditional societies, on average, might be more corrupt.

In order to assess the role of corruption, we use Afrobarometer survey data to construct a time-varying regional-level measure of corruption. These measures are matched with harmonized regions in the DHS surveys, which in turn contains individual specific information on contraception use, and in particular a measure of unmet needs, and education. Whereas the Afrobarometer data offers several indicators of corruption, our analysis use a measure of bribery which is less subjective than individual perceptions of corruption (Treisman, 2007). Thus, our empirical analysis is based on regressions at the individual level, but includes regional measures of bribery. By including regional fixed effects, we show that bribery is associated with significantly higher unmet needs in contraceptive use, and hence higher fertility. Secondly, as expected, education is strongly associated with unmet needs. When education is interacted with the regional measures of bribery, we find a strong gradient, implying that in highly corrupt regions, the gap in unmet needs becomes wider. This means that corruption does not only hamper fertility reduction, but also widens social inequalities between women attaining more education - and those with less or little education. In other words, in so far lower fertility brings about higher economic prosperity and well being, corruption widens social inequality across socio-economic groups.

2 Background

This study brings together two extensive - though diverse - fields in the social sciences: family planning and corruption. Family planning, broadly speaking, incorporates promotion and provision of contraception, sexual education, counseling and infertility management (Organization et al., 2007; Shaw, 2010). Since the 1960s, motivated by decreasing mortality rates (especially infant mortality) and sustained high fertility, thereby leading to dramatic population growth (Cleland et al., 2006), many countries and NGOs embarked on efforts to promote distribution of contraception. These efforts were driven by the idea that population control was an essential element for economic development (Bloom and Williamson, 1998; Bloom et al., 2003). In some cases, family planning interventions were taken to the extreme, with governments imposing one child policies and other forms of coercive planning (Sen et al., 1994; Cleland et al., 2006). Later, the International conference on Population and Development in Cairo in 1994 endorsed family planning to include women's empowerment and reproductive health and rights (McIntosh and Finkle, 1995; United Nations, 2014). Despite this important aspect, in the years following the Cairo conference, promotion and monetary support for family planning declined, a feature manifested by the Millennium Development Goals (MDG), where the issue of extensive population growth was not given explicit priority (United Nations, 2005a,c; Glasier et al., 2006; Cleland et al., 2006).

Over the past decade, however, there has been a revival of family planning initiatives, with an increased focus on Sub Saharan Africa (United Nations, 2005b). This renewed interest culminated with the 2012 international conference on population and development in London, where a new international coalition ("Family Planning 2020") was formed[1] with international support from the United Nations, USAID, UKAID and

[1]The declared aim of the organization is to ensure access to sexual and reproductive health services and rights to every woman by 2030, in line with the Sustainable Development Goals 3 (Good health and well-being for people) and 5 (Gender equality), the successor of the MDG (United Nations, 2016).

The Bill and Melinda Gates foundation (Carr et al., 2012; WHO, 2012; Dockalova et al., 2016).

Its focus is firmly on the reduction of unmet need for family planning. Indeed, given the lessons of the Cairo conference and in order to avoid coercive policies to reduce fertility, the aim of NGOs is to reduce the number of women who "are fecund and sexually active but are not using any method of contraception, and report not wanting any further children or wanting to delay the next child" (WHO, 2019). In this manner, it is assumed that women are not forced to have less children, but rather they shall be given the opportunity to have an option (Bendix and Schultz, 2018). This measure includes women who have an unmet need for family planning and ones that are using traditional contraception, who are assumed to have an unmet need for modern contraceptive methods as these have lower failure rates and are considered to be safer (Almalik et al., 2018). The focus on Africa stems from the fact that expected population growth is still high and, compared to many other countries, poverty rates and food insecurity remain sluggish (Casterline et al., 2017; World Bank, 2018; WorldBank, 2013; Yudin and Prata, 2016). Figure 1 shows that Africa has and will have the highest fertility and population growth rates across the world and will probably, by the end of the century, arrive at the same total population of Asia (United Nations, Department of Economic and Social Affairs, Population Division, 2017). Furthermore, the World Bank expects that about half of the world's people in extreme poverty will live in Africa (World Bank, 2018). Alongside these projections, Figure 2 shows that Africa has one of the lowest adoption of modern contraception in respect to traditional ones and the highest prevalence of unmet need for family planning (United Nations, Department of Economic and Social Affairs, Population Division, 2019).

There is broad consensus on the positive health impacts of modern contraception. It reduces the risk of maternal mortality and clearly alleviates health issues related to unsafe abortions. According to some estimates, approximately 40% of the reduction in

maternal mortality in developing countries can be attributed to the rise of modern contraceptives use (Cleland et al., 2006, 2012). Modern contraception also helps women in timing the interval between children, thereby ensuring that it is longer than the 18 months recomended by the WHO [2]. There is also a clear health effect taking place through women's empowerment. For instance, Gipson and Upchurch (2017) show that more empowered women are more likely to use skilled birth attendants which reduce drastically maternal mortality. At the same time, the use of modern contraception increases woman's empowerment by freeing them from excessive fertility and giving them the ability to postpone childbearing events - if wanted. There is consequently a close relationship between take-up of modern contraception and school completion, which in turn matters for their labour market participation and hence their empowerment (Division, 2010). Women who start childbearing at later ages tend to have higher gender egalitarian attitudes, which also leads to higher empowerment among women in the following generation (Gipson and Upchurch, 2017; Prata et al., 2017a,b).

Despite the breadth of its potential benefits, the success of family planning interventions depends closely on attitudes embedded in culture, and the political and economic environment of the targeted location. For instance the choice of whether to use contraception and what type, depends on social norms, where religion clearly matters, the structure of the household, and social acceptance, but also on public awareness, health infrastructure, stock outs and not least, the actual monetary cost of acquiring modern contraception (For a literature review refer to Herbert (2015)). Intuitively, one can easily argue that corruption must play an important role for the quality maternal care Lan and Tavrow (2017).

A common definition of corruption is that of "misuse of public office for private gain" (Svensson, 2005; J. Farrales, 2005). It comes in many forms, but is unequivocally asso-

[2]too short timing between births is linked to fetal death, prematurity or low birthweight (Zhu, 2005; Conde-Agudelo et al., 2006; Smits and Essed, 2001; Rutstein, 2005).

ciated with negative outcomes. While it is hard to disentangle causes and consequences of corruption, it has been consistently associated with inequality (Gyimah-Brempong, 2002; Jong-Sung and Khagram, 2005; Rose-Ackerman, 2004), size and quality of the public sector (Tiongson et al., 2002; Rose-Ackerman and Palifka, 2016), but also to the culture and values of a society (Seleim and Bontis, 2009). Furthermore, corruption stifles economic growth by discouraging capital flows and foreign direct investment (FDI) (Mauro, 1995; Lambsdorff, 2003), lowering productivity (Lambsdorff, 2003), and leading to under-investment in human capital and education (Tanzi and Davoodi, 2002; Mauro, 1997) among others. This effect is especially evident in developing countries, where lower constraint on the rule of law act as a catalyst for corruption (Lawal, 2007). In these countries the transition toward more democratic systems of government has resulted in dramatic levels of corruption simply because the adoption of new norms and institutions caused traditional uses and behaviours to be identified as corrupt (Mungiu, 2006). Sub-Saharan Africa in particular is plagued by endemic and widespread corruption and its countries rank consistently among the worst in the world according to the main corruption indexes available (UN, 2016). Despite being seen as one of the main culprits for the lack of economic development in Sub-Saharan Africa, and the international attention it is receiving, corruption has so far proved resistant to most efforts aimed at eradicating it (Hope Sr., 2000).

While to the best of our knowledge, no research directly studies the link between corruption and the use of modern contraceptive methods, our hypothesis derives from the literature that considers corruption and provision of public goods, health care in particular. Unsurprisingly, corruption significantly distorts the provision of public goods, both by reducing the funds available and by promoting an inefficient allocation of resources. In highly corrupt countries expenditure tends to be more concentrated toward projects where it is easier for public servants to collect bribes. Typical examples include investments in infrastructures or military projects Gupta et al. (2000), to the

detriment of areas like education Mauro (1998) and health.

Still, the variety and the sheer number of actors involved, i.e. government regulators, payroll managers, providers, suppliers and consumers, the amount of public money invested, and the uncertainty and asymmetry of information that characterizes it, make the health sector particularly susceptible to corruption (Savedoff and Hussmann, 2006). First, corruption reduces investments in family planning in general, since where corruption is rife, investments tend to be made in large-scale expenditures, such as building new hospitals or purchasing pricey equipment. Instead, smaller scale and geographically dispersed programs, which characterizes family planning in rural areas, get less funds allocated simply because the opportunities for bribery is smaller (Vian and Crable, 2017). In other words, whereas opportunities for corruption arise throughout the purchase and distribution process, it starts at the initial level where bribes influence bidding and procurement decisions. At the local level, state-purchased drugs and pharmaceuticals can be diverted toward the private sector (Vian and Crable, 2017), and discrimination based on kinship networks can limit access and derail public interventions (Smith, 2003). These features of corruption are indeed supported by empirical evidence. For instance, Azfar and Gurgur (2008) the finding that corruption has a negative effect on a variety of health outcomes, including immunization rates, as well as it discourages the use of public clinics, with an increase in waiting times.

Corruption can thus affect contraceptives use in a variety of ways. First and foremost it can divert funds that are allocated toward family planning projects, while vulnerabilities throughout the supply chain can hamper the realization of these projects, resulting in unavailability of contraceptives and impose price distortions for the end users. Furthermore, corruption could also limit campaigns aimed at informing on and promoting modern contraceptive methods among the population, crucial aspect when we consider that one of the main reasons for not using contraceptives in Sub-Saharan Africa is due to misconceptions regarding its effects on health (Schuler et al., 2011).

Importantly, the effect of corruption on take-up of modern contraceptive use is potentially stronger for the poor strata of the population (Azfar and Gurgur, 2008). In a landscape where corruption is rife, more resourced households will be both better informed and better resourced to access modern contraceptives. As a matter of fact there is an important interaction between household resources and corruption. Since availability of family planning is generally higher in low corruption areas, the role of household income may play less of a role for the use of modern contraception. By extension, living in higher income household may imply that women both have higher education and better empowered, but since family planning is widely available, the effect of women's education, may be less pervasive compared to high corruption areas.

3 Data

Our measure of corruption is calculated from the Afrobarometer survey rounds 2 (2004) to 6 (2016), and is constructed as the regional-level percentage of respondents that, in the year before the survey, had to pay a bribe in at least one of two cases: to avoid problems with the police or to obtain a document or permit. Most of the corruption indexes currently available are likewise calculated starting from survey questions but are generally based on perceptions of corruption. These perceptions, while moderately correlated with the actual extent of corruption within a territory, seem to depend more on individual characteristics such as education and gender (Olken, 2006). The use of bribery is possibly less subjective. Rather than gauging individuals' perception of corruption, it measure the actual extent in which they had to engage in corrupt behaviour, even more so when we consider that, in most contexts, there's no significant stigma to admitting to have payed bribes (Mocan, 2008; Olken and Pande, 2012). The individual responses for these variables are aggregated up to the regional level, which are - importantly - harmonized with sub-national regions in the DHS surveys.

We keep only the regions with at least 25 respondents per wave and for which is possible to calculate bribery at least two different points in time. Overall, the average number of respondent per region-year is 174, with a median of 116. Figure 3 shows the distribution of bribery in the sample regions. In the sample used to calculate the bribes measure, 27% of the Afrobarometer respondents have a first hand experience of corruption, with Kenya as the most corrupt country and Malawi being the least corrupt one. The Afrobarometer and the DHS surveys are obviously two independent data collection projects. This means that the timing of survey waves do not necessarily coincide. Since the bribery measures act as an explanatory variable, we make sure the Afrobarometer variables are lagged up to three years before the survey date of the DHS waves. As for the DHS, we have 173,897 respondents, all women aged 15 to 49, from 11 African countries, Benin, Ghana, Kenya, Malawi, Mali, Mozambique, Nigeria, Senegal, Togo, Uganda, and Zambia, divided in 65 sub-country regions.

As we suggested in Section 2, one possible reason corruption may affect contraceptive use comes from the fact that more hierarchical societies are more prone to corrupt behaviour. Yet, at the same time, traditional attitudes (including attitudes towards use of contraception) are stronger. Whereas the Afrobarometer survey does not provide a direct measure of neither the level of traditional attitudes nor the degree of hierarchy (which is in any case difficult to define and measure), we can construct a proxy. Here we do so by building an indicator for the support for free democratic elections in the region, with the idea that weaker democracies correlate positively with the strength of hierarchy, and hence traditional attitudes.

The dependent variable is the use of modern contraceptive methods[3], as opposed to no use of contraception or folkloric/traditional methods. In line with the literature, we measure this through *met* need for modern contraception. Following Bradley et al.

[3]The modern contraceptive methods are: female sterilization, male sterilization, the contraceptive pill, interuterine contraceptive device, injectables, implants, female condom, male condom, diaphragm, contraceptive foam and contraceptive jelly, lactational amenorrhea method, standard days method.

(2012), we define DHS respondents as in need for contraception if they are fecund, married or unmarried and sexually active, and do not desire a birth in the two years following the survey. Among these women, we classify as in need of modern contraception those that do not use any contraception or use traditional/folkloric contraceptive methods. Respondents that use modern contraception are instead classified as having "met need for contraception". We obtain a baseline sample of 173,897 women, with 38% that use modern contraceptive methods and 62% that have an unmet need for contraception. Of those, 65% have an unmet need for spacing, i.e. they want to delay their next pregnancy, while 35% do not want more children.

In addition, we know the respondent's highest level of schooling completed. This is defined as no education, completion of primary school or if they completed secondary school or higher. We construct three different dummies, one for each possible education level. One possible reason why education matters for the take up of modern contraception is that it brings about stronger empowerment and negotiation power. In order to tap into this mechanism, we build two indicators from the DHS to capture women's empowerment. The first one measures *Domestic violence*, and is a dummy variable taking value one if the respondent says it's never justified for the husband to beat their wife/partner and zero otherwise. The second indicator is *Household decision making*, a dummy taking value 1 if the respondent usually makes decisions regarding her own health, large household purchases and visits to family or relatives. Finally, we measure other individual characteristics that may have an effect on contraceptive behaviour. These include respondent's age, age squared, living in rural as opposed to urban residence, employment status and occupation, religion, if being part of the region's ethnic majority, the number of living children, and the intention of having a child in the two years following the survey.

In some specifications we also control for the regional-level Human Development Index (S-HDI), as measured by Smits and Permanyer (2019). This index is an average

of the sub-national values of three dimensions: education, health and standard of living, measured by indicators of mean years of schooling of the adult (25+) population and expected years of schooling of children aged 6, Gross National Income per capita in 2011 US$ PPP, and life expectancy at birth respectively. The indicators are constructed so that the country-level HDI calculated using the sub-national data is equal to that in the UNDP-HDI database. Table 1 displays the summary statistics for the final sample.

4 Methodology

The analysis assesses the role of bribery on the adoption of modern contraceptive methods. To isolate the effect of bribery we adopt the following empirical approach:

$$Contraception = \beta_0 + \beta_1 Bribery_{r,t} + \beta_2 Education_{t,i} + \boldsymbol{\beta}\mathbf{X}_{t,i} + \alpha_r + \gamma_t + \epsilon_{r,t,i} \quad (1)$$

Where i refers to the individual as recorded in the DHS and r denotes the regions where the individual resides. The dependent variable, *Contraception*, is a dummy taking value 1 if the respondent has a met need for contraception and 0 in the case of unmet need, while *Bribery* is the sub-national regional-level bribery score calculated from the Afrobarometer. The main coefficient of interest in the model is β_1, that isolates the effect of regional-level bribery on an individual's choice of contraceptive method. To further examine the role of corruption and education, we specify a second model that includes the interaction between *Bribery* and *Education*:

$$\begin{aligned} Contraception = \beta_0 + \beta_1 Bribery_{r,t} + \beta_2 Education_{t,i} + \boldsymbol{\beta}\mathbf{X}_{t,i} \\ + \beta_3 Bribery_{r,t} * Education_{t,i} + \alpha_r + \gamma_t + \epsilon_{r,t,i} \end{aligned} \quad (2)$$

β_3 are here the coefficients of interest, as it identifies differences in the impact of regional-level corruption depending on the education level of individuals. It is important to notice that, in all specifications, education is represented through three dummy variables, representing the higher educational level attained by the respondent, no education (taken as the reference group), primary school, and secondary or higher. All specifications also include X_i (the vector of individual-level controls) and year of interview FE (γ_t).

Whereas the DHS are in most cases cross-sectional surveys, it is important to point out that we have repeated observations for both countries and sub-national regions. From the Afrobarometer, we have used indicators that were available for five rounds, and hence matched with the respective DHS surveys. This set-up has several implications. First, it is clear that the measures taken from the Afrobarometer, will necessarily contain noise as they are aggregated from individual responses but for each round, they are taken from different samples. On the other hand, given that these measures are repeated over time, we can control for both country and sub-national region effects. This provides a more robust estimation of the key relationships, not least because there is variation over time at both levels. In all specifications, standard errors are clustered at the regional level.

5 Results

The Estimates of equations 1 and 2 are reported in Table 2. In columns (1) and (2) we estimate the model with random effects and with region fixed effects respectively, and without interaction between *Bribery* and *Education*. The results support our initial assumption: the higher the corruption within a country the lower the use of modern contraception. Specifically, a one standard deviation (0.158) increase in regional-level bribery leads to a two percentage points decrease in the probability of

using a modern contraceptive method. Education, on the other hand, positively impacts modern contraception, with both primary and secondary educated respondents that have a higher, and statistically significant in both columns, probability of using modern contraception when compared to people with no education.

Next, in columns (3) and (4) we include in the model the interaction term between *Bribery* and *Education* to detect potential differences in the impact of corruption depending on an individual's education level. While the coefficients of the two variables remain significant and consistent with those of the models without interaction, this specification shows the role played by corruption in fostering social inequality. The coefficients in this logit specification is of course hard to interpret given the non-linear functional form. In Figure 4 we demonstrate the effect by providing a set of predictions. The vertical axis measures here the probability of using modern contraceptive use, whereas the horizontal axis measure the regional bribery score. Predictions are then made for non-educated, those with primary education and those with secondary education or higher. The figure demonstrates the interaction effects very clearly. As bribery become more pervasive, the gap between educational groups widens. In other words, it is especially those with lower education levels that are affected the most by a highly corrupt environment, as evidenced by the sharp decline in modern contraception use by the non-educated when bribery increases.

In Table 3 we present the same specifications as 2 while also including sub-national HDI as one of the control variables. This is an important control, for the simple reason that take up of modern contraception is likely to be higher in more prosperous regions. Our previous results are robust to the addition of $S-HDI$, with corruption that continues to negatively affect the use of contraception, and the highly educated that have a higher probability of using modern contraceptive methods. The coefficient associated with $S-HDI$ is positive and significant at the 1% level in columns (1) and (3), indicating that in more developed regions the adoption of modern contraceptive methods

is indeed stronger. However, when we include region fixed effects in the model the coefficient loses significance. This suggests that the region fixed effect, fully captures the correlation between economic prosperity and take-up of modern contraception. It also suggests that corruption in these regions are not strongly correlated with economic prosperity.

In so far as corruption is correlated with other regional characteristics, our results might not capture solely the role played by corruption in inhibiting the use of modern contraceptive methods. While the inclusion of region fixed effects allows to control for unobserved time constant characteristics, it is of interest to understand if the effect of corruption is driven by other characteristics. As we have stated previously, one possibility is that hierarchical societies are more prone to corruption, yet at the same time, affects contraceptive take-up. In order to assess this possibility, we include in the regression a measure for the regional-level support for free and regular elections. Strong support to democracy is expected to reflect lower degree of hierarchy. The results of this specification are shown in Table 4. Focusing on the coefficient for *Choose leaders through elections*, we find a positive relationship between regional support for democracy and use of modern contraceptive methods, with a lower probability of unmet need for contraception in regions where the preference for free elections is higher. In contrast to the previous specification where we included the regional HDI, we see here that the relationship remains positive even when regional fixed effects are included. In so far attitudes towards democracy reflect the level of hierarchy in these regions, we see that this has an important impact on contraceptive use. Still, the effect of corruption remains unaltered. In other words, stronger democratic attitudes may reflect more modern societies, and hence explain its positive relationship with respect to take-up of modern contraceptives. Yet, corruption appears to have a pervasive impact on contraceptive use.

Next, in Table 5, we study the role played by women's empowerment and its inter-

play with regional corruption. In columns (1), (2) and (3) we focus on *Domestic violence*, i.e. whether a DHS respondent justifies for the husband to hit his wife. As columns (1) and (2) show, women that do not accept domestic violence are more likely to use modern contraception, effect that is driven by highly corrupt regions. However, when we include in the regression the interaction between *Bribery* and *Education*, the coefficient of *Domestic violence* is no longer significant. Conversely, as shown in columns (4), (5) and (6), coefficients associated with *Household decision making* remain significant throughout, with more empowered women that have a higher probability of using contraception, difference that diminishes as corruption increases. All in all, while women's empowerment helps in explaining fertility planning decisions, its effect does not seem to vary with corruption as much as that of education, as shown in Figure 5.

6 Conclusions

The analysis of corruption's role in shaping demographic behaviours is still relatively underdeveloped. With this paper we offer preliminary results suggesting that corruption does indeed affect fertility. Specifically, we study the relationship between bribery and the take-up of modern contraception by constructing a regional-level bribery score from Afrobarometer survey data and merging it with individual-level DHS data on contraception.

We present evidence of the inhibiting effect of corruption on the use of modern contraception, an effect that is robust to different model specifications. The mechanisms underlying our findings could be many, ranging from the link between bribery and economic and social backwardness within a country, to the role that corruption plays in diverting investments and foreign aid dedicated to supply modern contraception. Furthermore, the impact is mediated by education, with the less educated strata of the population that see a strong decline in contraception use as corruption rises, thus

widening social inequalities that we find to be present regardless of corruption.

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Tables and Figures

Table 1: Summary statistics

Variable	Mean	Std. Dev.	Min	Max
Bribery	0.276	0.163	0.0190	0.746
S-HDI	0.477	0.0816	0.237	0.668
Age	30.02	8.821	15	49
Rural household	0.635	0.481	0	1
Choose leaders through election	0.829	0.0868	0.575	1
Met need for modern contraception	0.376	0.484	0	1
No education	0.302	0.459	0	1
Primary education	0.385	0.486	0	1
Secondary education	0.313	0.464	0	1
Household decision making	0.275	0.446	0	1
Domestic violence	0.589	0.492	0	1
Number of living children	3.081	2.348	0	15
Never married	0.174	0.379	0	1
Currently married	0.708	0.455	0	1
Formerly married	0.118	0.322	0	1
Not working	0.312	0.463	0	1
Professional/technical/managerial	0.0444	0.206	0	1
Clerical	0.00819	0.0901	0	1
Sales	0.197	0.398	0	1
Agricultural - self employed	0.235	0.424	0	1
Agricultural - employee	0.0465	0.211	0	1
Household and domestic	0.0214	0.145	0	1
Services	0.0451	0.208	0	1
Skilled manual	0.0473	0.212	0	1
Unskilled manual	0.0422	0.201	0	1
Atheist	0.0145	0.120	0	1
Catholic	0.180	0.384	0	1
Other Christian	0.480	0.500	0	1
Muslim	0.301	0.459	0	1
Other	0.0250	0.156	0	1

Table 2: The effect of Bribery and Education on met need for Contraception

	(1)	(2)	(3)	(4)
Bribery	-0.586***	-0.572***	-1.508***	-1.481***
	(0.0798)	(0.155)	(0.105)	(0.292)
Primary education	0.539***	0.536***	0.307***	0.308***
	(0.0164)	(0.0637)	(0.0284)	(0.0892)
Secondary education	0.823***	0.820***	0.422***	0.422**
	(0.0190)	(0.0809)	(0.0327)	(0.172)
Bribery*Primary education			1.068***	1.052***
			(0.106)	(0.304)
Bribery*Secondary educations			1.672***	1.657***
			(0.111)	(0.563)
Observations	173,897	173,897	173,897	173,897
Countries	11	11	11	11
Regions	65	65	65	65
	ME	Region FE	ME	Region FE

Dependent variable: Met need for contraception. *Bribery* is the bribery measure at regional-level. *Education* is a dummy taking the value 1 for the observations after 1918 and 0 otherwise. The controls, all at individual-level, are: age, age squared, marital status, type of work, residence area, parity, belonging to the region's ethnic majority, religion, and year of interview FE. In columns (1) and (3) we run a multilevel mixed-effect model with country and region-level RE, while columns (2) and (4) include Region FE. *, **, *** indicate statistical significance at 10%, 5%, and 1% level, respectively.

Table 3: The effect of Bribery, Education and S-HDI on Modern Contraception

	(1)	(2)	(3)	(4)
Bribery	-0.550***	-0.550***	-1.473***	-1.455***
	(0.0804)	(0.164)	(0.106)	(0.294)
S-HDI	1.724***	0.753	1.721***	0.962
	(0.482)	(1.449)	(0.472)	(1.569)
Primary education	0.538***	0.536***	0.306***	0.307***
	(0.0164)	(0.0639)	(0.0284)	(0.0893)
Secondary education	0.822***	0.820***	0.420***	0.421**
	(0.0190)	(0.0811)	(0.0327)	(0.173)
Bribery*Primary education			1.066***	1.052***
			(0.106)	(0.304)
Bribery*Secondary education			1.673***	1.660***
			(0.111)	(0.562)
Observations	173,897	173,897	173,897	173,897
Countries	11	11	11	11
Regions	65	65	65	65
	ME	Region FE	ME	Region FE

Dependent variable: Met need for contraception. *Bribery* is the bribery measure at regional-level. The controls, all at individual-level, are: age, age squared, marital status, type of work, residence area, parity, belonging to the region's ethnic majority, religion, and year of interview FE. In columns (1) and (3) we run a multilevel mixed-effect model with country and region-level RE, while columns (2) and (4) include Region FE. *, **, *** indicate statistical significance at 10%, 5%, and 1% level, respectively. respectively.

Table 4: The effect of Bribery and Support for Democracy on Modern Contraception

	(1)	(2)	(3)	(4)
Bribery	-0.514***	-0.497***	-1.441***	-1.249***
	(0.0816)	(0.154)	(0.108)	(0.255)
Choose leaders through elections	0.656***	0.664**	0.454***	0.566*
	(0.150)	(0.296)	(0.151)	(0.290)
Primary education	0.538***	0.535***	0.311***	0.307***
	(0.0164)	(0.0638)	(0.0284)	(0.0782)
Secondary education	0.823***	0.819***	0.429***	0.570***
	(0.0190)	(0.0810)	(0.0327)	(0.146)
Bribery*Primary education			1.046***	0.864***
			(0.107)	(0.277)
Bribery*Secondary education			1.641***	1.124**
			(0.112)	(0.481)
Observations	173,897	173,897	173,897	173,897
Countries	11	11	11	11
Regions	65	65	65	65
	ME	Region FE	ME	Region FE

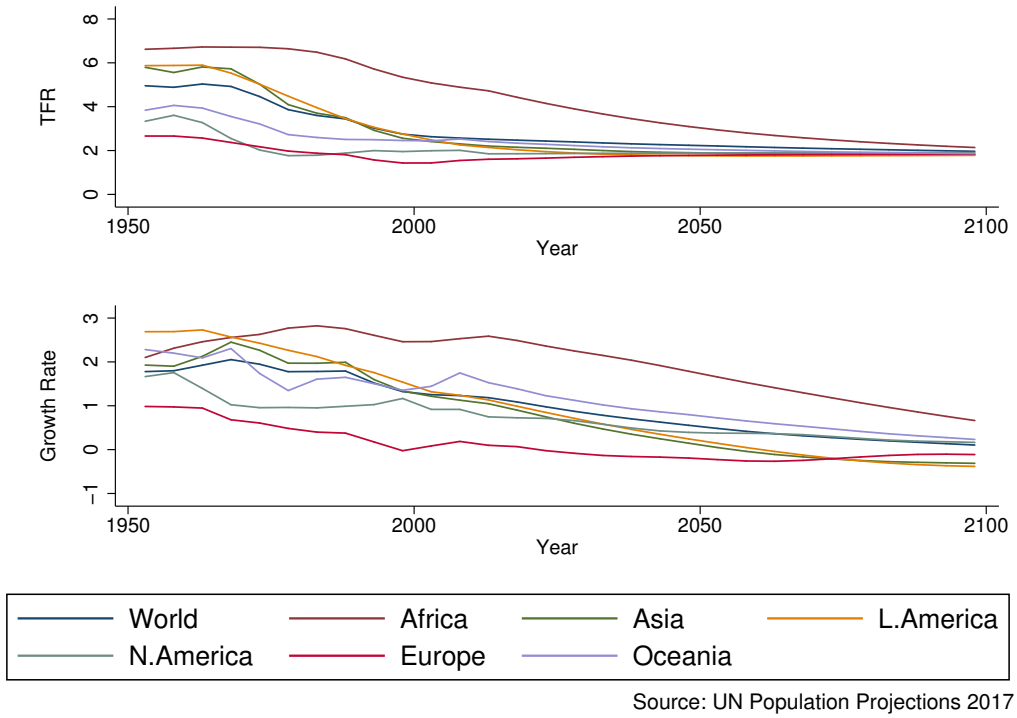
Dependent variable: Met need for contraception. *Bribery* is the bribery measure at regional-level. *Choose leaders through elections* is the regional level % that are in favor of choosing their leaders through elections. The controls, all at individual-level, are: age, age squared, marital status, type of work, residence area, parity, belonging to the region's ethnic majority, religion, and year of interview FE. In columns (1) and (3) we run a multilevel mixed-effect model with country and region-level RE, while columns (2) and (4) include Region FE. *, **, *** indicate statistical significance at 10%, 5%, and 1% level, respectively.

Table 5: The effect of Bribery and Women's empowerment on modern contraception: Logit model

	(1)	(2)	(3)	(4)	(5)	(6)
Bribery	-0.562***	-0.641***	-1.468***	-0.586***	-0.470***	-1.396***
	(0.152)	(0.170)	(0.303)	(0.156)	(0.174)	(0.279)
Primary education	0.527***	0.527***	0.299***	0.534***	0.534***	0.300***
	(0.0626)	(0.0627)	(0.0856)	(0.0632)	(0.0629)	(0.0871)
Secondary education	0.805***	0.806***	0.412**	0.814***	0.816***	0.411**
	(0.0798)	(0.0798)	(0.167)	(0.0796)	(0.0790)	(0.169)
Bribery*Primary education			1.053***			1.078***
			(0.297)			(0.301)
Bribery*Secondary education			1.645***			1.684***
			(0.547)			(0.558)
Domestic violence	0.0545***	0.0158	0.0529*			
	(0.0158)	(0.0329)	(0.0309)			
Bribery*Domestic violence		0.147	-0.001			
		(0.128)	(0.115)			
Household decision making				0.0818***	0.193***	0.201***
				(0.0249)	(0.0527)	(0.0513)
Bribes*Household decision making					-0.436**	-0.447**
					(0.217)	(0.211)
Observations	169,372	169,372	169,372	173,787	173,787	173,787
Countries	11	11	11	11	11	11
Regions	65	65	65	65	65	65
	Region FE	Region FE	Region FE	Region FE	Region FE	Region FE

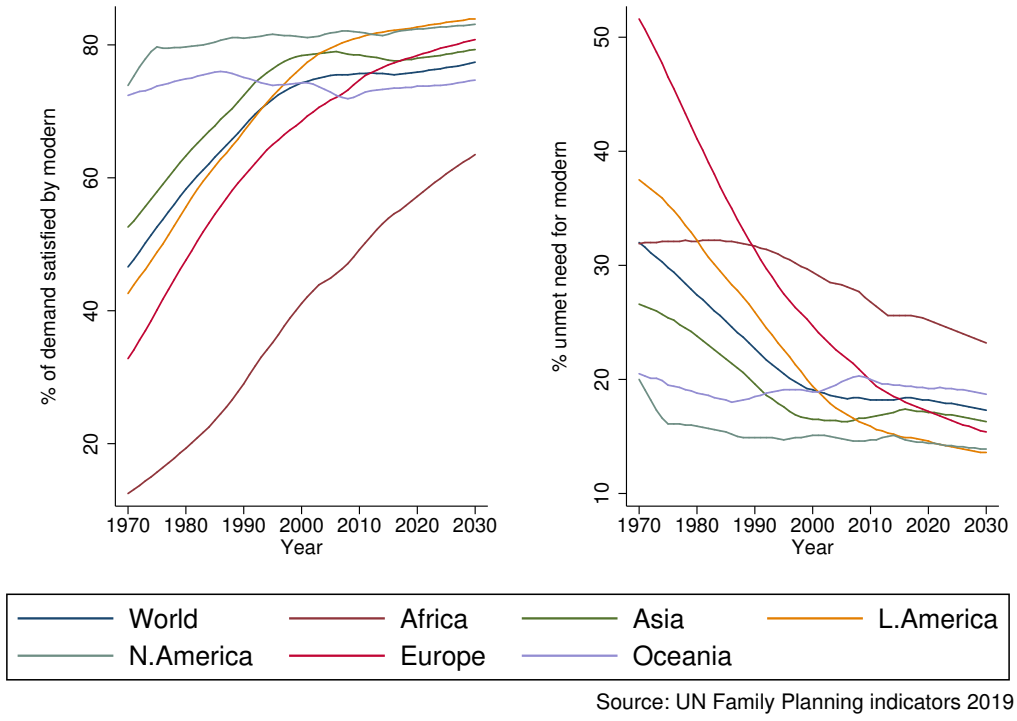
Dependent variable: Met need for contraception. *Bribery* is the bribery measure at regional-level. *Domestic violence* is a dummy taking value 1 if the respondent never agrees that a husband is justified in hitting his wife. *Household decision making* is a dummy taking value 1 if the respondent is involved in the household decision making process. The controls, all at individual-level, are: education level, age, age squared, marital status, type of work, residence area, parity, belonging to the region's ethnic majority, religion, and year of interview FE. In all columns we include Region FE. *, **, *** indicate statistical significance at 10%, 5%, and 1% level, respectively.

Figure 1: Total fertility rate and Population growth rate by continent



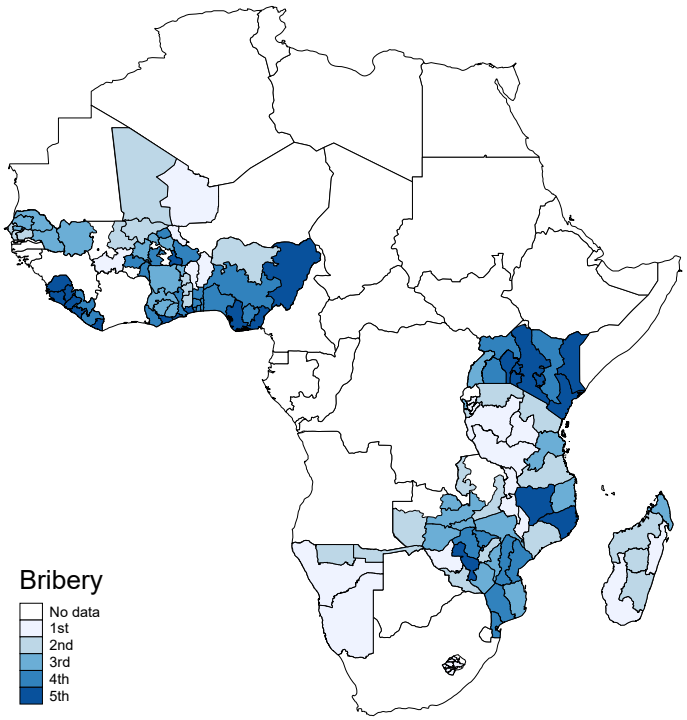
Source: UN Population Projections 2017

Figure 2: Family planning indicators by Continent



Source: UN Family Planning indicators 2019

Figure 3: Geographical distribution of Bribery



Note: the figure shows the distribution of Bribery in the sample regions. A darker color corresponds to a higher level of corruption.

Figure 4: Heterogeneous effects of Education level and Bribery on Contraception

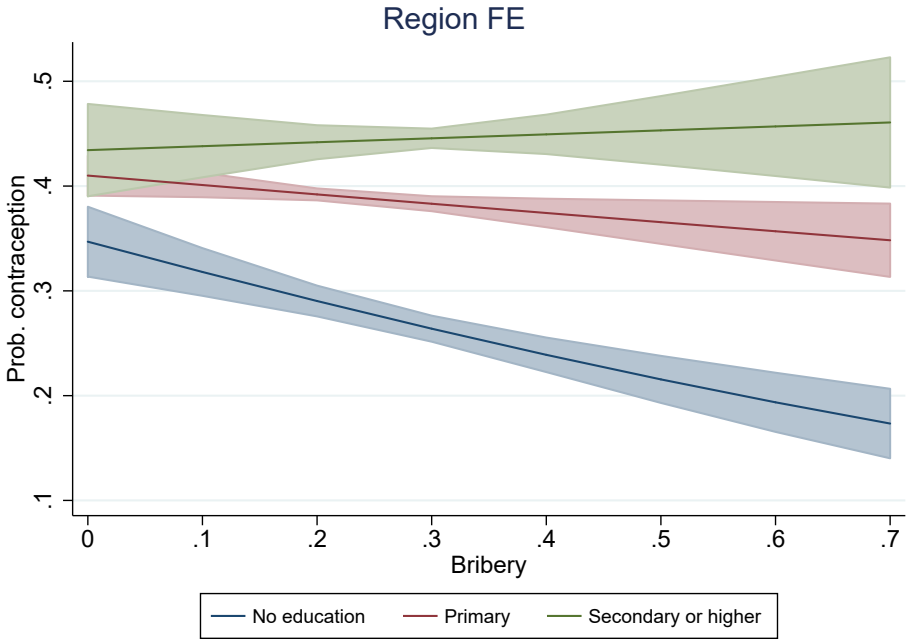


Figure 5: Heterogeneous effects of Women's empowerment and Bribery on Contraception