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Essays on the Economics of Identity

by

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Declaration of Authorship

I, Giulia Tagliaferri, confirm that the research included within this thesis is my own work or, where it has been carried out in collaboration with, or supported by others, that this is duly acknowledged below and my contribution indicated. Previously published material is also acknowledged below.

The first chapter of the thesis is joint work with Professor Marco Manacorda. My contribution to this paper included formulating the research question, writing the literature review, cleaning and analysing and working with Professor Manacorda to define the appropriate econometric strategy, algebraically solving the theoretical model following Professor Manacorda's inputs.

I attest that I have exercised reasonable care to ensure that the work is original, and does not to the best of my knowledge break any UK law, infringe any third party's copyright or other Intellectual Property Right, or contain any confidential material.

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Abstract

This thesis focuses on three different empirical questions related to the economic incentives to the formation of identity.

The first chapter examines the dynamics of occupational segregation of self-identified homosexual workers, specifically accounting for the fact that part of their observed distribution may come from selective disclosure of sexual identity. We present a simple labour supply model where individuals choose both an occupation and their revealed sexual identity. Using confidential data from the UK, we show that self-reported homosexuals are concentrated in opposite gender typical occupations. As tolerance increases, a greater fraction of homosexuals reports their homosexual identity, particularly in marginal homosexual occupations, hence occupational segregation falls. The finding suggests that part of the observed segregation of homosexuals in opposite sex occupations is due to selective disclosure rather tastes or comparative advantage.

The second chapter uses an original dataset covering the universe of local elections in England spanning over 40 years to investigate whether the electoral success of women and ethnic minorities leads to increases in these groups' representation as political candidates in subsequent elections. Using a regression discontinuity approach, we find that both groups enjoy a personal incumbency advantage. One direct consequence is an increase in the fraction of women and ethnic minority candidates contesting a seat previously held by someone from the same group. In the case of women, this increase is also driven by an inflow of new women candidates.

The third chapter focuses on the impact of television on religious identity. We use detailed survey data on individuals' self-reported religious sentiment, behaviours and attitudes from Indonesia. We use the variation in signal reception due to geographic topography at the sub-district level to estimate the causal effect of media exposure. Individuals exposed to a higher number of television channels are less likely to report being religious and following religious practices. Furthermore, they also display lower interfaith hostility. At the village level, higher exposure to television increases the supply of religiously forbidden activities. However, higher exposure to television seems to have no effect on political preferences.

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Chapter 1

Homosexuals' Segregation in the Labour Market: Occupational Choice and Selective Disclosure

1.1 Introduction

Labour force segregation is still entrenched in modern labour markets. The economic literature highlights how individuals unevenly distribute across firms, jobs, occupations and industries along gender, ethnic background, nationality and other demographic characteristics (Carrington and Troske (1998), (Hellerstein and Neumark, 2008), Blau et al. (2013), Goldin (2014a)). The key consequence of labour market segregation is segregation of pay structures and enduring differentials in earning between groups, often to the detriment of already disadvantaged groups. In contrast to the literature on gender and racial discrimination, labour market segregation of homosexual workers is still largely unexplored. Little is known about how self-identified homosexuals distribute across jobs and whether this is due to a disclosure effect (only individuals in certain jobs declare themselves to be homosexuals) or occupational choices. This is particularly relevant in a context of persistent high stigma against homosexuals (Stonewall (2013), Stonewall (2017)).

This paper explores the dynamics of occupational segregation by sexual orientation when society discriminates against homosexuals. More specifically, it assesses

whether the observed patterns of segregation are consistent with predictions from a Roy-type model of occupational choice where individuals selectively disclose their sexual identity to avoid discrimination at the workplace. Learning about how occupational segregation is shaped by discrimination allows us to understand better why occupational segregation along sexual identity lines persists today, an observation which has been shown to have an important role in explaining the wage gap between homosexual and heterosexual workers (Badgett (1995), Black et al. (2003), Blandford (2003), Plug and Berkhout (2004)).

In the first part of the paper we present the model. The model is justified by two stylised facts. First, empirical evidence shows that self-identified homosexual workers tend to work in gender-atypical jobs, i.e. jobs in which the opposite gender is predominant. Second, homosexual identity is likely to be selectively disclosed to avoid stigma and discrimination. As a consequence, the distribution of homosexuals across jobs can be influenced by the different costs that come with self-identifying as homosexual across occupations. The paper tries to shed light on the determinants of reporting a homosexual identity at the workplace by bringing these elements into a unified labour supply model in the spirit of a Roy's model of occupational choice (Roy (1951), Heckman and Honore (1990)). In this model, homosexuals are a minority in society and are discriminated against. Latent homosexuals and heterosexuals self-select into occupations based on preferences and costs, including discrimination, that can vary across occupations. Consistent with the observed patterns in the data, the model assumes that the costs of entering (or the distaste for) an occupation is higher the more gender typical the occupation is. The model is enriched by allowing individuals to selectively report their sexual identity. In the spirit of Akerlof and Kranton's (2000) model of identity, individuals can conceal their sexual identity. This has benefits if homosexuals are discriminated against; hence, latent homosexuals can escape the penalty that society imposes on them by adopting a heterosexual identity. However, it also entails a cost, as the violation of one's sense of self comes with a utility loss. One important feature of the model is that endogenising self-reported sexual identity allows us to derive implications for the distribution not only of latent, but also of self-reported homosexual and heterosexual identities in society. This is a

major advantage of the model, as only self-reported identities can be observed in the data.

The major prediction of the model is that, as society becomes more tolerant towards homosexuals, a greater fraction of individuals will report their latent homosexual identity. More importantly, the model shows that as tolerance increases, occupational segregation of self-reported homosexuals will fall, because self-identified homosexuals will be increasingly less segregated into gender atypical occupations. This mechanism is driven by selective disclosure of individuals in marginal (less and less gender atypical) occupations.

In the second part of the paper, we bring the model to the data. We use confidential data on around 1 million individuals from the UK Integrated Household Survey that reports - among others - individuals' self reported sexual identity together with information on socio-economic characteristics, including very detailed information on occupation (but unfortunately no data on wages[1]) over the course of five years. This data allows us to identify large samples of self-identifing homosexual individuals workers - about 4,300 men and 3,000 women. This sample is considerably larger than other studies that have used individual-level sexual identity information in the United Kingdom (Aksoy et al. (2018), Bryson (2016), Frank (2006), Arabsheibani et al. (2005)). We exploit cross sectional variation across very localised area to test the implications of the model. This is possible because the confidential version of the data we use provides very detailed information on individuals' geographical residence (the 379 local authorities in Great Britain). Consistent with the model, the empirical analysis finds that local tolerance increases the fraction of workers who self-identify as homosexuals and it lowers occupational segregation along sexual identity lines, as self reported homosexuals tend to appear in increasingly more gender-typical occupations.

While the empirical findings support our model, it is nonetheless useful to consider whether they are consistent with alternative models. We lend credibility to our results by exploiting a very localized cross-sectional variation, i.e. variation across

[1] Income and wage data are collected within the IHS, however the Office of National Statistics (ONS) has so far not been able to harmonise the income variables across the different surveys that comprise the IHS. Therefore, at the time of writing (January 2018) no income variables are included in the datasets released by the ONS.

local authorities within groups of on average four contiguous local authorities. We show that results are not driven by the local labour market structure, nor they are mechanically generated by the differential fraction of homosexuals across localities.

The remainder of the paper is organised as follows. Section 1.2 briefly discusses the relevant literature. Section 1.3 gives the motivating facts behind the theoretical model and describes its set-up. It also discusses the equilibrium of the model, its empirical implications and its limitations. Section 1.4 describes the data and the empirical strategy. Section 1.5 brings the model to the data and empirically tests the model's implications. Section 1.6 concludes.

1.2 Endogenous Disclosure of Sexual Orientation

Most of the literature on labour market outcomes and sexual identity has treated self-reported sexual identity as an exogenous characteristic (Carpenter (2005), Carpenter (2008a), Carpenter (2008b), Plug and Berkhout (2004), Aksoy et al. (2018)). Few papers attempt to deal with the potential endogeneity of truly reporting own sexual identity. Mueller-Smith (2014) uses a proxy from developmental psychology literature to identify men who are more likely to be homosexuals - men with more older brothers are more likely to identify as homosexuals. Adopting fraternal order as a proxy for homosexual identity, he finds that men who are more likely to develop a homosexual identity and are born in less tolerant locations are significantly less likely to exert extra effort to signal heterosexuality to mask their latent identity, at the expense of lower mental health. Two other papers investigate whether wage penalty and occupational choices of homosexuals differ between homosexuals who reveal their identity to their employers and the ones who do not. Plug and Berkhout (2008) use information on both self-reported sexual identity and workplace disclosure, finding that the wage penalty for homosexuals workers is driven by homosexual workers who do not disclose their identity to their employer. Discussing the endogeneity of disclosure, they observe that among homosexual workers, disclosed workers are abler workers. Using data on twins, Plug et al. (2014), examine whether homosexuals sort into tolerant occupations. They provide an array of interesting results. First, their results indicate that homosexual workers sort into less prejudiced occupations. Sec-

ond, they find that occupational segregation is largely driven by homosexual workers who disclose their identities at the workplace. Third, homosexuals' occupational choices are not driven by productivity/tastes that they share with their identical twin. Lastly, they also show that the sorting of prejudiced workers into occupations characterised by a lower share of homosexuals is largely explained by characteristics that they share with the identical twin (innate taste, ability or family background). This implies that prejudiced heterosexual workers shy away from homosexual workers for reasons other than their personal prejudice against homosexuals.

All these works acknowledge the importance of endogenising self-reported sexual identity. This paper takes a step further and embeds this notion into a model of occupational choice in the presence of discrimination. This allows us to derive implications for the distribution of self-reported homosexuals and heterosexuals across jobs, that is the measure of sexual identity that is available and observable in the data.

1.3 Theoretical Framework

1.3.1 Motivating Facts

As anticipated, the model is justified by some stylised facts. First, 1.1 provides suggestive evidence that dynamics of occupational segregation has potentially interesting patterns. It clearly indicates that homosexuals tend to concentrate in gender atypical jobs, meaning jobs where the share of people of the opposite gender is high. This pattern has been already noted in the empirical literature (see for example Black et al. (2007) and Antecol et al. (2008) for the U.S.). One obvious explanation for this regularity is that homosexuals have tastes or comparative advantages that are closer to those of the opposite gender. An alternative explanation is that it is more costly to self-identify as homosexual in a gender typical occupation because of a higher penalty imposed by heterosexual colleagues, employers or customers (in the form of harassment or wage loss). Several theories are consistent with this hypothesis. In line with the identity models developed by Akerlof and Kranton (2000), heterosexuals might feel discomfort from working alongside homosexuals of the same gender, as this may

influence the image they have of themselves or the image that others have of them. For example, if others erroneously assume that individuals who work alongside homosexuals are themselves homosexuals, this might betray an individual's inner sense of self and induce an identity loss. One competing theory, along the lines of a pollution model (Goldin (2014a)), is that working alongside homosexuals affects the image (the prestige) that others have of the job. Lastly, one could argue that customers, co-workers or employers have beliefs about possible homosexual's comparative advantage in gender-atypical jobs. To the extent that hiding one's own sexual identity is psychologically costly, whether differences in homosexual's occupational choices are driven by preferences or by the costs of coming out matters for welfare. This has clear policy implications. On one hand, if occupational segregation is explained by large costs associated with coming out, then policies aimed at reducing prejudice in those occupations could be effective in decreasing labour market segregation. On the other hand, if segregation is explained by innate tastes or preferences for certain occupations, such policies would be ineffective.

Second, a positive gradient exists in the probability of reporting a homosexual identity as a function of socio-economic status (SES). Table 1.2 shows that demographics usually correlated with higher SES, such as ethnicity, age, education and country of birth positively affect the probability of reporting a homosexual identity (with some differences between men and women). These correlations are very robust to the inclusion of different geography fixed effects and neighbourhood characteristics (moving from column (1) to (3) and from (4) to (6), stricter geographic controls apply). As it seems reasonable to assume that the incidence of homosexuality is uncorrelated with major determinants of SES, this suggests that sexual identity is only selectively disclosed. If, for example, the costs of (or the returns to) self-identifying as homosexual fall (or respectively increase) at higher SES, then this would provides a clear rationale for the observed gradient in the incidence of self-identified homosexuals in the population. This suggests that part of the observed distribution of homosexuals across jobs can be driven by selective disclosure.

1.3.2 A Model of Occupational and Identity Choice

This section introduces a simple labour supply model where individuals choose both an occupation and their revealed sexual identity. It borrows from Akerlof and Kranton (2000)'s models of identity and it combines it with a Roy model of occupational choice. This section discusses the model for homosexual men, although a symmetrical model applies to homosexual women. The full theoretical model is described in detail in Appendix A.

Homosexuals are a minority in society and, due to widespread homophobia, self-identified homosexuals suffer a penalty. This can be thought of as a wage penalty (a wage discrimination coefficient) or simply as the utility loss that results from perceived discrimination. This may arise from aversion to homosexuals in the labour market or in society as a whole, meaning that the heterosexual majority may have a distaste against homosexuals and as a result they impose a cost to those who self-identify as homosexuals.

In line with a body of literature from psychology (Herek and McLemore (2013)), the model assumes that aversion to homosexuals is stronger within own gender groups. Empirical evidence supports this claim. Patacchini et al. (2014) find that male employers discriminate more against male homosexual candidates than female homosexual candidates. This is because openly homosexual men threaten heterosexual men's masculine image of themselves, the masculinity of the job, or because of the uneasiness that heterosexual men experience when surrounded by men who could be sexually attracted to them[2]. If part of the cost of self-identifying as homosexual is imposed by co-workers or customers, then the penalty that homosexuals pay for coming out is lower in gender atypical occupations.

Latent homosexual workers have the option of self-identifying as heterosexuals and avoid the penalty that is imposed on them by choosing to be part of the minority. However, violating one's sense of self leads to a utility loss. Latent homosexuals hence simultaneously choose their occupation and revealed sexual identity based on the penalty associated with each occupation and the utility loss resulting from denying

[2]Discrimination might also come from consumers who might feel that homosexual men are not as good at performing male jobs (building) as heterosexual men and that perhaps homosexual men are better than heterosexual men at performing female jobs (nursing or tailoring).

one's own latent sexual identity.

1.3.3 Set-up

The model focuses on a local labour market. To keep things simple, it assumes that *i)* the demand for each occupation is fixed, *ii)* workers are geographically immobile, *iii)* local wages are given, *iv)* workers are wage-takers and *v)* everybody is in work. Subsection 1.3.6 discusses these assumptions in detail.

Let w_{ja} denote (self-identified) heterosexual workers' wages in occupation j and area and a D_{ja} the penalty that self-identified homosexuals suffer in occupation j and area a. Then:

$$lnw_{j\tilde{G}a} = lnw_{ja} - lnD_{ja}$$

Variables with the tilde subscripts denote self-identified sexual identity: S (straight) for heterosexual and G (gay) for homosexual - while variables without the tilde subscript refer to latent identity. The following restricts to the case where self-identification as homosexual leads to a wage penalty ($D_{ja} \geq 1$). This guarantees that no latent heterosexual chooses to self-identify as a homosexual. In order to derive choices, the model assumes the following pay-offs:

$$U_i(j, \tilde{G}|G, a) = \beta lnw_{ja} - \beta lnD_{ja} + lnc_j + \epsilon_{ijG}$$

$$U_i(j, \tilde{S}|G, a) = \beta lnw_{ja} + lnc_j - lnr + \epsilon_{ijG}$$

$$U_i(j, \tilde{S}|S, a) = \beta lnw_{ja} + \epsilon_{ijS}$$

where $r > 1$ is the identity loss that results from betraying one's identity, c_j denotes (latent) homosexuals' comparative advantage or preference for occupation j which is assumed to be area invariant. The error terms ϵ_{ijS} and ϵ_{ijG} follow type-I extreme value distributions and are independently distributed.

The model assumes that the penalty in occupation j and area a is a function of two parameters: the fraction of opposite gender individuals in occupation j ($0 \leq f_j \leq 1$) and the level of local tolerance (θ_a) which is assumed to be the same across

occupations. For simplicity, we adopt the following functional form:

$$\beta ln D_{ja} = -ln\theta_a - \delta ln f_j$$

The model also assumes that preferences increase with the fraction of opposite sex individuals in a certain occupation, namely:

$$lnc_j = \gamma + \gamma_1 ln f_j$$

Assume that the occupations are sorted inversely according to the nationwide share of opposite sex workers, i.e. $f_j > f_{j+1}$, which implies that $D_{ja} \leq D_{j+1a}$. Assume finally that $\beta ln D_{Na} \leq lnr < \beta ln D_{Na+1}$, or, which is the same, $f_{N_a} \geq [\frac{1}{r\theta_a}]^{\frac{1}{\delta}} > f_{N_a+1}$. This implies that in area a all latent homosexuals working in occupations $j : f_j \geq f_{N_a}$ self identify as homosexuals, while all those in occupations $j : f_j < f_{N_a}$ self identify as heterosexuals.

1.3.4 Equilibrium

Assuming that the fraction of latent homosexuals across areas is the same, i.e. $Pr(G|a) = Pr(G) \equiv P$, we derive the distribution of both latent and self-identified homosexuals and heterosexuals in society across jobs ($Pr(j|G,a)$, $Pr(j|S,a)$, $Pr(j|\tilde{G},a)$, $Pr(j|\tilde{S},a)$) and overall $Pr(\tilde{G}|a)$ and $Pr(\tilde{S}|a)$[3]. In particular, letting $f_j^{\delta}\theta_a r = x_{ja}$, in equilbirium:

(i) $Pr(\tilde{G}|a)$ is the sum across occupations of the share of latent individuals who self-identify as homosexuals in each occupation, times the incidence of homosexuality in the population:

$$Pr(\tilde{G}|a) = \frac{P\Sigma_{f_k \geq f_{N_a}} {w_{ka}}^{\beta} x_{ka} c_k}{\Sigma_{f_k \geq f_{N_a}} {w_{ka}}^{\beta} x_{ka} c_k + \Sigma_{f_k < f_{N_a}} {w_{ka}}^{\beta} c_k}$$

(ii) Given that no latent heterosexual self-identifies as homosexual in equilibrium, $Pr(j|\tilde{G},a)$ is the proportion of latent gays who choose occupation j and are latent homosexuals. In each area, self-identified homosexuals distribute only in occu-

[3]See Appendix A for a full derivation of these results.

pations in which the share of women is higher than the area specific threshold f_{N_a}:

$$Pr(j|\tilde{G},a) = \begin{cases} \frac{{w_{ja}}^{\beta} x_{ja} c_j}{\Sigma_{f_k \geq f_{N_a}} {w_{ka}}^{\beta} x_{ka} c_k} & f_j \geq f_{N_a} \\ \\ 0 & f_j < f_{N_a} \end{cases}$$

(*iii*) $Pr(j|\tilde{S},a)$ is the proportion of self-identified heterosexuals who are truly (latent) heterosexuals and choose job j, plus the ones who only pretend to be heterosexuals (latent homosexuals):

$$Pr(j|\tilde{S},a) = \begin{cases} \frac{(1-P)w_{ja}^{\beta}}{\Sigma_k {w_{ka}}^{\beta}} \frac{\Sigma_{f_k \geq f_{N_a}} {w_{ka}}^{\beta} x_{ka} c_k + \Sigma_{f_k < f_{N_a}} {w_{ka}}^{\beta} c_k}{(1-P)\Sigma_{f_k \geq f_{N_a}} {w_{ka}}^{\beta} x_{ka} c_k + \Sigma_{f_k < f_{N_a}} {w_{ka}}^{\beta} c_k} & f_j \geq f_{N_a} \\ \\ \frac{w_{ja}^{\beta}}{\Sigma_k {w_{ka}}^{\beta}} \frac{(1-P)[\Sigma_{f_k \geq f_{N_a}} w_{ka}^{\beta} x_{ka} c_k + \Sigma_{f_k < f_{N_a}} {w_{ka}}^{\beta} c_k] + P c_j \Sigma_k {w_{ka}}^{\beta}}{(1-P)\Sigma_{f_k \geq f_{N_a}} {w_{ka}}^{\beta} x_{ka} c_k + \Sigma_{f_k < f_{N_a}} {w_{ka}}^{\beta} c_k} & f_j < f_{N_a} \end{cases}$$

1.3.5 Empirical Implications

The empirical analysis studies how the previous quantities respond to changes in local tolerance θ_a. Assume that $\theta_a < \frac{1}{r f_{N_a}^{\delta}}$. Consider an infinitesimal increase in tolerance $d\theta_a$, such that $lim_{d\theta_a \to 0^+} \theta_a + d\theta_a = \frac{1}{r f_{N_a+1}^{\delta}}$. In other terms, the increase in tolerance implies that in area a all latent homosexuals in occupation j: $f_j = f_{N_a+1}$ self-identify as homosexuals; in contrast, before the increase in tolerance, they all identified as heterosexuals. Let us denote all occupations $j : f_j \geq f_{N_a}$ as "infra-marginal" occupations and let denote occupation $j : f_j = f_{N_a+1}$ as the "marginal" occupation.

Result 1: The fraction of self identified homosexuals in society increases: $\frac{\partial Pr(\tilde{G}|a)}{\partial \theta_a} \geq 0$

This result is quite intuitive. As tolerance increases, it is relatively less costly to identify as homosexual within for each occupation. Therefore, in each infra-marginal occupation, a higher share of latent homosexuals self-identifies as such. Furthermore, in the marginal occupation, all latent homosexuals report their true identity rather

than conceal it.

Result 2: The fraction of self identified homosexuals in infra-marginal occupations falls, while the fraction in the marginal occupation rises:

$\frac{\partial Pr(k|\tilde{G},a,k\leq N_a)}{\partial \theta_a} \leq 0$ and $\frac{\partial Pr(j|\tilde{G},a,j=N_a+1)}{\partial \theta_a} \geq 0$

As tolerance increases, there are effects on both disclosure and occupational choices. Closeted homosexuals in the marginal occupation disclose their true identity. This is accompanied by a shift of self-identified homosexuals towards gender atypical occupations, as it now pays to self-identify as homosexual and suffer a wage penalty rather than suffer an identity loss. Overall, the increase in the fraction of self identified homosexual is greater in the marginal occupation compared to infra-marginal ones, meaning that the fraction of self identified homosexuals in infra-marginal (marginal) occupations falls (rises).

Result 3: The opposite happens for self-identfied heterosexuals: the fraction of self-identified heterosexual in infra-marginal occupations increases: $\frac{\partial Pr(k|\tilde{S},a,k\leq N_a)}{\partial \theta_a} \geq 0$

In this model, latent heterosexuals are not affected by the change in tolerance. However, consistently with result 2, the decrease in the fraction of self-identified heterosexuals is greater in the marginal occupations compared to infra-marginal ones. This implies that the fraction of individuals who self-identify as heterosexuals in infra-marginal occupation rises.

Result 4: Occupational segregation across groups with different self-reported sexual identity, measured by the Duncan segregation index, falls:

$\frac{\partial DI_a}{\partial \theta_a} = \frac{\partial[\frac{1}{2}\Sigma_j|Pr(j|\tilde{G},a)-Pr(j|\tilde{S},a)|]}{\partial \theta_a} \leq 0$

In equilibrium, greater local tolerance implies that self identified homosexuals are more dispersed across occupations relative to self identified heterosexuals.

1.3.6 Limitations of the Model

This simple model rests on a number of simplifying assumptions, among which exogeneity of wages, absence of migration, specific functions for preferences towards a job and identity costs. This subsection briefly discusses these limitations.

First, in the setup of the model wages received by self-identified heterosexuals are allowed to vary both across jobs and across localities. However, given that individuals can freely move across jobs, one would expect that wages equalize across jobs. Instead, in our framework, wages do not respond to the number of people who self-select into an occupation. An extension of the model could endogenise wages received by latent heterosexuals by assuming a local labour demand for each job and that latent heterosexuals have preferences or a comparative advantage for some jobs.

Second, workers are assumed to be immobile. Without any doubt, this is the strongest assumption behind our model. Unfortunately our data does not allow us to test this assumption, nor to give an estimate of migration of self-identified homosexuals workers between local authorities. A more complex version of this simple model could add an additional decisional layer, allowing workers not only to choose a job and a sexual identity, but also to choose the local authority where to reside and work. In particular, homosexuals may compensate the costs of migration by moving to a locality that is friendlier towards homosexuality and escaping the penalty imposed on them.

Third, in the model everybody is in employment. One way to introduce unemployment would be to define pay-offs for the choice of not entering the labour market, characterised by a log wage of zero, no comparative advantage/taste, a cost of society-wide discrimination ($ln\theta_a$) if self-identifying as homosexual, and a psychological cost of concealing own identity otherwise (lnr). In this scenario, in equilibrium everybody chooses to join the labour market and the distribution of latent and reported homosexuals across jobs follows the one found in our model.

Fourth, the cost of concealing one's own sexual identity does not vary across individuals. This assumption is equivalent to assuming that the error term in the pay-offs varies with latent sexual identity (and not with reported identity). One direct advantage of this assumption is higher tractability. In particular, this simplifi-

cation implies that $P(\tilde{G}|G, j, a)$ is either equal to one or zero, meaning that all latent homosexuals in a job either come out or conceal their identity, without individual heterogeneity.

Fifth, there are no externalities in this model. An extension of the model may include a term that allows the payoff of reporting a homosexual identity in a job to increase with the fraction of individuals who report being homosexuals in that same job. Such a term could account for the psychological benefits in being surrounded by other openly homosexual workers or in increased chances of meeting a partner.

Last, rather than explaining, our model assumes that homosexuals prefer (or society prefers that homosexuals perform) gender atypical occupations. To motivate such assumption, the model draws on empirical evidence on the relationship between the fraction of women and the fraction of reported homosexuals in an occupation (examples also to be found in Blandford (2003), Black et al. (2007) and Antecol et al. (2008)). It also draws on a rich body of literature on occupation and gender that highlights the dependence of men's preferences on the gender composition of their occupation (Akerlof and Kranton (2000), Goldin (2014b), Pan (2015)). Following the psychology and sociology literature, we argue that similar preferences also apply to the (own gender) sexual composition of one's occupation, because of the strong connection between sexual prejudice and gender role norms. For example, masculinity is often conceptualised as a status that must be achieved, one that can be easily lost unless men repeatedly prove themselves to others. Males who do not conform to gender role expectations thus risk a variety of negative consequences, from being labelled as homosexuals to being punished with homophobic aggressions (Herek and McLemore (2013)).

1.4 Data and Unit of Analysis

To explore how occupational segregation across groups with different self-reported sexual identity responds to changes in tolerance, the paper uses a confidential version of the UK Integrated Household Survey (IHS). The IHS is an annual composite survey collected by the UK Office for National Statistics that combines a core of variables collected from several of household surveys. The data refer to years 2010-2014 and

include information on about 750,000 individuals aged 16-69. The confidential version of the data includes information about respondents' self-reported sexual orientation, the local authority of residence and detailed occupation and industry codes.

Respondents in the survey are asked about their sexual identity; that is, how they would describe themselves at the time the interview took place. The sexual identity question is administered to all members of the household aged at least 16 who were available at the time of the interview to provide their own responses - no proxy responses are allowed - and for this reason personal non-proxy weights are provided (and applied). Depending on the original survey, the question is administered face-to-face or using Computer Assisted Personal Interviewing (CATI). Either way, the question is asked in a way that ensures confidentiality and consequentially minimises the risk of misreported respondents' sexual identity (Joloza et al. (2011)). Table 1.1 provides the distribution of self-reported sexual identity by gender. The overwhelming majority of respondents reports a heterosexual identity (respectively 93% of men and 94% of women). Only 1.7% of male respondents and 0.9% of female respondents self-identify as homosexuals. A more even proportion of male and female respondents self-identify as bisexual or with other identities (0.7 and 1% respectively). These numbers are similar to other smaller population-based survey in the UK (Joloza et al. (2011)). In the analysis, we adopt a strict definition of homosexual identity (respondents reporting a homosexual identity). We also show that results are not affected if a broader definition is adopted.

Given that we do not observe whether individuals disclose their identity at their workplace, we assume that *i)* individuals who disclose their homosexual identity to the interviewer also do so to their co-workers and employer, *ii)* individuals who do not disclose their homosexual identity to the interviewer do not do so at their workplace. On the one hand, this latter assumption seems realistic, as the economic and social risk from disclosing sexual behaviour to a survey interviewer is less than the risk from workplace disclosure. On the other hand, we acknowledge that coming out to the interviewer is an imprecise proxy of coming out at the workplace and that a variable measuring the extent of workplace disclosure would be more appropriate (Badgett (1995), Plug and Berkhout (2008), Plug et al. (2014)).

The survey records respondents' local authority (LA) of residence, the lowest level of administrative geography in the country. On average each LA includes about 2,000 respondents (with standard deviation 1,400). In the empirical analysis, local authorities are our main unit of analysis. One of our main dependent variables is the fraction of workers self-identifying as homosexuals in a local authority and we exploit cross-sectional variations across local authorities within small groups of contiguous local authorities to identify a (more plausibly) causal relationship. Given that the IHS provides only information on where individuals reside, it is assumed that the local authority of residence coincides with the local authority where the individual works.

For the empirical part, in order to capture the nature of the job the respondent undertakes, we combine information about individuals' occupation (SOC2010 coding) and industry (SIC 2007 coding).[4] In the main analysis, we construct the job category from the combination of one-digit occupation category and one-digit industry category, for a total of 81 job-categories. As a robustness check, we also show that results are robust if we define a job-category as the interaction of two-digits and three-digits classifications of occupation and industry.

This data is complemented with attitudes towards homosexuality derived from the British Household Panel Survey (BHPS). The BHPS is a longitudinal survey, where each adult member of a sampled household is interviewed annually. Every two years from 1998-2008, respondents are asked to what extent they agreed with the statement "Homosexual relationships are always wrong". We construct an index of tolerance at local level by pulling together answers from 2002 to 2008[5] and computing the weighted share of the answers ("Strongly disagree", "Disagree", "Neither agree, disagree") at the local authority level. This index ranges from a minimum of 20% in North West Leicestershire (least tolerant local authority) to a maximum of 100% in

[4] The industry category mainly refers to the economic sector to which the work done in a particular job contributes. Occupations are instead defined according to the concept of "skill level" and "specialisation" (experience needed and field of knowledge required to pursue the occupation competently). For example, a person's job can be occupationally "managerial" and industrially pertaining to "manufacturing".

[5] Our identification strategy relies on instrumenting local tolerance with the share of non-religious individuals. Given that the share of non-religious individuals is measured in 2001 Census, we construct our measure of local tolerance using information *after* 2001 (so omitting years 1998 and 2000). The results are very similar if the measure of local tolerance is computed using data from 1998 to 2008 (not reported).

fifty-four local authorities (maximum tolerance).

Local area characteristics are mainly derived from the IHS itself or from census data. These include deprivation and population density from 2011 Census and the fraction of non-religious individuals from 2001 Census. Details of political controls of local authorities are available on the Elections Centre (Plymouth University) website.

1.4.1 Empirical Strategy

Let $\tilde{G}_{anr}$ denote the log odd of reporting a homosexual identity in local authority a, sub-region[6] n, region r. We first analyse how the relative proportion of self-identified homosexuals is correlated to local tolerance with the following basic econometric specification:

$$\tilde{G}_{an} = \alpha + \beta \; Tolerance_{an} + \gamma \; X_{anr} + \psi_n + \epsilon_{an} \tag{1.1}$$

where $Tolerance_{an}$ is the log odd of residents in the LA reporting that homosexual relationships aren't wrong, X_{an} is a vector of local authority characteristics, and ψ_n are sub-region fixed effects. Hence, to reduce measurement error in the tolerance variable, and to attenuate reverse causality concerns, we instrument $Tolerance_{an}$ with the share of non-religious individuals living in the local authority in 2001. As covariates, first we include sub-region fixed effects, that allow us to controls for unobserved heterogeneity between small groups of local authorities. One significant element that this geographical control accounts for is, for example, climate, a proxy for local amenities, that in Black et al. (2002) are found to be a major determinant of homosexuals' concentration. Second, in a further attempt to control for local amenities, in the most demanding specification we also control for the share of deprived household and population density. This latter control captures the degree of urbanisation of the local authority. Third, we control for population composition in terms of education and age and for contextual political views in the local authority. Separate equations for men and women take into account any differences in men's and women's labour market decisions and experiences.

Then, to measure differences in the distribution of self-identified homosexuals

[6]sub-regions correspond to the Nomenclature of Territorial Units for Statistics of Level 3 (NUTS3). There are 128 NUTS3 in Britain, and, average, a NUTS3 includes 4 LAs.

and non homosexuals across jobs, we adopt the most widespread measure of segregation, the dissimilarity index[7] (Duncan and Duncan (1955)). We are interested in measuring, for each local authority, segregation between workers with homosexual identity and without. The index is calculated as

$$DI_a = \frac{1}{2}\Sigma_j |Pr(j|\tilde{G}, a) - Pr(j|\tilde{S}, a)| \tag{1.2}$$

where j denotes a job and a a local authority. The index relates the share of the overall workforce with a homosexual identity that works in a particular occupation-industry to the share of the overall non-homosexual (self-reported) workforce in the same job. It ranges from 0 (no segregation) to 1 (complete segregation) and it can be interpreted as the percentage of self-reported homosexual workers that would have to move to different jobs to produce an even distribution relative to non-homosexual workers. An important property of the dissimilarity index is that it is scale invariant, meaning that if a number of concealed homosexual workers suddenly identify as homosexual, causing the number of self-identify homosexuals to double across a local authority without affecting the share in each job, then the value of the index does not change[8].

Last, we study the relationship between local tolerance and segregation with the following econometric model:

$$DI_{an} = \eta + \delta \, \tilde{Tolerance}_{an} + \lambda \, X_{an} + \psi_n + \zeta_{an} \tag{1.3}$$

where DI_{an} is the segregation index in local authority a, sub-region n, $\tilde{Tolerance}_{an}$

[7] See Massey and Denton (1988) for a discussion of the dissimilarity index and a comparison with other measures. Recent examples of its application to study labour market segregation can be found in Blau et al. (2013) (gender segregation across occupations), Bansak et al. (2012) (gender segregation across firms), Glitz (2014) (ethnic segregation across occupations).

[8] The dissimilarity index enjoys four other properties: 1) symmetry in groups: jobs can be re-ordered, yet the value of the index remains the same; 2) symmetry between types: the index is symmetrical in the sense that the segregation of self-identified homosexual workers is the same as the one of non-homosexual workers; 3) organisational equivalence: the index is unaffected by the number of units over which it is computed. If a job splits into two jobs by proportional division, then the value of the dissimilarity index does not change; 4) transfers (weak form): movements of self-reported homosexual workers from jobs where they are over-represented (above the local labour market-wide proportion) to jobs where they are under-represented (below the local labour market-wide proportion) affect the value of the index. However, the index is insensitive to the redistribution of self-reported homosexual workers among jobs with a proportion of self-reported homosexuals above or below the labour market-wide proportion.

is the instrumented log odd of residents in the LA reporting that homosexual relationships aren't wrong, while X_{an} is the vector of local authority characteristics and ψ_n are sub-region fixed effects.

1.5 Empirical Analysis

1.5.1 Descriptive Statistics

Table 1.3 reports the dissimilarity index computed nation-wide for different groups of workers. Occupational segregation along gender lines is very pronounced - about 45% of women (or men) should move job to have a similar distribution to the other gender across jobs. Systematic segregation along sexual identity lines appears to be a very relevant dimension too. About 30% of self-reported homosexual men and about 20% of self-reported homosexual women should change job in order to produce an even distribution relative to their non-homosexual counterpart. Segregation along ethnicity lines (white ethnicity versus ethnic minorities) and country of birth (UK born versus migrants) are less pronounced.[9]

Figure 1.2 gives a graphical representation of the negative correlation between segregation and the proportion of self-reported homosexuals in a local authority's labour market. We claim that increased tolerance is the force underlying this dynamic. As tolerance increases, more latent homosexuals self identify as homosexuals in the labour market and occupational segregation of self-reported homosexuals falls, as self-identified homosexuals increasingly enter gender typical occupations. The econometric analysis presented in the next section explores this claim.

Table 1.4 reports some descriptive statistics to provide further evidence in support of this claim. Each line represents a quintile of the distribution of local authorities by the share of self identified homosexuals, separately by gender. For example, on average in local authorities in the first quantile less than one individual out of 1,000 self identify as homosexual (0.04% for men, 0.01% for women), while in the fifth quantile more than one individual in 100 reports a homosexual identity (5.14% for men, 2.01% for women). In areas characterised by a higher proportion of self-

[9] Table B.1 in the Appendix reports values of the dissimilarity index computed for more granular definitions of job and if bisexuals are included in the homosexual group.

identified homosexuals, homosexuals enter more gender atypical jobs, as predicted by the model: column (1) reports the quintile-average minimum nation-wide share of opposite gender workers in occupations taken up by self-identified homosexuals. In local authorities in higher quantiles, homosexuals are present in jobs characterised by a lower share of individuals of the opposite gender. Column (2) displays the level of tolerance in the local authorities of the quantile, measured as the share of individuals who do not agree that homosexual relationships are wrong. In this simple tabulation, no clear pattern emerges between tolerance and the proportion of self-reported homosexuals. As mentioned in the empirical strategy section, to deal with possible measurement error in our tolerance variable, local tolerance is instrumented with the share of people who are not religious in the empirical analysis in section 1.4.1. The last column displays the average dissimilarity index of local authorities in the quantile. As we move to higher quantiles, segregation along sexual identity lines decreases both for men and women, as the model predicts.

1.5.2 Econometric Evidence

This section tests empirically the relationship between local tolerance, the fraction of self-identified homosexuals in the labour market and occupational segregation. In order to attenuate possible measurement error and reverse causality concerns, average local tolerance in 2002-2008 is instrumented with the share of non-religious individuals at baseline (2001). The bottom panel in Table 1.5 provides first stage coefficients' estimates and F-stats. For each specification, the share of non-religious residents is highly positively correlated with local tolerance. According to the specification, the F-stat ranges from 7.83 to 10.77[10].

Panel *A) Fraction of self-reported homosexuals* provides estimates of β from equation (1), exploiting the cross-sectional variation in tolerance at the local authority level. Column (1) shows the estimated β in a baseline specification, controlling for sub-region fixed effects. This implies that the variation exploited is a very local one, as it relies on variation in local tolerance across on average four contiguous local authorities. All regressions are weighted by population size. Consistently with the

[10] F-test are close or lower then the threshold level of 10, raising potential concerns about weak instrument, that tends to bias the results towards the OLS result.

model implication, the estimated coefficient is significantly different from zero and indicates that a 1% increase in the odds of predicted tolerance leads to 0.91% increase in the odds of reporting a homosexual identity for men. The point estimate drops slightly when adding local authorities' characteristics. Columns (3)-(4) repeat the exercise for women. The estimated coefficient for instrumented tolerance is significantly different from zero in the baseline specification, but not in the full specification when local authorities' characteristics are added. We can speculate that the nature of prejudice against male and female homosexuals is different and that the BHPS question ("Homosexual relationships are always wrong") detects tolerance towards homosexual men only[11]. The OLS estimates presented in Table B.2 are consistent with these estimates, with higher point estimates but lower significance levels.

Panel *B) Segregation* presents estimates of equation (3) for men (columns (1)-(2)) and women (columns (3)-(4)). The dependent variable in all regressions is segregation, measured by the dissimilarity index. Results indicate a strong negative relationship between local tolerance and segregation. Hence, a 1% increase in the log odds of predicted tolerance leads to a decrease of 0.23 and 0.14 percentage points in the dissimilarity index for men and women respectively. The results remain robust to the addition of local authorities' characteristics in columns (3) and (6).

However, there are two potential concerns with these estimates. First, the degree of segregation depends on the local occupational structure; that is, the relative size of segregated versus non-segregated jobs. This implies that differences in segregation across localities may occur as a by-product of a different local occupational mix. So, for example, if tolerant localities are also those historically characterised by the importance of predominantly female occupations (services, for example), the estimated coefficients in *Panel B)* would overestimate the true effect. To control for the occupational structure, we re-compute the dissimilarity index following Blau et al. (2013). For each local authority, we keep the local occupational composition fixed, mimicking the occupational distribution we observe nationally. *Panel C) Segregation under fixed occupational composition* reports the sensitivity of the results when the

[11]If we believe that our index of tolerance equally captures attitudes towards male and female homosexuality, another possibility is that latent homosexual women are truly unresponsive to local tolerance, in contrast with predictions from the model.

dissimilarity index is computed assuming a fixed occupational structure, separately for men and women. The results confirm the negative gradient between tolerance and segregation. The point estimates are smaller than the ones in *Panel B)*, indicating that a sizeable part of the effect can be attributed to differences in local authorities' occupational structure (40% for men and 16% for women).

Second, the dissimilarity index can also be positive when workers are randomly allocated across jobs, especially when, as in this case, the share of the minority group is small (Carrington and Troske (1997)). This leads to potentially larger values of the index where the proportion of self-identified homosexuals in a local authority is small, even if there is no underlying systematic segregation. In an effort to address this problem, we take as reference local authority the locality with the lowest proportion of self-identified homosexual workers by gender. We re-sample in each local authority the number of self-identified homosexuals such that the proportion of self-identified homosexual is the same. We compute the dissimilarity index repeating this procedure 100 times separately by gender and we average the dissimilarity indices obtained. Results from *Panel D) Segregation under fixed minority share* report estimated coefficients significantly smaller in magnitude than the previous regressions, confirming the fact that part of the correlation was due to an element of randomness. Nevertheless, coefficients are negative and significant, confirming the prediction of our model: as local tolerance increases, self-identified homosexuals are less segregated in gender atypical occupations.

Table 1.6 explores empirical evidence of self-reported homosexuals entering occupations that are less gender atypical (i.e. for homosexual men, less feminine) in local authorities characterised by a higher tolerance towards homosexuals. Gender atypicality of job is measured as the share of individuals of the opposite gender in the occupation at the national level. The dependent variable in the regressions of Table 1.6 is, for each local authority, the minimum value of gender atypicality among the jobs of self-reported homosexuals. The intuition is that as tolerance increases, self-reported homosexuals enter increasingly more gender typical jobs (Result 2). Therefore we expect the minimum value of gender atypicality among the jobs taken by self-reported homosexuals to decrease (as observed in the descriptive statistics).

Panel A) provides limited evidence of this phenomenon: coefficients are overall negative, but not significant for men. When we repeat the exercise assuming a fixed minority share, results for women are marginally less significant as before.

1.5.3 Robustness Checks

This section explores the sensitiveness of the main results to how we define a job, which respondents we categorise as homosexual and how we define local tolerance. Our results prove to be robust to these different choices, providing reassurance that our findings do not depend on ad-hoc definitions of the variables of interest.

First, Table 1.7 considers whether the results on segregation are affected by how we define a job. Instead of defining a job as the combination of one digit occupation and one digit industry code, in *Panel A) Job 2x2* a job is defined as the combination of two digits occupation and two digits industry codes, for a total of about 500 job categories; in *Panel B) Job 3x3* is defined as the combination of three digits occupation and three digits industry codes, for a total of about 5,000 job categories. With the exception of few specifications, all estimates are significant and of the same negative sign. However, point estimates vary: moving to more granular definitions of job, point estimates halve in magnitude at each step.

Second, in Table 1.8 we repeat the analysis by using a more generous definition of homosexual identity. Specifically, we include in the definition of workers with homosexual identity respondents who self-report an homosexual identity or a bisexual identity. Results confirm previous findings: local tolerance increases the fraction of male workers who report being homosexual or bisexuals (*Panel A)*). Furthermore, these workers distribute more evenly across jobs (*Panels B)*, *C)*, *D)*).

Third, we modify our definition of tolerance by only including individuals who report that homosexual relationships are strictly not wrong in BHPS (2002-2008). Tolerance is computed as the weighted share of the answers ("Strongly disagree", "Disagree") between 2002 and 2008 at local authority level (so excluding "Neithr agree, disagree" answers). Results in Table 1.9 are consistent with previous findings: point estimates are larger, suggesting an even stronger effect of tolerance on the fraction of individuals reporting an homosexual identity in the labour market and

segregation. However, the instrument is weak as indicated by the F-statistics being below the conventional value of 10.

1.6 Conclusions

This paper examines the dynamics of occupational segregation of self-identified homosexual workers, specifically accounting for the fact that part of their observed distribution across jobs may come from selective disclosure. This is an important but generally overlooked feature that differentiates the study of sexual minorities to other perfectly observable minorities in the labour market, such as women or ethnic minorities. To do so, we outline a simple labour supply model where individuals choose both an occupation and their revealed sexual identity.

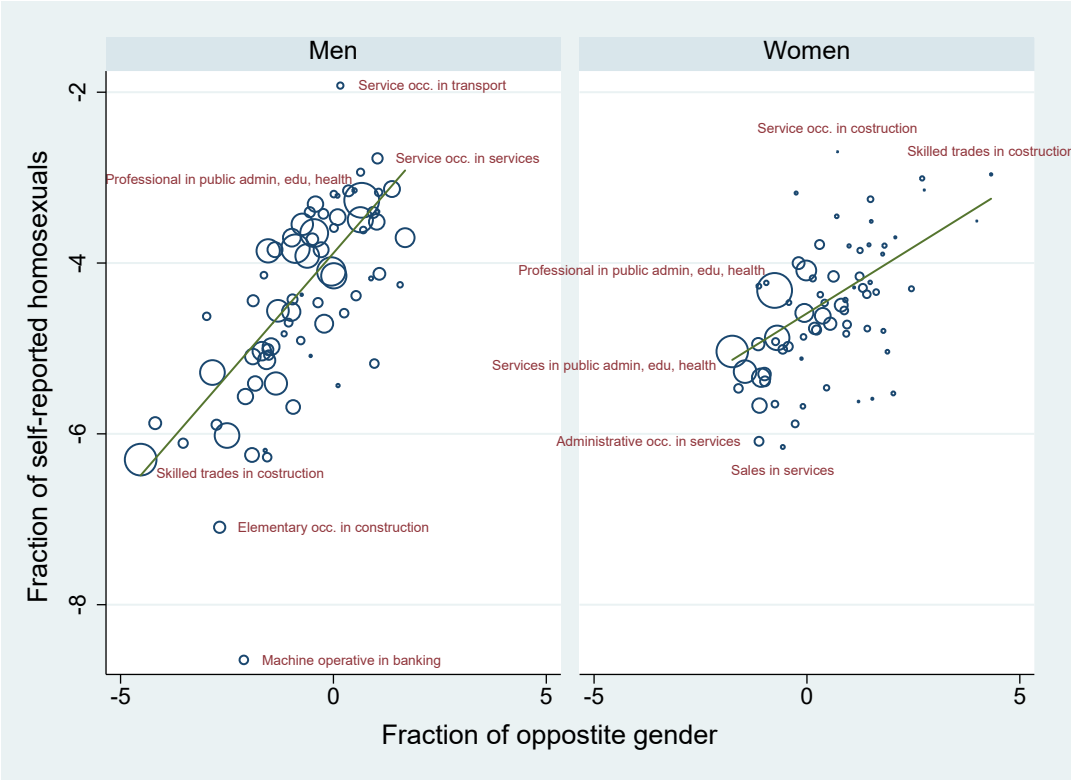
We motivate the model with two stylised facts. First, we show that self-reported homosexuals tend to concentrate into gender atypical jobs. Second, we show that the incidence of (reported) homosexual identity is higher for individual characteristics associated with a lower cost of being homosexual. These two facts suggest that differences in occupational choices along the lines of sexual identity may be driven by tastes or occupational-specific costs of revealing one's own identity. Using confidential data from the UK, we demonstrate that, consistently with the predictions of the model, a greater fraction of homosexuals reports their latent homosexual identity as tolerance increases. More importantly, we show that as tolerance increases, occupational segregation of self-reported homosexuals falls, as self-identified homosexuals are increasingly less segregated into gender atypical occupations. The findings suggest that part of the observed segregation of homosexuals in opposite sex occupations is due to selective disclosure rather tastes or comparative advantage.

While the theoretical and empirical evidence proposed here sheds some lights on the likelihood of reporting a homosexual identity, occupational segregation and their relationship with attitudes towards homosexuality, a few caveats should be kept in mind. In our discussion, we do out best to control for potential omitted variables, but we cannot completely rule out the endogeneity of local tolerance. Furthermore, plausible migration of homosexual workers towards more tolerant areas is a crucial factor that we do not account for. Nevertheless, this work constitutes a concrete step

in getting a better sense of how prejudice affects occupational segregation of homosexual workers. One natural direction for future research is to disentangle whether occupational choices are ultimately driven by tastes or discrimination, a challenge shared with the literature on gender.

1.7 Figures

Figure 1.1: Fraction of self-reported homosexuals and individuals of the opposite gender in the same job



Note: Incidence of self-reported homosexual workers across jobs as a function of fraction of opposite gender workers (log odd ratios) by gender. The left panel relates to men, the right panel to women. Each circle represents a job, where a job is defined as the combination of one-digit occupation (SOC2010) and one-digit industry (ISCO07), for a total of 81 job-categories. The size of the dot reflects the size of the job-category among the opposite gender. For each gender, the two jobs who employ most workers with the highest and the lowest fraction of self-reported homosexuals are labelled.

Figure 1.2: Incidence of self-reported homosexuals and local segregation

Note: Relationship between the relative incidence of self-reported homosexuals in a local authority and occupational segregation along sexual identity, measured by the dissimilarity index. The left panel relates to men, the right panel to women. Each circle represents a local authority. The size of the dot reflects the size of the population in the local authority.

1.8 Tables

Table 1.1: Sexual identity by gender

	Gender		
Self Reported Sexual Identity	Men	Women	Total
Heterosexual	92.74	93.70	93.22
Homosexual	1.63	0.83	1.23
Bisexual	0.38	0.65	0.52
Other	0.33	0.28	0.30
Don't Know/Refuse	3.63	3.46	3.55
Missing	1.28	1.08	1.18
Total	100.00	100.00	100.00

Notes: Self-reported sexual identity by gender. Sexual identity non-proxy weights applied. In face-to-face questionnaire, the exact question asked *"Which of the options [on this card] best describes how you think of yourself?"* (similar question in CATI mode of interview). *"Don't Know/Refusal"* were not explicitly provided as options, however, interviewers were able to record them if spontaneously provided by respondents, consistent with standard ONS survey practice. A missing value refers to where an eligible responder did not provide any response to the question, for example the interviewers were unable to ask the question (Joloza et al. (2011)).

Table 1.2: Probability of reporting homosexual identity

	Men			Women		
	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	OLS	OLS	OLS	OLS	OLS
White ethnicity	1.287***	1.278***	1.263***	1.052***	1.049***	1.263***
	(0.139)	(0.139)	(0.137)	(0.170)	(0.170)	(0.137)
Age	0.045***	0.044***	0.044***	0.059***	0.059***	0.044***
	(0.016)	(0.016)	(0.016)	(0.017)	(0.017)	(0.016)
Age squared	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Age finished edu	0.129***	0.126***	0.122***	0.107***	0.106***	0.122***
	(0.011)	(0.011)	(0.012)	(0.018)	(0.018)	(0.012)
Age finished edu sq.	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
UK-born	0.224**	0.224**	0.212**	0.357***	0.354***	0.212**
	(0.092)	(0.092)	(0.092)	(0.120)	(0.120)	(0.092)
Fixed Effects	Region	Sub-region	LA	Region	Sub-region	LA
LA charact	yes	yes	yes	yes	yes	yes
Observations	329,233	329,233	318,391	421,883	421,883	318,391
Pseudo R-squared	0.058	0.064	0.088	0.026	0.028	0.088

Notes: Conditinal logit regressions. In each column, the dependent variable is a dummy for reporting a homosexual identity. LA characteristics: Share of white ethnicity individuals residing in the local authority, mean age and mean age square, age finished education and age finished education square, and share of individuals born outside UK. Other controls included: survey year dummies, mode of interview dummy. Standard errors clustered at the LA level. *** p<0.01; ** p<0.05; * p<0.1.

Table 1.3: Segregation across different groups

	Dissimilarity Index
Gender	0.44
Sexual Identity (Men)	0.32
Sexual Identity (Women)	0.21
Ethnicity	0.15
Country of birth	0.15

Notes: The table ranks the nation-wide Dissimilarity Index calculated along different dimensions. The Dissimilarity index ranges from 0 (no segregation) to 1 (complete segregation). It can be interpreted as the share of individuals of one group that has to change job to achieve an even distribution across job when compared to the other group.

Table 1.4: Descriptive statistics

		(1)	(2)	(3)
Gender	Quintile Rank by $P(\tilde{G}\|a)$	Gender atypicality job	Tolerance	Dissimilarity Index
Men	1	0.50	0.81	0.97
	2	0.33	0.81	0.91
	3	0.24	0.81	0.84
	4	0.19	0.81	0.77
	5	0.17	0.84	0.67
Women	1	0.23	0.84	0.92
	2	0.35	0.82	0.87
	3	0.29	0.80	0.87
	4	0.24	0.80	0.72
	5	0.21	0.83	0.64

Notes: The table reports separately for men and women, for each quintile of the distribution of local authorities by the share of self-identified homosexuals, a measure of how much gender-atypical jobs taken by self-identified homosexuals are, tolerance and the dissimilarity index. The measure *Gender atypicality job* corresponds to the quantile-average minimum share of opposite gender workers in an occupation (measured nation-wide) taken by self-identified homosexuals residing in the local authorities of the quantiles. *Tolerance* is the log odds ratio of the proportion of population in the LA of residence reporting that homosexual relationships are not wrong, from the British Household Panel Survey (2002-2008). The *Dissimilarity Index* is computed as described in section 1.5.

Table 1.5: Fraction of self-identified homosexuals, segregation and tolerance

	(1)	(2)	(3)	(4)
	Men		Women	
	A) Fraction of self-reported homosexuals			
Tolerance	0.913***	0.838**	0.549*	0.326
	(0.347)	(0.374)	(0.317)	(0.300)
	B) Segregation			
Tolerance	-0.226***	-0.238***	-0.135**	-0.114**
	(0.072)	(0.086)	(0.055)	(0.054)
	C) Segregation under fixed occ composition			
Tolerance	-0.137***	-0.137**	-0.113**	-0.095*
	(0.047)	(0.054)	(0.052)	(0.052)
	D) Segregation under fixed minority share			
Tolerance	-0.029***	-0.030**	-0.060**	-0.046**
	(0.011)	(0.013)	(0.024)	(0.022)
F-stage				
% Non religious 2001	8.600***	8.172***	8.423***	8.656***
	(2.620)	(2.920)	(2.627)	(2.880)
F-stat	10.77	7.83	10.28	9.04
Obs	255	255	254	254
FE	sub-region	sub-region	sub-region	sub-region
LA controls		yes		yes

Notes: each panel corresponds to a set of regressions with the following dependent variables: *Panel A)* fraction of individuals in work reporting a homosexual identity for each local authority (log odds); *Panel B)* occupational segregation measures with the dissimilarity index; *Panel C)* occupational segregation measured with the dissimilarity index computed under fixed occupational composition (mimicking the national distribution); *Panel D)* occupational segregation measured with the dissimilarity index computed assuming a fixed proportion of self-identified homosexual workers in each local authority. The main independent variable, *Tolerance* is the fraction of individuals in the LA reporting that homosexual relationships are not wrong, from the British Household Panel Survey (2002-2008) (log odds). *Tolerance* is instrumented with the fraction of individuals who are not religious in the local authority, from 2001 Census. Additional local authorities controls included are mean age in the local authority, mean age when left education, share of deprived households (2011), population density (2011), years of conservative party control (2000-2015). Standard errors in parenthesis. *** p<0.01; ** p<0.05; * p<0.1.

Table 1.6: Gender atypicality of self-reported homosexuals' marginal job

	(1)	(2)	(3)	(4)
	Men		Women	
	A) Gender atypicality of marginal job			
Tolerance	-0.042	-0.034	-0.149**	-0.126*
	(0.061)	(0.072)	(0.073)	(0.073)
	B) Under fixed minority share			
Tolerance	0.074	0.076	-0.100*	-0.093
	(0.050)	(0.059)	(0.060)	(0.063)
Obs	255	255	254	254
FE	sub-region	sub-region	sub-region	sub-region
LA controls		yes		yes

Notes: each panel corresponds to a set of regressions in which the dependent variable is, for each local authority, the minimum share of opposite gender workers in an occupation (measured nation-wide) taken by self-identified homosexuals. In *Panel B)* this measure is computed assuming a fixed proportion of self-identified homosexual workers in each local authority. The main independent variable, *Tolerance* is the fraction of individuals in the LA reporting that homosexual relationships are not wrong, from the British Household Panel Survey (2002-2008) (log odds). *Tolerance* is instrumented with the fraction of individuals who are not religious in the local authority, from 2001 Census. Additional local authorities controls included are mean age in the local authority, mean age when left education, share of deprived households (2011), population density (2011), years of conservative party control (2000-2015). Standard errors in parenthesis. *** p<0.01; ** p<0.05; * p<0.1.

Table 1.7: Robustness: different definition of job

	(1)	(2)	(3)	(4)
	Men		Women	
A) Job 2x2				
	A1) Segregation			
Tolerance	-0.126***	-0.120***	-0.088***	-0.070**
	(0.041)	(0.045)	(0.033)	(0.031)
	A2) Segregation under fixed occ composition			
Tolerance	-0.081***	-0.067**	-0.082**	-0.069**
	(0.029)	(0.029)	(0.034)	(0.034)
	A3) Segregation under fixed minority share			
Tolerance	-0.009**	-0.008	-0.020**	-0.018*
	(0.004)	(0.004)	(0.010)	(0.010)
B) Job 3x3				
	B1) Segregation			
Tolerance	-0.070**	-0.066**	-0.043**	-0.032
	(0.024)	(0.026)	(0.021)	(0.021)
	B2) Segregation under fixed occ composition			
Tolerance	-0.076***	-0.067**	-0.060**	-0.044
	(0.028)	(0.029)	(0.028)	(0.028)
	B3) Segregation under fixed minority share			
Tolerance	-0.007*	-0.005	-0.018**	-0.016*
	(0.004)	(0.004)	(0.009)	(0.009)
Obs	255	255	254	254
FE	sub-region	sub-region	sub-region	sub-region
LA controls		yes		yes

Notes: in *Panel A) Job 2x2* , we define a job as the combination of two digits occupation and two digits industry codes (overall, about 500 categories); in *Panel B) Job 3x3*, we define it as the combination of three digits occupation and three digits industry codes (overall, about 5000 categories). In sub-panels *A1)* and *B1)* the dependent variable is occupational segregation measured with the dissimilarity index; in sub-panels *A2)* and *B2)*, the dependent variable is occupational segregation measured with the dissimilarity index computed under fixed occupational composition (mimicking the national distribution); in sub-panels *A3)* and *B3)*, the dependent variable is occupational segregation measured with the dissimilarity index computed assuming a fixed proportion of self-identified homosexual workers in each local authority. The main independent variable *Tolerance* is the fraction of individuals in the LA reporting that homosexual relationships are not wrong, from the BHPS (2000-2008) (log odds). *Tolerance* is instrumented with the fraction of individuals who are not religious in the local authority, from 2001 Census. Additional local authorities controls included are mean age in the local authority, mean age when left education, share of deprived households (2011), population density (2011), years of conservative party control (2000-2015). Standard errors in parenthesis. *** p<0.01; ** p<0.05; * p<0.1.

Table 1.8: Robustness: different definition of homosexual identity

	(1)	(2)	(3)	(4)
	Men		Women	
	A) Fraction of self-reported homosexuals and bisexuals			
Tolerance	0.802**	0.675*	0.321	-0.019
	(0.343)	(0.347)	(0.274)	(0.252)
	B) Segregation (job=1x1)			
Tolerance	-0.208***	-0.203***	-0.089*	-0.055
	(0.070)	(0.075)	(0.046)	(0.043)
	C) Segregation under fixed occ composition (job=1x1)			
Tolerance	-0.126***	-0.114**	-0.051	-0.011
	(0.048)	(0.048)	(0.043)	(0.042)
	D) Segregation under fixed minority share (job=1x1)			
Tolerance	-0.024**	-0.025**	-0.025*	-0.021
	(0.010)	(0.011)	(0.015)	(0.015)
F-stage				
% Non-religious 2001	8.013***	7.902**	8.429***	8.811***
	(2.574)	(2.83)	(2.451)	(2.711)
F-stat	9.68	7.76	11.82	10.56
Obs	267	267	283	283
FE	sub-region	sub-region	sub-region	sub-region
LA controls		yes		yes

Notes: In these regressions, we define as self-reported homosexuals individuals who report a homosexual or a bisexual identity. Each panel correspond to a set of regressions with the following dependent variables: *Panel A)* fraction of individuals in work reporting a homosexual or bisexual identity for each local authority (log odds); *Panel B)* occupational segregation measures with the dissimilarity index; *Panel C* occupational segregation measured with the dissimilarity index computed under fixed occupational composition (mimicking the national distribution); *Panel D)* occupational segregation measured with the dissimilarity index computed assuming a fixed proportion of self-identified homosexual workers in each local authority. The main independent variable, *Tolerance* is the fraction of individuals in the LA reporting that homosexual relationships are not wrong, from the British Household Panel Survey (2000-2008) (log odds). *Tolerance* is instrumented with the fraction of individuals who are not religious in the local authority, from 2001 Census. Additional local authorities controls included are mean age in the local authority, mean age when left education, share of deprived households (2011), population density (2011), years of conservative party control (2000-2015). Standard errors in parenthesis. *** p<0.01; ** p<0.05; * p<0.1.

Table 1.9: Stricter definition of tolerance

	(1)	(2)	(3)	(4)
	Men		Women	
	A) Fraction of self-reported homosexuals			
Tolerance	1.344**	1.560*	0.918	0.629
	(0.543)	(0.846)	(0.558)	(0.642)
	B) Segregation			
Tolerance	-0.289***	-0.371**	-0.241**	-0.259
	(0.107)	(0.187)	(0.116)	(0.165)
	C) Segregation under fixed occ composition			
Tolerance	-0.165**	-0.203*	-0.197*	-0.208
	(0.065)	(0.108)	(0.100)	(0.140)
	D) Segregation under fixed minority share			
Tolerance	-0.041**	-0.049*	-0.122**	-0.123
	(0.017)	(0.027)	(0.055)	(0.076)
F-stage				
% Non religious 2001	6.204***	5.050**	5.319**	4.293*
	(2.222)	(2.519)	(2.352)	(2.583)
F-stat	7.80	4.02	5.11	2.76
Obs	283	283	277	277
FE	sub-region	sub-region	sub-region	sub-region
LA controls		yes		yes

Notes: each panel correspond to a set of regressions with the following dependent variables: *Panel A)* fraction of individuals in work reporting a homosexual identity for each local authority (log odds); *Panel B)* occupational segregation measures with the dissimilarity index; *Panel C)* occupational segregation measured with the dissimilarity index computed under fixed occupational composition (mimicking the national distribution); *Panel D)* occupational segregation measured with the dissimilarity index computed assuming a fixed proportion of self-identified homosexual workers in each local authority. The main independent variable, *Tolerance* is the fraction of individuals in the LA reporting that homosexual relationships are *strictly* not wrong, from the British Household Panel Survey (2000-2008) (log odds). *Tolerance* is instrumented with the fraction of individuals who are not religious in the local authority, from 2001 Census. Additional local authorities controls included are mean age in the local authority, mean age when left education, share of deprived households (2011), population density (2011), years of conservative party control (2000-2015). Standard errors in parenthesis. *** p<0.01; ** p<0.05; * p<0.1.

Appendices

A Model

In this section we report the full equilibrium results. It is important to notice that by endogenizing disclosure of own sexual identity, we can derive the distribution of both latent (letters denoted without tilde) and self identified (letters denoted with G tilde) homosexuals (G) and heterosexuals (S) across jobs.

Let $f_j^{\delta}\theta_a r = x_{ja}$, where $x_{N_a} \geq 1$

$$(1)\ Pr(j|G,a) = \begin{cases} Pr(j,\tilde{G}|G,a) = \frac{{w_{ja}}^{\beta} x_{ja} c_j}{\Sigma_{f_k \geq f_{N_a}} {w_{ka}}^{\beta} x_{ka} c_k + \Sigma_{f_k < f_{N_a}} {w_{ka}}^{\beta} c_k} & f_j \geq f_{N_a} \\ Pr(j,\tilde{S}|G,a) = \frac{{w_{ja}}^{\beta} c_j}{\Sigma_{f_k \geq f_{N_a}} {w_{ka}}^{\beta} x_{ka} c_k + \Sigma_{f_k < f_{N_a}} {w_{ka}}^{\beta} c_k} & f_j < f_{N_a} \end{cases}$$

$$(2)\ Pr(j|S,a) = Pr(j,\tilde{S}|S,a) = \frac{w_{ja}^{\beta}}{\Sigma_k {w_{ka}}^{\beta}}$$

$$(3)\ Pr(\tilde{G}|a) = \frac{P\Sigma_{f_k \geq f_{N_a}} {w_{ka}}^{\beta} x_{ka} c_k}{\Sigma_{f_k \geq f_{N_a}} {w_{ka}}^{\beta} x_{ka} c_k + \Sigma_{f_k < f_{N_a}} {w_{ka}}^{\beta} c_k}$$

$$(4)\ Pr(\tilde{S}|a) = \frac{(1-P)\Sigma_{f_k \geq f_{N_a}} {w_{ka}}^{\beta} x_{ka} c_k + \Sigma_{f_k < f_{N_a}} {w_{ka}}^{\beta} c_k}{\Sigma_{f_k \geq f_{N_a}} {w_{ka}}^{\beta} x_{ka} c_k + \Sigma_{f_k < f_{N_a}} {w_{ka}}^{\beta} c_k}$$

$$(5)\ Pr(j,|\tilde{G},a) = \begin{cases} \frac{{w_{ja}}^{\beta} x_{ja} c_j}{\Sigma_{f_k \geq f_{N_a}} {w_{ka}}^{\beta} x_{ka} c_k} & f_j \geq f_{N_a} \\ 0 & f_j < f_{N_a} \end{cases}$$

$$(6)\ Pr(j|\tilde{S},a) = \begin{cases} \frac{(1-P)w_{ja}^{\beta}}{\Sigma_k {w_{ka}}^{\beta}} \frac{\Sigma_{f_k \geq f_{N_a}} {w_{ka}}^{\beta} x_{ka} c_k + \Sigma_{f_k < f_{N_a}} {w_{ka}}^{\beta} c_k}{(1-P)\Sigma_{f_k \geq f_{N_a}} {w_{ka}}^{\beta} x_{ka} c_k + \Sigma_{f_k < f_{N_a}} {w_{ka}}^{\beta} c_k} & f_j \geq f_{N_a} \\ \frac{w_{ja}^{\beta}}{\Sigma_k {w_{ka}}^{\beta}} \frac{(1-P)[\Sigma_{f_k \geq f_{N_a}} w_{ka}^{\beta} x_{ka} c_k + \Sigma_{f_k < f_{N_a}} {w_{ka}}^{\beta} c_k] + P c_j \Sigma_k {w_{ka}}^{\beta}}{(1-P)\Sigma_{f_k \geq f_{N_a}} {w_{ka}}^{\beta} x_{ka} c_k + \Sigma_{f_k < f_{N_a}} {w_{ka}}^{\beta} c_k} & f_j < f_{N_a} \end{cases}$$

Next, we provide proofs of the results illustrated in section 1.3. Let recall that we are interested in how $Pr(\tilde{G}|a)$, $Pr(j,|\tilde{G},a)$, $Pr(j,|\tilde{S},a,j \leq N_a)$ and ultimately DI_a respond to changes in local tolerance θ_a.

Assume that $\theta_a < \frac{1}{rf_{N_a}^{\delta}}$. Consider an infinitesimal increase in tolerance $d\theta_a$, such that $lim_{d\theta_a \to 0^+} \theta_a + d\theta_a = \frac{1}{rf_{N_a+1}^{\delta}}$. In other terms, the increase in tolerance implies that in area a all latent homosexuals in occupation j: $f_j = f_{N_a+1}$ self-identify as homosexuals, while before the increase in tolerance, they all identified as heterosexuals. Let us denote all occupation j:$f_j \geq f_{N_a}$ as "infra-marginal" occupations and let denote occupation $j : f_j = f_{N_a+1}$ as the "marginal" occupation. Furthermore, let $(\theta_a + d\theta_a) f_k^{\delta} r = \overline{x}_{ka}$ and $\theta_a f_k^{\delta} r = \underline{x}_{ka}$.

Result 1: The fraction of self identified homosexuals in society increases.

Proof:

$$\frac{\partial Pr(\tilde{G}|a)}{\partial \theta_a} = P[\frac{\Sigma_{f_k \geq f_{N_a+1}} w_{ka}^{\beta} \overline{x}_{ka} r c_k}{\Sigma_{f_k \geq f_{N_a+1}} w_{ka}^{\beta} \overline{x}_{ka} c_k + \Sigma_{f_k < f_{N_a+1}} w_{ka}^{\beta} c_k} - \frac{\Sigma_{f_k \geq f_{N_a}} w_{ka}^{\beta} \underline{x}_{ka} c_k}{\Sigma_{f_k \geq f_{N_a}} w_{ka}^{\beta} \underline{x}_{ka} c_k + \Sigma_{f_k < f_{N_a}} w_{ka}^{\beta} c_k}] =$$

$$= P \frac{[\Sigma_{f_k \geq f_{N_a}} w_{ka}^{\beta} d\theta_a f_k^{\delta} r c_k + w_{N_a+1}^{\beta} \underline{x}_{N_a+1,a} c_{N_a+1}] \Sigma_{f_k < f_{N_a}} w_{ka} c_k + w_{N_a+1} c_{N_a+1} \Sigma_{f_k \geq f_{N_a}} w_{ka}^{\beta} \underline{x}_{ka} c_k}{(\Sigma_{f_k \geq f_{N_a+1}} w_{ka}^{\beta} \overline{x}_{ka} c_k + \Sigma_{f_k < f_{N_a+1}} w_{ka}^{\beta} c_k)(\Sigma_{f_k \geq f_{N_a}} w_{ka}^{\beta} \underline{x}_{ka} c_k + \Sigma_{f_k < f_{N_a}} w_{ka}^{\beta} c_k)} =$$

$$\geq 0$$

Result 2: The fraction of self identified homosexuals in infra-marginal occupations falls, while the fraction in the marginal occupation rises.

Proof:

This follows from (5).

$$\frac{\partial Pr(k, |\tilde{G}, a, j \leq N_a)}{\partial \theta_a} = \frac{{w_{ja}}^{\beta} \overline{x}_{ka} c_j}{\Sigma_{f_k \geq f_{N_a+1}} {w_{ka}}^{\beta} \overline{x}_{ka} c_k} - \frac{{w_{ja}}^{\beta} \underline{x}_{ka} c_j}{\Sigma_{f_k \geq f_{N_a}} {w_{ka}}^{\beta} \underline{x}_{ka} c_k} =$$

$$= \frac{{w_{ja}}^{\beta} f_j^{\delta} c_j}{\Sigma_{f_k \geq f_{N_a+1}} {w_{ka}}^{\beta} f_k^{\delta} c_k} - \frac{{w_{ja}}^{\beta} f_j^{\delta} c_j}{\Sigma_{f_k \geq f_{N_a}} {w_{ka}}^{\beta} f_k^{\delta} c_k} \leq 0$$

$$\frac{\partial Pr(k, |\tilde{G}, a, j = N_a + 1)}{\partial \theta_a} = \frac{w_{N_a+1}^{\beta} \overline{x}_{ka} c_{N_a+1}}{\Sigma_{f_k \geq f_{N_a+1}} {w_{ka}}^{\beta} \overline{x}_{ka} c_k} - 0 \geq 0$$

$$\frac{\partial Pr(k, |\tilde{G}, a, j > N_a + 1)}{\partial \theta_a} = 0$$

Result 3: The opposite happens for self-identified heterosexuals: the fraction of self-identified heterosexuals in infra-marginal occupations increases.

Proof:

$$\frac{\partial Pr(j,|\tilde{S},a,j\leq N_a)}{\partial\theta_a} = [\frac{\Sigma_{f_k\geq f_{N_a+1}} w_{ka}^{\beta} x_{ka} c_k + \Sigma_{f_k<f_{N_a+1}} {w_{ka}}^{\beta} c_k}{(1-P)\Sigma_{f_k\geq f_{N_a+1}} w_{ka}^{\beta} x_{ka} c_k + \Sigma_{f_k<f_{N_a+1}} {w_{ka}}^{\beta} c_k} - \frac{\Sigma_{f_k\geq f_{N_a}} {w_{ka}}^{\beta} x_{ka} c_k + \Sigma_{f_k<f_{N_a}} {w_{ka}}^{\beta} c_k}{(1-P)\Sigma_{f_k\geq f_{N_a}} {w_{ka}}^{\beta} x_{ka}\theta_a c_k + \Sigma_{f_k<f_{N_a}} {w_{ka}}^{\beta} c_k}]$$

$$\frac{(1-P)w_{ja}^{\beta}}{\Sigma_k {w_{ka}}^{\beta}} =$$

$$= \frac{\Sigma_{f_k\geq f_{N_a}} w_{ka}^{\beta} f_k^{\delta} r c_k (\Sigma_{f_k<f_{N_a}} {w_{ka}}^{\beta} c_k + w_{N_a+1}^{\beta} c_{N_a+1}) + w_{N_a+1}^{\beta} f_{N_a+1}^{\delta} r c_{N_a+1} \Sigma_{f_k<f_{N_a}} {w_{ka}}^{\beta} c_k}{[(1-P)\Sigma_{f_k\geq f_{N_a+1}} w_{ka}^{\beta}(\theta_a+d\theta_a) f_k^{\delta} r c_k + \Sigma_{f_k<f_{N_a+1}} {w_{ka}}^{\beta} c_k][(1-P)\Sigma_{f_k\geq f_{N_a}} w_{ka}^{\beta}\theta_a f_k^{\delta} r c_k + \Sigma_{f_k<f_{N_a}} {w_{ka}}^{\beta} c_k]}$$

$$\frac{(\theta_a+d\theta_a)P(1-P)w_{ja}^{\beta}}{\Sigma_k {w_{ka}}^{\beta}} \geq 0$$

Result 4: Occupational segregation across group with different self reported sexual identity falls.

Proof:

The Duncan segregation index DI is $DI_a = \frac{1}{2}\Sigma_k |Pr(k|\tilde{G},a) - Pr(k|\tilde{S},a)|$

Let us start by noting that $Pr(j|\tilde{G},a) \geq Pr(j|\tilde{S},a)$ if and only if

$$f_j \geq f_{N_a} \text{ and } \frac{{w_{ja}}^{\beta} x_{ja} c_j}{\Sigma_{f_k\geq f_{N_a}} {w_{ka}}^{\beta} x_{ka} c_k} \geq \frac{(1-P)w_{ja}^{\beta}}{\Sigma_k {w_{ka}}^{\beta}} \frac{\Sigma_{f_k\geq f_{N_a}} {w_{ka}}^{\beta} x_{ka} c_k + \Sigma_{f_k<f_{N_a}} {w_{ka}}^{\beta} c_k}{(1-P)\Sigma_{f_k\geq f_{N_a}} {w_{ka}}^{\beta} x_{ka} c_k + \Sigma_{f_k<f_{N_a}} {w_{ka}}^{\beta} c_k}$$

or, which is the same, if

$$f_j \geq Max\{f_{N_a}, f_{M_a}\}$$

where $f_{M_a} = [\frac{(1-P)\Sigma_{f_k\geq f_{N_a}} {w_{ka}}^{\beta} x_{ka} c_k}{\Sigma_k {w_{ka}}^{\beta}\theta_a r e^{\gamma}} \frac{\Sigma_{f_k\geq f_{N_a}} {w_{ka}}^{\beta} x_{ka} c_k + \Sigma_{f_k<f_{N_a}} {w_{ka}}^{\beta} c_k}{(1-P)\Sigma_{f_k\geq f_{N_a}} {w_{ka}}^{\beta} x_{ka} c_k + \Sigma_{f_k<f_{N_a}} {w_{ka}}^{\beta} c_k}]^{\frac{1}{\delta+\gamma_1}}$

From the above, it follows that $Pr(j|\tilde{G},a) \geq Pr(j|\tilde{S},a)$ if and only if $\{f_j \geq f_{M_a} > f_{N_a}\}$ or $\{f_j \geq f_{N_a} > f_{M_a}\}$. Analysing the two cases separately:

Case 1: $\{f_{M_a} \geq f_{N_a}\}$

$$DI_a = \frac{1}{2}\Sigma_{f_k\geq f_{M_a}}(Pr(k|\tilde{G},a) - Pr(k|\tilde{S},a)) + \frac{1}{2}\Sigma_{f_k<f_{M_a}}(Pr(k|\tilde{S},a) - Pr(k|\tilde{G},a)) =$$

$$= \Sigma_{f_k\geq f_{M_a}}(Pr(k|\tilde{G},a) - Pr(k|\tilde{S},a))$$

Case 2: $\{f_{N_a} > f_{M_a}\}$

$$DI_a = \Sigma_{f_k \geq f_{N_a}} (Pr(k|\tilde{G}, a) - Pr(k|\tilde{S}, a))$$

So

$$DI_a = \Sigma_{f_k \geq max\{f_{M_a}, f_{N_a}\}} (Pr(k|\tilde{G}, a) - Pr(k|\tilde{S}, a))$$

In order to compute the comparative static on DI_a, one has to consider also that $\frac{\partial f_{N_a}}{\partial \theta_a} \leq 0$ and $\frac{\partial f_{M_a}}{\partial \theta_a} \geq 0$. Assume that, after an increase of $d\theta_a$ in θ_a, new sufficient and necessary condition for $Pr(j|\tilde{G}, \theta_a + d\theta_a) \geq Pr(j|\tilde{S}, \theta_a + d\theta_a)$ is $\{f_j \geq f_{M'_a} > f_{N'_a}\}$ or $\{f_j \geq f_{N'_a} > f_{M'_a}\}$, where $f_{N'_a} \leq f_{N_a}$ and $f_{M'_a} \geq f_{M_a}$. Three cases:

Case 1: $f_j \geq max\{f_{M_a}, f_{N_a}\} \rightarrow f_j \geq f_{N_a}$ and $f_j \geq max\{f_{M'_a}, f_{N'_a}\} \rightarrow f_j \geq f_{N'_a}$

$$\Delta DI_a = \Sigma_{f_k \geq f_{N'_a}} [Pr(k|\tilde{G}, \theta_a + d\theta_a) - Pr(k|\tilde{S}, \theta_a + d\theta_a)] -$$

$$-\Sigma_{f_k \geq f_{N_a}} [Pr(k|\tilde{G}, \theta_a) - Pr(k|\tilde{S}, \theta_a)] =$$

$$= \Sigma_{f_k \geq f_{N_a}} [Pr(k|\tilde{G}, \theta_a + d\theta_a) - Pr(k|\tilde{G}, \theta_a)] +$$

$$+\Sigma_{f_{N_a} > f_k \geq f_{N'_a}} [Pr(k|\tilde{G}, \theta_a + d\theta_a) - Pr(k|\tilde{S}, \theta_a + d\theta_a)] \leq 0$$

because of Result 1 and by construction of $f_{N'_a}$.

Case 2: $f_j \geq max\{f_{M_a}, f_{N_a}\} \rightarrow f_j \geq f_{N_a}$ and $f_j \geq max\{f_{M'_a}, f_{N'_a}\} \rightarrow f_j \geq f_{M'_a}$

$$\Delta DI_a = \Sigma_{f_k \geq f_{M'_a}} [Pr(k|\tilde{G}, \theta_a + d\theta_a) - Pr(k|\tilde{S}, \theta_a + d\theta_a)] -$$

$$-\Sigma_{f_k \geq f_{N_a}} [Pr(k|\tilde{G}, \theta_a) - Pr(k|\tilde{S}, \theta_a)] =$$

$$= \Sigma_{f_k \geq f_{N_a}} [Pr(k|\tilde{G}, \theta_a + d\theta_a) - Pr(k|\tilde{G}, \theta_a)] +$$

$$+\Sigma_{f_{N_a} > f_k \geq f_{M'_a}} [Pr(k|\tilde{G}, \theta_a + d\theta_a) - Pr(k|\tilde{S}, \theta_a + d\theta_a)] \leq 0$$

because of Result 1 and by construction of $f_{M'_a}$.

Case 3: $f_j \geq max\{f_{M_a}, f_{N_a}\} \rightarrow f_j \geq f_{M_a}$ and $f_j \geq max\{f_{M'_a}, f_{N'_a}\} \rightarrow f_j \geq f_{M'_a}$

$$\Delta DI_a = \Sigma_{f_k \geq f_{M'_a}} [Pr(k|\tilde{G}, \theta_a + d\theta_a) - Pr(k|\tilde{S}, \theta_a + d\theta_a)] -$$

$$-\Sigma_{f_k \geq f_{M_a}} [Pr(k|\tilde{G}, \theta_a) - Pr(k|\tilde{S}, \theta_a)] =$$

$$= \Sigma_{f_k \geq f_{M'_a}} [Pr(k|\tilde{G}, \theta_a + d\theta_a) - Pr(k|\tilde{G}, \theta_a)] -$$

$$+\Sigma_{f_{M'_a} > f_k \geq f_{M_a}} [Pr(k|\tilde{G}, \theta_a + d\theta_a) - Pr(k|\tilde{S}, \theta_a + d\theta_a)]$$

that has ambiguous sign (first term negative, second term positive).

In equilibrium hence, greater local tolerance almost unequivocally implies that the a greater fraction of the population self identifies as homosexuals and that self identified homosexuals are more dispersed across occupations relative to self identified heterosexuals.

B Additional Tables

Table B.1: Segregation along sexual identity lines for granularity of job categories and different homosexual definition

	Dissimilarity Index Job 1x1	Dissimilarity Index Job 2x2	Dissimilarity Index Job 3x3
	Self reported homosexuals vs everybody else		
Men	0.32	0.38	0.51
Women	0.21	0.28	0.42
	Self reported homosexuals & bisexuals vs everybody else		
Men	0.28	0.34	0.48
Women	0.16	0.22	0.34

Notes: The table reports the Dissimilarity Index along sexual identity lines calculated nation-wide when a job is defined as the intersection between 1 digit occupation and 1 digit industry (Segregation 1x1, 81 categories), 2 digits occupation and 2 digits industry (Segregation 2x2, about 500 categories), 3 digits occupation and 3 digit industry (Segregation 3x3, about 5000 categories). In the top panel, the two groups for which the Dissimilarity is computed are self-reported homosexuals versus self-reported heterosexuals, bisexuals, other definition and don't know answers. In the bottom panel, the two groups for which the Dissimilarity is computed are self-reported homosexuals and bisexuals versus self-reported heterosexuals, other definition and don't know answers. The Dissimilarity index ranges from 0 (no segregation) to 1 (complete segregation). It can be interpreted as the share of individuals of one group that has to change job in order to achieve an even distribution across job when compared to the other group.

Table B.2: OLS regressions

	(1)	(2)	(3)	(4)
	Men		Women	
	A) Fraction of self-reported homosexuals			
Tolerance	0.110*	0.121*	0.001	-0.015
	(0.064)	(0.063)	(0.070)	(0.070)
	B) Segregation			
Tolerance	-0.026***	-0.027***	-0.023**	-0.016
	(0.009)	(0.009)	(0.011)	(0.011)
	C) Segregation under fixed occ composition			
Tolerance	-0.015**	-0.016**	-0.016	-0.011
	(0.007)	(0.007)	(0.011)	(0.011)
	D) Segregation under fixed minority share			
Tolerance	-0.002	-0.002	-0.009**	-0.007
	(0.002)	(0.002)	(0.005)	(0.005)
Obs	255	255	254	254
FE	sub-region	sub-region	sub-region	sub-region
LA controls		yes		yes

Notes: each panel correspond to a set of regressions with the following dependent variables: *Panel A)* fraction of individuals in work reporting a homosexual identity for each local authority (log odds); *Panel B)* occupational segregation measures with the dissimilarity index; *Panel C)* occupational segregation measured with the dissimilarity index computed under fixed occupational composition (mimicking the national distribution); *Panel D)* occupational segregation measured with the dissimilarity index computed assuming a fixed proportion of self-identified homosexual workers in each local authority. The main independent variable, *Tolerance* is the fraction of individuals in the LA reporting that homosexual relationships are not wrong, from the British Household Panel Survey (2000-2008) (log odds). Additional local authorities controls included are mean age in the local authority, mean age when left education, share of deprived households (2011), population density (2011), years of conservative party control (2000-2015). Standard errors in parenthesis. *** $p<0.01$; ** $p<0.05$; * $p<0.1$.

Chapter 2

An Incumbency Spillover Effect? Running Against the "Pale, Male and Stale" in British Local Elections

2.1 Introduction

Women and ethnic minorities are still widely under-represented in governments and national parliaments around the world.[1] The academic literature supports the conventional wisdom that women and ethnic minorities face biases - in the form of beliefs that they lack the qualities for leadership or as pure taste based discrimination - when attempting to enter the political arena (Fox and Lawless (2004), Bhavnani (2009), Washington (2006), Thrasher et al. (2017)). If one problem that aspiring politicians face is the belief that they are unelectable, what happens when women and ethnic minorities have proven their electability by running for and winning office? Using

[1] UK general election of 1987 saw the first ever black MPs. Fast forward 30 years and the 2017 result has seen 52 ethnic minority MPs elected (over 650 members). Similarly, the number of African-American U.S. Congress members has steadily increased since the first African-Americans entered Congress in 1870, peaking to 49 members in the current legislative session (over 535 members). In both cases, the share of ethnic minority representatives is below their share of the population. Several countries have been led by women in the last decade: UK, Germany, Argentina, Thailand among others. However, in only a third of national parliaments around the world the share of women exceeds 30% (Women in National Parliaments `http://archive.ipu.org/wmn-e/classif.htm`)

data from English local elections, this paper investigates whether the electoral success of women and ethnic minorities leads to subsequent increases in these groups' representation as political candidates.

The paper uses data covering the universe of the 7,707 electoral wards of England spanning over 40 years (1973-2014) to investigate whether a woman or an ethnic minority winning a seat in the local council leads, in subsequent elections, to increased candidacy and electoral success for individuals from the same group in the same area.

A candidate's electoral success can impact future candidacy and electoral performance of people belonging to the same group by acting both on the demand for candidates and the supply of candidates. On the demand side, an electoral success has the potential to shape the attitudes of voters and parties towards women or ethnic minorities in politics, leading to greater demand for similar candidates. On the supply side, winning candidates can create a positive role model effect, encouraging individuals belonging to the same group to stand as candidates.

In order to estimate the causal effect of a woman or ethnic minority winning a seat in the local council, this paper uses a regression discontinuity design (RD).[2] We compare political representation as candidates in electoral wards where a woman/ethnic minority has previously narrowly won a seat in the local council to political representation in wards where they have experienced a narrow defeat. To lend credibility to the identification strategy, several tests on the validity to the RD are presented.

Our analysis provides three main results. First, both women and ethnic minorities enjoy a personal incumbency advantage, i.e. candidates are more likely to re-run for elections and to be re-elected following a personal electoral success than after a defeat. Second, elections following a female and an ethnic minority victory are contested by a higher female and ethnic minority share of candidates than elections following a male/white victory. In the case of ethnic minorities, this increase is driven by the personal advantage of the ethnic minority incumbent. Contrary to the evidence from other countries, in the case of women the personal incumbency

[2] Lee (2008) is the first example of a regression discontinuity design applied to the electoral context. Examples of studies using RD-design and mixed-gender elections are Clots-Figueras (2011), Clots-Figueras (2012), Bhalotra et al. (2017) and Brollo and Troiano (2014). Studies applying RD-designs in interracial elections are more sporadic (see Vogl (2014) and Nye et al. (2014)).

effect spills over to other women. When a woman's seat is re-contested, a higher share of women *among new candidates* run in the subsequent election. These new women candidates run affiliated to a non-incumbent major party and are electorally competitive. The differing results for women and ethnic minorities suggests that these two groups face different challenges in attempting to enter the political arena. Lastly, there is no evidence of incumbency spillovers to women or ethnic minorities in nearby areas or to a higher level of government.

A growing body of work in economics studies the implication of ethnic minority and female political leadership on policy outcomes, attitudes and own-group aspirations.[3] This literature suggests that women and ethnic minorities' underrepresentation at higher and lower level of government can significantly shape - for the worst - the economic performance of a country. Understanding the factors that can foster political representation of women and ethnic minorities is therefore the first step to reduce this outcome. This paper thus contributes to the existing body of literature discussing barriers that women and ethnic minority face in attaining leadership positions. Existing studies on how women respond to the competitive electoral success of other women are to be found in Bhalotra et al. (2017) in the Indian state legislative assembly elections, Broockman (2014) in the US state legislature elections, and Ferreira and Gyourko (2014) in US mayoral elections. All these works provide evidence of a positive effect on the share of women contesting subsequent elections, primarily driven by the increased propensity of the incumbent woman to run again in the following election.[4] Very limited evidence currently exists on the effect of ethnic minorities' electoral success on the groups' subsequent political representation. Vogl (2014) documents that close black victories in southern US states are more likely

[3] See for example Nye et al. (2014), and Ferrando and Gille (2017) for the effects of black leaders on blacks' labour market outcomes and educational achievements, respectively; see Gagliarducci and Paserman (2012) for the effect of female leadership on the duration of legislature, Chattopadhyay and Duflo (2004) on the quality and type of public goods delivered, Clots-Figueras (2012) on the educational attainment of girls, Beaman et al. (2009) on attitudes towards women in leadership positions, Brollo and Troiano (2014) on corruption.

[4] Results from studies on the effect of increased female representation via affirmative action (gender quotas) are relatively more encouraging. Bhavnani (2009) finds that the selection of women as Indian village leaders via a quota policy improves women's access to this position even after the quota is removed. In a similar setting, Beaman et al. (2012) find that, after two terms of a women as village leader, villagers' confidence in female leaders' competence improved and a higher share of women contest elections. DePaola et al. (2010) finds a positive effect on female candidacy to Italian local elections subsequent a temporary quota-system.

than close black defeats to be followed by another black victory, while evidence outside the US is particularly scarce. The importance of race in the electoral context is provided by Washington (2006), who shows that turnout increases when black candidates contest an election in the US.

The remainder of the paper is organised as follows. Section 2.2 gives a brief background to local elections in England. Section 2.3 illustrates the data used and Section 2.4 presents the identification strategy. Section 2.5 presents descriptive statistics. Section 2.6 discusses the validity of the regression discontinuity design and provides the main results, first for women and then for ethnic minorities. Section 2.7 concludes.

2.2 Background to Local Government and Local Elections

Local councils spend £4bn of taxpayers' money each year, almost a quarter of public spending. They employ over 1.5 million people and provide a wide range of services, from public education to waste collection. Local government is thought to have an important effect on people's lives: public awareness of local councils in England is above that of other political institutions and people consider local authorities to be more influential in everyday life than the central government (Ipsos MORI (2008)). Even more importantly, local government is often considered an important avenue for gaining practical experience in participating in politics before moving on to the national arena.

Local councillors sit in local authorities councils, the lowest level of the British Local Government and act as legislative bodies. There are 326 local authorities in England: 201 shire districts (lower tier of two tiers), 55 unitary authorities, 36 metropolitan districts, 32 London boroughs and the special local authorities of the City of London and Isles of Scilly. Shire district councils deal with public housing, local planning and development applications, leisure and recreation facilities, waste collection, environmental health and revenue collection. On top of these function, unitary authorities, metropolitan districts and London boroughs councils deal with

education, strategic planning, transport, highways, fire services, social services, public libraries, and waste disposal.[5]

In the period examined, local authorities have adopted differing types of executive arrangements which set out how decisions are made within the council. The most commonly adopted executive arrangements are the committee system and leader and cabinet system. In both cases, the council elects a leader. Under the committee system, the executive power is exercised by a series of committees formed by council members in proportion to their parties' representation. Under the leader and cabinet system, the leader appoints members of the cabinet who are each responsible for a specific policy area.[6]

The size of the council varies according to the local authority's population: it has an average of 49 seats and a standard deviation of 12 seats. Local authorities are divided into wards (23 on average), which are the primary unit of the electoral system. As of 2014, there were 7,707 wards in England, with a potential electorate of about 5,500 people each. Each ward elects one, two or three councillors according to its size.[7]

Candidates can run as independents or affiliates to a party. Each party nominates candidates up to the maximum number of vacant seats, while the winning candidate is selected via first past the post system. To be eligible, candidates must be adult, British or citizens of the Commonwealth or European Union and having ties with the local area.[8] The frequency of Council renewal varies with the type of

[5]Local councils have four main sources of funding: central government grants, business rates (until 2013, collected by the government and re-distributed to councils), council tax (collected directly by the local authorities), fees and charges on local council services.

[6]Since 2000, local authorities can also move to a system where instead of having a leader elected by the council, a mayor is directly elected by the electorate.

[7] To be completely accurate, in 1974-2014, in 1.21% elections, more than 3 seats have been simultaneously contested. These elections were concentrated before 1979, while after 1980 only a few wards in City of London and Isles of Scilly have elected more than 3 councillors. These wards are excluded from the analysis.

[8] Specifically, candidates have to be registered to vote in the Local Authority or have lived, worked or owned property there for at least 12 months before an election. In addition, a person cannot be a councillor if they work for the council they want to be a councillor for, or for another local authority in a political restricted post; if they are the subject of a bankruptcy restrictions order or interim order; if they have been sentenced to prison for three months or more (including suspended sentences) during the 5 years before election day; have been convicted of a corrupt or illegal practice by an election court. Furthermore, whether potential candidates have been selected by a party or are standing as an independent candidate, they must make sure that they are officially nominated by getting 10 people to sign their nomination papers - signatories must be registered electors in the ward where they wish to stand.

Local Authority. The three methods of holding elections to local councils are by whole council (all the councillors are elected simultaneously every four years), as for London boroughs; by halves (half of the councillors are elected every two years), as for Metropolitan Districts and most Shire Districts; and by thirds (a third of the councillors are elected every year for three years, with no elections in the fourth year), as for some Shire Districts. There is no term limit for elected councillors, meaning there is no maximum limit to the number of times they can re-run (and be elected) for a seat on the council.

On election day, candidates appear on the ballot box in alphabetical order by surname, along with the party symbol and their address (Figure 2.1). Councillors are elected for a four-year term and they receive no salary for the time they devote to serving their community. However, they do receive allowances to cover expenses. Estimates of the time commitment vary, ranging from 5 to 20 hours per week (Kettlewell and Phillips (2014)).

2.3 Data

To study gender-mixed and interracial in British local elections, our paper uses an original dataset spanning over 40 years. We rely on candidates' names and surnames to recover information about their gender and ethnicity. This section describes the dataset used and the procedure followed to create the final dataset.

2.3.1 Local Election Data

This paper uses the Local Election Database 1889-2003 compiled by the Local Government Chronicle Elections Centre, University of Plymouth (Rallings et al. (2006)). This database includes results from every local government election in Britain from 1973-2003, with information about ward and year in which the election was contested, number of vacancies, size of the electorate, candidates' surname, gender (but not ethnicity), party, number of votes received and turnout. The paper complements this dataset with data from the Local Archive Election Project which includes, for every council election between 2004-2014, information on the name and surname of each candidate, the party and number of votes received, the ward and year in which

the election is contested and number of vacancies. Nonetheless, it does not provide any information about candidates' gender nor ethnicity. The turnout and size of the electorate for years 2004-2014 come alternatively from the Electoral Commission or they have been kindly provided by the Elections Centre, University of Plymouth. Overall, the dataset includes 132,238 elections and 531,607 candidates.

2.3.2 Gender of Candidates

For elections contested before 2004, the Local Election Database provides information on candidates' gender. Hence, to assign gender to candidates contesting elections after 2003, a step-wise procedure is followed, relying on candidates' first name. First, all given names are matched to the relative frequency of given names in the population of new-borns in UK by gender in 1996-2016. Gender is assigned as the most frequent gender: for example, the name Jamie is a female name for 75% of the times and a male name for 25% of the times. According to the procedure, all candidates named Jamie are recorded as female in the data, with a gender-accuracy score of 75%. Second, names that do not have a match in the list (about 35%) are match to a similar list of the population of U.S. births 1940-2016 where the individual has a Social Security Number and a similar procedure applied. Third, given that most of the remaining unmatched names were non-British sounding names, the matching also relies both on the 40,000 Namen database (Michael (2007)) and on the Gender Api database. Overall, gender cannot be assigned to less than 3% of the candidates contesting an election in 2004-2014. Among names for which it has been possible to match the most probable gender, more than 94% have an accuracy rate higher than 95%. Elections for which one or more candidates have missing gender information are excluded from the empirical analysis (4% of the elections held after 2003).[9]

2.3.3 Ethnicity of Candidates

To determine candidates' ethnicity, the paper uses a software, Onolytics INC, that ascribes ethnicity based on surnames. Onolytics INC[10] name-classification system,

[9] In the Appendix, it is shown that the main result is similar when using exclusively data from the Local Election Database, in which candidates' gender is unambiguously determined (Table B.1, col(1)).

[10] Previously called OnoMap Inc.

developed by researchers at University College London, relies on a reference population of a million names from 28 countries for which ethnicity is known. Each candidate's surname is matched with an ethnic category from 2011 census (White British, White Irish, White - any other background, Asian - Indian, Asian - Pakistani, Asian - Bangladeshi, Asian - Other, Black - Caribbean, Black - African, Chinese, Other) according to the share of the reference population with that surname belonging to each ethnic group. [11] Of the 41,572 unique surnames, the software successfully ascribes 98% of surnames to an ethic category. As for gender, the analysis in the paper does not use elections with missing ethnicity information for one or more candidates (about 6% of the elections). Candidates of non-white descent (here onwards also defined with the acronym BME: Black and Minority Ethnic) are categorised as belonging to an ethnic minority. From 1973-2014, only 2.6% of candidates contesting a local election belonged to an ethnic minority.

2.3.4 Auxiliary Data

The dataset on local elections is complemented with few other data sources. First, the paper relies on the 1971 Census to recover exogenous local authority characteristics. In particular, the paper uses *i)* the difference in male and female employment rate to identify areas where women were historically more attached to the labour market; *ii)* the share of individuals born in Commonwealth countries to identify areas with a higher fraction of ethnic minority population. Second, the paper uses 2001-2015 General Elections data (candidates' name and surname[12], constituency name, party, vote share) collected from a variety of sources. The paper relies on this data to investigate spillovers to higher levels of government. Third, the paper uses data on investigated electoral frauds (2010-2014) available on the Electoral Commission website.

[11] For more details of the coding algorithm, see Mateos et al. (2007) and Mateos (2007) and Lakha et al. (2011) for a validation of the algorithm.

[12] Candidates' gender and ethnicity is inferred using candidates' name and surname following the methods described in the previous subsections.

2.4 Econometric Model: RD Design

The empirical analysis' objective is to test whether the electoral success of women and ethnic minorities leads to subsequent increases in women's and ethnic minorities' representation as political candidates in local elections. The lack of randomised assignment of individuals to council seats represents a threat to the identification of a causal effect. For example, an ethnic minority candidate's success might be correlated with constituencies' unobserved characteristics, such as ethnic composition or attitudes towards diversity, that might influence ethnic minorities' representation as candidates and electoral success in subsequent elections.

The paper uses a regression discontinuity (RD) design to solve this problem, focusing on gender-mixed and interracial elections. To the best of our knowledge, this is the first application of RD design to an electoral context in the UK.[13] The following paragraphs refer to mixed-gender elections, but the same idea applies to interracial elections. According to the type of local authority, each electoral ward elects one to three councillors at time, meaning that it is usually the case that multiple candidates compete for multiple seats.[14] For example, twelve candidates might simultaneously compete for three seats, with the seats being assigned to the candidates with the three highest vote shares. An election is classified as a mixed gender election based on the gender of the last candidate who barely won a seat and the gender of the candidate who barely lost a seat (marginal candidates). The race in the previous example would be classified as mixed-gender if the gender of the candidate with the third highest vote share were different from the fourth highest vote candidate's gender. This implies that wards where a woman narrowly won a seat in the local authority council are compared to wards where a woman narrowly lost, independently of whether other women won non-marginal seats (in the previous example, independently from the gender of the two candidates with the highest vote shares).

[13] Eggers et al. (2015) is the only other case found of RD design applied in a UK electoral setting. Using the British Local Election Database and focusing exclusively on single-member elections, they show that in this setting and in many others - excepting the U.S. House of Representatives - the incumbent party does not have systematically greater chances of winning in close elections.

[14] Metropolitan districts elect three councillors, while wards in non-metropolitan district, unitary authorities and London boroughs elect between one and three councillors. In the period 1974-2014, in 66% of the elections one councillor is elected, in 17% two councillors are elected, and in the remaining 17% three councillors are elected.

Consistently, the running variable is computed as the difference between the vote share received by a marginal woman and the vote share received by a marginal man in a mixed-gender election.[15] The identifying assumption is that the assignment of treatment around the threshold (i.e. a woman winning rather than a man) is uncorrelated with candidates' and constituencies' characteristics. The estimated equation is the following:

$$Y_{i,c,t} = \alpha + \beta F_{i,c,t-1} + f(m_{i,c,t-1}) + \epsilon_{i,c,t} \tag{2.1}$$

where $Y_{i,c,t}$ is a measure of female political candidacy and performance in ward i, local authority c in election t, such as the share of female candidates contesting the election and the probability of a female win. $f(m_{i,c,t-1})$ is a flexible function of the margin of victory $m_{i,c,t-1}$, that we allow to differ on each side at the discontinuity. $F_{i,c,t-1}$ is a dummy that takes value one if a marginal woman had won against a marginal man (female margin of victory $m_{i,c,t-1} > 0$) and zero otherwise. The coefficient β can be interpreted as the causal impact of an additional woman winning a council seat against a man on women's representation in the subsequent election.[16] Standard errors are clustered at the local authority-decade level to allow for correlated outcomes across all wards within the same local authority by decade.

To test the sensitivity of the results, the paper adopts three approaches. First, we estimate local linear regressions (Hahn et al. (2001), Imens and Lemieux (2008)) restricting the sample to a data-driven optimal bandwidth around the discontinuity, with the optimal bandwidth selected by applying the mean square error (MSE) method (Cattaneo et al. (2018)). Second, we estimate local linear regressions using an optimal bandwidth selected by applying the coverage error rate (CER) method

[15] Beach and Jones (2017) adopt a similar strategy in analysing the effect of ethnic diversity in local government on public good provision in Californian city councils.

[16] This design pools a larger number of constituency-specific RD design into one, by normalising the running variable (vote margin). Each individual RD design is characterised by a different vote share of the marginal winning candidate (because of multi-member elections) and of the marginal loser (because of the presence of other non-marginal losers). The normalising and pooling technique is a widespread practice in the empirical literature using RD in electoral contexts (see for example Beach and Jones (2017), Broockman (2014), Ferreira and Gyourko (2009), Ferreira and Gyourko (2014), Gagliarducci and Paserman (2012), Lee (2008), Vogl (2014)). Cattaneo et al. (2016) point out that this approach has implications for the interpretation of the RD parameter. With pooling, β can be interpreted as a double average: the weighted average across cut-offs of the local average treatment effects of all observations at each particular cut-off value. More weight is given to observations at more frequent cut-off values.

(Cattaneo et al. (2018)). These two alternative bandwidth choices involve a trade-off between size and power of the hypothesis testing: MSE-optimal bandwidth leads to more powerful hypothesis tests but includes observations that are relatively further away from the cut-off with respect to tests implemented using the CER-optimal bandwidth. Unless specified differently, these estimations adopt a triangular kernel function, that assigns zero weight to all observations outside the bandwidth interval and positive weight (symmetrically and linearly declining in the distance to the cut-off) to observations within the interval. Third, we fit a quadratic function of the vote margin $m_{i,c,t-1}$. This specification includes local authorities interacted with time fixed effect, which control for all local authorities' fixed and time-varying characteristics, such as the local authority's ethnic composition or the political colour of the council. Last, the paper investigates the robustness of results by experimenting with different kernels and polynomial selections and by restricting the sample to a very small window around the cut-off.

To examine geographical spillovers, $Y_{i,c,t}$ is replaced with $\bar{Y}_{c-i,t} = \Sigma_{j \neq i}^{J} Y_{i,c,t}$, the average outcome in wards other than ward i within the same local authority c. To investigate political spillovers to higher level of government, the dependent variable in Equation (2.1) is replaced with $Y_{i,p,t}$, the political representation in the next closest General Elections in the constituency p in which the ward i is included.[17]

2.5 Descriptive Statistics

Despite local government in England often being characterised as 'pale, male and stale', it has certainly experienced an upsurge in ethnic minorities and female representation over time. Figure 2.2 depicts the increase in female and ethnic minorities' representation in local elections from 1974 to 2014. The representation of women steadily increased until mid-2000, when it reached around 33% (panel *a*), continuous lines). Consistently, the fraction of women winning a seat in the local council has increased from 8% in the 1970s to 10% in the 2000s (panel *a*), dashed lines). The candidacy and political representation of ethnic minorities has also steadily increased

[17] Despite covering smaller areas, electoral wards' boundaries do not overlap precisely with the boundaries of parliamentary constituencies. A ward is considered to be included in a parliamentary constituency if the ward's centroid falls within the parliamentary constituency borders.

in the last four decades (panel *b*)) because of the increase in net migration and in the political awareness of ethnic minorities. The oscillating trend depicted in the figure is explained by the fact that elections in different localities take place in different years. The spikes in the fraction of BME candidates correspond to the years in which elections were held in London Boroughs, where the share of ethnic minority residents is particularly high.[18]

2.6 Regression Discontinuity Analysis

2.6.1 Validity of the RD Design

Before presenting the results, this section discusses the validity of the regression discontinuity design. First, we test for internal validity, analysing the continuity of the running variable and ensuring that constituencies' or candidates' characteristics do not present a discontinuity at the zero cut-off. Second, we discuss the external validity of the RD design in this context.

Internal validity

The paper presents here several tests of the validity of the regression discontinuity design. The first test constitutes in analysing whether the running variable is continuous at the zero threshold. The histogram of density of female and ethnic minority margin of victory is displayed in Figures 2.3 and 2.4 (left panels), while the right panels formally test for the presence of a discontinuity following McCrary (2008). There is no indication of discontinuity around the zero threshold in the female margin of victory. However, the ethnic minority margin of victory exhibits a discontinuity at zero, suggesting that close victories are significantly more likely than close defeats for ethnic minority candidates. The sorting observed around the threshold could be the result of either ex ante (i.e. higher voter mobilisation or electoral frauds such as ballot stuffing or votes' suppression) or ex post manipulation (i.e. recounts or lawsuits) of the ethnic minority vote share.[19]

[18] 40% of London population belongs to an ethnic minority, in contrast to 15% in the rest of England (Census 2011). The differential pattern in BME candidacy and political representation for London boroughs and council outside the capital is clearly depicted in Figure A.1 in the Appendix

[19] Vogl (2014) observes that narrow black victories are significantly more likely than narrow black losses in the US South. He argues that if the discontinuity is due to recounts or law suits (ex post

Table B.2 in the Appendix tries to shed some light on the determinants of this discontinuity. Columns (1) to (3) examine whether elections in which a BME candidate barely won are characterised by a higher turnout than elections in which a BME candidate barely lost, using different econometric specifications. The hypothesis that BME candidates can mobilise voters in competitive elections is not supported by the data. Columns (4) to (6) investigate whether narrow BME victories are more likely to be followed by investigations of cases of alleged electoral frauds by police forces, finding no significant result either.[20] In any case, manipulation of the running variable in electoral context rarely lead to identification problems (McCrary (2008)). This is because while candidates or parties may attempt to manipulate the vote tally, it would be difficult to do so perfectly, particularly since elections are secret ballot.

An alternative explanation for the discontinuity is a bias introduced by the surname-ethnicity algorithm. The algorithm categorises BME candidates with white-sounding surnames as non-BME. This implies that the software fails to identify some elections as interracial, i.e. those elections in which a marginal candidates belongs to an ethnic minority but has a white sounding name. If BME candidates with a white sounding name were more likely to be the marginal loser than the marginal winner when contesting the marginal seat with a (truly) white candidate, one would observe a "missing mass" to the left of the zero threshold in the BME victory margin. However, this is not consistent with existing empirical evidence. Analysing British local elections covering the same time span as this study, Thrasher et al. (2017) find that candidates with names suggesting a non-European ethnic origin perform least well compared to candidates with surnames indicating a British origin.

The second test for the internal validity of the regression discontinuity design constitutes in ensuring that constituencies' or candidates' characteristics do not present a discontinuity at the zero cut-off. Figures 2.5 and 2.6 show a number of constituency characteristics and pre-determined electoral variables (year, ward in

manipulation), then the turnout rate should not differ between close black victories and close black losses. Finding that turnout is significantly higher in narrow black victories than in narrow black losses, he argues that ex ante black voter mobilisation drives the result. For a detailed explanation of sorting in close elections and and application in the US House elections, see Caughey and Sekhon (2011).

[20] Alleged fraud cases related to general elections are excluded from the analysis. The results do not change if the analysis is restricted to cases that resulted in an action from the police, or if alleged frauds related to electoral campaigns are excluded.

London, multi-member election, number of votes polled, election by thirds, number of female/ethnic minority candidates, total share of votes won by the Labour party and contextual turnout) by the female and ethnic minority victory margin respectively. The dots represent unconditional means of the relevant characteristic in bins of 5% by the running variable. The solid line represents the predicted values of a global 4th-order smoother estimated using raw data on each side of the zero threshold. Looking at Figure 2.5, these variables do not vary discontinuously at the zero threshold of the female margin of victory. This result lends additional credibility to the identification strategy: RD results cannot be driven by different pre-existing characteristics across constituencies in which a woman barely won and barely lost an election. Additionally, panels *i*) and *j*) show that, in multi-member elections, characteristics of non-marginal winners do not vary discontinuously at the threshold. Lastly, the incumbency status of women who narrowly lost is similar to the incumbency status of women who narrowly won (panel *k*)) and their probability of running with the Labour Party too (panel *l*).[21] The formal statistical analysis reported in Table 2.1 confirms the results of the graphical analysis. None of the characteristics examined here exhibits a discontinuity at the threshold.[22] Figure 2.6 explores the continuity of these variables around the zero threshold for the BME margin of victory. The graphical analysis suggest that some variables may vary discontinuously around the cut-off - namely panel *e*) share of female candidates, panel *i*) share of women among non marginal elected candidates, panel *l*) probability that the winner is a Labour party candidate. The formal statistical analysis reported in Table 2.2 shows that discontinuity in the probability that the BME candidate runs for the Labour Party candidate is statistically significant. This means that, in elections where an ethnic minority candidate narrowly wins a seat in the local council against a white ethnicity candidate, it is more likely that the BME candidates is Labour. Hence, to account for this difference, the main empirical analysis controls for whether the marginal ethnic minority candidate run for the Labour Party in the previous election.

[21] Historically, both women and ethnic minorities have been targeted by the Labour Party as voters and candidates (Norris (1999), Anwar (2001)).

[22] Using CER-optimal bandwidth instead of MSE-optimal bandwidth does not affect the results.

External validity

The tests presented in the previous subsection corroborate the causal interpretation of the β parameter estimates in Equation (2.1). However, as in many RD settings, this effect may not be representative of the treatment effect that would occur for units farther away from the cut-off, i.e. for elections with high/low margin of victory. For example, a potential threat to the external validity of the estimated can be inspected in Figure 2.5, Panel c), d) and e). Close mixed-gender elections are more likely to occur in multi-member elections, where a high number of votes are cast and where the share of women contesting the election is low. This finding indicates that the RD effect estimates may not be informative of the average effect of treatment when the female margin of victory is very far from zero. However, results obtained using the whole sample of mixed-gender elections are very similar to RD results relying on the sub-sample of observation around the cut-off, pointing towards the external validity of the results.

A second threat to external validity comes from the focus on mixed gender/interracial elections, as these elections may not be representative of all the elections. Mixed-gender elections are 34% of the total, while interracial elections are 9% of the election held in London and 2.5% of the elections held outside the capital. Between 1973-2014, all local authorities experience at least one mixed gender election. However, they are more likely to happen in London boroughs wards and in more recent years. Meanwhile, 10% of local authorities never experienced an interracial election in their wards in the period. Interracial elections are more likely to happen in wards characterised by a wider electorate, in London boroughs and in unitary authorities and in the last decade.

2.6.2 Women's Electoral Success and Subsequent Political Representation

This section investigates whether a woman candidate's electoral success causes an increase in the share of female candidates contesting the next election and tests the robustness of the result to different RD specifications. First, we investigate the personal incumbency advantage of women; second, we test whether this advantage spills

over to other women; third, we investigate the role of voters, parties and heterogeneity to area characteristics. Last, we analyse potential spillovers to nearby areas and to higher levels of government.

Subsequent Female Candidacy in Local Elections

The incumbency advantage reflects the benefits that come with office-holding: increased access to the local media, influence in the party's local branches, opportunity to deliver goods and services to the constituency and build a (positive) reputation.[23] Table 2.3 shows that incumbent women enjoy a personal incumbency advantage in terms of the probability of re-running (col. (1)) and re-election (col. (3)): women who narrowly won against a man are more likely to re-run and be re-elected than women who have narrowly lost against a man. However, women who have won a close election against a man do not appear to be more likely to re-run and be re-elected than men who narrowly won against a woman (col. (2) and (3)).

Female incumbency is a crucial factor for increasing women's political candidacy and therefore their chances of election. This has been shown by Ferreira and Gyourko (2014), Broockman (2014), Bhalotra et al. (2017). Table 2.4 col. (1) shows that this is the case for British local elections too. The election of a marginal women in a close election, compared to the election of a marginal man, leads to an increase of 8.5 percentage points in the share of woman contesting the seat in the next local election. More importantly, col. (2) shows that the increase in female candidacy observed following a female victory is not entirely driven by the personal incumbency effect. When the previous election has seen a female candidate winning against a man, the share of women is also significantly higher among candidates who never contested a race before. Hence, electorally successfully women cause an inflow of new women contesting the next election. Figure 2.7 gives a graphical representation of the effect, clearly showing a positive jump in the share of female candidates (panel *a*)) at the zero threshold of the female victory margin. This effect is robust to differed RD specifications, as shown in panels *b*) and *c*). Robustness to additional specifications is reported in Table B.1, panel *a)* in the Appendix. Focusing on a sub-

[23] See Erikson (2016) for a recent and comprehensive review of the incumbency advantage literature in the US.

sample of elections in which gender is unambiguously assigned to candidates (col. (1)), different kernel choice (col. (2) and (3)), smaller bandwidth selection (col. (4)), different polynomial order (col(5) and (6)) leaves the result substantially unaffected.

The fact that the total number of new candidates remains unaffected (Table 2.4 col. (3), negative but not significant coefficient in RD specifications), while the number of female new candidates significantly increases (col. (4)), indicates that female candidates substitute male candidates on the ballot list.

The results in Table 2.5 indicate that the increase in female new candidacies observed following a female victory is of competitive candidates (col. (1)) who mostly run affiliated to a major party (Conservative, LibDem or Labour) (col. (3)). Col. (4) indicates that the share of women among new candidates running with the incumbent party is only marginally affected; it is mainly non-incumbent parties that increase the share of new female candidates on the ballot list. The fraction of new independent female candidates does not respond to previous female victories (col. (2)). The results are consistent with a proactive role of parties in recruiting more new, competitive women who can potentially challenge the female incumbent.

Voters, Parties and Heterogeneous Effects

This subsection investigates whether the female representation effect found can be explained by demand-side factors such as voters' and parties' attitudes towards female candidates. Table 2.6, panel *a*), col. (1)-(4) uses turnout and women's electoral performance as proxies for voters' attitudes. Turnout is not significantly higher in wards in which a woman won a marginal seat against a man in the preceding election.[24] There is little evidence that women's electoral performance (on top of incumbency advantage) is significantly higher in wards when a woman previously won against a man (Table 2.6, col. (2)-(4)). The share of women among new elected is significantly higher when when their candidacy follows a female victory in the previous election (col. (2)). However, each new woman does not receive a higher share of votes (col. (4)). Figure 2.7, panel *b*) gives a graphical representation of the effect on the prob-

[24] Unfortunately, turnout by gender is not available. It cannot be ruled out that women have a higher turnout, as they are more encouraged to cast their votes when more women appear on the ballot list, while the opposite happens to men, with the two effects off-setting each-other.

ability of election for women among new candidates and Table B.1, panel *b)* in the Appendix shows the robustness of this result to different econometric specification.

Table 2.6, panel *b*) investigates the heterogeneity of these results to women's historical labour force participation. Local authorities that, according to 1971 Census, were below (above) the mean in terms of male-female employment rate differential are considered localities where women have a less traditional gender role, i.e. they participate more similarly to men to the labour market.[25] No differential effect is to be found with respect to candidacy (col. (1) and (2)). In local authorities characterised by a more even men-women labour force participation, voters seem to reward more new women after a female victory, than voters in local authorities characterised by a more gender unbalanced labour force participation (col (3) versus col. (4)). This suggests that a social context that promotes more equal gender roles leads to a stronger response after a woman demonstrates the ability to win an election.

Last, Table 2.6, panel *c*) examines the role of parties in selecting female candidates. The female candidacy and performance effect among new candidates seems to be driven by parties who are not led by a woman (i.e. the Conservative Party when not led by Margaret Thatcher and any party outside of the period 1975-1990). However, differences in coefficients are not statistically significant.

Other Spillover Effects

Table 2.7 empirically tests two potential spillover effects. First, it investigates whether a marginal female win in a ward leads to a higher representation as candidates and success in subsequent elections held in nearby wards (col. (1)-(2)). Second, it asks whether a marginal female win in the local council translates into a higher share of women running for general elections in the future (col. (3)-(4)). The results do not provide evidence in support of spillover effects.

[25] Using attitudinal data from 1998-2008 British Household Survey, the share of respondents agreeing to the statement "Woman and family are happier if she works" / disagreeing with the statement "The family suffers if the woman works full time" negatively correlates with 1971 male-female employment rate differentials in unconditional regressions. This suggests that the 1971 male-female employment rate differential has some power in explaining gender norms about 30-40 years later.

2.6.3 Ethnic Minorities' Electoral Success and Subsequent Political Representation

This section presents the results of the analysis carried out for ethnic minority candidates. In addition to providing insights into another politically under-represented group, this section sheds additional light on the mechanisms that can explain female representation in leadership positions. If similar results to the analysis for women are to be found, female under-representation is unlikely to be due only to gender-specific factors, such as lack of confidence, distaste for competition (Gneezy et al. (2003)) or family duties.

Table 2.8 confirms that BME winners enjoy an incumbency effect in terms of future candidacy and re-election probability (col. (1) and (2)). Similar to women, winning BME candidates are equally as likely as white winning candidates to re-run and be re-elected, conditional on their re-running (col. (3) and (4)). The incumbency effect enjoyed by winning BME candidates enjoy causes elections subsequent a BME victory in a close interracial election to have a higher fraction of BME candidates on the ballot list (Table 2.9, col. (1)). However, differently to women, this advantage does not "spill-over" to other similar candidates. Col. (2)-(4) shows that the increase in the share of BME candidates is not driven by an inflow of new BME candidates. Consistently, Figure 2.8, panel *a*), shows that the share of BME new candidates does not exhibit a jump in correspondence to the zero-threshold in the share of the BME candidate's victory margin in the previous election.

Table B.3 in the Appendix shows that neither the share of BME among new competitive candidates, independent nor affiliated to major parties (incumbent and not) is affected. Table B.4, panel *a)* further illustrates that voters do not respond to a BME victory in terms of higher turnout (Col. (1), or higher BME share of new elected candidates (Col. (2) and (3); graphically shown in Figure 2.8, panel *b*)).[26] Panel *b)* investigates whether local authorities with high ethnic minority presence in 1971 exhibit a higher response to a BME electoral victory. However, the results do not support the hypothesis that elections held in local authorities with a high minority

[26] No major political party has ever been headed by an ethnic minority leader in Britain, limiting the scope of this investigation only to voters' behaviour.

share react more to a BME electoral victory in terms of new BME candidates running or being elected in a subsequent election.

Lastly, Table 2.10 investigates potential geographical and political spillovers. A BME close victory in an interracial close election does not affect the share of BME candidates running or elected in other wards in the same local authority (col. (1) and (2)). With respect to spillovers to other types of elections, results indicate that a close BME victory in marginal elections does not trigger higher BME participation as candidates nor higher electoral success in subsequent general elections in the same area (col. (3) and (4)).

Overall, the analysis carried out for ethnic minority candidates provides different results to the one for female candidates. This suggests that women and ethnic minority face significantly different challenges when they seek to enter local politics. Existing survey evidence supports this claim. In a survey of local elections' candidates, Rallings et al. (2015) finds the majority of candidates agrees that the explanation for women's under-recruitment is that women put family above political career. Women's responsibilities in the home and to the family appear to be gender-specific concrete obstacles to recruitment. On the other hand, they find that lack of parties' effort in recruiting BME candidates is thought to be the main reason for BME under-representation as candidates.

2.7 Conclusions

This paper investigates whether the electoral success of women and ethnic minorities leads to subsequent increases in these groups' representation in elections as political candidates. In doing so, it focuses on the universe of mixed gender and interracial local elections in England spanning over 40 years. Causal effects are estimated using a regression discontinuity design, that compares outcomes in wards where a woman/BME candidate narrowly won a council seat to outcomes in wards where a woman/BME narrowly lost. Many checks are provided to ensure both the validity of the design and the robustness of the estimates.

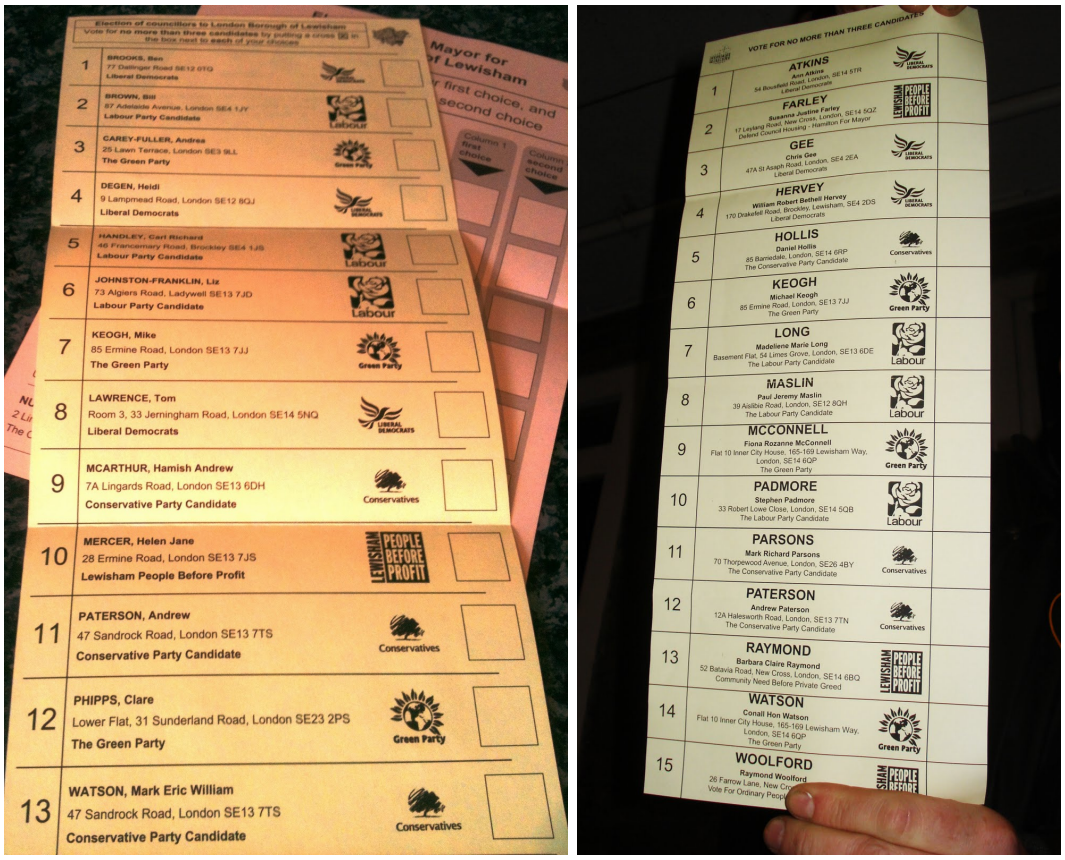
The electoral success of an individual from a politically under-represented group can affect future political engagement of members of the same group if it helps re-

ducing stereotypes towards the ability of these groups as political leaders among voters, parties and potential candidates themselves. The evidence provided by this paper partially confirms this hypothesis. The analysis confirms that both women and ethnic minorities enjoy a personal incumbency advantage, as men and white candidates. One direct consequence of the incumbency advantage is a large and significant increase in the fraction of women and ethnic minority candidates contesting a local election, where previously the seat was won by somebody from the same group. Additional results show that, in the case of women, this increase can also be attributed to an inflow of new candidates. These new candidates are both electorally competitive and mainly recruited by non-incumbent major parties.

These results provide three insights. First, that women and ethnic minority face significantly different challenges when attempting to enter the political arena. Second, that affirmative actions aimed at increasing female representation in leadership positions can be of use in breaking down stereotypes against women and can potentially have a trickle-down effect on subsequent elections. Third, that the idea that more political representation leads to even more political representation does not apply to every under-represented group. In the case of ethnic minorities, additional incentives may be needed. Such possible measures may include guidance to political parties to ensure that there is no discrimination in the selection of candidates and pro-active campaigning to encourage ethnic minorities to stand as councillors.

2.8 Figures

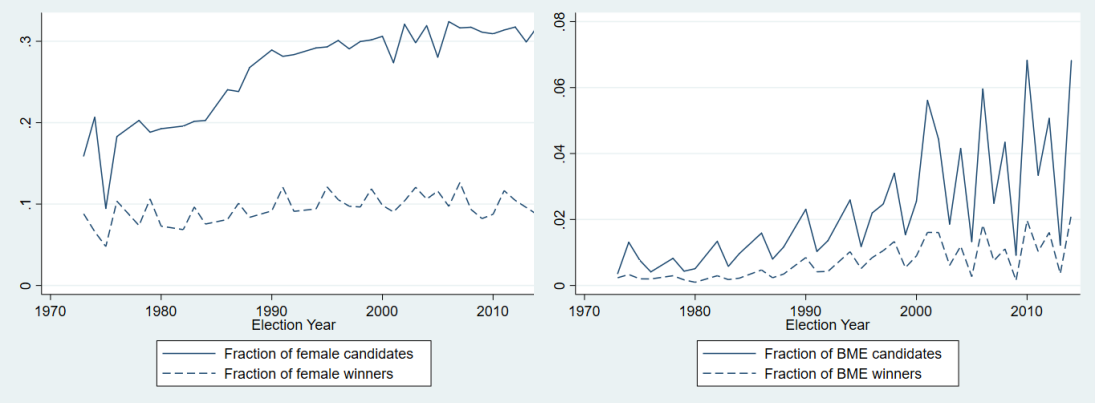
Figure 2.1: Ballot paper examples



Notes: Ballot paper for Ladywell ward, Lewisham, London (election held on 22nd May 2014), on the left;ballot paper for New Cross ward, Lewisham, London (election held on 6th May 2010), on the right. In both cases, three seats were vacant.

Figure 2.2: Electoral representation and performance

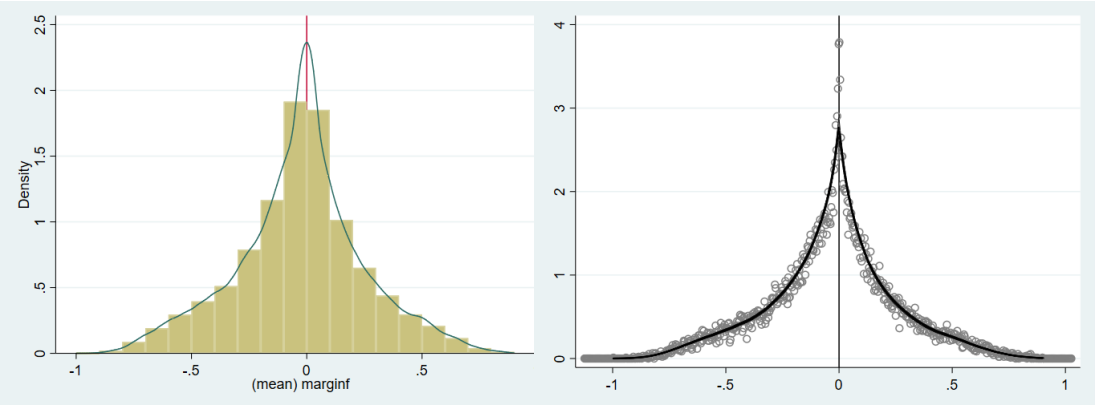
(a) Women (b) Ethnic minorities



Notes: Panel a) shows the fraction of female candidates contesting local elections and fraction of female winners per year (1973-2014); Panel b) shows the fraction of ethnic minority candidates contesting local elections per year and fraction of ethnic minority winners per year (1973-2014).

Figure 2.3: Continuity of female margin of victory

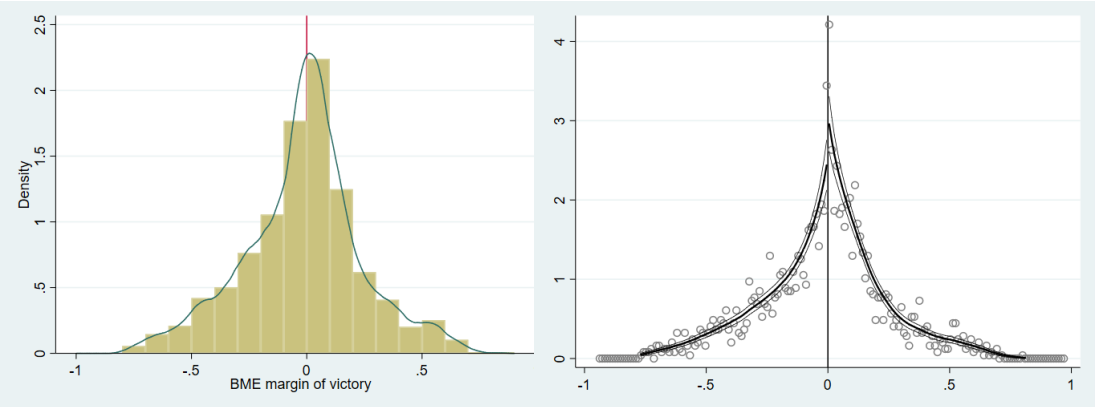
(a) Histogram (b) Mc Crary (2008) discontinuity test



Notes: The sample includes all mixed-gender elections during 1973-2014. Discontinuity estimate in Panel b) (Log difference in height): 0.013 (SE: 0.030)

Figure 2.4: Continuity of BME margin of victory

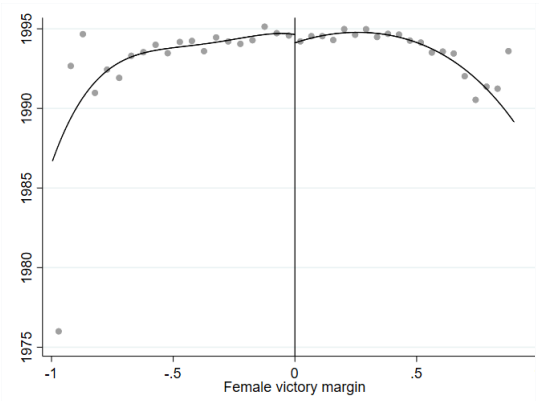
(a) Histogram (b) Mc Crary (2008) discontinuity test



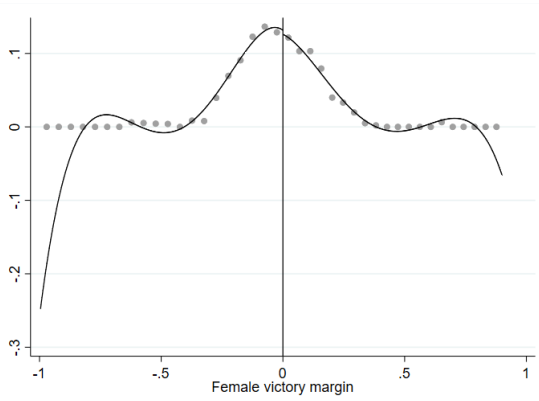
Notes: The sample includes all interracial elections during 1973-2014. Discontinuity estimate in Panel b) (Log difference in height): 0.189 (SE: 0.094)

Figure 2.5: Continuity of covariates at zero-threshold of female margin of victory

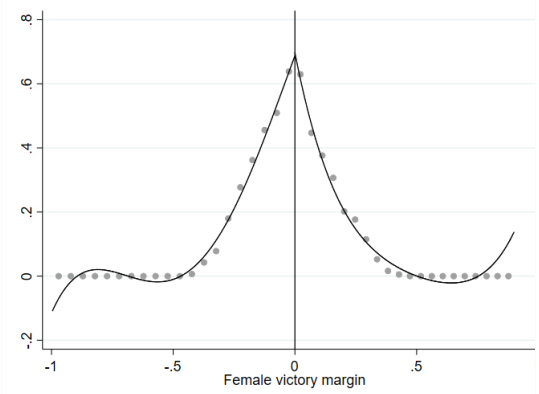
(a) Year of the election



(b) Share of elections held in London

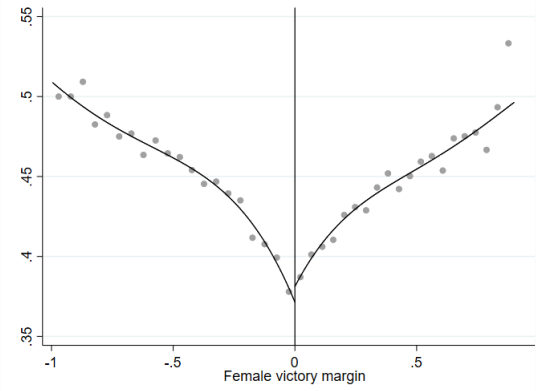


(c) Multi-member elections

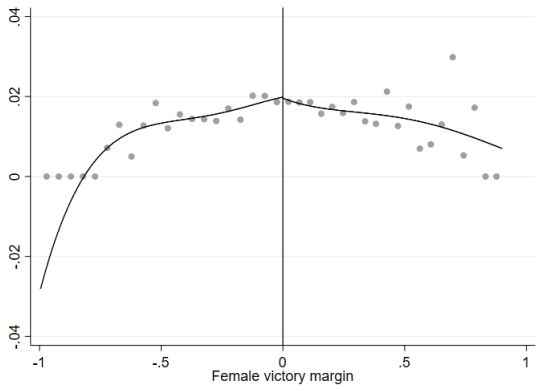


(d) Votes cast

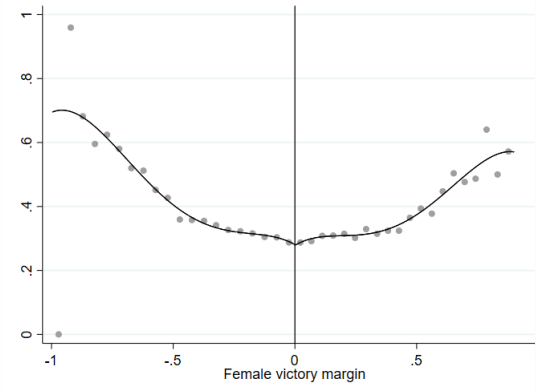
(e) Share of female candidates



(f) Share of BME candidates



(g) Labour votes



(h) Turnout

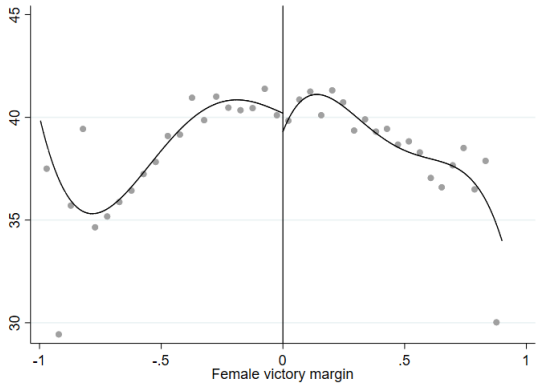
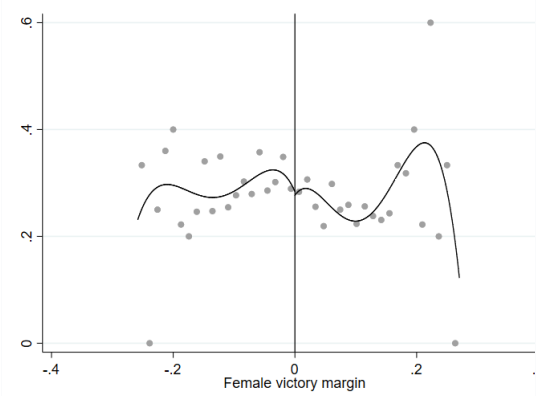
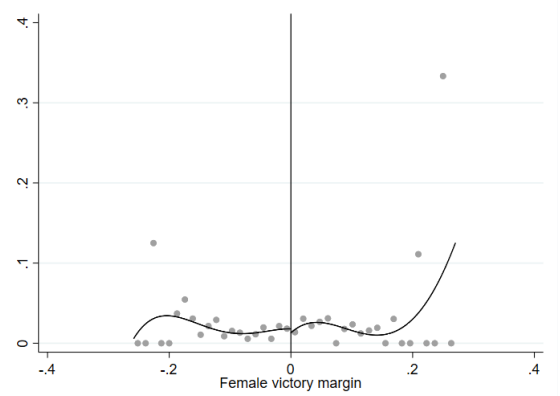


Figure 2.5: (continued) Continuity of covariates at zero-threshold of female margin of victory

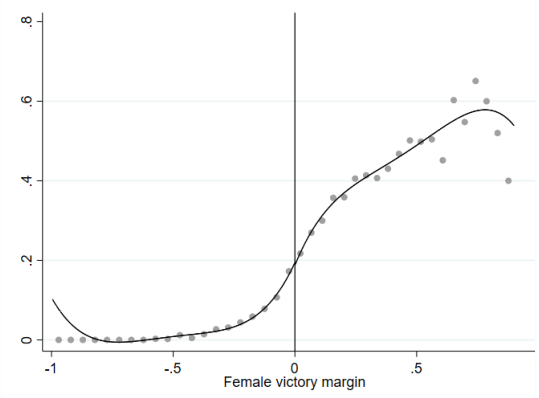
(i) Share of women among non-marginal elected candidates



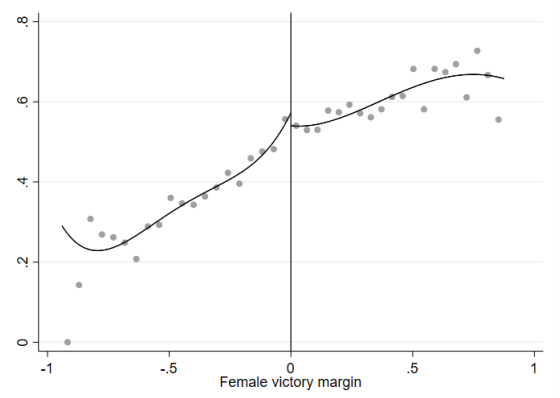
(j) Share of BME among non-marginal elected candidates



(k) Incumbency status



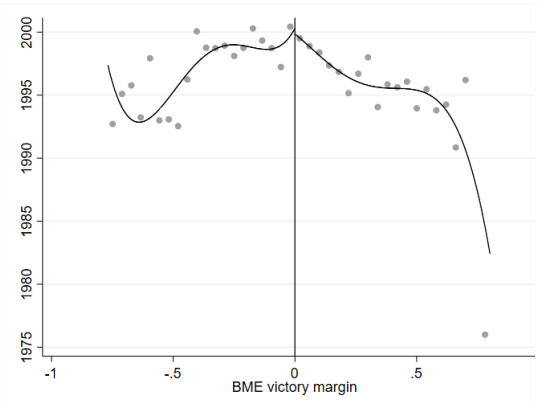
(l) Labour party



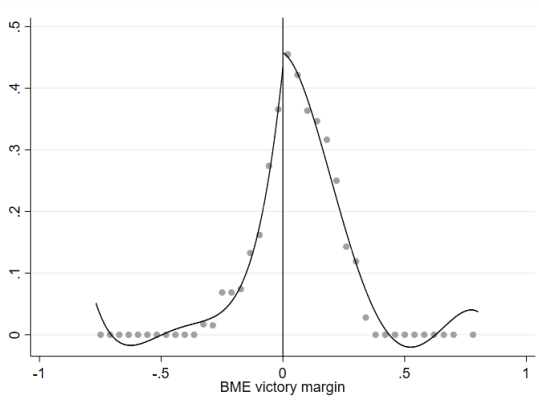
Notes: Panels show a number of constituency characteristics, pre-determined electoral variables and candidates' characteristics by female victory margin respectively. All dots represent unconditional means of the relevant characteristic in bins of 5% by the running variable. The solid line represents the predicted values of a global 4th-order smoother estimated using raw data on each side of the zero threshold.

Figure 2.6: Continuity of covariates at zero-threshold of BME margin of victory

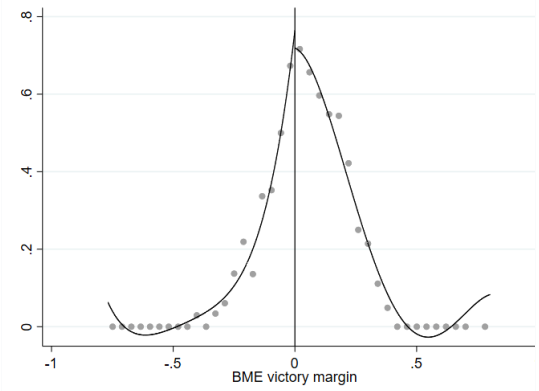
(a) Year of the election



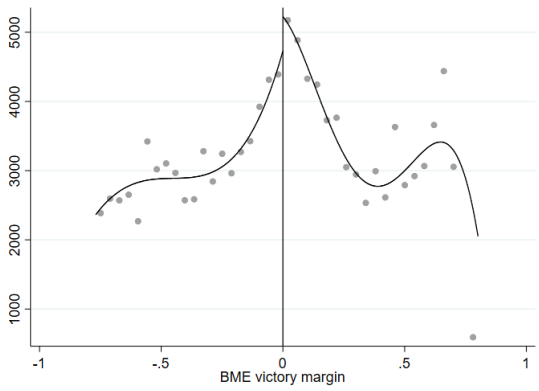
(b) Share of elections held in London



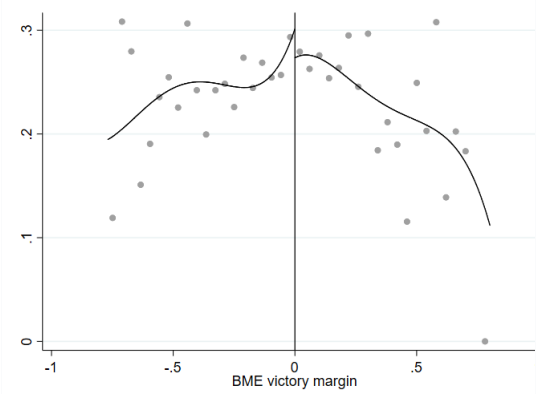
(c) Multi-member elections



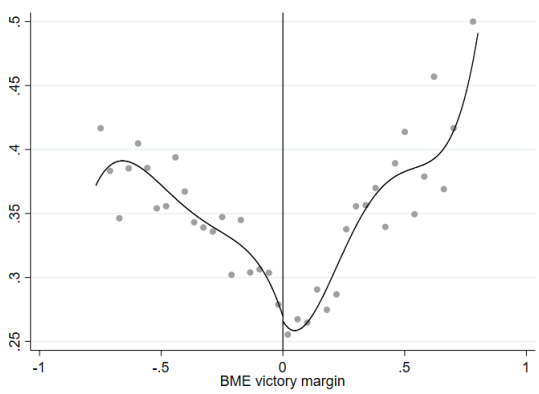
(d) Votes cast



(e) Share of female candidates

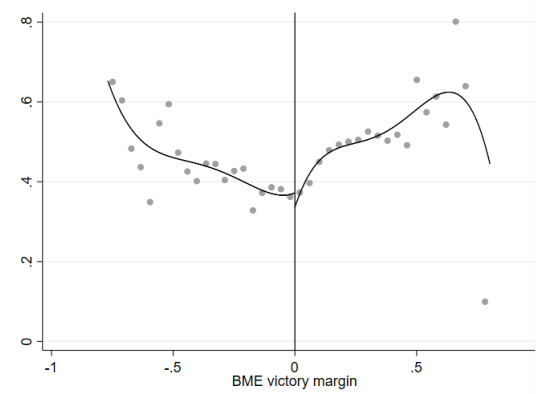


(f) Share of BME candidates



(g) Labour votes

(h) Turnout



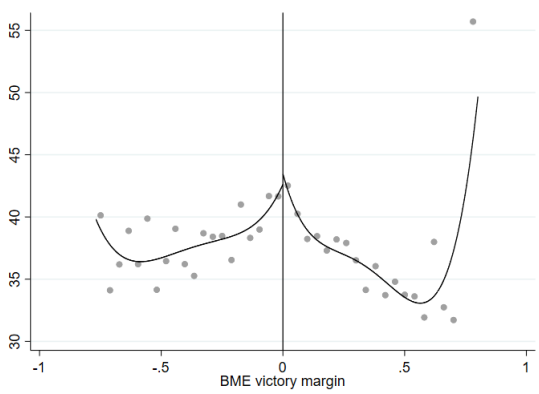
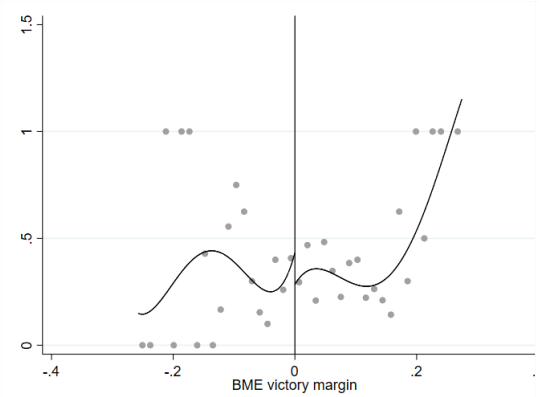
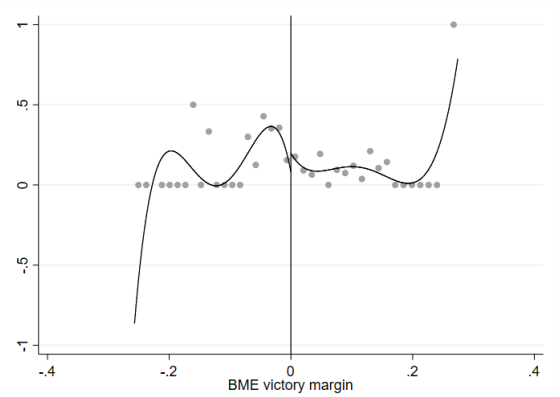


Figure 2.6: (continued) Continuity of covariates at zero-threshold of BME margin of victory

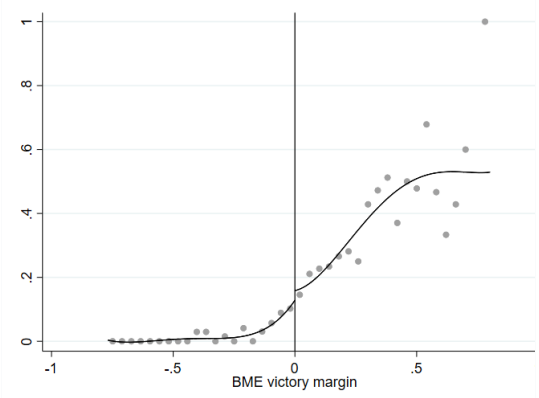
(i) Share of women among non-marginal elected candidates



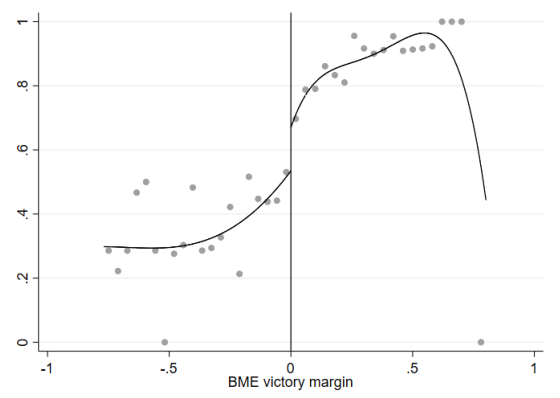
(j) Share of BME among non-marginal elected candidates



(k) Incumbency status



(l) Labour party

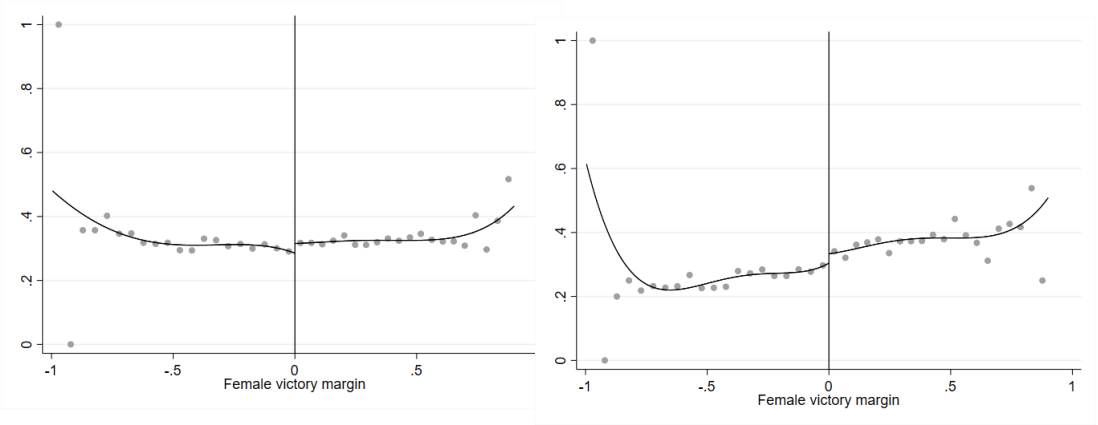


Notes: Panels show a number of constituency characteristics, pre-determined electoral variables and candidates' characteristics by ethnic minority victory margin respectively. All dots represent unconditional means of the relevant characteristic in bins of 5% by the running variable. The solid line represents the predicted values of a global 4th-order smoother estimated using raw data on each side of the zero threshold.

Figure 2.7: RD Estimate for new women's candidacy and performance in subsequent election

(a) Share of female new candidates

(b) Share women among new elected candidates

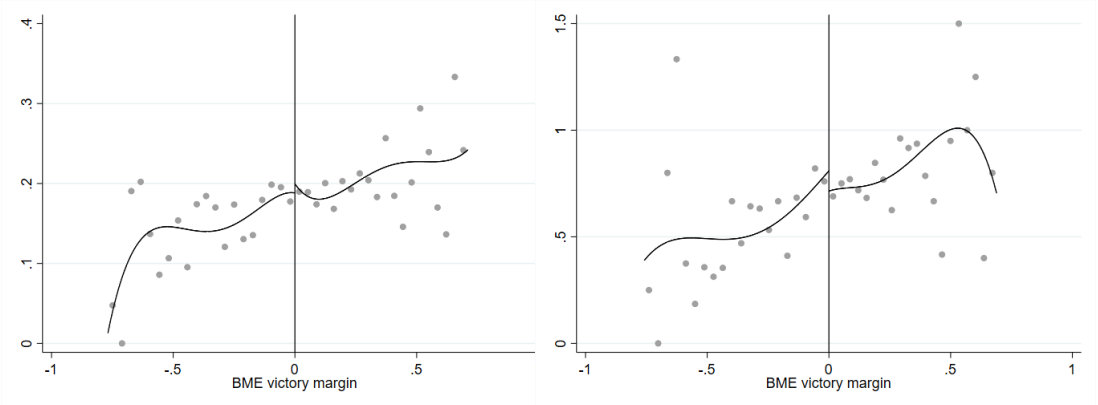


Notes: All dots represent unconditional means of the relevant characteristic in bins of 5% by the running variable. The solid line represents the predicted values of a global 4th-order smoother estimated using raw data on each side of the zero threshold.

Figure 2.8: RD Estimate for new BME's candidacy and performance in subsequent election

(a) Share of BME candidates

(b) Share BME among elected candidates



Notes: Notes: All dots represent unconditional means of the relevant characteristic in bins of 5% by the running variable. The solid line represents the predicted values of a global 4th-order smoother estimated using raw data on each side of the zero threshold.

2.9 Tables

Table 2.1: Formal continuity-based analysis for covariates by female victory margin

	VARIABLES	RD estimate	SE	Bandwidth	Effective Obs.
a)	Year	-0.458	(0.328)	0.172	7976 ; 7461
b)	Ward in London	-0.008	(0.029)	0.188	8418 ; 7861
c)	Multi-member election	-0.006	(0.026)	0.146	7181 ; 6776
d)	Votes cast	-145.1	(176.5)	0.223	9297 ; 8638
f)	Share of female candidates	0.010	(0.005)	0.171	7933 ; 7419
g)	Share of BME candidates	0.000	(0.003)	0.244	9083 ; 8381
h)	Labour votes	-0.002	(0.010)	0.169	7890 ; 7368
i)	Turnout	-0.602	(0.724)	0.184	8279 ; 7760
j)	Share of women among elected non-marginal candidates	-0.001	(0.031)	0.053	1231 ; 1118
k)	Share of BME among elected non-marginal candidates	-0.004	(0.009)	0.048	1163 ; 1060
l)	Incumbency status	-0.003	(0.014)	0.118	6140 ; 5891
m)	Labour party	-0.018	(0.023)	0.144	4120 ; 3852

Note: Robust standard errors in parenthesis, clustered at the local authority-decade level. Sample includes all mixed gender elections in years 1973-2014. MSE-Optimal bandwidth, Triangular Kernel. *** p<0.01; ** p<0.05; * p<0.1.

Table 2.2: Formal continuity-based analysis for covariates by BME victory margin

	VARIABLES	RD estimate	SE	Bandwidth	Effective Obs.
a)	Year	-1.038	(1.064)	0.117	464 ; 592
b)	Ward in London	0.047	(0.058)	0.165	576 ; 744
c)	Multi-member election	-0.024)	(0.051	0.140	518 ; 678
d)	Votes cast	601.3	(291.0)	(0.176	601 ; 772
f)	Share of female candidates	-0.020	(0.021)	0.153	533 ; 693
g)	Share of BME candidates	-0.008	(0.017)	0.167	580 ; 753
h)	Labour votes	-0.007	(0.016)	0.170	587 ; 759
i)	Turnout	0.518	(1.476)	0.172	590 ; 764
j)	Share of women among elected non-marginal candidates	-0.081	(0.094)	0.057	124 ; 186
k)	Share of BME among elected non-marginal candidates	0.090	(0.082)	0.038	101 ; 150
l)	Incumbency status	0.018	(0.035)	0.159	564 ; 727
m)	Labour party	0.152**	(0.053)	0.197	518 ; 672

p<0.05; * p<0.1.

Note: Robust standard errors in parenthesis, clustered at the local authority-decade level. Sample includes all interracial elections in years 1973-2014. MSE-Optimal bandwidth, Triangular Kernel. Robust p-value for BME being a Labour party candidate: 0.022. *** p<0.01; **

Table 2.3: Gender and personal incumbency effect

	(1) Incumbency effect on candidacy among women	(2) Incumbency effect on winning prob. among women	(3) Incumbency effect on candidacy of women vs men	(4) Incumbency effect on winning prob. of women vs men
Panel a) RD, local linear regression with MSE-optimal bandwidth				
Female winner	0.249***	0.341***	0.015	0.022
	(0.016)	(0.025)	(0.016)	(0.025)
Observations	6523 ; 6212	2410 ; 2334	7938 ; 7403	2974 ; 2881
Bandwidth	0.126	0.116	0.168	0.158
Panel b) RD, local linear regression with CER-optimal bandwidth				
Female winner	0.247***	0.330***	0.010	0.021
	(0.019)	(0.029)	(0.019)	(0.029)
Observations	4641 ; 4527	1762 ; 1738	5769 ; 5535	2229 ; 2161
Bandwidth	0.080	0.076	0.107	0.103
Panel c) Quadratic polynomials in the running variable, LA x year FE				
Female winner	0.288***	0.436***	0.019*	0.022
	(0.011)	(0.016)	(0.011)	(0.019)
Observations	28,326	11,406	28,326	11,406

Note: Col. (1) and (2) compare probability of re-running for a council seat and probability of winning a council seat for a woman who won a close election against a man to the same probabilities for a woman who lost a close election against a man. Col. (3) and (4) compare probability of rerunning and re-election for a woman who won a close election against a man to the same probabilities for a man who won a close election against a woman. Robust standard errors in parenthesis, clustered at the local authority-decade level. Sample includes all mixed gender elections in years 1973-2014. Kernel type in RD regressions: Triangular. *** p<0.01; ** p<0.05; * p<0.1.

Table 2.4: Effect on women's candidacy

	(1) Share of female candidates	(2) Share of female new candidates	(3) N of new candidates	(4) N of new female candidates
Panel a) RD, local linear regression with MSE-optimal bandwidth				
Female winner	0.085***	0.027***	-0.066	0.065*
	(0.007)	(0.008)	(0.073)	(0.036)
Observations	7494 ; 7030	8823 ; 8187	7353 ; 6914	7103 ; 6678
Bandwidth	0.156	0.211	0.149	0.144
Panel b) RD, local linear regression with CER-optimal bandwidth				
Female winner	0.083***	0.030***	-0.052	0.067
	(0.008)	(0.009)	(0.084)	(0.043)
Observations	5403 ; 5209	6605 ; 6239	5275 ; 5091	5071 ; 4912
Bandwidth	0.099	0.134	0.095	0.091
Panel c) Quadratic polynomials in the running variable, LA x year FE				
Female winner	0.090***	0.022***	-0.059*	0.057**
	(0.006)	(0.008)	(0.032)	(0.023)
Observations	28,084	27,128	28,315	28,084

Note: Robust standard errors in parenthesis, clustered at the local authority-decade level. Sample includes all mixed gender elections in years 1973-2014. New candidates are candidates who did not contest the council seat in the previous election. Kernel type in RD regressions: Triangular. *** p<0.01; ** p<0.05; * p<0.1.

Table 2.5: Subsequent female candidacies' characteristics: competitive, party affiliation

	(1) Share of women among new competitve candidates	(2) Share of women among new independent candidates	(3) Share of women among new major parties' candidates	(4) Share of women among new candidates from incumbent party
Panel a) RD, local linear regression with MSE-optimal bandwidth				
Female winner	0.025***	0.004	0.033***	0.037*
	(0.008)	(0.031)	(0.009)	(0.017)
Observations	8657 ; 8026	1079 ; 993	7768 ; 7211	4049 ; 3675
Bandwidth	0.205	0.186	0.176	0.132
Panel b) RD, local linear regression with CER-optimal bandwidth				
Female winner	0.027***	0.013	0.035***	0.035
	(0.009)	(0.035)	(0.010)	(0.019)
Observations	6453 ; 6112	859 ; 827	5709 ; 5416	2978 ; 2769
Bandwidth	0.130	0.126	0.112	0.085
Panel c) Quadratic polynomials in the running variable, LA x year FE				
Female winner	0.023***	-0.040	0.025***	0.055***
	(0.008)	(0.038)	(0.008)	(0.015)
Observations	27,062	1,976	26,530	14,785

Note: New candidates are candidates who did not contest the council seat in the previous election. Competitive candidates are candidates who received at least 5% of votes. Major parties are the Conservative Party, LibDem Party and Labour party. Robust standard errors in parenthesis, clustered at the local authority-decade level. Sample includes all mixed gender elections in years 1973-2014. Kernel type in RD regressions: Triangular. *** p<0.01; ** p<0.05; * p<0.1.

Table 2.6: Voters' and parties' behaviour

Panel a) Voters' behaviour

	(1)	(2)	(3)	(4)
	Turnout	At least one new woman elected	Share of women among new elected	Avg share of votes by new women
Female winner	-0.257	0.025	0.036**	0.006
	(0.507)	(0.018)	(0.015)	(0.006)
Observations	8985 ; 8340	5258 ; 4854	5265 ; 4859	4859 ; 4650
Bandwidth	0.208	0.150	0.150	0.153

Panel b) Heterogeneity

	(1)	(2)	(3)	(4)
	Share of women among new candidates: $\Delta_{Men-Women}$ labour force participation, 1971		Share of women among new elected: $\Delta_{Men-Women}$ labour force participation, 1971	
	Low	High	Low	High
Female winner	0.035***	0.025**	0.043**	0.025
	0.011	0.012	0.020	0.021
Observations	3989 ; 3656	3934 ; 3710	2816 ; 2532	2726 ; 2527
Bandwidth	0.181	0.176	0.165	0.161

Panel c) Role of parties

	(1)	(2)	(3)	(4)
	Share of women among new candidates		Share of women among new elected	
	Thatcher	No Thatcher	Thatcher	No Thatcher
Female winner	0.002	0.027***	0.023	0.038***
	0.030	0.009	0.051	0.019
Observations	1060 ; 1105	8867 ; 8168	416 ; 423	3354 ; 3260
Bandwidth	0.182	0.231	0.190	0.155

Note: New candidates are candidates who did not contest the council seat in the previous election. Men-Women differential labour force participation is measured as difference in the share of population in employment by gender, according to 1971 Census. Margaret Thatcher led the Conservative Party from 1975 to 1990. Robust standard errors in parenthesis, clustered at the local authority-decade level. Sample includes all mixed gender elections in years 1973-2014. RD regressions bandwidth type: MSE-optimal, kernel type: Triangular. *** p<0.01; ** p<0.05; * p<0.1.

Table 2.7: Spillovers of female close win

	(1)	(2)	(3)	(4)
	Wards in same LA		General elections	
	Share of female candidates	Share of female winners	Share of female candidates	Share of female winners
Panel a) RD, local linear regression with MSE-optimal bandwidth				
Female winner	-0.001	-0.008	0.008	0.002
	(0.002)	(0.019)	(0.012)	(0.006)
Observations	8286 ; 7745	7600 ; 7133	3070 ; 2750	2648 ; 2416
Bandwidth	0.181	0.157	0.177	0.140
Panel b) RD, local linear regression with CER-optimal bandwidth				
Female winner	-0.001	-0.011	0.014	0.005
	(0.001)	(0.014)	(0.013)	(0.006)
Observations	5374 ; 5177	4987 ; 4836	2253 ; 2086	1888 ; 1770
Bandwidth	0.097	0.088	0.112	0.088
Panel c) Quadratic polynomials in the running variable, LA x year FE				
Female winner	0.001	-0.002	0.007	-0.003
	(0.001)	(0.007)	(0.007)	(0.003)
Observations	28,607	28,607	10,101	10,101

Note: A ward is considered to be included in a parliamentary constituency if the centroid of the ward falls within the parliamentary constituency borders. Robust standard errors in parenthesis, clustered at the local authority-decade level. Sample in columns (1) and (2) includes all mixed gender elections in years 1973-2014; sample in columns (3) and (4) includes 2001, 2004, 2009, 2014 General Elections. Kernel type in RD regressions: Triangular. *** p<0.01; ** p<0.05; * p<0.1.

Table 2.8: Ethnicity and personal incumbency effect

	(1) Incumbency effect on candidacy among BME	(2) Incumbency effect on winning prob. among BME	(3) Incumbency effect on candidacy of BME vs non BME	(4) Incumbency effect on winning prob. of BME vs non BME
Panel a) RD, local linear regression with MSE-optimal bandwidth				
BME winner	0.295***	0.498***	-0.007	0.151
	(0.041)	(0.090)	(0.049)	(0.095)
Observations	548 ; 710	149 ; 200	561 ; 721	189 ; 254
Bandwidth	0.151	0.148	0.156	0.225
Panel b) RD, local linear regression with CER-optimal bandwidth				
BME winner	0.278***	0.443***	-0.021	0.098
	(0.046)	(0.102)	(0.056)	(0.109)
Observations	425 ; 525	119 ; 152	434 ; 548	153 ; 217
Bandwidth	0.104	0.107	0.108	0.163
Panel c) Quadratic polynomials in the running variable, LA x year FE				
BME winner	0.308***	0.640***	-0.006	0.092
	(0.047)	(0.078)	(0.050)	(0.112)
Observations	1,525	367	1,525	367

Note: Col. (1) and (2) compare probability of re-running for a council seat and probability of winning a council seat for a BME politician who won a close election against a non-BME to the same probabilities for a BME who lost a close election against a non-BME. Col. (3) and (4) compare probability of rerunning and re-election for a BME who won a close election against a non-BME to the same probabilities for a non-BME who won a close election against a BME. Robust standard errors in parenthesis, clustered at the local authority-decade level. Sample includes all mixed gender elections in years 1973-2014. All regressions include a dummy for BME running with Labour party in previous election. Kernel type in RD regressions: Triangular. *** p<0.01; ** p<0.05; * p<0.1.

Table 2.9: Effect on BMEs' candidacy

	(1) Share of BME candidates	(2) Share of BME new candidates	(3) N of new candidates	(4) N of new BME candidates
Panel a) RD, local linear regression with MSE-optimal bandwidth				
BME winner	0.068**	0.051	-0.072	0.092
	0.029	0.038	0.299	0.167
Observations	482 ; 605	358 ; 468	418 ; 549	517 ; 629
Bandwidth	0.214	0.136	0.138	0.237
Panel b) RD, local linear regression with CER-optimal bandwidth				
BME winner	0.081**	0.070	-0.185	0.118
	0.033	0.044	0.345	0.195
Observations	378 ; 505	279 ; 360	329 ; 409	403 ; 537
Bandwidth	0.150	0.095	0.096	0.166
Panel c) Quadratic polynomials in the running variable, LA x year FE				
BME winner	0.036	0.002	0.125	-0.074
	(0.027)	(0.032)	(0.187)	(0.177)
Observations	1,105	1,102	1,304	1,105

Note: New candidates are candidates who did not contest the council seat in the previous election. Robust standard errors in parenthesis, clustered at the local authority-decade level. Sample includes all interracial elections in years 1973-2014. All regressions include a dummy for BME running with Labour party in previous election. Kernel type in RD regressions: Triangular. *** p<0.01; ** p<0.05; * p<0.1.

Table 2.10: Spillovers of BME close win

	(1)	(2)	(3)	(4)
	Wards in same LA		General elections	
	Share of BME candidates	Share of BME winners	Share of BME candidates	Share of BME winners
Panel a) RD, local linear regression with MSE-optimal bandwidth				
BME winner	0.003**	-0.001	-0.001	0.002
	0.002	0.014	0.030	0.006
Observations	436 ; 581	520 ; 673	294 ; 363	363 ; 409
Bandwidth	0.149	0.198	0.159	0.230
Panel b) RD, local linear regression with CER-optimal bandwidth				
BME winner	0.003	-0.004	0.008	0.001
	0.002	0.016	0.036	0.007
Observations	342 ; 429	419 ; 551	234 ; 288	298 ; 367
Bandwidth	0.104	0.138	0.115	0.166
Panel c) Quadratic polynomials in the running variable, LA x year FE				
BME winner	0.001	0.002	0.020	0.003
	(0.001)	(0.008)	(0.020)	(0.005)
Observations	1,929	1,929	1,049	1,049

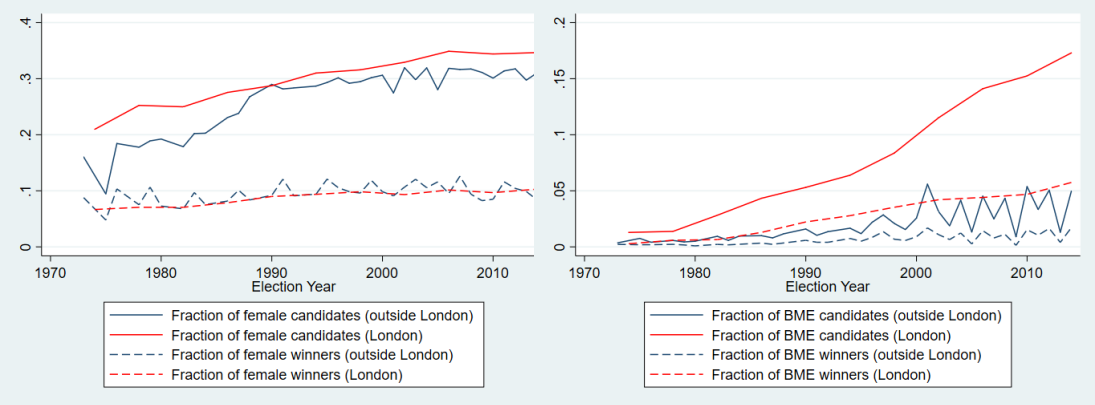
Note: Robust standard errors in parenthesis, clustered at the local authority-decade level. Sample includes all interracial elections in years 1973-2014. All regressions include a dummy for BME running with Labour party in previous election. Kernel type in RD regressions: Triangular. *** p<0.01; ** p<0.05; * p<0.1.

Appendices

A Appendix: Additional Figures

Figure A.1: Electoral representation and performance

(a) Women (b) Ethnic minorities



Notes: Panel a) shows the fraction of female candidates contesting local elections and fraction of female winners per year (1973-2014). Panel b) shows the fraction of ethnic minority candidates contesting local elections per year and fraction of ethnic minority winners per year (1973-2014). Red lines refer to elections contested in London Metropolitan boroughs, blue lines in local authorities outside London.

B Appendix: Additional Tables

Table B.1: Effect on new women's candidacy and performance - Robust to different different sample, polynomials and bandwidth selection

	(1)	(2)	(3)	(4)	(5)	(6)
Panel a) Share of women among new candidates						
Female winner	0.026***	0.030***	0.030***	0.030*	0.027***	0.029***
	(0.009)	(0.008)	(0.009)	(0.012)	(0.009)	(0.010)
Observations	6956 ; 6346	7268 ; 6828	5256 ; 5050	3152 ; 3077	27,120	27,120
Bandwidth	0.207	0.154	0.098	0.050	1	1
Panel b) Share of women among new elected candidates						
Female winner	0.038**	0.038**	0.039**	0.0414	0.047***	0.045**
	(0.016)	(0.015)	(0.018)	(0.022)	(0.016)	(0.018)
Observations	4398 ; 4021	4395 ; 4150	3196 ; 3086	2426 ; 2362	17,745	17,745
Bandwidth	0.158	0.115	0.074	0.050	1	1
KernelType	Triangular	Uniform	Uniform	Triangular		
BW Type	MSE	MSE	CER	Manual		
Polynomial					3nd order	4nd order
LA x year FE					yes	yes
Sample	RD; Restrict to 1973-2003	RD	RD	Full	Full	Full

Note: New candidates are candidates who did not contest the council seat in the previous election. Col. (1) focuses on the sub-sample of elections in which gender is unambiguously assigned to candidates (years 1973-2003). Col. (2) and (3) report the estimates from a RD regression using MSE-optimal and CER-optimal bandwidth with uniform kernel, respectively. Col. (3) restricts the bandwidth further, to a symmetric window of 5% margin of victory to each side of the cut-off. Col. (6) fits a quadratic function of the margin of victory, varying at each side of the cut-off, and controls for year times local authority fixed effects. Col (7) and (8) adopt a similar strategy, varying the order of the fitted polynomial. Robust standard errors in parenthesis, clustered at the local authority-decade level. Sample includes all mixed gender elections in years 1973-2014. *** p<0.01; ** p<0.05; * p<0.1.

Table B.2: Discontinuity in density of BME victory margin in London elections - mobilisation or electoral frauds?

	(1) Turnout	(2) Turnout	(3) Turnout	(4) Fraud Rate	(5) Fraud Rate	(6) Fraud Rate
BME winner	0.498	0.896	0.657	-0.005	-0.007	0.003
	(1.478)	(1.649)	(1.124)	(0.017)	(0.019)	(0.004)
Observations	590 ; 764	467 ; 603	2,329	15 ; 20	15 ; 19	81
BW Type	MSE	CER		MSE	CER	
Bandwidth	0.172	0.118	1	0.025	0.021	1
Polynomial	Linear	Linear	2nd order	Linear	Linear	2nd order

Note: The dependent variable in columns (1)-(3) is contextual turnout; in columns (4)-(6) it is the fraud rate in the local authority-year in which the election is held, computed as the number of cases investigated by police forces in that area-year divided by the number of elections held in the area-year. Robust standard errors in parenthesis, clustered at the local authority-decade level. Sample in columns (1)-(3) includes all interracial elections held in years 1973-2014; sample in columns (4)-(6) includes all interracial elections in years 2010-2014. Data on alleged electoral frauds come from the Electoral Commission website and are available only from 2010. *** p<0.01; ** p<0.05; * p<0.1.

Table B.3: Subsequent BME candidacies' characteristics: competitive, party affiliation

	(1) Share of BME among new competitve candidates	(2) Share of BME among new independent candidates	(3) Share of BME among new major parties' candidates	(4) Share of BME among new candidates from incumbent party
Panel a) RD, local linear regression with MSE-optimal bandwidth				
BME winner	0.051	0.046	0.003	0.061
	0.051	0.046	0.035	0.056
Observations	347 ; 453	50 ; 67	485 ; 614	266 ; 404
Bandwidth	0.128	0.185	0.227	0.196
Panel b) RD, local linear regression with CER-optimal bandwidth				
BME winner	0.078	0.044	0.019	0.074
	0.050	0.154	0.040	0.061
Observations	269 ; 340	45 ; 60	388 ; 516	228 ; 337
Bandwidth	0.090	0.142	0.159	0.140
Panel c) Quadratic polynomials in the running variable, LA x year FE				
BME winner	0.018	0.111	-0.044	0.065
	(0.039)	(0.266)	(0.039)	(0.075)
Observations	1,092	45	1,094	533

Note: New candidates are candidates who did not contest the council seat in the previous election. Competitive candidates are candidates who received at least 5% of votes. Major parties are the Conservative Party, LibDem Party and Labour party. Robust standard errors in parenthesis, clustered at the local authority-decade level. Sample includes all interracial elections in years 1973-2014. All regressions include a dummy for BME running with Labour party in previous election. Kernel type in RD regressions: Triangular. *** p<0.01; ** p<0.05; * p<0.1.

Table B.4: Voters' behaviour and heterogeneity

Panel a) Voters' behaviour

	(1)	(2)	(3)	(4)
	Turnout	At least one new BME elected	Share of BME among new elected	Avg share of votes by new BME
BME winner	-0.076	0.034	-0.083	0.038*
	1.487	0.064	0.157	0.023
Observations	397 ; 512	337 ; 464	366 ; 484	165 ; 247
Bandwidth	0.125	0.229	0.259	0.139

Panel b) Ethnic minority presence

	(1)	(2)	(3)	(4)
	Share of BME among new candidates:		Share of BME among new elected:	
	High minority LAs	Low minority LAs	High minority LAs	Low minority LAs
BME winner	0.017	-0.013	-0.199	-0.202
	0.040	0.051	0.201	0.143
Observations	264 ; 396	129 ; 131	239 ; 364	77 ; 71
Bandwidth	0.174	0.142	0.258	0.117

Note: New candidates are candidates who did not contest the council seat in the previous election. Local authorities that, according to 1971 Census, were below (above) the mean in terms population born in a Commonwealth country are considered localities with a low (high) minority share. Robust standard errors in parenthesis, clustered at the local authority-decade level. Sample includes all interracial elections in years 1973-2014. All regressions include a dummy for BME running with Labour party in previous election. Kernel type in RD regressions: Triangular. *** p<0.01; ** p<0.05; * p<0.1.

Chapter 3

Television, Religiousness and Inter-religious Attitudes in a Muslim Country: Evidence from Indonesia

3.1 Introduction

One strand of literature in the economics of religion investigates the relationship between economic development and religiosity. In particular, the secularisation hypothesis predicts that economic development leads to decreased religiosity by increasing education and income.[1] In this context, our paper contributes to this literature by considering the impact of an understudied factor: how the exposure to secular, commercial television affects individuals' religious identity and behaviour. Individuals' religion and religiosity affects social behaviour in many secular settings, including subjective well-being, physical and mental health outcomes, relationships and sexual behaviour, crime and delinquency as well as occupational choices.[2] How media affects religious behaviours is an especially important question for developing coun-

[1] The economist Jacob Viner defined secularisation as "a lessening of the influence on ethical and economic thought of ecclesiastical authority and traditional church creeds, and a shifting of weight from dogma and revelation and other-worldliness to reason and sentiment and considerations of temporal welfare" (Viner as quoted in Oslington (2003), p. 159).

[2] See Iannaccone (1998), Hoffman (2013) and Iyer (2016) for surveys.

tries which, over the last decades, have experienced a dramatic increase in access to television.

This paper uses detailed survey data on individuals' self-reported religious sentiment and religious practices, as well as attitudes towards people of different faith in Indonesia, the largest Muslim country in the world. Hence, to recover a causal effect of exposure to television, the paper uses a popular instrumental variable strategy that exploits the exogenous variation in TV reception across Indonesian sub-districts given by geomorphological obstacles of the terrain.

The effect of exposure to secular television is not a priori obvious. On the one hand, being located in areas exposed to secular television can make religion a less salient aspect of an individual's identity. Furthermore, role models portrayed in the programmes may influence viewer preferences over their life-style (LaFerrara et al. (2012)). On the other hand, exposure to secular content may instigate a backlash leading to increased religiosity.[3] The impact of media may also be negligible, it were the case that only (already) non-religious individuals consume secular television (Durante and Night (2012)). In addition to this "content effect", exposure to media can also have a "time displacement effect" (DellaVigna and LaFerrara (2015)). Increased television reception leads to more time spent in front of the television screen that crowds out other types of activity, such as social activities (Olken (2009)). Religious activities may therefore be displaced by the time spent watching television, so having negative effects on religiosity.

Our analysis provides three main insights. First, individuals exposed to a higher number of television channels are less likely to be very religious and report a lower frequency of religious practices. Second, higher exposure to television decreases inter-faith hostility. Third, higher exposure to television increases the supply of forbidden activities at the village level, such as the presence of commercial sex places and gambling. The paper also investigates whether higher exposure to television affects

[3] For example, Fouka (2016) finds that a language policy meant to facilitate the assimilation of immigrant children heightened their sense of cultural identity. Carvalho (2012) provides a theoretical model with the aim of explaining veiling amongst Muslim women and determining the effects of policies regulating veiling. His model predicts that veiling is highest among women from highly religious communities who interact in irreligious environments, i.e. when temptations are higher. As possible test of the mechanism, he suggests that veiling could rise at the neighbourhood level with the introduction of television.

political preferences towards religious candidates and parties, but it finds little evidence of this effect.

This paper relates to three main streams of literature: the impact of media on socio-economic behaviours; identity manipulation; and the determinants of religious sentiment. The literature on the impact of media on social and economic outcomes has been reviewed recently in DellaVigna and LaFerrara (2015). These outcomes include fertility preferences and gender norms (LaFerrara et al. (2012); Jensen and Oster (2009)), inter-ethnic attitudes (DellaVigna et al. (2014), Blouin and Mukand (2018)) and inter-cultural attitudes (Gentzkow and Shapiro (2004)). Olken (2009) and Fasani and Ferre' (2013) focus on the effect of television in the Indonesian context, the former showing that increased exposure to television decreases social capital and the latter demonstrating that it decreases the probability of migration.

This paper also relates to a flourishing literature in economics that focuses on identity formation and manipulation. Akerlof and Kranton (2000, 2002, 2005) seminal papers introduce the idea that identity (a person's sense of self) affects economic outcomes, providing examples ranging from gender discrimination in the workplace to the economics of poverty and social exclusion. Both applied and theoretical works enriched this literature, increasingly providing evidence that identity plays a crucial role in individuals' economic behaviours (Bisin et al. (2010), David Austen-Smith (2005), Bertrand et al. (2015)). Within this context, Benjamin et al. (2010) and Benjamin et al. (2016) extend Akerlof's work by providing theoretical and experimental evidence on how the salience of group identity influences people's choices. In particular, in a lab experiment Benjamin et al. (2016) show that, when religious identity is temporarily primed, individuals' actions are closer to the behaviour prescribed by their religion.

The third stream of literature related to this paper investigates the determinants of religious sentiment.[4] Exploiting a quasi-experiment, Buser (2015) examines the effect of income on religiosity in Ecuador, finding that households with higher incomes have a higher church attendance. Higher income may increase the utility of participating in church activities by increasing status within the community,

[4]See Iyer (2016) for a comprehensive survey of the state of the art in research in economics of religion.

possibly through donations. Chen (2010) examines how the Asian financial crisis has affected religious participation in Indonesia, showing that those most negatively affected by the crisis were more likely to increase their religious participation as measured through the study of the Koran and Islamic school attendance. He also demonstrates that religious participation serves as an ex-post social insurance mechanism. Several studies examine how education affects religiosity (Becker et al. (2014); Cesur and Mocan (2014); Gulesci and Meyersson (2013); Hungerman (2014), finding that increased education reduces religious identification.

The remainder of the paper is organised as follows. Section 3.2 provides background information about religion and television in Indonesia. Section 3.3 describes the data and Section 3.4 illustrates the empirical identification strategy. Section 3.5 presents the main findings on television exposure on religiosity, religious practices and interfaith attitudes. Section 3.6 presents supporting evidence from a village survey and Section 3.7 concludes.

3.2 Background to Religion and Television

Religion in Indonesia

In Indonesia six religions are officially recognised: Islam, Protestantism, Catholicism, Buddhism, Hinduism and Confucianism. Although the Indonesian constitution or state philosophy, *Pancasila*, guarantees freedom of religion and worshipping, only these officially recognized religions can be legally practised. Moreover, atheism is not recognized, and blasphemy can lead to imprisonment. Islam is the main religion with 88% of Indonesians identifying themselves as being Muslims. This constitutes the largest Muslim population of any country in the world. The second most prevalent religion is Christianity with 10% of Indonesians identifying themselves as Catholic or Protestant. Christianity was introduced and spread throughout the archipelago by the Dutch when they colonised Indonesia in 1605. Other religions account for around 2% of the Indonesian population. Of these, Hinduism is widespread in Bali, where 80% of Indonesian Hindu lives, Buddhism is mostly practised in Jakarta and Confucianism counts less than 700,000 believers (Figure 3.1 and Table 3.3).

Although Indonesian islands tend to be homogeneous in terms of religion practiced, there are nonetheless areas where different religions coexist with each other. This is because the Indonesian Transmigration programme, initiated by Dutch East Indies government, contributed to the religious diversity of the archipelago by promoting migration of (mainly) Muslim Javanese Indonesians to non-Muslim areas (Ascher and Mirovitskaya (2016)). Today citizens in western Indonesia are mostly Muslims but they coexist with a small minority of Christians, whereas, in eastern regions, the Christian population is similar in size or larger than the Muslim population (Figure 3.1 and Table 3.3). Moreover, the presence of Christianity is found in almost all major cities of the country, including regions dominated by Muslims (Mujibur Rahman (2006)), through the establishment and provision of social services such as schools, universities, hospitals and orphanages. Greater religious diversity has led, in certain areas such the eastern regions of Poso and Maluku, to religious conflicts that started after the resignation of President Suhearto (Sidel (2006), Mujibur Rahman (2006)).

Television Industry

The history of television in Indonesia began in 1962 when the government established the first public television station Televisi Republik Indonesia (TVRI). TVRI enjoyed an official monopoly on television broadcasting for about 30 years during which it served as a political tool to legitimise the government, build consensus and promote national identity and cohesion. For this reason, in this period, Suhearto's New Order imposed strict content restrictions that forbid public television from discussing potentially divisive issues such as ethnicity, religion, race and social class (Kitley (2000)).

The monopoly of public television started breaking up at end of the '80s. Gradually, five privately owned TV station entered the market, only broadcasting in the major cities of Jakarta and Surabaya through satellite dishes and cable networks. In 1993 the government liberalised the broadcasting market even further allowing commercial channels to broadcast in clear nationwide (Olken (2009)). Since then, commercial television has become a rapidly booming business and between 2000-

2002 five new competitors entered the market, bringing to 11 the number of private and public television stations allowed to broadcast nationally free-to-air (Figure 3.2). This expansion led to a dramatic increase of television availability throughout the country. In 2005, 88% of the Indonesian population had reception of at least one television channel, almost a three-fold increase in comparison to 1993[5] .

Today television is widespread in Indonesia, where 90% of Indonesians report watch TV daily (see Table 3.1). Viewing data for 2007 shows that Indonesians spend about 2 hours and 30 minutes per day watching television (AGB Nielsen (2007)).[6] Furthermore, television is the main source of political information and news in general (Fasani and Ferre' (2013), Lim (2011)).

Although content restrictions established during the Suhearto's New Order were removed in 1998, discussions of potentially sensitive issues such as race, religion and ethnic issues have been very limited on television (Hollander et al. (2009)). The removal of such restrictions has spurred internal debates with representatives of religious organisations dismissing the television industry's programming as Western and hedonistic (Kitley (2000), Weintraub (2011), Reporters Without Borders (2003), Barkin (2014)) due to the lack of religious programmes and content.[7]. For this reason, since their entry, private networks have started to offer some religious content by, for example offering religious programs, usually featuring Muslim clerics discussing religious issues. However, these programmes account for only about 2% of total broadcast hours and are often broadcast very early in the morning (typically at 5 am). Nonetheless, public and private televisions today offer mostly commercial and secularised programmes such as a mix of information, education and entertainment

[5]According to the Census of Villages data (PODES), about 28% of the villages had reception for the public television channel in 1993, while 72% of villages had reception for at least one television channel in 2005.

[6]Nielsen data cover only the nine major Indonesian cities. Older figures from SUSENAS, representative for the whole country, indicate an average watching of 1h45 minutes in 1997. Olken (2009) reports that Indonesians spend on average 2h in 2003 (Jawa only). People with lower socio-economic status tend to spend more time in front of the screen, particularly at prime time. Consistently, the higher the education level, the lower the viewing level. Housewives and youngsters (5-15 years old) appear to be the segment with the longest time spent watching TV (respectively, 3 hours 15 minutes and 3 hours) (AGB Nielsen (2007)).

[7]Many broadcast programs still experience friction with Islamic values (Hollander et al. (2009)). In 2006, the Indonesian Council of Islamic Scholars issued a fatwa arguing that the popular information/entertainment programs were forbidden from the Islamic juridical standpoint (Sofjan and Hidayati (2013)). Islamist groups have been reported demonstrating, even attacking, TV studios asking for the cancellation of TV shows if perceived as offensive to religion (Barkin (2014)).

(Figure 3.3).[8]

3.3 Data and Descriptive Statistics

The empirical analysis relies on two data sources: the Indonesia Family Life Survey (IFLS) and the Census of Indonesian Villages (PODES).

3.3.1 IFLS

The IFLS is an on-going longitudinal survey started in 1993. It collects a rich set of information on households, the communities they live in and the facilities available to them. It originally sampled households in 13 Indonesian provinces (out of the existing 26 in 1993), stratifying on provinces and urban/rural locations and then randomly sampling within these strata. Subsequent waves re-interviewed the original households (and all the members older than 15) and tracked individuals who had moved to another destination within the country. Although the IFLS has a panel structure, religion and tolerance modules were only introduced in the fourth round, run in 2007 (IFLS4), where a total of 29,054 adults - defined as household members 15 years or older – in 12,692 households were administered these modules. On top of basic demographic characteristics and respondents' religious confession, the IFLS4 includes four types of religious related questions, from which this paper derives the main dependent variables for the analysis.

[8]The three major networks, RCTI, SCTV, and INDOSIAR, are in direct competition with one another; they aim at mainstream content (Hollander et al. (2009)) and only minor differences can be spotted in their programming strategies. Looking at programme schedules (for example, week 2-8 November 2009, available on `http://www.jadwalTVhariini.com`, it is clear that Indonesian soap operas dominate the schedule of major networks between 6pm and 11pm, complemented with occasional reality shows and Asian imported movies. RCTI's entertainment programmes mainly target the most affluent audience groups, with drama aired in prime time including "mystery series", soft porn and violent shows, while SCTV aims at the younger, more modern audience groups, with talk shows being the most prominent format. Of the minor networks, TRANS TV offers a mix of Indonesian reality shows and quizzes, Indonesian movies and Hollywood blockbusters, catering for the same affluent audience groups as RCTI. The programmes aired are a little riskier than those of its competitors in terms of portrayed lifestyle, but no risks are taken in political terms (Hollander et al. (2009)). TRANS7's prime time show schedule is filled with Indonesian talk shows, soap operas and comedy shows; ANTV and TPI offer a similar schedule, however broadcasting also movies produced in the US or Europe. Meanwhile, news entirely dominates METRO schedule; TVONE offers news and political talk shows too, with occasional reality shows. GLOBAL TV mainly broadcasts imported programmes during prime time (television series or movies either from US, Europe or Asia). The public network, TVRI, is characterised by a very strong state ideology (Hollander et al. (2009)). Programmes schedules for TVRI indicate that during prime time it mainly broadcasts news/opinion programs and cultural programs oriented towards community development.

First, individuals are asked to rate their level of religiosity. Table 3.4 , panel *a)*, shows that about 80% of respondents reports being religious or very religious and that only a very small minority reports not being religious at all.

Second, respondents report their observance of religious practices. Respondents report whether they consume halal food and praying at least 5 times a day if they areMuslim; whether they read the Bible and attend the Holy Mass if they are Christian; whether they follow any dietary restriction and practise meditation if they are Hindu or Buddhist. Only 8% of respondent are not observant, i.e. they do not follow the practices prescribed by their religion (Table 3.4, panel *b)*).

Third, the survey asks a set questions concerning attitudes towards people of different religions in different situations (whether respondents object to having non co-religionists live in their village, neighbourhood, or house, whether they would object if a relative was going to marry a non-co religionist and if people of a different religion were to build a house of worship in their village). Respondents answer on a 4-scale measure, from "No objection at all" to "Not acceptable"). Table 3.4, panel *c*), shows that respondents oppose more strongly somebody of a different faith undertaking an action that implies a close, intimate contact ("Somebody of a different faith marring a close relative or children" is not acceptable by 45% of respondents) with respect to activities that may imply only a casual encounter ("Somebody of a different faith moving to your village" is not acceptable by only 2.7% of respondents). In the main empirical analysis, the variable *Hostility* is an indicator that takes value one if the respondent answers that it is *Not Acceptable* (most negative answer) to at least one of the previous set of attitudinal questions, whilst *Acceptance* is an indicator that takes value one if the respondent answers *No objection at all* (most positive answer) to the aforementioned questions at least once.

Fourth, IFLS4 includes a question about the importance of religion and religiosity of a candidate when casting a vote. Answers are coded such that the dependent variable in the regressions takes value one when respondents indicate that the religion or religiosity of the candidate does not matter to them. Table 3.4, panel *d*), shows that candidate's religion or religiosity does not matter for about one of ouf three respondents when they are casting their vote. We will use this last variable when

assessing the impact of television exposure to political preferences towards religious parties and candidates.

Last, a crucial characteristic of the IFLS is that it recodes respondents' location in terms of their sub-district of residence at the time of the interview. In this way, each respondent can be matched with the information about television reception at the sub-district level. Sub-districts are the lowest administrative units above villages (on average, each sub-district includes 8 villages/7,000 individuals).

3.3.2 PODES

PODES is the periodic census of Indonesian villages. The 2005 PODES first introduced detailed questions regarding reception of all the existing 11 Indonesian TV channels. For each TV channel, the head of the village was asked whether there was a strong enough signal in the village in order to watch the programs clearly without a satellite dish or cable TV. On average, the 844 Indonesian sub-districts also covered by IFLS4 receive 7.9 channels out of 11, with a standard deviation of 3.58. Almost all the villages in these sub-districts have clear reception for the public channel TVRI and for the main networks, while reception of minor networks is less widespread (Table 3.5).

The 2005 PODES also provides useful information for testing whether exposure to television affects individual preferences for religiously immoral activities and political preferences towards religious parties. First, the PODES includes information on the presence of gambling and "commercial sex activities" in the village - two activities forbidden by all major confessions. Second, PODES asks to village heads to rank the parties by their popularity in the village in 2004 legislative elections. We build an index of preference for religious parties by computing the share of villages in a sub-district which ranked a religious party first.

Last, we complement these data with additional information from the 1990 and 1993 PODES, used to construct sub-district level pre-treatment characteristics (frequency of religious buildings and socio-demographic variables).

3.4 Identification Strategy

The empirical analysis begins by examining the effect of TV exposure (number of channels for which there is clear reception in the sub-district) on self-reported religiosity and the observance of religious practices of Indonesian citizens living in the sub-district. The main specification is the following:

$$Y_{isd} = \alpha + \beta TV_{sd} + X_{isd}\gamma + \zeta GEO_{sd} + \delta_d + u_{isd} \tag{3.1}$$

where i denotes individuals, s sub-district and d district. The main explanatory variable, TV_{sd}, captures TV exposure in sub-district s in district d. It measures the average number of channels received in each sub-district across villages. X_{isd} is a set of individual characteristics such as gender, age dummies, confession, level of education, household log total expenditure and a rural/urban indicator.[9] An obvious threat to the causal interpretation of the parameter β is that TV reception in the sub-district is not necessarily exogenous. There may be unobserved factors that affect TV reception and religiosity or inter-religious attitudes simultaneously. For this reason, the analysis always controls for districts' fixed effects δ_d, to capture any time-invariant characteristics at the district level. Since the topography of a sub-district may be correlated with unobservable determinants of religious identity, we include the mean altitude of the villages in the sub-district (GEO_{sd}) as additional control.

To rule out endogeneity concerns further, a popular instrumental variable strategy is applied. This instrument is based on Indonesia's mountainous terrain and was first developed by Olken (2009) and then applied by Enikolopov et al. (2011), Fasani and Ferre' (2013) and Yanagizawa-Drott (2014)). The intuition behind this type of instrument is that once geomorphological and transmitters' characteristics are taken into account, the residual variation in TV signal across locations is exogenous to pre-determined area characteristics. First, using information about the power of transmitters, their geographical location and the characteristics of the terrain, Olken

[9]Following Olken (2009) and Fasani and Ferre' (2013), the three Indonesian major cities Jakarta, Surabaya and Medan, where private television broadcasting started before 1993, are excluded from the analysis.

predicts the average signal strength across channels received at the centroid of each sub-district (*predicted signal strength*). This measure captures the intensity of TV reception based both on topography and distance. Second, in order to isolate the pure effect of topography, he estimates the counter factual predicted signal strength that one would have obtained had been there a direct line of sight between the transmitter and sub-districts' centroids (*free space signal strength*). Using the former variable as an instrument for the actual average number of channels received in the sub-district while controlling for the latter allows to isolate the variation in signal strength that is due exclusively to geomorphological accidents. The exclusion restriction for this instrumental variable strategy holds under the reasonable assumption that, once the other geographical determinants of signal reception are controlled for, geographical idiosyncrasies have no direct effect on religious outcomes. The paper borrows these two constructed measures (*predicted signal strength* and *free space signal strength*) from Olken (2009).

3.4.1 Validity of the Identification Strategy

If the identification strategy is valid, then there should be no correlation between the variation in TV signal and other potential determinants of religious sentiments measured before TV introduction. To assess this, the validity of the exogeneity assumption is tested by using available observable pre-determined sub-district characteristics according to the following regression:

$$y_{sd} = \zeta + \phi PREDICTEDSIGNAL_{sd} + \psi FREESPACE_{sd} + \theta GEO_{sd} + \delta_d + v_{sd} \tag{3.2}$$

where y_{sd} is a characteristic of sub-district s in district d; $PREDICTEDSIGNAL_{sd}$ and $FREESPACE_{sd}$ are the predicted signal strength and the free-space signal strength in sub-district s and district d respectively; GEO_{sd} is altitude and δ_d district fixed effects. If the exogeneity assumption is correct, we expect $\phi = 0$. Results in Table 3.6 shows that almost none of the sub-district characteristics measured in 1993 (nor the change between 1990 and 1993) significantly explain signal strength available about 10 years after, which lends credibility to the identification strategy.

In particular, none of the religious characteristics measured in the '90s (number of mosques, other faith buildings and Islamic praying centres) are correlated with future signal when district fixed effects are taken into account. None of the sub-district socio-economic characteristics (population in agriculture, number of social organisations, literacy rate, electricity rate) are correlated with predicted signal strength. Among population variables, the number of villages per sub-district in 1993 is correlated with signal strength. For this reason, in the main regressions, results will always be presented with and without this sub-district control variable.

Table 3.7 shows the first stage estimates. In all the specifications, the instrument is significant at any conventional level and the F-statistic is above the conventional threshold of 10 for strong instruments. This rules out any concern about potential biases in the second stage due to the use of a weak instruments.

3.5 Main Results

3.5.1 Religiosity and Religious Practices

This section explores the effect of exposure to an additional television channel on religiosity and frequency of religious practices. Table 3.8 shows the estimation results for alternative specifications of equation (1). Both OLS and IV specifications are presented. The odd columns control for elevation and free space signal strength; even columns add district fixed effects and the number of villages per sub-district in 1993. Standard errors are clustered by sub-district to allow for any possible correlation in the unobservable characteristics of individuals who live in the same sub-district.

OLS estimates provide little support to the hypothesis that improved television reception affects religiosity (col (1), (2)).[10] However, results from the IV estimates indicate that reception for an additional channel decreases the probability of self-describing as very religious or religious by 3 percentage points (col (4)). This effect is mainly driven by a decrease in the share of people declaring being "religious" with respect to being "somewhat religious" (not shown).

[10] A possible reason for OLS estimates being biased towards zero is that PODES question may imprecisely captures the variation in television reception relevant for actual television watching decisions, as also observed by Olken (2009).

Table 3.8, col. (5)-(8) show the effect on increased television reception on the probability of observing religious practices. The IV estimates suggest that reception for each additional channel reduces the probability of observing prescribed religious behaviours by 2 percentage points. Furthermore, by splitting the sample by religion, it appears that the effect is driven by the majority group (Muslims), rather than by minority religious groups (Table 3.9, col. (3) and (4) - difference in coefficients is statistically significant at conventional levels).

3.5.2 Interfaith Attitudes

Having provided evidence that higher exposure to television lowers religious identity both in terms of self reported religiosity and intensity of religious practices, the paper now researches whether increased reception affects relationships between people of different faith.

Table 3.10 shows that increased exposure to television significantly decreases hostility towards people of a different faith. In particular, in the most demanding IV specification (col (4)) exposure to an additional TV channel decreases the share of "haters" (people objecting to people of a different faith on at least one of the attitude questions) by 13% with respect to the mean. Consistently, the share of people showing high acceptance towards people of a different faith increases by 25% with respect to the mean for each additional TV channel with reception in the sub-district (col (8)).

Table 3.11 details how exposure to television influences people's attitudes towards people of a different faith in different situations. From Panel A to panel E, the table ranks questions from "less intimate" to "more intimate" situations. There is no doubt that somebody of a different faith marrying a member of the family implies a closer contact with respect to somebody of a different faith moving to the village. Exposure to television seems to influence attitudes on both sides of the spectrum. More exposure to television makes people less intolerant in the closest type of inter-faith relationship (Panel E) and more openly acceptant in the less intimate aspect of inter-faith relationships (Panel A and B). These findings can be interpreted as individuals becoming increasingly more open as more contact is involved. Hostility decreases in the most intimate type of contacts, while tolerance reaches its maximum

when the least intimate type of interfaith contact is involved.

Estimates from Table 3.12 suggest that the effect is driven by Muslim respondents. The difference in estimated coefficients is statistically significant for columns (3) - (4). In unreported regressions, the paper also examines whether the impact of TV exposure on interfaith attitudes varies by gender, age or level of education. The analysis does not find any clear-cut evidence of heterogeneous effects; in fact, the paper finds only a very modest stronger effect for women with respect to men.

The decrease in religiosity documented in the previous section may contribute to the change in attitudes. In other words, it cannot be ruled out that the change in inter-faith tolerance is a consequence of a decrease in religiosity. The psychology research literature highlighted how religion fosters in-group pro-sociality and out-group hostility (Hall et al. (2010), Johnson et al. (2010)).[11] Religious practice can also lead to hostility by encouraging religious individuals to remain cloistered in cohesive homogeneous social groups without exposure to worshippers of different beliefs.

3.6 Additional Results

Improved television reception can have consequences on outcomes beyond religiosity and inter-faith attitudes by affecting individual preferences towards religiously immoral activities and political preferences towards religious candidates and parties. The next sub-sections explore these possibilities. First, the paper investigates whether there is a lower presence of gambling and prostitution, both activities largely condemned by Islam and the other religions, in sub-districts with better reception with respect to villages with worse reception. Second, the paper examines individual preferences towards religious candidates and voting for religious parties at the aggregate level.

[11] Also called parochial altruism, this paradox was first expressed by the influential psychologist Gordon Allport (1955)

3.6.1 Forbidden Economic Activities

Religion is often considered the backbone of a society's morality. How individuals value some actions (i.e. their preferences over these actions) may be influenced by their own degree of religiosity[12]. This section therefore analyses whether television reception influences preferences towards two types of activities considered immoral according to most confessions and for which information can be found in PODES, namely gambling and prostitution. Gambling is forbidden by all the major confessions[13], as well as extramarital sex. The intuition is that if exposure to television shifts viewers' preferences towards these activities, there will be a higher demand for them in sub-districts with better reception, and therefore in equilibrium also higher supply.

Consistently, Table 3.13 , col (1)-(4), shows that, in sub-districts exposed to a higher number of television channels, gambling is present in a higher share of villages. Reception for each additional channel leads to an increase in the share of villages with gambling of 3.7 percentage points in the most demanding IV specification. Similarly, col. (5)-(8) show that increased exposure to television leads to an increase in the share of villages where places of commercial sex are found. Estimates from the most demanding IV specification indicates that reception for each additional TV channel increases the share of villages with commercial sex places by 1 percentage point.[14]

3.6.2 Political Preferences

Exposure to a secular television can also potentially affect the political preferences of Indonesians towards religious candidates or parties with a religious platform. Identity of elected politicians matters in terms of socio-economic outcomes (Bhalotra et al. (2014)) and can drive favouritism (Burgess et al. (2015)). Furthermore, Banerjee

[12]Benjamin et al. (2010) provides a useful theoretical model to study how saliency of identity affects individual behaviour in terms of respecting/deviating from the norm dictated by the group.

[13] Hoffmann (2000) provides a summary of the gambling views of major religious denominations in the U.S. While from the Qur'an: *"O believers, wine and gambling, idols and divining arrows are an abhorrence, the work of Satan. So keep away from it, that you may prevail. Satan only desires to arouse discord and hatred among you with wine and gambling, and to deter you from the mention of God and from prayer. Will you desist?"* Qur'an, Sura 5:90-91 (Al-Ma'ida)

[14]When a similar analysis is performed including all the sub-districts in IFLS4 provinces, and not just the IFLS4 sub-districts sample, the result on commercial sex places is not robust (Table A.2 in the Appendix).

and Pande (2007) suggest that stronger voter ethnicisation, i.e. a greater preference for the party representing one's ethnic group, reduces the quality of government. The role of media in shaping political outcomes has been extensively studied in the economic literature (DellaVigna and Kaplan (2007), Enikolopov et al. (2011), DellaVigna et al. (2014) and Durante et al. (2017)), especially when captured by the political elite itself.

Results in Table 3.14 indicate that, overall, exposure to television does not shift preferences away from religious candidates (col. (1)-(4)), nor makes the religious denomination of a candidate a less salient trait (col. (5)-(8)). However, when focusing on the non-Muslim sub-sample (Table 3.15, col. (2) and (4)), each additional channel increases by 8.9% the probability that the level of religiosity of a candidate does not matter and by 7.8% the probability that the religious denomination of a candidate does not matter to the respondent. One possible explanation for this finding is that Muslim candidates respond to the decreased religiosity of the Muslim electorate by lessening this aspect of their identity in their campaigns for local elections in localities with increased television reception. As a consequence, non-Muslim voters may then increasingly perceive that the religious identity of a candidate matters less. Another possibility is that increased reception allows non-Muslim voters to know Muslim candidates better and to go beyond religious cleavages in voting. Christian newspapers often emphasise how Islamist politicians are moving to the centre of the political spectrum, downplaying divisive issues of faith and supporting programs to help the poor or fight corruption.[15]

Unfortunately, the IFLS4 does not include any information about respondents' actual voting behaviour or intentions. A proxy for preferences for religious voting can be extracted from PODES, that, in the 2005 wave, asks to village heads to rank the parties by their popularity in the village in 2004 legislative elections. Of the 24 political parties that contested the election, eight parties have direct or partial affiliation with a religion.[16] Nationally, parties with direct or partial affiliation with

[15]See for example Vatican Insider News (April 21, 2017) or Christian Science Monitor (April 9, 2009)

[16]The following parties have direct or partial affiliation to Islam: the Indonesian Nahdlatul Community Party (PPNUI, Partai Persatuan Nahdatul Ummah Indonesia), the Prosperous Justice Party (PKS, Partai Keadilan Sejahtera), the Moon and Star Party (PBB, Partai Bulan Bintang), the United Development Party (PPP, Partai Persatuan Pembangunan), the National Awakening Party (Partai

Islamic organizations received about 39 percent of the vote, while the only Christian party received less than 2 percent of the vote (U.S. Department of State (2004)). Table 3.16 shows that the share of villages in a sub-district ranking a religious party first (col (1)-(4)) is not affected by television reception in the sub-district. The second panel of the table (col (5)-(8)) shows that reception has no impact on the share of villages in a sub-district ranking a religious party among the first five.[17]

3.7 Conclusions

This paper documents the effect of television exposure on religious identity and inter-faith attitudes in Indonesia. The identification strategy is based on the variation in the number of television channels available, purely generated by geographic idiosyncrasies of the terrain.

The paper finds a strong negative effect on individuals religiosity and observance of religious practices. Exposure to an additional channel reduces the probability of individuals reporting being very religious by 3.7% and reduces the probability of observing religious practices of 2.3% Consistently with this effect, exposure to an additional TV channel reduces hostility and increases open acceptance of contacts with people of different faith. Furthermore, the paper suggests that television exposure increases the demand for religiously immoral activities - meaning gambling and prostitution. Reception of an additional TV channel in a sub-district increases the proportion of villages in which gambling takes place by 5.6% and the proportion of villages with commercial sex places of 33%. The paper also investigate the effects of the media on political preference and voting outcomes. It analyses whether exposure to television shifts voters away from religious candidates and religious parties. Results do not support this hypothesis. However, non-Muslim respondent, when exposed to a higher number of television channels, appear to have a higher probability of not giving importance to the religion and religiosity of a candidate in an election

Kebangkitan Bangsa or PKB) and the National Mandate Party (PAN, Partai Amanat Nasional), the Star of Reform Party (Partai Bintang Reformasi or PBR). Only the Prosperous Peace Party (PDS) has an openly Christian orientation. No party representing another religion competed.

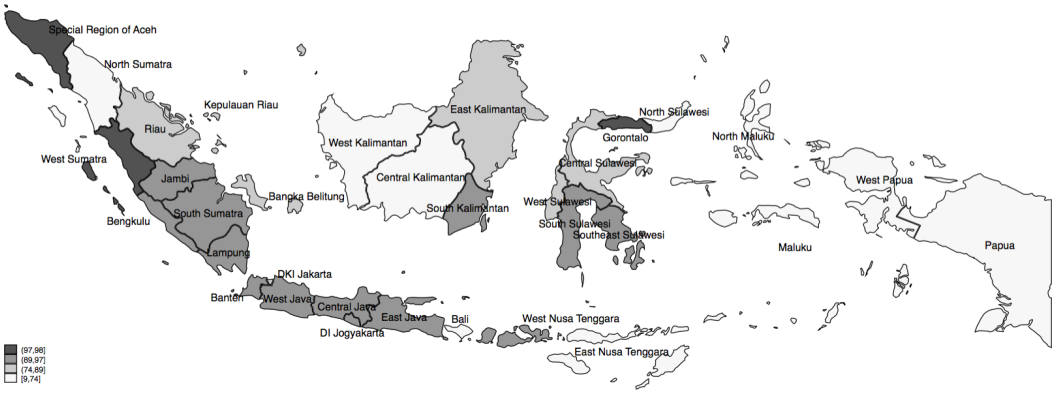
[17] Results do not change if the Christian party is excluded, or whether the definition of Islamic party is restricted to parties whose official platform in 1998 called for Islamic law as the basis of the Indonesian state (PPNUI, PKS, PBB, PPP). Extending the analysis to all subdistricts in IFLS4 provinces does not affect the results (Table A.3 in the Appendix).

(respectively 7.8% and 8.9% with respect to the mean).

These results suggest that the media possess a substantial power in shaping the religious identity of a country, especially when captured by a political elite which has an interest in lessening the saliency of a potentially divisive issue such as religion.

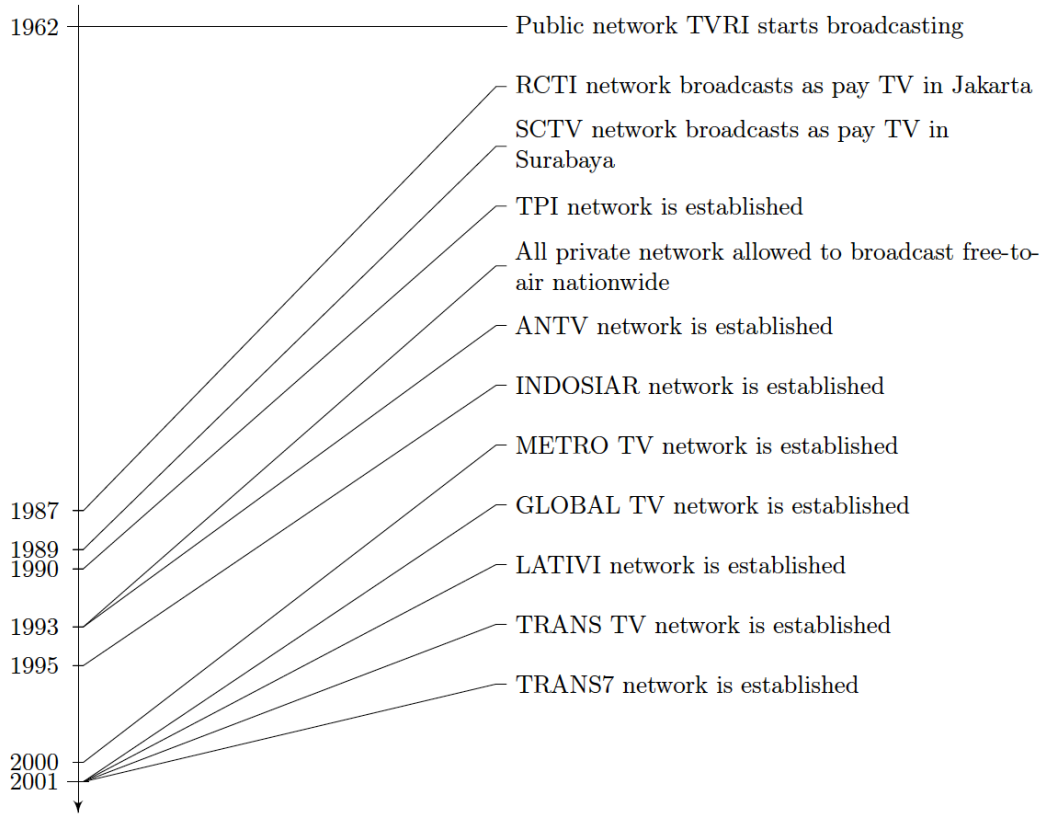
3.8 Figures

Figure 3.1: Share of Muslim population by province



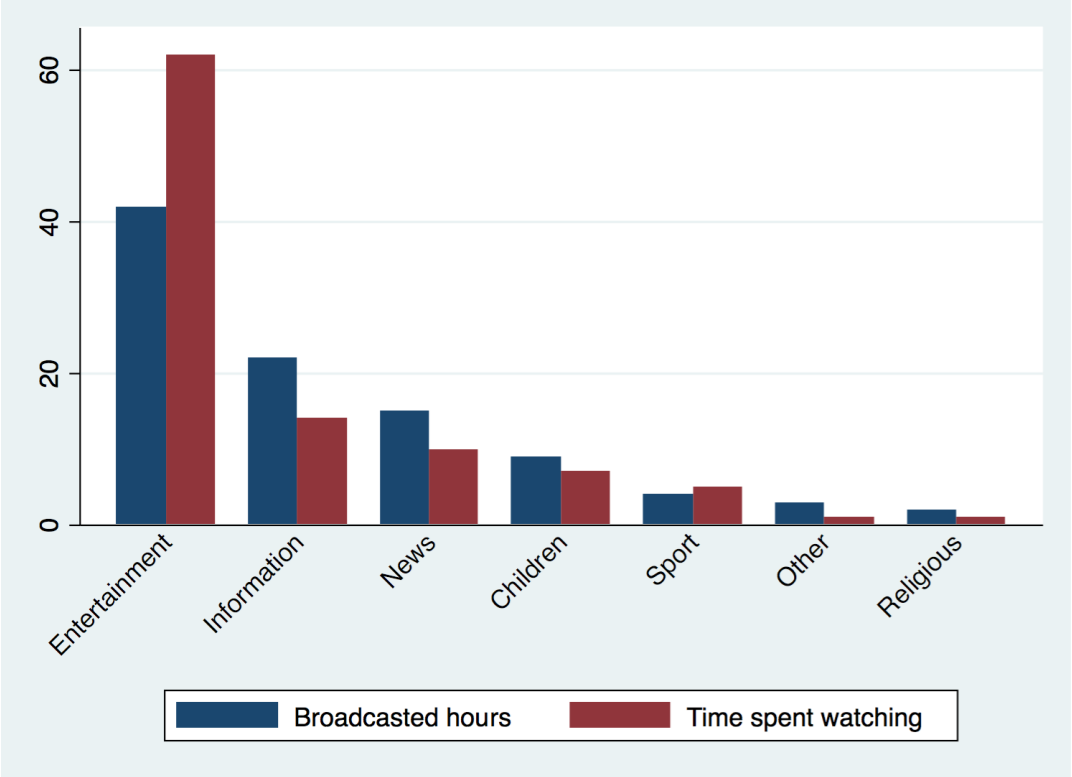
Note: 2010 Indonesian Census. Share of Muslim population by province. Protestantism is the dominant religion in Papua and North Sulawesi, whilst most of the population in East Nusa Tenggara are Roman Catholics. Hinduism is widely practised in Bali, where 80% of Indonesia Hindu people live. Buddhism is mostly practised around Jakarta by Chinese Indonesians and some indigenous Javanese people. Provinces covered by IFLS and included in the analysis: North Sumatra, Riau, South Sumatra, Lampung, West Java, Central Jawa, DI Yogyakarta, North Java, Bali, West Nusa Tenggara, Sud Sulawesi

Figure 3.2: TV time-line



Source: Hollander et al. (2009), Olken (2009)

Figure 3.3: Broadcast hours and time spent watching by type of program



Source: AGB Nielsen (2007)

3.9 Tables

Table 3.1: Percentage of population and media related activities

% Population who ...	1997	2003	2006	2009
Watched a television program in the last week	77	85	86	90
Listened radio broadcasting in the last week	53	50	40	24
Read a magazine/newspaper in the last week	11	25	23	21
Accessed internet in the last 3 months	.	.	4	11

Notes: National Socioeconomic Survey (SUSENAS) microdata, 1997. Sample restricted to individuals aged 10 years old or older.

Table 3.2: TV networks' market shares

Network	Market Share (%)	Network	Market Share (%)
RCTI	19.0	GLOBAL TV	5.1
SCTV	17.3	LATIVI	4.5
INDOSIAR	14.2	ANTV	4.2
TPI	12.6	METRO	1.9
TRANSTV	12.1	TVRI	1.4
TV7	6.4	Other	1.3

Note: Market share calculated by AGB Nielsen as reported by Hollander et al. (2009). "Other" category refers to local TV stations. Nielsen market research only covers the metropolitan areas, therefore is likely to underestimate TVRI market share.

Table 3.3: Religions in Indonesia in IFLS4

Prov. code	Prov.	Muslim	Christian	Other
12	North Sumatra	60.43	39.56	0.00
14	Riau	82.00	18.0	0.00
16	South Sumatra	95.23	2.51	2.26
18	Lampung	99.15	0.73	0.12
32	West Java	98.81	1.04	0.15
33	Central Java	98.62	1.33	0.03
34	DI Yogyakarta	89.78	10.71	0.16
35	East Java	98.22	1.67	0.12
51	Bali	12.98	2.25	84.77
52	West Nusa Tenggara	98.44	0.24	1.32
73	South Sulawesi	75.09	12.54	12.36
Total		93.11	3.71	3.18

Note: The category "Christian" includes both Catholic and Protestant. The category "Other" includes Hindu, Buddhist and Confucian. Provinces for which we have sub-districts with complete data religiosity and TV reception.

Table 3.4: Descriptive statistics: dependent variables from IFLS4

Panel a) How religious are you? (%)				
Not religious	Somewhat religious	Religious	Very religious	
2.40	15.45	76.30	5.85	
Panel b) How observant? (%)				
Not observant	Observant			
8.19	91.81			
Panel c) How do you feel if someone with different faith from you ... (%)				
	Not acceptable	Somewhat acceptable	No obj.	No obj.at all
Lives in your village?	2.68	21.77	72.22	3.34
Lives in your neighbourhood?	3.80	22.89	70.39	2.92
Builds a house of worship in your community	18.15	42.44	36.87	2.54
Rents a room from you?	11.67	35.45	51.09	1.79
Marries one of your close relatives or children?	45.118	32.46	21.07	1.29
Panel d) Political candidate's characteristics do not matter (%)				
Religiosity does not matter	32.31			
Religion does not matter	35.44			

Notes: Share of respondent and answers for each question. In panel *c*), attitudes-related questions are ranked by "intimacy of contact", from the least intimate to the most intimate type of contact. In original survey, the order of the question is very similar, but the question related to building a house of worship in the community comes last.

Table 3.5: Reception by channel

Network	Obs	Mean	Sd	Min	Max
TVRI	844	0.91	0.23	0	1
RCTI	844	0.85	0.34	0	1
SCTV	844	0.83	0.34	0	1
INDOSIAR	844	0.83	0.35	0	1
TRANS	844	0.72	0.42	0	1
TPI	844	0.73	0.40	0	1
ANTV	844	0.71	0.40	0	1
METRO	844	0.66	0.43	0	1
TV7	844	0.62	0.45	0	1
LATIVI	844	0.54	0.47	0	1
GLOBAL	844	0.50	0.45	0	1
Average #channels in subdistrict	844	7.90	3.58	0	11

Note: The table displays the average share of villages with clear reception for each television channel. Only subdistricts covered by IFLS4 are included. Last line displays the average number of channels for which there is clear reception in Indonesian subdistricts covered by IFLS4.

Table 3.6: Balance test

			(1) OLS		(2) OLS with controls	
Independent variable:	obs.	mean	Signal	R2	Signal	R2
Mosques (level '93)	851	5.635	-0.022**	0.125	-0.004	0.704
			(0.010)		(0.009)	
Mosques (change '90-'93)	851	0.303	-0.000	0.004	0.003	0.376
			(0.001)		(0.004)	
Islamic praying rooms (level '93)	851	14.19	0.041	0.054	0.004	0.734
			(0.027)		(0.027)	
Islamic praying rooms (change '90-'93)	851	1.329	-0.005	0.001	0.019	0.291
			(0.019)		(0.025)	
Other religious buildings (level '93)	851	0.625	0.001	0.010	0.001	0.694
			(0.003)		(0.003)	
Other religious buildings (change '90-'93)	851	0.679	-0.003	0.003	0.004	0.222
			(0.009)		(0.013)	
Pop in agriculture (share '93)	851	0.634	-0.000	0.298	-0.001	0.558
			(0.000)		(0.001)	
N social organizations (level '93)	851	3.448	0.001	0.063	0.000	0.598
			(0.001)		(0.001)	
Electricity rate (share '93)	851	0.478	0.000	0.282	0.001	0.622
			(0.001)		(0.001)	
Literacy rate (share '93)	851	0.871	-0.000	0.006	-0.000	0.284
			(0.000)		(0.000)	
N villages (level '93)	851	17.87	-0.004	0.045	0.069*	0.635
			(0.021)		(0.035)	
Avg. pop in villages (level '93)	851	8.193	0.001	0.106	0.001	0.533
			(0.001)		(0.001)	

Notes: each obs. is a sub-district (admin. boundaries 1990). Each line reports result from a different regression, in which signal strength is the dependent variable. Specifically, col. (1) reports the coefficient, standard error and R^2 of the univariate OLS regression of each variable on the intensity of signal controlling for free space signal strength and elevation. Column (2) adds district fixed effects. Observations weighted per population size (1993) with the exception of population regressions. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 3.7: First stage

	(1) TVchannels	(2) TVchannels	(3) TVchannels
Avg signal strength	0.040***	0.030***	0.031***
	(0.009)	(0.007)	(0.007)
Observations	17,980	17,980	17,980
R-squared	0.596	0.911	0.911
Free space signal	yes	yes	yes
Elevation	yes	yes	yes
District fe		yes	yes
N villages 1993			yes
Indiv contr	yes	yes	yes
N of clusters	844	844	844
F-stat	21.17	18.02	18.33
F-stat P-value	0.00	0.00	0.00

Note: First stage regression. Individual controls: education dummies, gender, age categories dummies, religion dummies, log household expenditure, dummy for the village being urban or rural. Robust SE in parenthesis, clustered at sub-district level. ***p<0.01; ** p<0.05; *p < 0.1.

Table 3.8: Religiosity and religious practices (I)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Religiosity				Observance			
	OLS		IV		OLS		IV	
TV channels	0.005	-0.000	-0.013	-0.030*	-0.001	0.002	-0.019***	-0.021***
	(0.003)	(0.004)	(0.009)	(0.018)	(0.002)	(0.003)	(0.007)	(0.007)
Obs	17,980	17,980	17,980	17,980	17,980	17,980	17,980	17,980
R-squared	0.051	0.116	0.038	0.042	0.156	0.193	0.021	0.029
Mean dep var	0.821	0.821	0.821	0.821	0.0819	0.0819	0.918	0.918
Free space signal	yes	yes	yes	yes	yes	yes	yes	yes
Elevation	yes	yes	yes	yes	yes	yes	yes	yes
Individual contrs	yes	yes	yes	yes	yes	yes	yes	yes
District fe		yes		yes		yes		yes
N villages 1993		yes		yes		yes		yes

Note: Robust SE in parenthesis, clustered at sub-district level. *** p<0.01; ** p<0.05; *p < 0.1; The dependent variable in col 1-4 is a dummy for self reported religiosity = religious or very religious (0 for somewhat religious and not religious); the dependent variable in col 5-8 is a dummy that takes value one when the respondent observes religious practices (being a Muslim, he/she consumes halal food and pray at least 5 times a day; being a Christian reads the bible and attend the holy mass; being a Hindu or Buddhist , does have any dietary restriction and practises meditation. *TVchannels* is the number of channels for which there is clear reception in the subdistrict; in IV estimates, it is instrumented with the average predicted signal strength as described in Section **??**

Table 3.9: Religiosity and religious practices (II)

	(1)	(2)	(3)	(4)
	Religiosity		Observance	
	Muslim	Non Muslim	Muslim	Non Muslim
	IV	IV	IV	IV
TV channels	-0.031	0.000	-0.027***	0.002
	(0.020)	(0.017)	(0.009)	(0.013)
Obs	15,895	2,085	15,895	2,085
R-squared	0.042	0.052	-0.004	0.117
Mean dep var	0.183	0.113	0.935	0.686
Free space signal	yes	yes	yes	yes
District fe	yes	yes	yes	yes
Individual contrs	yes	yes	yes	yes
Elevation	yes	yes	yes	yes
N villages 1993	yes	yes	yes	yes

Note: Robust SE in parenthesis, clustered at sub-district level. *** p<0.01; ** p<0.05; *p < 0.1; Even columns refer to the Muslim respondents subsample; odd columns to non-Muslims. The dependent variable in col (1) and (2) is a dummy for self reported religiosity = religious or very religious (0 for somewhat religious and not religious); The dependent variable in col (3) and (4) is a dummy that takes value when the respondent observes religious practices (being a Muslim, he/she consumes halal food and pray at least 5 times a day; being a Christian reads the bible and attend the holy mass; being a Hindu or Buddhist , does have any dietary restriction and practises meditation. *TVchannels* is the number of channels for which there is clear reception in the subdistrict; in IV estimates, it is instrumented with the average predicted signal strength as described in Section **??**

Table 3.10: Attitudes (I)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Hostility				Acceptance			
	OLS		IV		OLS		IV	
TV channels	-0.007	0.006	-0.035	-0.065*	-0.002	-0.001	0.007**	0.016**
	(0.007)	(0.004)	(0.022)	(0.035)	(0.002)	(0.003)	(0.008)	(0.008)
Observations	17,980	17,980	17,980	17,980	17,980	17,980	17,980	17,980
R-squared	0.178	0.178	-0.008	-0.007	0.009	0.064	-0.001	-0.001
Mean dep var	0.052	0.501	0.501	0.501	0.0642	0.0642	0.0642	0.0642
Free space signal	yes	yes	yes	yes	yes	yes	yes	yes
District fe		yes		yes		yes		yes
Individual contrs	yes	yes	yes	yes	yes	yes	yes	yes
Elevation	yes	yes	yes	yes	yes	yes	yes	yes
N villages 1993		yes		yes		yes		yes

Note: Robust SE in parenthesis, clustered at sub-district level. *** p<0.01; ** p<0.05; *p < 0.1; The dependent variable in col (1)-(4) *Hostility* is an indicator that takes value one if the respondent answers that it is *Not Acceptable* (most negative answer) if somebody of a different faith lives in the village, lives in the neighbourhood, rents a room from you, marries somebody in your family or builds a house of worship in the community at least once. The dependent variable in col (5)-(8) *Acceptance* is an indicator that takes value one if the respondent answers *No objection at all* (most positive answer) to the aforementioned questions at least once. *TVchannels* is the number of channels for which there is clear reception in the subdistrict; in IV estimates, it is instrumented with the average predicted signal strength as described in Section 3.4. Individual controls: education dummies, gender, age categories dummies, religion dummies, log household expenditure, dummy for the village being urban or rural.

Table 3.11: Attitudes, detailed

	(1)	(2)	(3)	(4)
	Hostility		**Acceptance**	
	IV		IV	
	Panel A: wrt villagers			
TV channels	0.003	0.007	0.010**	0.010**
	(0.003)	(0.004)	(0.005)	(0.005)
R-squared	-0.002	0.001	-0.011	0.001
Mean dep var	0.0268	0.0268	0.0334	0.0334
	Panel B: wrt neighbours			
TV channels	0.000	0.004	0.008*	0.007*
	(0.004)	(0.005)	(0.005)	(0.004)
R-squared	0.002	0.004	-0.008	0.003
Mean dep var	0.0380	0.0380	0.0292	0.0292
	Panel C: wrt own house			
TV channels	-0.014	-0.014	0.006*	0.004
	(0.009)	(0.013)	(0.003)	(0.003)
R-squared	0.012	0.004	-0.012	0.002
Mean dep var	0.117	0.117	0.0179	0.0179
	Panel D: wrt own family			
TV channels	-0.037*	-0.062**	0.001	0.003
	(0.021)	(0.031)	(0.002)	(0.002)
R-squared	-0.008	-0.003	0.000	0.002
Mean dep var	0.452	0.452	0.0129	0.0129
	Panel E: wrt religious buildings			
TV channels	-0.006	-0.043	-0.002	0.006
	(0.008)	(0.027)	(0.004)	(0.004)
R-squared	0.008	-0.003	0.005	0.004
Mean dep var	0.182	0.182	0.0254	0.0254
Observations	17,980	17,980	17,980	17,980
Free space signal	yes	yes	yes	yes
Individual contrs	yes	yes	yes	yes
Elevation	yes	yes	yes	yes
District fe		yes		yes
N villages 1993		yes		yes

Note: Robust SE in parenthesis, clustered at sub-district level. *** p<0.01; ** p<0.05; *p < 0.1; Each panel refers to an attitudinal question: what do you think if somebody of a different faith lives in the village (*Panel A)*), lives in the neighbourhood (*Panel B)*), builds a house of worship in the community (*Panel C)*), rents a room from you (*Panel D)*), marries somebody in your family (*Panel E)*). The dependent variable in col (1)-(2) *Hostility* is an indicator that takes value one if the respondent answers that it is *Not Acceptable* (most negative answer). The dependent variable in col (3)-(4) *Acceptance* is an indicator that takes value one if the respondent answers *No objection at all* (most positive answer). *TVchannels* is the number of channels for which there is clear reception in the subdistrict; it is instrumented with the average predicted signal strength as described in Section 3.4.

Table 3.12: Attitudes (II)

	(1)	(2)	(3)	(4)
	Hostility		Acceptance	
	Muslim	Non Muslim	Muslim	Non Muslim
	IV	IV	IV	IV
TV channels	-0.072*	-0.020	0.017**	0.009
	(0.039)	(0.012)	(0.008)	(0.010)
Obs	15,895	2,085	15,895	2,085
R-squared	-0.018	-0.001	-0.002	0.034
Mean dep var	0.529	0.108	0.0608	0.110
Free space signal	yes	yes	yes	yes
District fe	yes	yes	yes	yes
Individual contrs	yes	yes	yes	yes
Elevation	yes	yes	yes	yes
N villages 1993	yes	yes	yes	yes

Note: Robust SE in parenthesis, clustered at sub-district level. *** p<0.01; ** p<0.05; *p < 0.1; The dependent variable in col (1)-(2) *Hostility* is an indicator that takes value one if the respondent answers that it is *Not Acceptable* (most negative answer) if somebody of a different faith lives in the village, lives in the neighbourhood, rents a room from you, marries somebody in your family or builds a house of worship in the community at least once. The dependent variable in col (3)-(4) *Acceptance* is an indicator that takes value one if the respondent answers *No objection at all* (most positive answer) to the aforementioned questions at least once. *TVchannels* is the number of channels for which there is clear reception in the subdistrict; in IV estimates, it is instrumented with the average predicted signal strength as described in Section 3.4. Individual controls: education dummies, gender, age categories dummies, religion dummies, log household expenditure, dummy for the village being urban or rural.

Table 3.13: Forbidden economic activities

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Gambling				Prostitution			
	OLS		IV		OLS		IV	
TV channels	0.017***	0.022**	0.052***	0.037*	0.001	0.002	0.006***	0.010**
	(0.005)	(0.009)	(0.015)	(0.022)	(0.001)	(0.001)	(0.002)	(0.004)
Observations	842	842	842	842	842	842	842	842
Mean dep var	0.665	0.665	0.665	0.665	0.0328	0.0328	0.0328	0.0328
R-squared	0.031	0.386	-0.033	0.010	0.018	0.170	-0.009	-0.014
Elevation	yes	yes	yes	yes	yes	yes	yes	yes
Free space signal	yes	yes	yes	yes	yes	yes	yes	yes
District FE		yes		yes		yes		yes
N villages 1993		yes		yes		yes		yes

Note: Robust SE in parenthesis, clustered at sub-district level. *** p<0.01; ** p<0.05; *p < 0.1; Each observation is a sub-district covered by IFLS, 1990 boundaries. Observations are weighted for population size in 1993. The dependent variable in col (1)-(6) *Gambling* is the share of villages in which gambling is present in the sub-district. The dependent variable in col (7)-(12) *Gambling* the share of villages in the sub-district in which prostitution is present in the sub-district. *TVchannels* is the number of channels for which there is clear reception in the sub-district; in IV estimates, it is instrumented with the average predicted signal strength as described in Section **??**

Table 3.14: Political preferences

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Candidate's religiosity does not matter				Candidate's religion does not matter			
	OLS		IV		OLS		IV	
TV channels	0.014**	0.001	-0.002	-0.003	0.015**	0.000	0.022	-0.002
	(0.006)	(0.004)	(0.012)	(0.012)	(0.006)	(0.003)	(0.020)	(0.013)
Observations	17,980	17,980	17,980	17,980	17,980	17,980	17,980	17,980
R-squared	0.032	0.144	0.009	0.010	0.052	0.184	0.010	0.018
Mean dep var	0.323	0.323	0.323	0.323	0.354	0.354	0.354	0.354
Free space signal	yes	yes	yes	yes	yes	yes	yes	yes
Individual contrs	yes	yes	yes	yes	yes	yes	yes	yes
Elevation	yes	yes	yes	yes	yes	yes	yes	yes
District fe		yes		yes		yes		yes
N villages 1993		yes		yes		yes		yes

Note: Robust SE in parenthesis, clustered at sub-district level. *** p<0.01; ** p<0.05; *p < 0.1. The dependent variable in col (1)-(4) is an indicator that takes value one if the respondent answers that the *religiosity* of a candidate does not matter in an election (alternative answers: It makes it very unlikely/unlikely/somewhat likely/very likely to vote for him). The dependent variable in col (5)-(8) is an indicator that takes value one if the respondent answers that a candidates' *religion* does not matter in an election (alternative answers: It makes it very unlikely/unlikely/somewhat likely/very likely to vote for him). *TVchannels* is the number of channels for which there is clear reception in the subdistrict; in IV estimates, it is instrumented with the average predicted signal strength as described in Section 3.4. Individual controls: education dummies, gender, age categories dummies, religion dummies, log household expenditure, dummy for the village being urban or rural.

Table 3.15: Political preferences (II)

	(1)	(2)	(3)	(4)
	Candidate's religiosity does not matter		Candidate's religion does not matter	
	Muslim IV	Non Muslim IV	Muslim IV	Non Muslim IV
TVchannels	-0.010	0.052**	-0.011	0.055**
	(0.014)	(0.022)	(0.015)	(0.025)
Observations	15,895	2,085	15,895	2,085
R-squared	0.005	0.024	0.008	0.026
Mean dep var	0.304	0.583	0.329	0.708
Free space signal	yes	yes	yes	yes
District fe	yes	yes	yes	yes
Individual contrs	yes	yes	yes	yes
Elevation	yes	yes	yes	yes
N villages 1993	yes	yes	yes	yes

Note: Robust SE in parenthesis, clustered at sub-district level. *** p<0.01; ** p<0.05; *p < 0.1; The dependent variable in col (1)-(2) is an indicator that takes value one if the respondent answers that the *religiosity* of a candidate does not matter in an election (alternative answers: It makes it very unlikely/unlikely/somewhat likely/very likely to vote for him). The dependent variable in col (3)-(4) is an indicator that takes value one if the respondent answers that a candidates' *religion* does not matter in an election (alternative answers: It makes it very unlikely/unlikely/somewhat likely/very likely to vote for him). Odd columns restricts to the Muslim subsample; even columns to respondents of other confessions. *TVchannels* is the number of channels for which there is clear reception in the subdistrict; in IV estimates, it is instrumented with the average predicted signal strength as described in Section 3.4. Individual controls: education dummies, gender, age categories dummies, religion dummies, log household expenditure, dummy for the village being urban or rural.

Table 3.16: Voting for religious parties

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Religious party top 1				Religious party top 5			
	OLS		IV		OLS		IV	
TV channels	0.010**	-0.009*	0.030***	0.005	0.001	0.002	-0.003	-0.004
	(0.005)	(0.005)	(0.010)	(0.015)	(0.002)	(0.001)	(0.008)	(0.004)
Obs	842	842	842	842	842	842	842	842
Mean dep var	0.243	0.243	0.243	0.243	0.954	0.954	0.954	0.954
R-squared	0.023	0.587	-0.006	0.032	0.022	0.808	0.018	-0.011
Elevation	yes	yes	yes	yes	yes	yes	yes	yes
Free space signal	yes	yes	yes	yes	yes	yes	yes	yes
District FE		yes		yes		yes		yes
N villages 1993		yes		yes		yes		yes

Note: Robust SE in parenthesis, clustered at sub-district level. *** p<0.01; ** p<0.05; *p < 0.1; Each observation is a sub-district covered by IFLS, 1990 boundaries. Observations are weighted for population size in 1993. The dependent variable in col (1)-(6) is the share of villages in the sub-district in which a religious party ranked first in the 2004 elections. The dependent variable in col (7)-(12) is the share of villages in the sub-district in which a religious party ranked among the first 5 parties in the 2004 elections. Religious parties are listed in section 3.6.2. *TVchannels* is the number of channels for which there is clear reception in the sub-district; in IV estimates, it is instrumented with the average predicted signal strength as described in Section **??**

Appendices

A Additional Tables

Table A.1: Balance test, all sub-districts in IFLS4 provinces

			(1) OLS		(2) OLS with controls	
Independent variable:	obs.	mean	Signal	R2	Signal	R2
Mosques (level '93)	1,989	5.301	-0.027***	0.125	-0.006	0.652
			(0.007)		(0.005)	
Mosques (change '90-'93)	1,989	0.290	0.000	0.003	0.002	0.174
			(0.001)		(0.002)	
Islamic praying rooms (level '93)	1,989	14.18	0.023	0.026	-0.022	0.750
			(0.028)		(0.023)	
Islamic praying rooms (change '90-'93)	1,989	1.631	-0.017	0.004	-0.004	0.138
			(0.011)		(0.017)	
Other religious buildings (level '93)	1,989	0.625	0.001	0.010	0.001	0.694
			(0.003)		(0.003)	
Other religious buildings (change '90-'93)	1,989	0.749	0.000	0.004	-0.002	0.108
			(0.006)		(0.008)	
Pop in agriculture (share '93)	1,989	0.714	0.000	0.297	0.000	0.574
			(0.000)		(0.000)	
N social organizations (level '93)	1,989	3.372	0.002***	0.095	-0.000	0.559
			(0.001)		(0.001)	
Electricity rate (share '93)	1,989	0.390	-0.000	0.341	-0.001	0.636
			(0.000)		(0.000)	
Literacy rate (share '93)	1,989	0.852	-0.000	0.005	-0.000	0.315
			(0.000)		(0.000)	
N villages (level '93)	1,989	16.74	-0.027**	0.049	0.021	0.564
			(0.012)		(0.017)	
Avg. pop in villages (level '93)	1,989	6906	23.359	0.008	31.783	0.098
			(18.464)		(35.705)	

Notes: each obs. is a subdistrict (admin. boundaries 1990). Each line reports result from a different regression, in which signal strength is the dependent variable. Specifically, col. (1) reports the coefficient, standard error and R^2 of the univariate OLS regression of each variable on the intensity of signal controlling for for free space signal strength and elevation, elevation square and cubic and distance to the district capital (km) Even columns add district fixed effects, while column (2) adds subdistricts fixed effects. Observations weighted per population size (1993) with the exception of population regressions. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A.2: Forbidden economic activities, all sub-districts in IFLS4 provinces

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Gambling				Prostitution			
	OLS		IV		OLS		IV	
TV channels	0.016***	0.017***	0.037***	0.029**	0.002***	0.002***	0.004***	0.004
	(0.003)	(0.004)	(0.006)	(0.013)	(0.001)	(0.001)	(0.001)	(0.003)
Observations	1,989	1,989	1,989	1,989	1,989	1,989	1,989	1,989
Mean dep var	0.628	0.628	0.628	0.628	0.0262	0.0262	0.0262	0.0262
R-squared	0.028	0.352	-0.006	0.015	0.007	0.160	-0.006	0.008
Free space	yes	yes	yes	yes	yes	yes	yes	yes
Elevation	yes	yes	yes	yes	yes	yes	yes	yes
District FE		yes		yes		yes		yes
Elevation ˆ2, ˆ3		yes		yes		yes		yes
Dist. from capital		yes		yes		yes		yes

Note: Robust SE in parenthesis, clustered at sub-district level. *** p<0.01; ** p<0.05; *p < 0.1; Each observation is a sub-district in a province covered by IFLS, 1990 boundaries. Observations are weighted for population size in 1993. The dependent variable in col (1)-(4) *Gambling* is the share of villages in which gambling is present in the sub-district. The dependent variable in col (5)-(8) *Prostitution* the share of villages in the sub-district in which prostitution is present in the sub-district. *TV channels* is the number of channels for which there is clear reception in the sub-district; in IV estimates, it is instrumented with the average predicted signal strength as described in Section 3.4.

Table A.3: Voting for religious parties, all sub-districts in IFLS provinces

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Religious party top 1				Religious party top 5			
	OLS		IV		OLS		IV	
TV channels	0.015***	-0.003	0.035***	0.012	0.002*	0.001	0.001	-0.003
	(0.003)	(0.003)	(0.004)	(0.008)	(0.001)	(0.001)	(0.003)	(0.002)
Obs	1,989	1,989	1,989	1,989	1,989	1,989	1,989	1,989
Mean dep var	0.263	0.222	0.263	0.222	0.963	0.947	0.963	0.947
R-squared	0.022	0.621	0.020	0.000	0.014	0.801	0.011	-0.004
Elevation	yes	yes	yes	yes	yes	yes	yes	yes
Sub-district FE		yes		yes		yes		yes
Elevation ^2, ^3		yes		yes		yes		yes
Distance from capital		yes		yes		yes		yes

Note: Robust SE in parenthesis, clustered at sub-district level. *** p<0.01; ** p<0.05; *p < 0.1; Each observation is a sub-district covered by IFLS, 1990 boundaries. Observations are weighted for population size in 1993. The dependent variable in col (1)-(4) is the share of villages in the sub-district in which a religious party ranked first in the 2004 legislative elections. The dependent variable in col (5)-(8) is the share of villages in the sub-district in which a religious party ranked among the first 5 parties in the 2004 elections. Religious parties is listed in section 3.6.2. *TVchannels* is the number of channels for which there is clear reception in the sub-district; in IV estimates, it is instrumented with the average predicted signal strength as described in Section 3.4

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