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# Social ties and the influence of public policies on individual opinions: The case of same-sex marriage laws

Sylvie Blasco\*   Eva Moreno - Galbis<sup>†</sup>   Jeremy Tanguy<sup>‡§</sup>

## Abstract

This paper evaluates the extent to which same-sex marriage (SSM) laws, approved in several EU countries over the past two decades, have contributed to favor gay-friendly opinions among people depending on their social interactions. We propose a simplified dyadic model in which individuals learn about the social norm conveyed by a law through strong and weak ties. We show that the relative importance of these different social ties in shaping individuals' opinions depends on the alignment between the law and the local social norm. Using the 2002-2016 European Social Surveys, we test the theoretical predictions with a pseudo-panel dynamic difference-in-difference setting relying on the progressive adoption of SSM laws in European countries. We show that strong ties induce a lower increase in gay-friendly opinions following the adoption of SSM law when the law is aligned with the local social norm. Results are reversed when the law clashes with the local social norm.

**Keywords:** same-sex marriage, social interactions, social norm, public opinion

**JEL:** J12; J18; K36; Z1.

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\*Le Mans University (France), GAINS-TEPP, IZA.

<sup>†</sup>Corresponding author. Aix-Marseille Univ., CNRS, EHESS, Centrale Marseille, IRD, AMSE, Marseille, France.  
Email: eva.moreno-galbis@univ-amu.fr

<sup>‡</sup>University Savoie Mont Blanc (France), IREGÉ.

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# 1 Introduction

Since the early 2000s, laws protecting and promoting gay rights<sup>1</sup> have been progressively adopted and populations seem to have become overall more accepting of gay rights. In the US, only 39% of people would vote against same-sex marriage (SSM) in 2016, against 68% in 1996 (see Roy and Abaid, 2017). In the European Union, 61% of people agreed that “same sex marriages should be allowed throughout Europe” in 2015, while they were only 44% in 2006 (Eurobarometer, 2015). Still, attitudes towards homosexuality vary greatly across countries and in all countries some remain strongly hostile to gay rights, as exhibited by the rise of homophobic hate crimes in a number of countries. According to the FBI’s annual Hate Crime Statistics Report, the number of hate crime incidents targeting gays, lesbians, and bisexuals in the United States in 2018 increased by nearly 6% over the previous year. In the UK 11,600 crimes motivated by a bias toward gender identity were recorded by the police in 2017-2018, an increase by 144% since 2013-2014 (Marsh et al., 2019). In France 231 assaults were reported in 2018, accounting for an increase by 66% in one year (SOS Homophobie).

In this paper we aim at evaluating the extent to which SSM laws, that were passed in several countries in the 2000s and 2010s, contributed to favor gay-friendly opinions in the population. There are direct and indirect effects of a law change. In addition to direct adjustments of opinions or behaviors to the new law, there is an indirect effect that comes through information transmission among people and this transmission is affected by the nature of the social ties through which the information transits. This paper focuses on the indirect effect and investigates how social interactions act as a factor facilitating or on contrary preventing the acceptance of gay rights that SSM laws officialised. We first propose a theoretical framework with social interactions to model how law and social norms interact in the opinion formation process. We then test our theoretical predictions in a dynamic difference-in-difference setting relying on progressive adoption of SSM laws in European countries to control for the concomitant evolution of other factors that may also have helped the development of gay-friendly opinions.

Social ties convey information through observation of others’ decisions as well as through conversations and the sharing of opinions. Individuals belonging to a social network are influenced in their opinions and choices by those of other members of the social network. However, different opinions may be advocated in an individual’s social group and some peers may be more or less influential.

To understand how individuals form opinions in such a context, we adapt the dyadic theoretical setup proposed in Giulietti et al. (2018). We assume that individuals develop both weak and strong ties. They engage in close social interactions with a partner (the other member of the dyad – the strong tie), that may or may not accept the dominant social norm and they also have random encounters (the weak ties), who are assumed to create and foster the social norm.<sup>2</sup> Individuals can

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<sup>1</sup>Gay rights refer throughout the paper to legal and civil rights of homosexuals, including both gays and lesbians.

<sup>2</sup>If we adopt from sociology the definition of the social norm, as in Acemoglu and Jackson (2017) – “A rule or a

only receive information on the social norm through social ties. They are all the more exposed to the social norm that their partner agrees with it. They are said to be integrated when they adopt the dominant social norm, non-integrated otherwise.

Our theoretical setup predicts that, if a law does not clash with the dominant social norm and then reduces the rejection rate of this norm, individuals with dominant strong ties will be on average less responsive to the law, as they may be less exposed to the social norm it conveys (if their partner is non-integrated). On the contrary, if the law clashes with the dominant social norm, it may lead to an increase in the rejection rate of this norm. In this case, the role of weak ties as diffusors of the officialised social norm is reduced and the relative influence of strong ties in promoting the norm is improved. Applied to the particular case of gay rights, we expect SSM laws adopted by European countries during the 2000s and 2010s to reduce the rejection rate of gay rights in these countries, since the average opinion was favorable to these rights. However, in communities (within countries) where the local<sup>3</sup> social norm was homophobia, SSM laws may have rather promoted a rejection of gay rights since opinions radicalize.

We test our theoretical predictions using the 2002-2016 European Social Surveys and exploiting variations in the timing of SSM laws across European countries. More precisely, we adopt a pseudo-panel (cell) approach to implement a difference-in-difference model that exploits sequential approval of SSM across countries to assess the impact of the law on the cells' average opinion about gay rights. Following Wolfers (2006) and Stevenson and Wolfers (2006), we estimate the dynamic response to the law to account for possible time-varying effects on opinions.<sup>4</sup> To control for the endogenous timing of the law, we control for country- and cohort-specific trends (in addition to the usual country, year and cohort fixed effects). To control for socio-demographic changes over time, that may also participate in changing overall opinion about gay rights, cells are weighted so as to maintain constant the socio-demographic structure of the sample.

To assess the extent to which the effect of a law legalizing the dominant social norm differs depending on social interactions and on the alignment between the law and the local social norm prevailing in the group, we distinguish between cells with dominant strong ties and cells where strong ties are not dominant, as well as between cells where the dominant local social norm aligns with the social norm promoted by the law and cells where it does not. We assume that an individual has a strong tie if she has a partner, which is in line with our dyadic theoretical framework. To address potential biases from reverse and simultaneous causation between the nature of social relations and the opinion about gay rights, we fix the ties' composition of each cell to its level in 2002, *i.e.* the first year observed in the data. We consider that the dominant local social norm

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standard that governs our conduct in the social situations in which we participate. It is a societal expectation" –, the dominant social norm is the norm that is accepted by more than 50% of the population and that is most likely to be supported by the weak ties.

<sup>3</sup>We use the term "local" to refer to a subgroup or community, not in a geographical sense.

<sup>4</sup>A similar approach is also presented as a robustness test by Sansone (2019) to analyze the employment probabilities of same-sex couples following the approval of SSM in the US.

aligns with the social norm promoted by the law when the majority of people in the cell is favorable to gay rights. Again, to address reverse and simultaneous causation we will consider the majority opinion of the cell in 2002. Furthermore, we propose an original strategy exploiting the homophobic or non-homophobic origin of immigrants to analyze the role of social ties in shaping individual’s opinions depending on whether the law aligns or not with the local social norm.

Consistently with our theoretical framework, we find that when considering the whole sample or a subsample composed by a majority of gay-friendly individuals, cells with dominant strong ties are less likely to positively change the opinion about gay rights following SSM approval. This result is reversed when we focus on a community of people for whom homophobia is the local social norm, in spite of living in a country where the aggregate social norm is the full recognition of gay rights. In this case, people with dominant strong ties react less negatively following the approval of SSM law.

We combine and contribute to three streams of literature. The first body of literature we relate to has its main representation in the recent paper of Acemoglu and Jackson (2017), which focuses on how social norms are shaped by laws while, at the same time, social norms constrain the effectiveness of laws.<sup>5</sup> The interplay between social norm and law is complex. On some societal issues the question is repeatedly asked whether the law can precede the norm and change behaviors and opinions (Benabou and Tirole, 2011). As pointed out in Acemoglu and Jackson (2017), in some circumstances, we observe a rapid and profound change in the social norm following the passing of the law – *e.g.* the impact of antidiscrimination and antiracist laws on norms and practices in US South (Wright, 2013) –, while in other cases, the law appears ineffective in changing behaviors and opinions of a large share of the population – *e.g.* the (un)enforcement of British laws in Afghanistan (Barfield, 2010), in India and Kenya (Parsons, 2010) or may even have countervailing effect (Bishin et al., 2016; Parisi and von Wangenheim, 2006). Acemoglu and Jackson (2017) underline that a conflict between prevailing norms and new laws often renders such laws ineffective. Because authorities cannot check if everyone is respecting the law, they must rely on whistle-blowing by private citizens or firms to enforce the law. When the law goes against the prevailing norms, *i.e.* restricts the behavior excessively relative to the distribution in the society, then most people prefer breaking the law, which reduces whistle-blowing and hence the effectiveness of laws. Moreover, as laws are broken by more people, whistle-blowing becomes even less likely, and law-breaking snowballs. The authors conclude that “gradual imposition of laws that are more in accord with prevailing norms can successfully change behavior and thus future norms”.

In the present paper, we consider the effect of the law on the opinion of individuals about a particular societal issue and we do not refer to law enforcement, so that the mechanism of whistle-blowing cannot apply here. In our paper the snowball effect is at play depending on the local norm, the nature of the individual’s social ties and opinions of the partner and encounters. In a study close to ours, Tankard and Levy-Paluck (2017) use a controlled experimental setting to study

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<sup>5</sup>See also Benabou and Tirole (2011) or, for a survey, see McAdams and Rasmusen (2007).

reactions to the June 2015 U.S. Supreme Court ruling in favor of same-sex marriage. They found an increase in perceived social norms supporting gay marriage after the ruling but no average change in personal attitudes. Tankard and Levy-Paluck (2017) do not consider potential heterogeneous changes in attitudes depending on the nature of social interactions. The idea of our work is that it is the social norm prevailing in the individuals' social network that matters to shape opinions. Agents tend to imitate choices and opinions of their ties (conformity within groups was first studied by Banerjee, 1992 or Bikhchandani et al., 1992 and has also been recently analyzed by Bursztyn et al., 2020). This imitating behavior is likely to affect the potential influence of the law on individuals' choices and opinions.

The second stream of literature we contribute to is about networks and the strength of interpersonal relationships (weak vs. strong ties), which has already shown quite extensively how strong and weak ties affect individuals' decisions and behaviors in a number of areas, such as employment, migration or criminality (see Calvo-Armengol et al., 2007, Giulietti et al., 2018, Hemeny, 2015, or Zenou, 2015)<sup>6</sup>. We investigate here how the nature of social ties may matter in an area where evidence is still scarce, that is opinion formation and the diffusion of a social norm (see French, 1956, Harary, 1959, DeGroot, 1974, for seminal theoretical references, and Golub and Sadler, 2016, for a detailed review on learning in social networks).

On a close subject, Broockman and Kalla (2016) analyze the influence of social interactions on individuals' opinions about antitransgender prejudice, using a field experiment with a door-to-door canvassing intervention in South Florida. They show that these conversations substantially reduced transphobia (this effect persisting for 3 months), thus pointing to the importance of social interactions as drivers of individual opinions. While Broockman and Kalla (2016) focus on weak ties (*i.e.* canvassers did not know previously the interviewee), in our paper we analyze the differentiated influence of weak ties and strong ties in the formation of opinions.

Last, our work relates to the specific literature about gay-friendly attitudes. Existing studies show that attitudes towards gays and lesbians are influenced by a number of factors, including religious and moral values, political affiliation, contacts and social interactions with gays, lesbians and same-sex couples, and demographics such as gender and age (Baunach, 2012; Broockman and Kalla, 2016; Garretson, 2015; Keleher and 2012., 2012; Roy and Abaid, 2017). In this respect, recent studies show that historical events, by creating a variegated spatial pattern of sex ratios, help to explain the spatial distribution of current attitudes towards homosexuality. Baranov et al. (2020a,b) provide such evidence for Australia, by exploiting the British convict transportation to the country in the 18th-19th centuries. Brodeur and Haddad (2018) show similar consequences

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<sup>6</sup>Information flows resulting from conveying information within social networks, play a role in a range of phenomena such as an effective mechanism for obtaining job offers (see Wahba and Zenou, 2005, Bayer et al., 2008, Bentolila et al., 2010, or Pellizzari, 2010, among others), geographical mobility (see David et al., 2010, Alesina et al., 2015, Spilimbergo and Ubeda, 2004, Gibson and McKenzie, 2011, concerning the return decision of immigrants), welfare participation of immigrants (Bertrand et al., 2000; Furtado and Theodoropoulos, 2013) or self-reported delinquency (see, *e.g.*, Glaeser et al., 1996; Matsueda and Anderson, 1998; Warr, 2002).

from the US gold-rushes during the mid-to-late 19th century. Moreover, Fernandez et al. (2019) show that the AIDS epidemic in the US promoted a greater political organization and mobilization of the gay community in the late 80s and 90s. Mainstream political parties had to take positions on gay related issues for the 1992 presidential election, and there were heated political debates and large media coverage. After the election, the authors find that states that were more exposed to the AIDS epidemic experienced a greater change in the positive opinions about gay people.

The positive influence of SSM laws has been documented by Flores and Barclay (2016), Tankard and Levy-Paluck (2017), Ofori et al. (2019) and Sansone (2019) on US data, and by Aksoy et al. (2020), Takacs and Szalma (2011) or Hooghe and Meeusen (2013) on European data. Similarly to these last three studies, we use the European Social Survey (ESS) and exploit variations in the timing of SSM laws across European countries to evaluate the effect of SSM laws on people’s opinions about gay rights. In contrast, we provide two types of contributions. First, we focus on the heterogeneous effects of the law with respect to the nature of social ties and investigate to what extent the nature of social ties may favor or, on the contrary, limit the influence of laws on people’s opinions about gay rights depending on the alignment between the law and the dominant social norm at the aggregate and local community levels. Second, we adopt a slightly different empirical strategy that allows for dynamic reactions to the passing of a law. The formation of opinions and the diffusion of social norms within the population are not an instantaneous process. In the specific context of SSM, its adoption is likely to have time-varying effects: the debates surrounding the law passing may exacerbate extreme opinions and once the law is passed the social norm conveyed by the law may progressively be adopted or may foster an increased rejection as individuals interact with more and more same-sex married couples.<sup>7</sup> Our approach specifically addresses such dynamics.

The remainder of the paper is organized as follows. The theoretical setup is presented in section 2. Data and variables are described in section 3 and the empirical strategy is detailed in section 4. Estimation results are analyzed in section 5 and section 6 concludes.

## 2 The model

The objective of this section is to illustrate the economic rationale behind the econometric results proposed in section 5. We adopt the same framework as in Giulietti et al. (2018) but, instead of analyzing migration decisions, we analyze the adoption of a social norm by the individual. The social norm considered here is the acceptance of gay rights. As shown in the following section, between 2002 and 2016 the average share of people in European countries agreeing or strongly agreeing on the fact that gays and lesbians have the right to live their life as they want progressed from 70% to 80%. The sequential approval of SSM by European countries during this period of time is likely to have directly modified the rejection rate of the social norm. We show here how the impact of the law on individuals’ opinions may also be indirectly shaped by the nature of ties

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<sup>7</sup>In France, since the approval of SSM, same-sex weddings represent an average of 3% of yearly weddings.

depending on the dominant local norm.

## 2.1 Dyads and social interactions

We consider an economy composed by a population whose size is normalized to one. Time is continuous and individuals live forever. As in Calvo-Armengol et al. (2007), Zenou (2015), Hemet (2015) or Giulietti et al. (2018), we assume that individuals have two types of social interactions. First, they belong to mutually exclusive two-person groups, referred to as dyads. Two individuals belonging to the same dyad hold a strong tie with each other. We can thus think of strong ties as marriage or civil partnerships, where two individuals agree to sign a social and economic contract to stay together and the contract is enforced by law.<sup>8</sup> Second, individuals may have weak ties, which are encounters outside the dyad partnership (or random encounters). These relationships will correspond to colleagues or friends met time to time. There is no emotional or socio-economic contract between weak ties, which can be easily broken up.

A law is set by the government. In a democratic society, the social norm conveyed by a law is supposed to correspond to the dominant social norm, since it is promoted by a government which has been elected by the majority of people. The law is thus a legalization of the dominant social norm at the country level, which we will simply call the social norm in the rest of the paper for brevity.<sup>9</sup> A given individual either adopts the social norm, in which case the individual is considered as integrated, or does not, in which case he is considered as non-integrated. We can then distinguish among 3 different types of dyads: (i) both members accept the social norm; (ii) one member accepts the social norm but not the other; (iii) both members reject the social norm. For each period  $t$ , we denote by  $i_t$  the number (or proportion since the population size is normalized to 1) of individuals in the population that accept the social norm, while  $u_t$  stands for the number (or proportion) of individuals rejecting the social norm. The number of integrated and non-integrated individuals in period  $t$  is respectively given by:

$$i_t = 2d_{II}t + d_{IU}t \tag{1}$$

$$u_t = 2d_{UU}t + d_{IU}t \tag{2}$$

where  $d_{II}t$  is the number of dyads composed by two integrated members,  $d_{IU}t$  is the number of dyads in which only one member accepts the social norm and  $d_{UU}t$  is the number of dyads with two non-integrated members. Given that  $1 = i_t + u_t$ , we get  $\frac{1}{2} = d_{II}t + d_{UU}t + d_{IU}t$ .

We assume repeated random pairwise meetings over time. Meetings can take place between dyad partners or not. At time  $t$ , each individual meets a weak tie with constant probability  $\omega$  and her strong tie partner with constant probability  $\alpha$ . We assume that these probabilities are exogenous

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<sup>8</sup>Considering the possibility of divorce and therefore the separation of two members of a dyad is beyond the scope of this paper.

<sup>9</sup>In our case, the adoption of SSM laws took place in a context where the large majority of European societies was supportive of gay rights.

and independent of the integrated nature or not of the individual and of the social tie.<sup>10</sup> In line with Giulietti et al. (2018), we assume that individuals spend some time with their weak ties (captured by  $\omega$ ) and some time with their strong ties (captured by  $\alpha$ ) and impose neither complementarity nor substitutability between these two types of interactions.

## 2.2 Information transmission

Information on the social norm can only arrive through social ties. The pace at which individuals receive this information depends on the status of the dyad partner and on the time spent with strong and weak ties. By definition weak ties always promote acceptance of the social norm but, as shown below, their relative influence is increased when the social norm is accepted by the majority of people in a society, *i.e.*  $i_t > u_t$ . If the individual's dyad-partner is integrated, the influence about the social norm will arrive through both strong ties and weak ties. Conversely, if the partner is non-integrated, information about the social norm can only arrive through sporadic contacts outside the dyad (*i.e.* weak ties).

Quite naturally, we assume that individuals are more willing to accept the social norm when the information comes from a strong tie rather than from a weak tie. This difference is explained by the fact that a strong tie who has a long-term relationship with the non-integrated individual is considered to provide more reliable information. To simplify, the probability of accepting the social norm is set to 1 when the information is received from the strong tie and is equal to  $0 < p < 1$  when it comes from a weak tie.

We assume that individuals that already accept the social norm will only change their mind and start rejecting the social norm following an exogenous shock that arrives with probability  $\delta$  – an hypothesis which is also consistent with the assumptions in Giulietti et al. (2018).<sup>11</sup> In our case, the approval of SSM is likely to modify this probability of rejection,  $\delta$ .<sup>12</sup> We can reasonably argue that the approval of SSM was aimed at reducing the rejection rate of gay rights. However, the law was so controversial among some people that it could have eventually increased this rejection rate. We will consider the consequences of both scenarii.

This information transmission protocol defines a Markov process. The state variable is the relative size of each type of dyad. Because of the continuous-time Markov process, the probability of a two-state change is zero during a small interval of time  $t$  and  $t + dt$ . This means, in particular, that both members of a dyad cannot change their status at the same time.

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<sup>10</sup>Endogenizing the  $\omega$  and  $\alpha$  probabilities is beyond the scope of the paper. See Zenou (2015) for a dyadic model with endogenous social interactions.

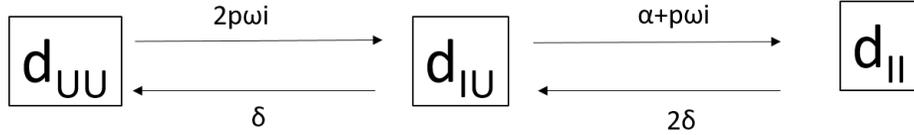
<sup>11</sup>This modelling choice implies that social ties cannot push individuals to reject the social norm. Note though that when the majority of the individual's social contacts rejects the social norm, *i.e.*  $u_t > i_t$ , social interactions will barely influence the adoption of the norm.

<sup>12</sup>See Tankard and Levy-Paluck (2017) for an analysis on how the institutional ruling about SSM by the Supreme Court in the US influenced the social norm and personal attitudes towards gay marriage.

### 2.3 Flows of dyads between states

Entry and exit flows of dyads from each state between  $t$  and  $t + dt$  are given by equations (11), (12) and (13) in Appendix A. Figure 1 illustrates the different types of dyads we encounter in our model as well as the flows between the dyads.

**Figure 1:** Flows across dyads



A non-integrated individual being in a dyad  $d_{UUt}$  can only be influenced to change her mind about the social norm through random contacts with integrated individuals she might meet or hear. Time spent with weak ties equals  $\omega$ , the probability of being influenced by a weak tie equals  $p$  and the number of integrated individuals equals  $i_t$ . Therefore, outflows from the  $d_{UUt}$  equal the number of  $d_{UU}$ -dyads in which one of the two members has accepted the social norm through her weak ties,  $p\omega i_t$ .

Non-integrated individuals who belong to  $d_{IUt}$  dyads, and hence have a dyad partner who accepts the social norm, have a probability  $(\alpha + p\omega i_t)$  of accepting the social norm. They are more likely to be influenced by the social norm than individuals from a  $d_{UUt}$  dyad, since they interact with both strong ties and weak ties accepting the social norm.

### 2.4 Steady state population composition

As shown in Appendix A, a steady state dyad equilibrium flows is a quintuple  $(i^*, u^*, d_{UU}^*, d_{IU}^*, d_{II}^*)$  such that  $d_{UUt} = d_{IUt} = d_{II}t = 0$ ,  $\frac{1}{2} = d_{II}^* + d_{IU}^* + d_{UU}^*$ ,  $i^* = 2d_{II}^* + d_{IU}^*$  and  $u^* = 1 - i^*$  are satisfied.

Following the same procedure as in Appendix A1 of Giulietti et al. (2018), we can establish the equivalent proposition as their proposition 1:

1. There always exists a steady-state equilibrium  $\mathcal{N}$  where no one accepts the social norm and only  $d_{UU}$ -dyads exist. In such equilibrium  $d_{II}^* = d_{IU}^* = i^* = 0$ ,  $d_{UU}^* = 1/2$  and  $u^* = 1$ .
2. If

$$\delta < \frac{\omega p + \sqrt{\omega p(4\alpha + \omega p)}}{2} \quad (3)$$

there exists an interior steady-state equilibrium  $\mathcal{I}$ , where  $0 < i^* < 1$  is defined by :

$$i^* = \frac{\sqrt{4\delta\alpha + \alpha^2 + 2\alpha\omega p + \omega^2 p^2} - 2\delta - \alpha + \omega p}{2\omega p} \quad (4)$$

If the rate at which individuals reject the social norm  $\delta$  is sufficiently low (condition (3)), then an interior equilibrium exists. Otherwise individuals reject the social norm with a very high probability and mostly become non-integrated, so that the steady state equilibrium  $\mathcal{N}$  prevails. In the interior steady state equilibrium  $\mathcal{I}$  we can determine the share of people  $i^*$  that accepts the social norm, as well as the dyad composition (see Appendix A).

As in proposition 2 of Giulietti et al. (2018) we find that:

1. If  $\omega = 0$  (*i.e.* no weak ties), then condition (3) does not hold and we will be in  $\mathcal{N}$  with  $i^* = i_{\omega=0}^* = 0$ .
2. If  $\alpha = 0$  (*i.e.* no strong ties), then condition (3) holds and we will be in  $\mathcal{I}$ . From equation (4) we find  $i^* = i_{\alpha=0}^* = 1 - \frac{\delta}{\omega p}$ .
3. If we compare the share of integrated people in each case we find that  $i_{\omega=0}^* < i_{\alpha=0}^* < i^*$ , where  $i^*$  denotes the share of integrated people when both types of interactions are allowed, *i.e.*  $\omega \neq 0$  and  $\alpha \neq 0$ .

The last inequality comes from the fact that  $\frac{\partial i^*}{\partial \alpha} > 0 \Leftrightarrow 2\delta + \alpha + \omega p > \sqrt{4\delta\alpha + \alpha^2 + 2\alpha\omega p + \omega^2 p^2}$ , which is equivalent to  $\delta + \omega p > 0$  which is always true. Moreover, from equation (4) we can also draw the following conclusions:

- The share of integrated people increases with time spent with weak ties  $\frac{\partial i^*}{\partial \omega} > 0$ <sup>13</sup> ;
- The share of integrated people decreases with the exogenous rate at which integrated people reject the social norm  $\frac{\partial i^*}{\partial \delta} < 0$ .<sup>14</sup>

In this framework, non-integrated individuals can only hear about the social norm through their ties. Then, social ties always influence positively the number of integrated individuals. If  $i_t > u_t$  the relative influence of weak ties is increased compared to the situation where  $u_t > i_t$ . In the absence of weak ties, non-integrated individuals with non-integrated partners never have the opportunity to hear about the social norm. Non-integrated individuals with integrated partners will always accept the social norm since information comes from their partner. However, given the constant rejection rate  $\delta$ , the economy with no weak ties eventually converges to an equilibrium  $\mathcal{N}$  with  $i_{\omega=0}^* = 0$ . In contrast, in the presence of weak ties, when time spent with strong ties equals zero, all non-integrated individuals, whatever the status of their partner have the opportunity to hear about the social norm through weak ties. The larger the share of integrated people the larger the relative influence of weak ties. The economy converges to an interior equilibrium  $\mathcal{I}$  where  $i_{\alpha=0}^* = 1 - \frac{\delta}{\omega p}$ . Weak ties then play a relatively more important role in the acceptance of the social norm. This is consistent with findings in Calvo-Armengol et al. (2007) or Zenou (2015).

<sup>13</sup>  $\frac{\partial i^*}{\partial \omega} > 0 \Leftrightarrow (2\delta + \alpha)^2 4\delta\alpha + \alpha^2 + 2\alpha\omega p + \omega^2 p^2 > (4\delta\alpha + \alpha^2 + \alpha\omega p)^2$  which is always true.

<sup>14</sup>  $\frac{\partial i^*}{\partial \delta} < 0 \Leftrightarrow \frac{\alpha}{\sqrt{4\delta\alpha + \alpha^2 + 2\alpha\omega p + \omega^2 p^2}} < 1$  which is always true

## 2.5 SSM approval

In our specific case, SSM approval is assumed to modify the rate  $\delta$  at which people reject the social norm, *i.e.* gay rights. We now seek to analyze how the impact of this  $\delta$ -change on individuals' opinions is altered by the nature of ties when we are in the interior equilibrium  $\mathcal{I}$ .

To do so we need to cross differentiate equation (4) with respect to  $\delta$  and  $\alpha$ . Differentiating with respect to  $\delta$  leads to:

$$\omega p \frac{\partial i^*}{\partial \delta} = \frac{\alpha}{\sqrt{4\delta\alpha + \alpha^2 + 2\alpha\omega p + \omega^2 p^2}} - 1$$

To simplify, let us denote  $A = 4\delta\alpha + \alpha^2 + 2\alpha\omega p + \omega^2 p^2$ . Cross differentiating with respect to  $\alpha$  leads to:

$$\frac{\partial i^{*2}}{\partial \delta \partial \alpha} = \frac{1}{\omega p A \sqrt{A}} (2\delta\alpha + \alpha\omega p + \omega^2 p^2) > 0 \quad (5)$$

The positive cross derivative implies that following a decrease in the rejection rate of gay rights, the increase in the share of integrated people will be smaller the larger the time spent with strong ties. Similarly, following an increase in the rejection rate  $\delta$ , the decrease in the share of integrated people will be smaller the larger the time spent with strong ties. In this case strong ties promote more integration.

The sign of  $\frac{\partial i^{*2}}{\partial \delta \partial \omega}$  is in principle undetermined. Following an increase in the rejection rate of gay rights, the decrease in the share of integrated people should be smaller the larger the time spent with weak ties, since these ties promote acceptance. However, if  $\delta$  is very high, the number of integrated people will be so small that the positive effect induced by weak ties on the number of integrated people will be dominated by the negative impact of the rejection rate. The sign of the cross derivative  $\frac{\partial i^{*2}}{\partial \delta \partial \omega}$  is then undetermined.<sup>15</sup>

## 2.6 The local social norm

Until now, we have interpreted the adoption of SSM law as a legalization of the dominant social norm at the country level, *i.e.* at the aggregate level  $i_t > u_t$ . There are though some communities (or social networks) within countries having approved SSM where the dominant opinion is unfavorable to gay rights. For these communities, the local social norm is opposed to the aggregate social norm. In these communities the share of non-integrated people overcomes the share of integrated people,  $u_{jt} > i_{jt}$  where  $j$  stands for community. Following the adoption of SSM law, did weak and strong ties shaped differently the opinion about gay rights within these communities?

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<sup>15</sup>More precisely

$$\omega p \frac{\partial i^{*2}}{\partial \delta \partial \omega} = \frac{-\alpha(\alpha p + \omega p^2)}{A\sqrt{A}} - \frac{\alpha}{\omega\sqrt{A}} + \frac{1}{\omega} \geq 0 \quad (6)$$

For  $1 < \frac{\alpha\omega(\alpha p + \omega p^2)}{A\sqrt{A}} + \frac{\alpha}{\omega\sqrt{A}}$  we will have  $\frac{\partial i^{*2}}{\partial \delta \partial \omega} < 0$ . Applied to the approval of SSM, this implies that the increase in the number of integrated people following a decrease in  $\delta$  is higher for larger  $\omega$ .

Given that the static comparative results presented in the previous section do not depend on whether  $u_t \leq i_t$ , the answer would be negative. Weak and strong ties do not shape in a different way the opinion of individuals when  $u_t > i_t$ . However, the impact of SSM law on the rejection rate may differ. In communities where the majority of people is favorable to gay rights, the adoption of SSM law simply makes legal the already dominant social norm and therefore it should contribute to reduce the rejection rate  $\delta$  or, at least, it should not increase it. In contrast, in communities where the majority of people is unfavorable to gay rights, the direct impact of SSM laws may rather be negative and favor an increase in the rejection rate  $\delta$ . Positions in these communities may become radicalized (at least in the short run) following the approval of SSM.

If within the communities unfavorable to gay rights the  $\delta$  is so high that condition (3) does not hold, we will converge to the steady-state equilibrium  $\mathcal{N}$  where only non-integrated people exist in the community. If the rejection rate satisfies condition (3) the community will converge to an interior steady-state equilibrium  $\mathcal{I}$ , where the share of integrated people is given by (4). In this equilibrium, comparative static results from previous section still hold:  $\frac{\partial i^*}{\partial \alpha} > 0$  and  $\frac{\partial i^*}{\partial \omega} > 0$ . Non-integrated individuals can only change their mind if they are influenced by weak or strong ties. However, the influence of weak ties is reduced with respect to strong ties since now the share of integrated people is smaller (*i.e.*  $u_t > i_t$ ) and non-integrated individuals continue to accept the norm with probability  $p$  when information arrives through weak ties. In contrast, non-integrated individuals always accept the norm whenever the information arrives from the dyad-partner (strong tie).

Within these communities, the aggregate social norm (conveyed by SSM law) clashes with the local social norm. SSM adoption may increase the rejection rate of the aggregate social norm,  $\delta$ . Since results from the previous section do not depend on  $i_t \geq u_t$ , we still have  $\frac{\partial i^{*2}}{\partial \delta \partial \alpha} > 0$ . This implies that, following a rise in  $\delta$ , the decrease in the share of integrated people will be smaller the longer the time spent with strong ties. In these communities, strong ties should then favor relatively more integration.

If SSM is still associated with a decreased rejection rate even within these communities, conclusions from the previous section will hold and strong ties should promote relatively less integration.

The way social ties shape individuals' opinions is going to depend on whether the law induces a decrease or an increase in the rejection rate, and this will depend on whether the law is in line with the local norm. Our empirical analysis is operated in a backward manner since we deduce the impact of the law on the rejection rate depending on the influence of strong ties on personal attitudes towards LGBT rights.

## 2.7 From theory to econometrics

The sequential approval of SSM laws in European countries represented a progressive legalization of what was already becoming a dominant social norm: “gays and lesbians have the right to live their life as they want”. The model provides the following predictions concerning the impact of

SSM approval and the role of weak/strong ties in shaping this impact.

At the aggregate level, if the legalization of the dominant social norm (favorable to gay rights) through the approval of SSM is associated with a decrease in the rejection rate  $\delta$ , we should find that the increase in the number of integrated people should be smaller the longer the time individuals spend with strong ties, *i.e.*  $\frac{\partial i^{*2}}{\partial \delta \partial \alpha} > 0$ . We will refer to this first prediction of the model as Scenario G (general scenario).

The second prediction of the model focuses on the role of the dominant local social norm, which stands for the social norm shared by the majority of people belonging to a particular community within the society. When the aggregate and local social norms are similar, predictions from Scenario G are not modified. SSM approval stands for a legalization of the local social norm. As far as this decreases the rejection rate  $\delta$  we should still find that within the community the increase in the number of integrated people is smaller the longer the time spent with strong ties. We refer to the situation where the aggregate and local social norms are similar as Scenario NH (non-homophobic scenario).

When the aggregate and local social norms differ, the approval of SSM clashes with the local norm. This may foster an increased rejection of the aggregate social norm leading to an increase in  $\delta$ . In this case, the model predicts that, following the increase in  $\delta$ , the number of integrated people should be larger among individuals spending more time with strong ties. The scenario where SSM approval clashes with the local social norm and induces an increased rejection rate is referred as Scenario H (homophobic scenario).

The econometric section proposes to test the three predicted scenarios: (i) Scenario G applies to the whole sample of individuals; (ii) Scenario NH applies to any subsample including individuals whose dominant opinion is favorable to gay rights; (iii) Scenario H applies to any subsample including a majority of homophobic people.

## 3 Data

### 3.1 The data

We use the European Social Survey (ESS), an academically driven cross-national survey, which is conducted every two years since 2001 on more than 30 countries. In each participating country, face-to-face interviews are conducted with newly selected, cross-sectional representative samples of residents aged of 15 and above. The aim of the ESS is to chart stability and change in social structure, conditions and attitudes in Europe and to interpret how Europe's social, political and moral fabric is changing. Individuals are asked about their attitudes, beliefs and behavior patterns in various areas. In particular, they are asked about their opinion regarding the statement "Gay men and lesbians should be free to live their own life as they wish". They report whether they "1 Strongly agree ; 2 Agree; 3 Neither agree nor disagree; 4 Disagree; 5 Strongly disagree " with this statement. We consider that people agreeing or strongly agreeing with this statement have

gay-friendly opinions. This is our main outcome variable.

According to Acemoglu and Jackson (2017), the dominant social norm in a country is that accepted by the majority of the individuals. On the basis of this definition, we consider that in European countries where SSM laws have been adopted by a democratic elected government the dominant social norm is a positive recognition of gay rights.<sup>16</sup> We collect information on SSM legalization dates from the International Lesbian, Gay, Bisexual, Trans and Intersex Association. In every country, the year the law is passed is also the year it becomes effective. We restrict our analysis to SSM laws and do not extend our analysis to the recognition of unregistered cohabitation or to civil unions because for most countries such changes occurred before the beginning of our observation period<sup>17</sup>.

To test our theoretical predictions, we need to determine what is a strong tie. There is no unanimous definition of strong ties in the empirical literature. Granovetter (1973) measures the strength of the ties by the frequency at which individuals met. Lin et al. (1981) include in strong ties relatives, friends and neighbors, so as Giulietti et al. (2018), who however exclude strong ties members of the household so as to avoid endogeneity issues. In this paper we consider that individuals being married or having an official partner have dominant strong ties. While being married or having an official partner may be an imperfect measure on the nature of ties, a marriage or partnership involves two individuals in a couple (or dyad), who have chosen to be together and they have agreed to sign a social and economic contract which can be enforced by law. This makes the link stronger than other social contacts. Furthermore, in most occidental countries there is around 50% of married couples that do not divorce and stay together “for life”.

To test our scenarii H and NH, we do not need to know the opinion of the partner (which is anyway not available in the data), as our theoretical predictions do not depend on the opinion of the strong tie, but we need to know the social norm that is dominant within the individual’s

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<sup>16</sup>Table C.2 in Appendix C regresses the share of gay-rights supporters in the country-age-gender cells (we define cells in more detail in section 4) on the dummy variable “Before SSM”, which equals unity for the period before SSM adoption in countries having adopted SSM and zero for countries that have not adopted SSM. Whatever the set of fixed effects introduced, the estimated coefficients remain positive and significant, suggesting that countries that adopted SSM had ex-ante more tolerant social norms towards gay rights. Table C.3 compares social attitudes towards homosexuality during the period 2002-2010 between countries having adopted SSM before 2010 (this date is chosen in a somewhat arbitrary way but results remain robust if we eliminate countries that adopted the law around this threshold), countries adopting SSM after 2012 (*i.e.* the “Followers”) and countries that did not adopt SSM until 2016 (*i.e.* the “Non-adopters”). Results confirm that countries not adopting SSM display systematically less positive opinions about gay rights – and so more intolerant social norms – during the period 2002-2010. In contrast, the “Followers” display more positive opinions about gay rights than countries adopting SSM before 2010. Heterogeneity in the countries’ legislation concerning children adoption could be one potential explanation behind this delayed adoption by countries displaying positive opinions about gay rights.

<sup>17</sup>See Table C.1 in Appendix C. We also focus on gay rights, rather than on rights of the whole LGBT community, since the ESS explicitly asks the individual whether gays and lesbians should be free to live their own life as they wish. Note though that SSM laws have actually benefited the whole LGBT community and that individuals’ opinions about gays and lesbians rights to live their life as they wish should be strongly correlated with the individuals’ opinion about LGBT rights.

social network. To define this local social norm, we will adopt two strategies, one of which requires to gather data about homophobia around the world. To do so we use the “Gay Voyager” (<https://www.gayvoyageur.com>), which provides advice to homosexual travelers on both gay-friendly and homophobic countries. According to this site, recommendations are based on culture, religion and history of a country, city or town. We also use the World Value Survey (wave 2010-2014)<sup>18</sup>, which asks individuals if they would not like to have as neighbor a homosexual person.

## 3.2 The sample

We keep countries who participated in the ESS for at least 7 out of the 8 waves from 2002 to 2016 and that have not passed SSM laws by 2002.<sup>19</sup> We end up with the following 17 countries: Belgium, Switzerland, Czech Republic, Germany, Denmark, Estonia, Spain, Finland, France, Great Britain, Hungary, Ireland, Norway, Poland, Portugal, Sweden, and Slovenia. 9 of these countries legalized SSM between 2002 and 2016 (see Table B.1 in Appendix B).

We use all the individual observations of these countries and apply design/post-stratification weights in combination with population size weights to our estimations.<sup>20</sup> Table B.2 in Appendix B describes the main variables used in the analysis for the whole sample and the immigrant sample.

## 3.3 Descriptive analysis

Over the 2002-2016 period, the average opinion on gay rights improved overall (see Figure 2): the share of individuals agreeing or strongly agreeing with the statement “Gay men and lesbians should be free to live their own life as they wish” increased from 70% to 80%. This increase is more marked starting from 2006 and is mostly driven by an increase in the share of individuals strongly agreeing with the statement.

The situation is though far from being homogeneous across countries and it strongly differs with respect to the legal framework (see Figure 3). If the share of people agreeing with the statement that gay men and lesbians should be free to live their own life as they wish is fairly the same in countries with and without SSM law, the share of the population that strongly agrees on this

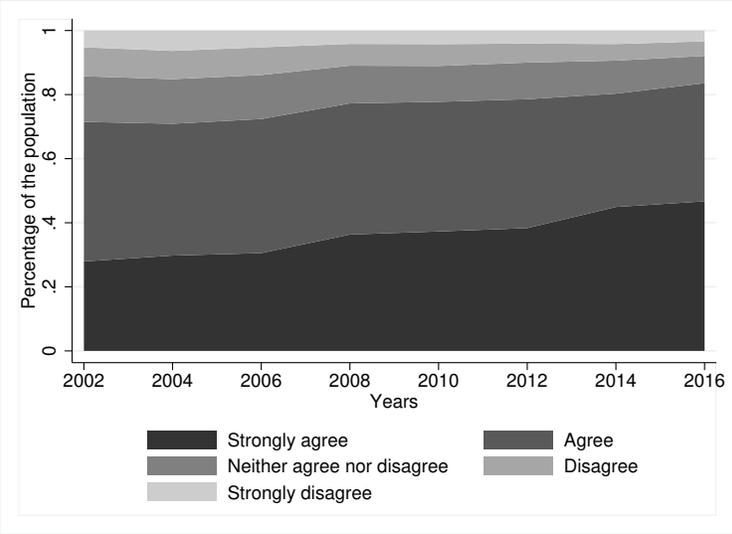
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<sup>18</sup>Information on Andorra, Bulgaria, Burkina Faso, Canada, Ethiopia, Finland, France, Guatemala, Hungary, Indonesia, Iran, Italy, Mali, Moldova, Norway, Serbia, Switzerland, United Kingdom, Vietnam and Zambia comes from the 2005-2009 waves.

<sup>19</sup>The choice to exclude for the analysis sample countries that passed SSM laws before the beginning of the observation period is driven by the identification strategy. See Section 4.

<sup>20</sup>Design weights are computed as the inverse of the inclusion probabilities. The inverse inclusion probabilities are then scaled such that their sum equals the net sample size and the mean equals one. The post-stratification weights are obtained by adjusting the design weights in such a way that they will replicate the distribution of the cross-classification of age group, gender, and education in the population and the marginal distribution for region in the population. The population size weight makes an adjustment to ensure that each country is represented in proportion to its population size. See [https://www.europeansocialsurvey.org/methodology/ess\\_methodology/data\\_processing\\_archiving/weighting.html](https://www.europeansocialsurvey.org/methodology/ess_methodology/data_processing_archiving/weighting.html) for further details about weighting in ESS.

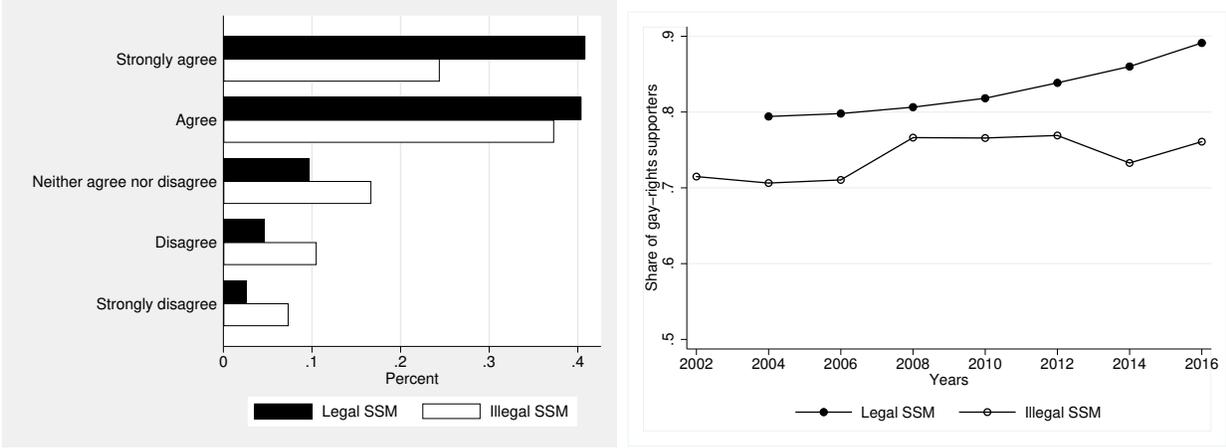
**Figure 2:** “Gay men and lesbians should be free to live their own life as they wish” : average opinion over time



Source: European Social Survey (2002-2016). Sample: All countries together.

statement is much larger in countries that passed SSM laws than in those which did not, with 40% versus 23%. Additionally, the share of individuals with no opinion or (strongly) disagreeing with the statement is also greater in countries where SSM is illegal than in countries where it is legal. The gap on the average opinion about gay rights between countries with legalized SSM and the rest of the countries has remained fairly constant around 10 to 15 ppt since 2002, as shown by the right-hand side panel in Figure 3.

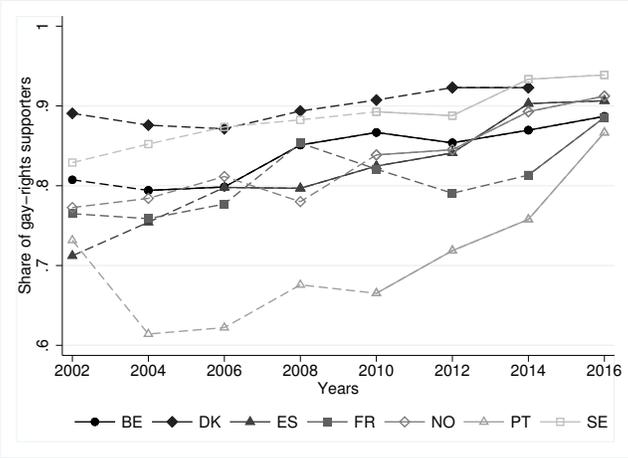
**Figure 3:** “Gay men and lesbians should be free to live their own life as they wish”: average opinion by legal status of SSM and by year



Source: European Social Survey (2002-2016). Note: Gay-rights supporters are individuals who agree or strongly agree with the statement: “Gay men and lesbians should be free to live their own life as they wish”.

Legal framework concerning SSM and population opinions about gay rights are then strongly correlated. The causality between laws and average opinions remains undetermined though. This positive correlation between SSM laws and gay-friendly opinions may reflect a positive impact of SSM approval on gay-friendly opinions, but it may also be due to the fact that countries adopt SSM laws when a majority of the population is in favor (or is expected to be soon in favor) of such laws. Both explanations seem to be supported by Figure 4, which shows for each country that passed SSM laws between 2002 and 2016, how the share of gay-friendly opinions evolved before (dashed line) and after (solid line) the adoption of the law. The approval of SSM was preceded in all countries, except for France, by a rising path in the share of people agreeing or strongly agreeing that gay men and lesbians should be free to live their own life as they wish. After legalization this positive trend in gay-friendly opinions has remained and even accelerated in almost all countries. These pre-existing changes in opinions would suggest that the approval of SSM was the legalization of the dominant social norm, so that law approval stands for a good indicator of the dominant social norm at the aggregate level. As for the post-law changes in opinions, it would suggest that SSM approval promoted a reduction in the rejection probability of gay rights,  $\delta$ , at the country level. The empirical analysis developed in the rest of the paper aims to control for these pre-existing changes in opinions and neutralize the reverse causality problem, to determine the extent to which SSM approval has a causal impact on opinions and contributes to explain the positive post-law trends documented here.

**Figure 4:** “Gay men and lesbians should be free to live their own life as they wish”: average opinion by country and over time

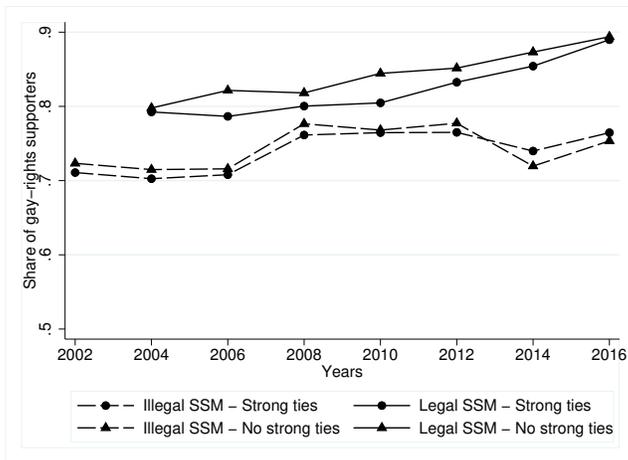


Source: European Social Survey (2002-2016). Notes: Gay-rights supporters are individuals who agree or strongly agree with the statement: “Gay men and lesbians should be free to live their own life as they wish”. For each country, the dashed (solid) line indicates the share of supporters before (after) the legalization of gay marriage in the country.

One main goal of this paper is to test whether people are less likely to adopt the social norm made legal depending on the nature of social ties. To get a first descriptive picture of the possible relationship between law, opinion and social ties, Figure 5 shows the evolution of the average gay-friendly opinion depending on the legal status of SSM in the country of residence and on the nature of individuals’ dominant ties (see online Appendix<sup>21</sup> for a decomposition by country). While there are strong differences in the share of gay-rights supporters depending on the legal status of SSM, the nature of dominant ties does not seem to fundamentally modify the observed trend in the share of gay-rights supporters. Any further interpretation of this figure is prevented by the endogenous nature of gay-friendly opinions to the type of ties. Individuals with a partner may indeed have specific attributes that make them also be more or less in favor of gay rights. The econometric analysis will deal with these issues.

<sup>21</sup> Available on the personal websites of the authors.

**Figure 5:** “Gay men and lesbians should be free to live their own life as they wish”: average opinion of Europeans by legal status of SSM and nature of dominant social ties



Source: European Social Survey (2002-2016). Note: Gay-rights supporters are individuals who agree or strongly agree with the statement: “Gay men and lesbians should be free to live their own life as they wish”.

## 4 Econometric Analysis

### 4.1 A dynamic difference-in-difference model

We exploit cross-country differences in the timing of adopting SSM and implement a difference-in-difference strategy on a pseudo-panel created from the repeated cross-sectional individual ESS data. The diff-in-diff estimator compares changes in the share of gay-rights supporters between cohorts which are subject to the policy at different moments of time and those which are not subject to it yet or that are not at all subject to it.

We adopt a cell approach to introduce a temporal dimension – as we can follow cells over time – and consider fixed effects models as with genuine panel data.<sup>22</sup> Our cells are defined by country, year, and individual demographics, including age (15-25, 26-35, 36-45, 46-55, more than 55) and gender.<sup>23</sup> Considering age and gender as the demographic characteristics driving social interactions

<sup>22</sup>Because we aim at evaluating the impact of social ties on the effect of SSM laws, we need to adopt an approach that deals with the endogenous nature of social ties. In absence of panel data at the individual level and of an obvious instrument for the nature of social ties, an analysis at the individual level would produce biased estimates due to omitted variables. To remedy this issue, we follow Verbeek and Nijman (1992) and Verbeek and Nijman (1993) and aggregate data into cells to create a (pseudo-)panel. Working on aggregated data allows for the inclusion of (cell-) fixed effects and for the control of lag values of social ties (that therefore act as predetermined instruments). Additionally, the cell-approach gives us a simple way to proxy the opinion of peers, information that is not directly available at the individual level.

<sup>23</sup>In a pseudo-panel approach, cells are formed with individuals having some common characteristics and then cell means are treated as observations. These cell means may be subject to measurement (or sampling) errors, in approximating population means if the number of individuals in each cell is not sufficiently large. There is no general rule to determine whether the cell size is large enough to ignore sampling errors, but Verbeek and Nijman (1992)

seems consistent with the empirical evidence and the existing literature. As revealed by Panel A in Figure C.1 Appendix C, whatever the age range we consider, around 70% of the population in the age range declares a “Strong sense of belonging to age group”. Moreover, the ESS (wave 2008) also asks the individual if she has friends (outside the family) younger than 30 years old and older than 70 years old. Panel B of Figure C.1 Appendix C considers the answers to these questions by age range. We find that among people between 15 and 25 years old, 80% declares having at least 2 friends younger than 30. This percentage is above 60% when considering the age range 26-35, and it falls to 37%, 30% and 21% when considering the age ranges 36-45, 46-55 and more than 55, respectively. When individuals are asked about their friends above 70 years old, around 5% of people in the age ranges 15-25 and 26-35 declares having at least 2 friends. This percentage equals 13% and 18% for the age ranges 36-45, 46-55, respectively, and it raises above 40% for people above 55 years old. Friendship seems then strongly driven by age. It is also driven by gender. As remarked by the psychological literature (see Rose, 2002 or Kovacs et al., 1996), friends in childhood and in youth are typically same-sex peers and consistent gender differences are present in these relationships. During childhood the two sexes engage in fairly different kinds of activities and games (see Huston, 1985 or Maccoby, 1990). As children move into adolescence and adulthood, despite the powerful attraction to members of the opposite sex, young people continue to spend a good proportion of their social time with same-sex partners, which contributes to the development of sex-typed peer relationship processes that influence emotional and behavioral development of girls/women and boys/men (see Rose and Rudolph, 2006 or Giulietti et al., 2020). In adulthood, there is extensive gender segregation in workplaces and in leisure time even after marriage (see Maccoby, 1990).

In addition to age and gender, we add a geographic dimension to define our cells. We work at the “country” level which, in the case of the ESS, also captures the fact that people that interact together speak the same language.<sup>24</sup> The construction criteria for our cells are left constant for every year of the considered period. Most cells are composed of more than 100 individuals.<sup>25</sup>

Our setup departs from the standard two periods - two groups diff-in-diff model, as we consider multiple time-periods and multiple groups that are treated at different dates. Moreover, we need to consider time-varying effects, as the spread of a new norm may take time. Such a diff-in-diff framework with multiple treatment times and dynamic responses has recently been a source of controversy in the literature. Wolfers (2006) pointed out that when treatment effects vary over time, a major difficulty in diff-in-diff analyses involves separating out preexisting trends from the dynamic effects of the policy shock. A single-coefficient diff-in-diff estimator reflects the

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and Verbeek and Nijman (1993) suggest that 100 individuals per cell is a reasonable floor. In our case we respect this lower bound and when we cannot respect it due to the lack of observations we mention it in the text.

<sup>24</sup>Using a smaller geographical unit, as the region, will lead to a number of observations per cell too small to operate a cell analysis. The country level allows us to capture the language similarity dimension, as does the region, and internalizes the fact that people moving from one region to another within a country may keep their friends who stayed in the region of origin.

<sup>25</sup>321 over 1450 cells include less than 100 individuals.

difference between the actual path of the outcome variable and a systematically biased estimate of its counterfactual.<sup>26</sup> To remedy this identification issue, Wolfers (2006) and Stevenson and Wolfers (2006) propose a specification that explicitly models the dynamic response function, thanks to the inclusion of dummy variables for the different couples of years following the adoption of the law (1-2, 3-4, 5-6 and so on) instead of a single before/after dummy. These dummy variables identify the entire response function allowing the estimated country-specific time trends to identify pre-existing trends. The inclusion in our sample of countries that have not adopted SSM laws over the period also helps us to identify trends and separate the effects of passing on absolute time and relative time.

Leaving aside the nature of ties, we first estimate the average dynamic effect of SSM approval on gay-friendly opinions, by estimating an equation similar to the one found in Wolfers (2006) and Stevenson and Wolfers (2006):

$$Opinion_{gct} = \sum_{k \geq 1} \psi_k \text{Same sex marriage has been in effect for } k \text{ periods}_{ct} + \lambda_g + \eta_c + \tau_t \quad (7)$$

$$+ \lambda_g \times Trend_t + \eta_c \times Trend_t + [\lambda_g \times Trend_t^2 + \eta_c \times Trend_t^2] + \varepsilon_{gct}$$

where  $Opinion_{gct}$  stands for the share of gay-rights supporters for the cell defined by demographic group  $g$  (*i.e.* by age and gender), in country  $c$  and year  $t$ .  $\lambda_g$ ,  $\eta_c$  and  $\tau_t$  are vectors of cohort (*i.e.* demographic group), country and year fixed effects, respectively.  $\lambda_g$  controls for systematic differences in the opinion about gay rights across age-gender cohorts. It captures the systematic differences in the opinion that could come from systematic differences in education, fertility, income, etc. across age-gender cohorts;  $\eta_c$  controls for systematic unobservable differences across countries – that may be correlated with SSM approval, and  $\tau_t$  captures the common shocks across countries in the opinion about gay rights.  $\psi_k$  for  $k = 0-1$  years, 2-3 years, 4-5 years, 6-9 years are the coefficients of interest reflecting dynamic responses in the opinion about gay rights after SSM has been approved for  $k$  years. To estimate the average response of the opinion about gay rights following the approval of SSM, we take the average of these coefficients, as done in Stevenson and Wolfers (2006).

Identification of causal effects in a difference-in-difference model relies on the common trend assumption. In our context this means that one needs to be concerned with the timing of the reform. If more progressive countries or countries that experience (or expect) a faster improvement in gay-friendly opinions pass SSM laws first, estimates would be upward biased. Time-invariant country characteristics are captured by country fixed effects. To account for possible country time-variant differences (and therefore country-specific pre-trends), we add country-specific trends. We allow for linear and non-linear trends. Identification then comes from the discontinuity surrounding the

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<sup>26</sup>As already treated units act as controls of untreated units when treatment effects vary over time, the single-coefficient diff-in-diff estimator subtracts average changes in untreated outcomes and treatment effects. For more details, see *e.g.* de Chaisemartin and D’Haultfoeuille (2018), Borusyak and Jaravel (2017), Goodman-Bacon (2018) or Callaway and Sant’Anna (2019).

adoption of SSM. Controls for country-specific (pre-)trends prevent estimated coefficients to reflect the action of other possible changes, such as changes in religious or political thinking or other LGBT specific laws like anti-discrimination, registered partnership and parent rights legislations, that were adopted at different times in different countries,<sup>27</sup> that are potentially correlated to the adoption of SSM and that may affect the evolution of opinions about gay rights independent to any SSM laws – see Autor et al. (2007a)<sup>28</sup>, Wolfers (2006) or Bailey (2006).<sup>29</sup>

The diff-in-diff strategy also relies on the no-anticipation assumption, according to which individuals should not change their opinions due to the expectation of upcoming law adoption. Obviously, SSM law adoptions are preceded by debates that may influence opinions about gay rights before the passing of the law. Our assumption here is that such pre-existing effects may occur in all countries and are captured by our country fixed effects and country-specific trends.

A last concern comes from structural socio-demographic changes. The inclusion of a cohort-specific trend controls for (pre-)trends at the cohort level which are orthogonal to SSM approval. Still, in diff-in-diff frameworks applied on repeated cross-sections as the ESS, the compositions of treated and control groups need to be constant over time and must not be influenced by treatment. Otherwise estimates would capture changes in gay-friendly opinions due to structural changes (as ageing) and to possible increasing growth of socio-demographic groups that would have more or less gay-friendly opinions. To control for socio-demographic changes over time, and remove such confounding composition effects, we assign to each age-gender cell in a given year and a given country the average yearly weight of the cell in the corresponding country over the whole observed period (as in Autor et al., 2007a). Put differently, we weight observations so as to keep the socio-demographic structure of the sample constant.

## 4.2 Estimating the role of social ties on the effects of SSM laws

To test our theoretical predictions, we need to augment equation (7) to allow for heterogeneous effects with respect to the nature of ties. Our main challenge here is to account for the endogenous nature of ties. If SSM laws affect the structure of the population in terms of ties, for instance

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<sup>27</sup>As shown in Table C.1 in Appendix C, such laws were adopted at different dates in different countries, sometimes long before or after SSM became legal and for other countries only a couple of years apart from SSM laws, but on very rare occasions the same year as SSM laws. The complexity of the legislative process, with possible different timing of adoption within countries like Switzerland, Belgium, Germany or Great Britain, and possible successive amendments, especially in the area of anti-discrimination, make it difficult to pinpoint for each country the relevant dates of legislative changes. It is therefore difficult to create law-specific indicators and country-specific trends are the most appropriate way to control for the effect of such possibly confounding laws.

<sup>28</sup>See also the companion paper Autor et al. (2007b). The authors use a year-by-year difference-in-difference model to understand how mandated employment protections reduce productive efficiency.

<sup>29</sup>Sansone (2019), who face similar identification issues, also argue that a time span of about 10 years is too short for variables like religion or political affiliation to significantly change, meaning that our identification would not be threatened anyway by such evolutions that may affect opinions towards homosexuality and be concomitant to SSM laws.

if people’s opinion about gay rights influence the probability to have strong ties, then this would threaten identification of causal effects.<sup>30</sup> To remedy this problem we first consider all types of partnerships to define strong ties, and do not restrict in particular to married couples. Moreover, results in Table D.1 in Appendix D reveal no significant relationship between the approval of SSM and the share of people living in partnership, suggesting that our measure of strong ties (including all partnerships) is not endogenous to SSM approval.

Second, and most importantly, we compute the composition of cells in terms of the nature of ties (*i.e.* the share of individuals with dominant strong ties and without dominant strong ties) in 2002, when SSM was illegal in all European countries (other than The Netherlands, which is not included in our sample). Therefore people’s opinion on the topic was very unlikely to influence their social tie formation (by that time SSM was not a controversial issue). For the whole period of analysis we leave constant the tie composition at its 2002 level. Such a strategy also protects us from a contamination bias: we expect that SSM adoption in a country may help to change mentalities within the population beyond the country’s borders. With the sequential adoption of SSM in most European countries, the institutional context is likely to further shape individual opinions, and then the composition of social ties in terms of strong and weak ties is more likely to be endogenous. Such a contamination between countries can neither be excluded or tested and may lead to (unsigned) biases if it is related to the composition of social ties.<sup>31</sup> By leaving constant and equal to their 2002 levels the internal composition of cells in terms of strong/weak social ties, we control for this bias.

We define a dummy variable *Strong ties* adopting the unitary value when more than 60% of the cell members declare having a wife/husband/partner. Cells satisfying such a condition are referred to as cells with dominant strong ties. The rest of the cells are not dominated by strong ties.<sup>32</sup> When making comparisons we will refer to cells with dominant strong ties versus cells without dominant strong ties. We have chosen a threshold equal to 60% since for any lower proportion, the number of cells without dominant strong ties is so small that we do not have enough variability to identify the effect of dominant strong ties. Although more tractable, such dichotomous approach has the disadvantage of relying on an arbitrary threshold. To that matter, in the robustness analysis we

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<sup>30</sup>Ties could also be endogenous if there were some attributes that would explain both the partnership status and the propensity to be influenced by the adoption of a law (independent to partnership status). Our strategy does not control for such sources of endogeneity, but we cannot find example of such confounding factors.

<sup>31</sup>We refer here to the so called Stable Unit Treatment Value Assumption (SUTVA), which requires that controls are not affected by the treatment received by the treated. Such a contamination between countries can neither be excluded or tested and may lead to (unsigned) biases in the estimation of the average effect of the law on opinion (see equation (7)).

<sup>32</sup>Consistently with our theoretical model that assumes neither complementarity nor substitutability between weak ties and strong ties, we do not make any presumptions about interactions with weak ties depending on the existence or not of a strong tie. While individuals in cells dominated by strong ties could also have more random encounters (*i.e.* weak ties) than individuals in the other cells, in our database the correlation coefficient between the fact of having a partner and the fact of meeting socially with others at least once a week (which will be closer to our definition of weak ties) is negative and significant at a value equal to -0.1921.

adopt a continuous measure of strong ties and estimate heterogenous effects with respect to the share of people in the cell having strong ties. Results are the same in both specifications. The estimated model is then:

$$\begin{aligned}
Opinion_{gct} = & \sum_{k \geq 1} \psi_{k0} \textit{Same sex marriage has been in effect for } k \textit{ periods}_{ct} + \psi_2 \textit{Strong ties}_{gc} \\
& + \sum_{k \geq 1} \psi_{k1} \textit{Same sex marriage has been in effect for } k \textit{ periods}_{ct} \times \textit{Strong ties}_{gc} \\
& + \lambda_g + \eta_c + \tau_t + \lambda_g \times \textit{Trend}_t + \eta_c \times \textit{Trend}_t \\
& + [\lambda_g \times \textit{Trend}_t^2 + \eta_c \times \textit{Trend}_t^2] + \varepsilon_{gct}
\end{aligned} \tag{8}$$

where  $\psi_2$  captures the average effect of strong ties on the opinion about gay rights. Because the nature of ties' composition by cell is computed for 2002 and remains unchanged for the rest of the period, the dummy variable *Strong ties* captures a time-invariant characteristic of the age-gender-country cell associated with the presence of dominant strong ties. This contrasts with  $\lambda_g$  and  $\eta_c$  which capture, respectively, time-invariant characteristics by age-gender cohort (such as differences in fertility, education or income) and time-invariant characteristics by country.  $\psi_{k1}$  parameters capture the average dynamic response to the law in cells with dominant strong ties compared to the average dynamic response in cells without dominant strong ties (captured by the  $\psi_{k0}$  parameters).

### 4.3 Estimating the role of local social norms on the effects of SSM laws

According to the model's predictions, the law has heterogenous effects depending on the local norm prevailing among social ties of a given community. The law can actually decrease or increase the rejection rate  $\delta$  of the aggregate social norm depending on whether the law is in line with the local social norm or not.<sup>33</sup> Depending on the impact on the rejection rate, the relative role of strong ties in shaping individuals' opinions will vary. If the SSM law leads to a reduction in the rejection rate  $\delta$  of the aggregate social norm, we expect individuals (*i.e.* cells in our pseudo-panel approach) with dominant strong ties to experience a smaller progression in their opinion about gay rights than the other observations. In contrast, if the SSM law fosters an increase in the rejection rate of the aggregate social norm, we expect individuals (*i.e.* cells in our pseudo-panel approach) with

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<sup>33</sup>While  $\delta$  is exogenous in the theoretical model, in the empirical analysis it becomes basically endogenous due to our "reverse" interpretation. In Table D.2 in Appendix D, we propose to see how evolves between two waves a proxy of  $\delta$ , which is the share of cells in a given country that have a negative opinion about gay rights. The table displays estimation results obtained after regressing this proxy of  $\delta$  over a dummy variable that equals unity once the country has approved SSM. After controlling for country, year and country-trend specific fixed effects we still find a negative and significant coefficient, suggesting that, at the aggregate level, the approval of SSM has been associated with a slowdown in the progression of negative opinions about gay rights. This is consistent with the "reverse" interpretation used in our empirical analysis.

dominant strong ties to experience a more positive progression in their opinion about gay rights with respect to other individuals.

How can we measure the local norm? A first strategy relies on the dominant opinion about gay rights in the cell, as computed in 2002. We consider that the local social norm is non-homophobic (i.e. in line with SSM laws) when more than 60% of individuals in the cell declare gay-friendly opinions in 2002. We chose the threshold of 60% so that we are not at the margin. The categorization of cells according to their gay-friendly nature or not is computed for 2002 and left unchanged for the whole period so as to control for the potentially endogenous progression in the share of favorable opinions about gay rights. We consider that in cells that are classified as gay-rights supporters according to this criterion, the average dominant opinion among weak ties will be favorable to gay rights. The estimation of equation (8) on the subset of gay-rights supporters cells provides a test for Scenario NH. In spite of setting to 60% the threshold of gay-rights supporters to classify a cell as gay-friendly, there are not enough cells classified as non gay-rights supporters to test for Scenario H.

The second strategy focuses on immigrants and distinguishes those coming from homophobic countries from those coming from non-homophobic countries. For the former the local social norm is considered to be homophobia, while for the latter it is non-homophobia. This strategy allows us to test the theoretical predictions corresponding to both scenarii NH and H. It stems from the literature that network effects are of major importance on immigrants' choices and behaviors (see McKenzie and Rapoport, 2010, Munshi, 2003, Waldinger, 1996 or Patel and Vella, 2013, among many others). Immigrants tend to interact more frequently with people coming from the same country of origin. Immigrants in a given host country are likely to be part of a social network or community made up by people coming from the same country of origin. Therefore immigrants coming from a country classified as homophobic (*i.e.* the dominant social norm in the country of origin is homophobia) are likely to have social ties who are mostly homophobic. This guess is confirmed by Figure C.2 in Appendix C. Among immigrants coming from non-homophobic countries, more than 75% (on average, over the whole period) agree on the fact that gay men and lesbians should be free to live their own life as they wish. This share does not exceed 52% among immigrants coming from homophobic countries. From a dynamic perspective (left-hand side panel of Figure C.2), opinions of immigrants coming from the two categories of countries have followed a similar path, implying that the difference of 20 percentage points in opinions has remained fairly stable over time. We only observe a slight decrease in this difference in 2016.<sup>34</sup>

To ensure a sufficient number of observations, cells are now redefined for immigrants by host

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<sup>34</sup>The right-hand side panel in Figure C.2 shows the progression of immigrants' opinions about gay rights by type of country of birth (*i.e.* homophobic vs. non homophobic) and by the nature of the social ties. Among immigrants coming from non-homophobic countries, there are no major differences depending on the nature of social ties. In contrast, among immigrants coming from homophobic countries, we observe from 2010 a relative more positive progression of the opinion about gay rights among immigrants without dominant strong ties, compared to those with dominant strong ties.

country, type of country of birth (*i.e.* homophobic vs. non homophobic) and year. Using this strategy requires dealing with the endogeneity of location choices with respect to opinions about gay rights. In particular, immigrants may migrate to countries that are more or less favorable to gay rights depending on their own opinion about homosexuality. To control for endogenous location choices, we rely on the past settlement of immigrants across European countries. We specifically use data from Docquier et al. (2007) on the stock of immigrants by European country in 1990.<sup>35</sup> We compute the share of immigrants coming from  $r = (\textit{homophobic}, \textit{non-homophobic})$  countries in the host country  $c$  in 1990.<sup>36</sup> For each country of birth we define an indicator variable *Homophobic*, which equals 1 if the corresponding country is classified as homophobic by the website “Gay Voyageur” or if more than 60% of individuals in the country declare in the World Value Survey (2010-2014) that they would not like to have a homosexual person as a neighbor.<sup>37</sup> The combination of the information provided by both data sources ensures to have more reliable classification of homophobic countries. We find that around 39% of the 192 origin countries included in our sample for foreign born people are classified as homophobic (see Table B.2 in Appendix B). The share of immigrants coming from  $r$  countries in the host country  $c$  in 1990 is then computed as follows:

$$\gamma_{cr,1990} = \frac{\sum_{o \in r} Immigrants_{oc,1990}}{\sum_{o \in r} Immigrants_{o,1990}} \quad (9)$$

where  $\sum_{o \in r} Immigrants_{oc,1990}$  stands for the total number of immigrants living in host country  $c$  in 1990 who were born in any country  $o$ , classified as  $r = \textit{homophobic}, \textit{non-homophobic}$ ;  $\sum_{o \in r} Immigrants_{o,1990}$  is the total number of immigrants in 1990 (living in any of the host countries identified in the sample) who were born in any country  $o$ , classified as *homophobic* or *non-homophobic*. This new sharing rule is then applied over the whole stock of immigrants in our considered sample in period  $t$ :

$$\widehat{Immigrants}_{crt} = \gamma_{cr,1990} \times \sum_c Immigrants_{crt} \quad (10)$$

In period  $t$ , the estimated number of immigrants in host country  $c$  from  $r$  countries,  $\widehat{Immigrants}_{crt}$ , is obtained by multiplying the 1990 share of immigrants coming from  $r$  countries that were living in host country  $c$  by the total number of immigrants in our sample coming from  $r$  countries in period  $t$ . This sharing rule ensures exogeneity of the distribution of immigrants. The implicit

<sup>35</sup>While following the last refugee crisis in 2015 the allocation of immigrants might have been strongly modified with respect to past settlements, our paper is not essentially concerned since our observation period stops in 2016.

<sup>36</sup>One of the main concerns of our approach refers to the cell size. Given that in the database there are almost two hundred countries of birth, defining cells by host country, country of birth and year implied that most cells had too few observations. We decided thus to define cells by host country, homophobic nature or not of the country of birth and year.

<sup>37</sup>Again, we chose the threshold 60% not to be at the margin and to ensure that our sample includes a sufficiently large number of countries classified as non-homophobic.

assumption is that the 1990 sharing rule of immigrants across host countries is exogenous to any current shock, such as the approval of SSM.

To control for population composition changes, we consider a constant weight for each cell defined by host country and country of origin (homophobic/non-homophobic) over the whole period.<sup>38</sup> These constant weights result from multiplying the share of immigrants from  $r$  countries in host country  $c$  in 1990  $\gamma_{cr,1990}$  times the average stock of immigrants from  $r$  countries during the considered sample whole period. As previously, 2002 tie composition is held constant for all subsequent years in our sample.

To test scenarii NH and H from the theoretical model, we re-estimate equation (8) for people coming from respectively non-homophobic and homophobic countries. Again, we include year and country fixed effects as well as a country-specific trend.  $\psi_{k0}$ ,  $\psi_2$  and  $\psi_{k1}$  keep the same interpretation as in equation (8).

## 5 Results

The sequential approval of SSM by European countries over the period 2002-2016 is considered as a legalization of the dominant favorable opinion about gay rights, *i.e.* the aggregate social norm. The approval of SSM aimed at decreasing the rejection rate of gay rights ( $\delta$ ) and thus increasing the proportion of people accepting this social norm. With such a decrease in the rejection rate, our theoretical model predicts that people are less likely to accept the social norm when they have dominant strong ties. As a consequence, the adoption of SSM law would induce a larger increase in the share of gay rights supporters among people without dominant strong ties than among people with dominant strong ties. In contrast, if the law induces an increase in the rejection rate (which may happen in communities where the local social norm is not aligned with the aggregate social norm), our theoretical model predicts that people with dominant strong ties are relatively more likely to accept the aggregate social norm. Before testing these heterogenous effects of SSM approval, we first assess the average effect it has had on people’s opinions about gay rights.

### 5.1 The overall impact of SSM approval

Parameter estimates from Equation (7) are reported in Table 1. Column (1) reports results from a specification not including fixed effects. Column (2) adds year, country and cohort fixed effects and the last columns add linear (column (3)) and non linear (column (4)) country- and cohort-specific trends. Our preferred specification combines yearly shocks with country- and cohort-specific time trends and their squares. This allows to control for the pre-existing trends at the cell level which are orthogonal to SSM approval. In all specifications, observations are weighted using counterfactual weights to control for any population composition changes over the observation period.

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<sup>38</sup>We provide in the online Appendix additional regression results using standard weights provided by the ESS.

In absence of any control, SSM approval is associated with more positive opinions about gay rights (see column (1)). Once year, cohort and country fixed effects are controlled for, all coefficients of the dynamic response function to the law become non significant (see column (2)). This confirms the importance of controlling for time-invariant country differences when evaluating the effect of policies on opinions, as highlighted among others by Aksoy et al. (2020) in the context of same-sex relationship recognition policies and attitudes towards sexual minorities. Adding country-specific trends does not change the significance of coefficients (see columns (3) and (4)). These results imply that the observed dynamic response to SSM approval in opinions about gay rights is mostly explained by systematic differences across countries and across cohorts, as well as aggregate yearly shocks. So, on average, there is no impact of SSM approval on opinions about gay rights.<sup>39</sup>

Our results slightly contrast but are not inconsistent with those of Aksoy et al. (2020), who find a significant but rather limited effect of same-sex relationship recognition policies (including SSM) on attitudes towards homosexuality.<sup>40</sup> Our results are in line with those of Bishin et al. (2016) and Tankard and Levy-Paluck (2017) who, in response to US Supreme Court rulings on SSM, find no opinion backlash against gay men and lesbians and no significant change in personal attitudes, respectively. Our findings further suggest that the impact of SSM approval on the rejection rate has not been sufficiently large to alter significantly average opinions about gay rights and their dynamics over time. Despite this zero average impact of SSM approval, we could expect different changes in opinions depending on individuals’ social ties and the local social norm of the community to which they belong. We investigate such heterogenous effects in the next section.

## 5.2 The role of social ties

In Table 2, we test whether the dynamic response to SSM approval differs between individuals having dominant strong ties and those where strong ties are not dominant. Results are reported according to the same four specifications as in Table 1 and observations are weighted using counterfactual weights. Coefficient estimates reveal that the dynamic response to SSM approval is indeed heterogenous with respect to the nature of the dominant ties in cells. For both types of cells, including country, cohort and year fixed effects tends to reduce the influence of SSM approval, but coefficients remain significant. Estimation results are fairly stable across specifications (2) to (4).<sup>41</sup> The coefficient on “Strong ties” indicates that the average opinion about gay rights is not significantly different between cells with dominant strong ties and the other cells. However, there are significant differences between these two types of cells in the dynamic response to SSM approval.

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<sup>39</sup>The online Appendix shows that these results are robust to both the weighting scheme of observations and the variables used to define our cells (age-gender vs. age).

<sup>40</sup>The online Appendix replicates our estimations using the approval of registered same-sex partnership, parenting rights or same-sex parents and LGTB anti-discrimination legislations. Results remain consistent with our main findings.

<sup>41</sup>Allowing for a non-linear trend leads to less precise estimates, but results in columns (3) and (4) are comparable in terms of size of the estimated coefficients.

**Table 1:** The influence of SSM approval on the opinion about gay rights.

	(1)	(2)	(3)	(4)
First 0-1 years	0.089*	-0.009	0.003	0.010
	(0.045)	(0.016)	(0.008)	(0.017)
Years 2-3	0.118**	-0.012	0.003	0.014
	(0.045)	(0.013)	(0.018)	(0.054)
Years 4-5	0.099*	-0.000	0.009	0.004
	(0.047)	(0.014)	(0.023)	(0.061)
Years 6-9	0.150***	0.023	0.035	0.024
	(0.045)	(0.024)	(0.037)	(0.076)
N	196,779	196,779	196,779	196,779
Number of cells	1,330	1,330	1,330	1,330
R-squared	0.115	0.875	0.908	0.913
Country FE	No	Yes	Yes	Yes
Cohort FE	No	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes
Country $\times$ Trend	No	No	Yes	Yes
Cohort $\times$ Trend	No	No	Yes	Yes
Country $\times$ Trend <sup>2</sup>	No	No	No	Yes
Cohort $\times$ Trend <sup>2</sup>	No	No	No	Yes
Population	All	All	All	All
Weights	Counterfactual	Counterfactual	Counterfactual	Counterfactual

Notes: Dependent variable: share of individuals in the cell agreeing or strongly agreeing with the idea that gay and lesbians are free to live their life as they want. The cohort refers to a particular gender-age group, as specified in Section 4. Regressions are weighted using a counterfactual weight equal to the average population in the cell over the whole considered sample period (“Counterfactual”). Robust standard errors in parentheses. Statistical significance: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

In cells where strong ties are not dominant, the approval of SSM results in a significant and large increase in the share of gay-rights supporters within the first 3 years following adoption (“First 0-1 years” or “2-3 Years”). More precisely, we find a direct increase by more than 0.09 pp in the share of individuals with favorable opinions about gay rights during the year or the year after the approval of SSM. Following this first spike, the impact of SSM approval equals 0.07 pp 2-3 years after.<sup>42</sup> Dynamic response effects are significantly lower for cells with dominant strong ties from the year of approval to more than 6 years after the approval. The difference between the two

<sup>42</sup>Longer-run effects are significant when country- and cohort-specific linear trends are included. They turn out non-significant in the specification with country- and cohort-specific non-linear trends due to loss of precision in the estimates.

groups remains fairly stable over time.

**Table 2:** The influence of SSM approval on the opinion about gay rights : the role of social ties.

	(1)	(2)	(3)	(4)
Strong ties	0.111 (0.072)	0.025 (0.017)	0.026 (0.016)	0.026 (0.015)
First 0-1 years	0.201* (0.102)	0.081*** (0.018)	0.087*** (0.017)	0.094*** (0.030)
Years 2-3	0.231** (0.104)	0.045*** (0.013)	0.056*** (0.013)	0.073* (0.040)
Years 4-5	0.266** (0.104)	0.070*** (0.021)	0.092*** (0.022)	0.091 (0.054)
Years 6-9	0.277** (0.101)	0.074*** (0.019)	0.101** (0.041)	0.093 (0.083)
Strong ties × First 0-1 years	-0.124 (0.074)	-0.094*** (0.020)	-0.088*** (0.017)	-0.087*** (0.016)
Strong ties × Years 2-3	-0.125 (0.079)	-0.060*** (0.017)	-0.056*** (0.016)	-0.061** (0.023)
Strong ties × Years 4-5	-0.189** (0.082)	-0.078*** (0.018)	-0.089*** (0.024)	-0.090*** (0.024)
Strong ties × Years 6-9	-0.143* (0.072)	-0.054** (0.026)	-0.066*** (0.015)	-0.066*** (0.015)
N	196,779	196,779	196,779	196,779
Number of cells	1,330	1,330	1,330	1,330
R-squared	0.157	0.878	0.912	0.916
Country FE	No	Yes	Yes	Yes
Cohort FE	No	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes
Country × Trend	No	No	Yes	Yes
Cohort × Trend	No	No	Yes	Yes
Country × Trend <sup>2</sup>	No	No	No	Yes
Cohort × Trend <sup>2</sup>	No	No	No	Yes
Population	All	All	All	All
Weights	Counterfactual	Counterfactual	Counterfactual	Counterfactual

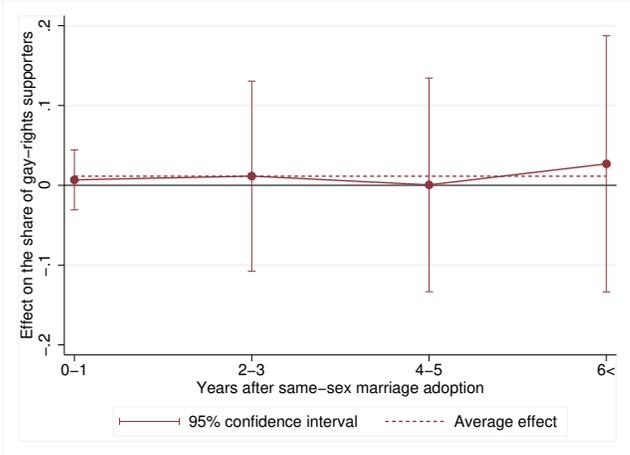
Notes: Dependent variable: share of individuals in the cell agreeing or strongly agreeing with the idea that gays and lesbians are free to live their life as they want. The cohort refers to a particular gender-age group, as specified in Section 4. Strong dominant is a dummy variable equal to unity if more than 60% of individuals in the cell have dominant strong ties. Robust standard errors in parentheses. Regressions are weighted using a counterfactual weight equal to the average population in the cell over the whole considered sample period (“Counterfactual”). Statistical significance: \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

As shown in Figure 6, the lower response identified among cells with dominant strong ties is such that SSM approval actually has had no influence on the average opinion about gay rights in these cells. Consistent with theoretical predictions, these results suggest that SSM approval has

reduced the overall rejection rate of gay rights in the population ( $\delta$ ). This reduction is indeed a prerequisite to observe a smaller increase in the share of gay rights supporters (*i.e.* integrated individuals) among individuals with strong ties. The effect is large enough to influence the opinion of individuals in cells where strong ties are not dominant, but too small to significantly influence cells with dominant strong ties.

This result is though modified when we ignore potential endogeneity issues of social ties and allow the tie composition of cells to change from one year to another. As revealed by Table E.1 in Appendix E, in this case the approval of SSM laws displays no significant effect on the opinion of individuals without strong ties and a negative effect on the opinion of individuals with strong ties, underlying the importance of controlling for the endogenous nature of ties.<sup>43</sup>

**Figure 6:** The influence of SSM adoption on the opinion about gay rights in case of dominant strong ties



Notes: The figure plots linear combinations of coefficients from Table 2, column (4) – specification with country- and cohort-specific non-linear trends. Each point is the linear combination of the coefficient associated with the dynamic treatment indicator and the coefficient associated with the corresponding interaction term with Strong ties.

As previously mentioned, evidence suggests that the way in which women/girls interact with their female peers is very different from the way men/boys interact with their male peers (see Rose, 2002, Rose and Rudolph, 2006 or Giulietti et al., 2020). In particular, unlike men, women tend to discuss extensively and revisit problems with their female peers (*i.e.* co-rumination). These differences in social interactions may drive the way weak and strong ties influence the opinions of women and men about gay rights. Estimates reported in Table 2 could therefore conceal specific dynamics among

<sup>43</sup>The online appendix proposes a more traditional strategy consisting in using one-period lagged values of the tie composition, instead of fixing the nature of type at their 2002 value. Results remain consistent with respect to findings in Table 2, suggesting that potential contamination coming from the approval of SSM laws by different European countries remains small.

women and men. Table F.1 in Appendix F displays estimation results distinguishing between men and women. Results remain consistent with dynamic response effects being systematically lower for cells with dominant strong ties. Note though that women with dominant strong ties have on average a more positive opinion about gay rights than women without dominant strong ties.

### 5.3 The law and the local social norm

To test Scenarii NH and H, we need to control for the local social norm which stands for a proxy of the opinion of weak ties. We do not have this information in our data, but we propose two strategies to approximate it. First, we focus on cells with a majority of gay-rights supporters. In these cells, the dominant local social norm is in line with the aggregate social norm at the time of SSM approval. This allows us to test Scenario NH.<sup>44</sup> Second, we focus on immigrants, and distinguish those coming from homophobic countries (Scenario H) and those coming from non-homophobic countries (Scenario NH). We assume that the dominant local social norm of the latter is in line with the aggregate social norm in the country at the time of SSM approval, while we assume the opposite for immigrants coming from homophobic countries.

For the first strategy, we replicate the previous analysis on the subsample of gay-rights supporters. Results are presented in Table 3. In line with results from Table 1, columns (1)-(4) in Table 3 reveal that the average impact of SSM approval on the opinion about gay rights is zero among gay-rights supporters. Columns (5)-(8) introduce social ties into the analysis. The coefficient on “Strong ties” reveals that the average opinion about gay rights does not significantly differ between cells with dominant strong ties and the other cells when considering the population of gay-rights supporters. When controlling for country- and cohort-specific linear trends (see column (7)), we find that SSM approval has a positive and significant impact on the opinion about gay rights 0-1 years and 4-5 years after approval among individuals without dominant strong ties. This positive impact is though absorbed by country- and cohort-specific non-linear trends in column (8). Independent on whether these non-linear trends are controlled for or not, we find that the dynamic response for individuals with dominant strong ties is significantly smaller than that of individuals without dominant strong ties 0-1 years, 4-5 years and more than 6 years after SSM approval.<sup>4546</sup>

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<sup>44</sup>We would have liked to replicate the analysis on cells with a majority of people that do not support gay rights to test Scenario H, but the small number of these cells prevents such an analysis.

<sup>45</sup> If instead of keeping constant at its 2002 level the type of cell (*i.e.* supporter vs. non supporter) we allow it to vary from year to year the effects are reinforced (see Table E.2 in Appendix E). More precisely, the dynamic response for individuals without dominant strong ties is positive and significant and that of individuals with strong ties negative and significant, underlining the interest of controlling for the endogenous tie type (*i.e.* supporter vs. non supporter) composition. In the online Appendix we propose alternative estimations where the type of cell is lagged by one period or where we also allow tie composition (strong ties vs. no strong ties) to time vary together with the cell type.

<sup>46</sup>When conducting separate regressions for men and women (see Table F.2 in Appendix F), we still find that dynamic response for individuals with dominant strong ties is significantly smaller than that of individuals without dominant strong ties. However, the lower number of observations in these separate estimates induces a loss of

**Table 3:** The influence of SSM approval on the opinion about gay rights among supporters

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Strong ties					0.006 (0.024)	0.013 (0.017)	0.011 (0.016)	0.013 (0.016)
First 0-1 years	0.031* (0.016)	-0.007 (0.013)	0.006 (0.007)	0.014 (0.017)	0.033 (0.033)	0.047** (0.020)	0.060* (0.028)	0.067 (0.041)
Years 2-3	0.065*** (0.015)	-0.002 (0.010)	0.018 (0.016)	0.029 (0.050)	0.063 (0.039)	0.014 (0.011)	0.032 (0.022)	0.049 (0.047)
Years 4-5	0.066*** (0.022)	0.003 (0.014)	0.026 (0.022)	0.018 (0.061)	0.098** (0.039)	0.038** (0.017)	0.066** (0.029)	0.065 (0.060)
Years 6-9	0.093*** (0.015)	0.005 (0.019)	0.046 (0.041)	0.027 (0.081)	0.109*** (0.027)	0.047** (0.017)	0.083 (0.048)	0.070 (0.088)
Strong ties × First 0-1 years					-0.002 (0.031)	-0.057* (0.028)	-0.058* (0.029)	-0.056* (0.028)
Strong ties × Years 2-3					0.001 (0.038)	-0.017 (0.017)	-0.016 (0.015)	-0.020 (0.015)
Strong ties × Years 4-5					-0.039 (0.039)	-0.039* (0.020)	-0.045* (0.024)	-0.050* (0.024)
Strong ties × Years 6-9					-0.018 (0.024)	-0.047** (0.022)	-0.040*** (0.012)	-0.043*** (0.013)
Observations	144,364	144,364	144,364	144,364	144,364	144,364	144,364	144,364
Number of cells	738	738	738	738	738	738	738	738
R-squared	0.116	0.729	0.787	0.800	0.117	0.732	0.790	0.803
Country FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Cohort FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Country × Trend	No	No	Yes	Yes	No	No	Yes	Yes
Cohort × Trend	No	No	Yes	Yes	No	No	Yes	Yes
Country × Trend <sup>2</sup>	No	No	No	Yes	No	No	No	Yes
Cohort × Trend <sup>2</sup>	No	No	No	Yes	No	No	No	Yes
Population	Supporter	Supporter	Supporter	Supporter	Supporter	Supporter	Supporter	Supporter
Weights	Counterfactual							

Notes: Dependent variable: share of individuals in the cell agreeing or strongly agreeing with the idea that gays and lesbians are free to live their life as they want. The cohort refers to a particular gender-age group, as specified in Section 4. Cells where more than 60% of individuals had agreed or strongly agreed on the fact that “gays and lesbians are free to live their life as they want” in wave 1 of the ESS are classified as “Supporters”. Strong dominant is a dummy variable equal to unity if more than 60% of individuals in the cell have dominant strong ties. All regressions are weighted using a counterfactual weight equal to the average employment in the cell over the whole considered sample period (“Counterfactual”). Robust standard errors in parentheses. Statistical significance: \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

As for the whole population, these results suggest that SSM approval has reduced the rejection rate of gay rights among cells with a majority of gay-rights supporters. This reduction is indeed a prerequisite to observe a smaller increase in the share of gay-rights supporters among people with dominant strong ties. This is consistent with predictions from Scenario NH.

For the second strategy, our analysis is based on cells defined at the host country-homophobic origin level – 169 cells. Before analyzing the role of social ties, we first propose to test whether the local social norm of immigrants coming from homophobic countries clashes with the aggregate social norm. Table 4 provides coefficients estimates obtained from estimating a rephrased version of Equation (8) where  $\psi_{k0}$  captures the dynamic response to the approval of SSM on the opinion about gay rights among immigrants coming from non-homophobic countries,  $\psi_2$  captures the average response effect of immigrants coming from homophobic countries (compared to immigrants coming from non-homophobic countries), and  $\psi_{k1}$  captures the additional dynamic response to SSM adoption for immigrants coming from homophobic countries instead of non-homophobic countries.<sup>47</sup>

Results in Table 4 reveal that immigrants coming from homophobic countries have on average a less favorable opinion about gay rights (see coefficient on “Homophobic”). This finding confirms that the dominant local social norm is less gay-friendly within communities composed by immigrants coming from homophobic countries. The approval of SSM has had no significant effect on the opinion of immigrants coming from non-homophobic countries. In contrast, the opinion of immigrants coming from homophobic countries is more negatively affected immediately after the adoption of the law.<sup>48</sup> According to the theoretical framework, this result suggests that SSM has increased the rejection rate of gay rights among people from these communities.

We then investigate the role of social ties in the subpopulation of immigrants, considering separately those coming from homophobic countries (Scenario H) and those coming from non-homophobic countries (Scenario NH). We provide estimates from Equation (8) in Figure 7 which represents coefficient estimates from Table G.2 in Appendix G. In this table, columns (1)-(3) consider the whole population of immigrants, without distinction with respect to the homophobic nature or not of the country of origin. Columns (4)-(6) allow to test Scenario H thanks to a focus on immigrants from homophobic countries (74 cells). Estimated coefficients are represented on the left-hand side panel of Figure 7. In contrast, columns (7)-(9) focus on immigrants from non-homophobic countries (95 cells) to test Scenario NH, which is represented on the right-hand side panel of the figure. Cells are weighted so as to control for demographic changes.<sup>49</sup>

Among immigrants coming from homophobic countries (left-hand side panel of Figure 7), the local

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precision, particularly for women.

<sup>47</sup> Results from the estimation of Equation (7) on the immigrant population are reported in Table G.1 Appendix G. Conclusions are similar to those drawn from the main analysis sample. The online Appendix replicates these estimations using standard weights.

<sup>48</sup> The online Appendix confirms that results are robust to the weighting scheme.

<sup>49</sup> Again results are robust when using “Standard” weights (see online Appendix).

**Table 4:** The influence of SSM approval on the opinion about gay rights over the immigrant population depending on their homophobic origin

	(1)	(2)	(3)
Homophobic	-0.207*** (0.014)	-0.201*** (0.006)	-0.200*** (0.005)
First 0-1 years	0.019 (0.028)	-0.019 (0.023)	-0.024 (0.027)
Years 2-3	0.035 (0.021)	-0.024 (0.023)	-0.021 (0.034)
Years 4-5	0.083** (0.031)	-0.008 (0.046)	0.017 (0.036)
Years 6-9	0.075*** (0.024)	0.001 (0.024)	0.075 (0.044)
Homophobic × First 0-1 years	-0.030* (0.017)	-0.034** (0.013)	-0.038** (0.014)
Homophobic × Years 2-3	0.049 (0.033)	0.039 (0.035)	0.034 (0.036)
Homophobic × Years 4-5	-0.032 (0.107)	-0.043 (0.107)	-0.044 (0.107)
Homophobic × Years 6-9	-0.052 (0.057)	-0.060 (0.055)	-0.061 (0.056)
Observations	129,229	129,229	129,229
Cells	169	169	169
R-squared	0.590	0.792	0.806
Country FE	No	Yes	Yes
Year FE	No	Yes	Yes
Country × Trend	No	No	Yes
Population	All	All	All
Weights	Counterfactual		

Notes: Dependent variable: share of individuals in the cell agreeing or strongly agreeing with the idea that gays and lesbians are free to live their life as they want. Cells where more than 60% of individuals agreed or strongly agreed on the fact that “gays and lesbians are free to live their life as they want” in wave 1 of the ESS are classified as “Supporters”. Homophobic is a dummy variable equal to unity when individuals from the cell come from a country classified as homophobic. Regressions are weighted using a constant counterfactual weight equal to the product between the share of immigrants from homophobic countries in country  $c$  in 1990 times the total stock of immigrants from homophobic countries during the considered sample whole period (“Counterfactual”). Overfitting issues prevent us from including non-linear trends. Robust standard errors in parentheses. Statistical significance: \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

social norm clashes with the aggregate social norm at the time of SSM approval. The role of weak ties in disseminating the aggregate social norm is then strongly reduced and strong ties play a more important role therein. Among these immigrants, we find that those with dominant strong ties have reacted more positively to SSM approval than people without strong ties. For the latter,

SSM approval has an immediate negative impact but no lasting effects on gay-friendly opinions. Consistent with our theoretical predictions, these results suggest that SSM approval has induced an increase in the rejection rate of gay rights ( $\delta$ ) among these immigrants coming from homophobic countries. This increase is a prerequisite to observe such a large increase in the share of gay-rights supporters among people with dominant strong ties.

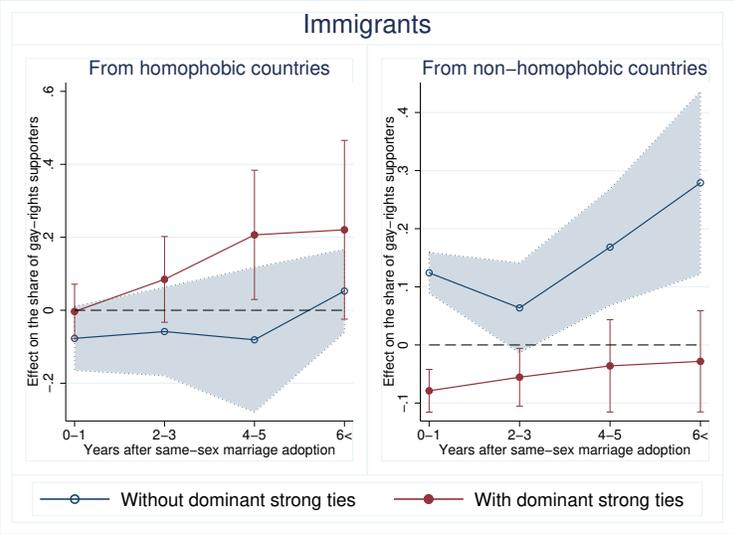
The situation is reversed for immigrants coming from non-homophobic countries, among which the local social norm is likely to be in line with the aggregate social norm at the time of SSM approval. The right-hand side panel of Figure 7 indicates that SSM approval has induced on all subsequent years an increase in the share of gay-rights supporters among immigrants without dominant strong ties. Immigrants with dominant strong ties are on average less likely to be gay-rights supporters (see coefficient on “Strong ties”). According to our theoretical model, such a lower increase in gay-rights supporters among people with dominant strong ties is possible because SSM approval has induced a decrease in the rejection rate of gay rights ( $\delta$ ) in this subpopulation of immigrants coming from non-homophobic countries.

These last results confirm the importance of the local social norm with respect to the impact of SSM approval on the rejection rate of gay rights within a community and the consecutive role that strong ties may play in the acceptance process of the aggregate social norm.<sup>50</sup>

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<sup>50</sup>In the online Appendix, we additionally assess the differentiated impact of SSM approval by homophobic origin on the subset of immigrant cells with a majority of gay-rights supporters. Unlike results obtained over all immigrant cells (see Table 4), when distinguishing between immigrants having an homophobic or a non-homophobic origin within gay supporters’ cells, SSM approval induces a more positive dynamic response among immigrants coming from homophobic countries thanks to the influence of gay-friendly weak ties.

**Figure 7:** The influence of SSM approval on the opinion about gay rights over the immigrant population depending on their homophobic origin



Notes: The figure plots linear combinations of coefficients from Table G.2, column (3) – specification with country- and cohort-specific linear trends.

## 5.4 Robustness analysis

### 5.4.1 Placebo tests

Our empirical strategy relies on a number of assumptions, so that identification of the effects we are interested in may be threatened by a number of factors. Do we actually capture the effect of SSM laws and social ties? Our main concern lies in the timing of the law and the credibility of the non-anticipation and parallel trends assumptions that are required in a difference-in-difference approach. As explained above, country-specific trends are included in the model to deal with an endogenous timing of the law, and to ensure that the estimated parameters of interest do not capture the effects of time-varying factors that may affect both the timing of the law and opinions towards homosexuality.

To test the credibility of this identifying assumption and test the relevance of the threat of pre-trends and concomitant progressive changes, we perform two placebo tests, whose results are given in Figure 8. We run both placebos with linear specific trends and with nonlinear specific trends. The first placebo test consists in estimating the effect of SSM laws on an outcome variable which is not (directly) related to the opinion about gay rights and should not be particularly affected by SSM laws, but should be affected by the widespread of a more progressive way of thinking. If the year fixed effects and trends failed to capture such a trend, we would get that SSM laws also affect such opinions. A natural candidate for this test is the fact that it is important to follow traditions and customs. Results of this test are reported in column (1) of Figure 8. They reveal that the

approval of SSM laws did not have significant dynamic response effect on the share of individuals who consider that traditions and customs are important. When controlling for a linear trend (first panel in column (1)) no significant impact arises whether we consider individuals with dominant strong ties or without dominant strong ties. When we allow for a non-linear trend (second panel in column (1)), there is only a significant reduction in the share of favorable opinions for individuals without dominant strong ties after 4-5 years and after 6 years.

The second placebo test consists in testing the significance of the effect of SSM laws assuming that laws were passed two years before they were actually passed. Given that we have a dynamic model, it is expected that no significant effect is shown within the first two years of the placebo years and that the dynamics of the effect mimics the actual one but with a two-year lag. Results of this test are provided in column (2) of Figure 8. When introducing a linear trend we find that the positive and significant impact that we found in column (3) of Table 2 for individuals without dominant strong ties is delayed by 2 years, while for individuals with dominant strong ties the effect becomes significant only after 4-5 years. As soon as we consider non-linear trends (second and third panel in the column) no significant coefficient arises.

#### 5.4.2 An event-study design

To further assess the importance of the pre-trend issue, we additionally estimate an event-study type specification and include both treatment leads and treatment lags in the model. A recent literature discusses identification and specifications in dynamic event studies (see, for instance, Borusyak and Jaravel, 2017, Abraham and Sun, 2020, Schmidheiny and Siegloch, 2019, and Freyaldenhoven et al., 2019) and challenges the ability of tests for joint significance of lead coefficients to test for the presence of pre-trends (Roth, 2019). We follow the standard and exclude the pre-treatment indicator just prior SSM approval and therefore standardize coefficient  $\psi_{t_0-1}$  to zero. Parameters  $\psi_{t_0+k}$ , with  $k$  now possibly taking negative values in case of leads, are the effect  $k$  time periods before or after the event compared to the level one period prior the event.

Results graphed in Figure 9 correspond to estimation results reported in column (2) of Table H.1 in Appendix H. As observed from this column, although not parallel, pre-trends are not different between people without and with dominant strong ties. This suggests that the corresponding effects on individual opinions may be interpreted in terms of causality. Overall, these event-study results confirm our previous findings. Individuals without dominant strong ties positively respond to SSM approval and do so significantly more than individuals with dominant strong ties.

Estimation results from columns (4) and (5) of Table H.1 are respectively represented on the left-hand side and right-hand side panels of Figure 10.<sup>51</sup> Among immigrants coming from homophobic

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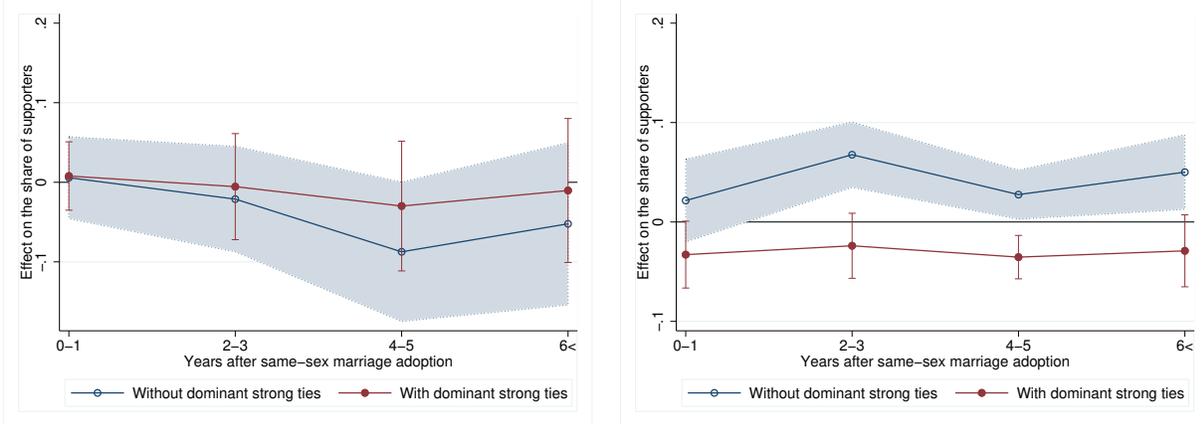
<sup>51</sup>When we focus on immigrants, the number of cells is too small to allow for an heterogeneous pre-trend with respect to the nature of ties, so we consider an homogenous pre-trend for cells without dominant strong ties and cells with dominant strong ties.

**Figure 8:** Placebo tests

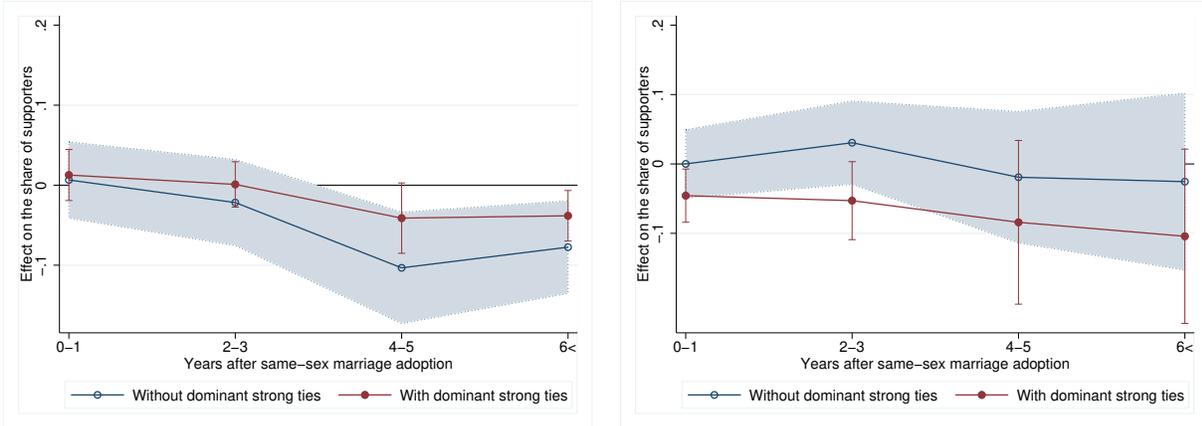
$y =$  important traditions and customs  
 Dates: actual  
 Ties: actual

$y =$  gay rights  
 Dates: placebo  
 Ties: actual

All cells - Linear trend

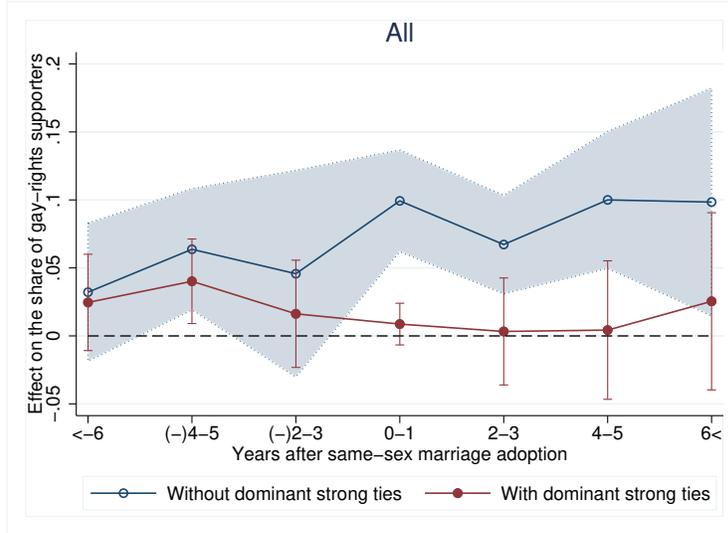


All cells - Non linear trend



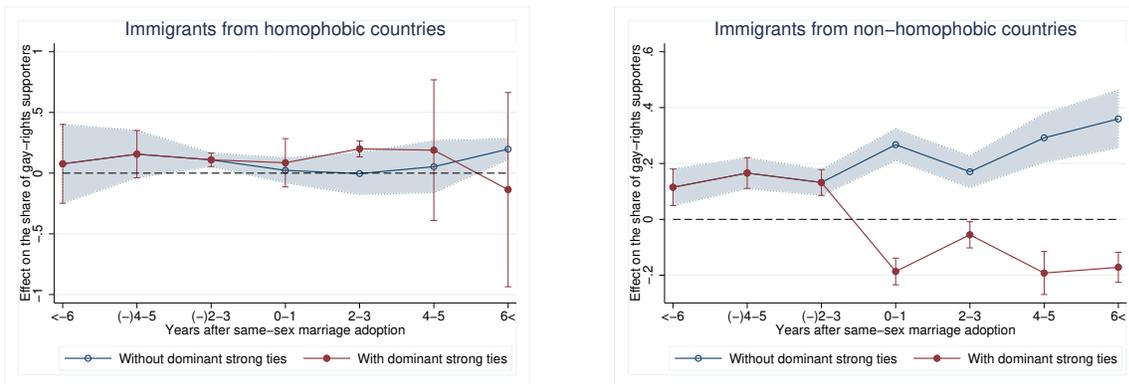
countries (left-hand side panel), the share of gay-rights supporters is not significantly different after SSM approval compared to its level the year just before the law was passed. Moreover, no significant differences arise between the response of people with and without dominant strong ties in the five years following SSM approval. For the subsample of immigrants coming from non homophobic countries (right-hand side panel), after the reform people with dominant strong ties are observed to be less gay-friendly, while the others happen to have on the contrary more gay-friendly opinions. These event-study results need though to be taken with caution and causal interpretation is prevented given that pre-trends are significant and positive (see Table H.1, column (5)).

**Figure 9:** Event study for SSM approval



Notes: The figure plots linear combinations of coefficients from Table H.1, column (2) – specification with country- and cohort-specific linear trends.

**Figure 10:** Event study for SSM approval: immigrant population by origin (homophobic vs. non-homophobic)



Notes: The figure plots linear combinations of coefficients from Table H.1, columns (4) and (5) – specification with country- and cohort-specific linear trends.

### 5.4.3 A continuous measure of strong ties

To simplify economic interpretations all along the analysis we have considered that cells that had more than 60% of the individuals living in partnership in 2002 were dominated by strong ties while the other cells were not dominated by strong ties. This threshold was chosen so as to ensure a sufficient number of cells in both categories. In order to test the robustness of our results we consider in this section a continuous measure of strong ties. More precisely, we compute for 2002 the share of individuals living in partnership in each of the cells. This measure is a continuous variable. Again, to account for the endogeneity of ties with respect to SSM, we leave the distribution of tie composition of cells invariant for the whole considered period 2002-2016 at its 2002 level.

Results reported in Table 5 are consistent with main findings from Tables 2, 3 and Figure 7. At the aggregate level (columns (1)-(2)), there is a decrease in the number of integrated people as the share of strong ties increases, suggesting that SSM approval induced a decrease in the rejection rate  $\delta$ .

Similarly, when considering community groups sharing a favorable opinion on homosexuals' rights (columns (3)-(4) and (6)) the approval of SSM law seems again associated with a decrease in the rejection rate, promoting a smaller increase in the share of favorable opinions the larger the share of people with strong ties. In contrast, within communities whose local social norm clashes with SSM (column (5)) we find the opposite result. The increase in the share of people accepting gay rights is larger among cells with a larger share of people with strong ties, suggesting that the law has rather induced an increase in the rejection rate.

In sum, estimation results obtained when considering a continuous measure of strong ties are consistent with our previous findings obtained distinguishing between cells with dominant strong ties (*i.e.* more than 60% of individuals in the cell had a partner in 2002) and cells without dominant strong ties. Our categorical definition of ties composition then does not alter the generality of our main conclusions.

**Table 5:** The influence of SSM approval on the opinion about gay rights: the role of social ties depending on the local norm when considering a continuous measure of ties composition

	(1)	(2)	(3)	(4)	(5)	(6)
	b/se	b/se	b/se	b/se	b/se	b/se
Strong ties	0.023 (0.082)	0.033 (0.084)	0.031 (0.067)	0.034 (0.062)	-3.667 (2.824)	-0.630 (0.388)
First 0-1 years	0.099 (0.065)	0.112 (0.084)	0.122** (0.051)	0.132* (0.064)	-0.644*** (0.187)	0.530*** (0.076)
Years 2-3	0.051*** (0.016)	0.090** (0.038)	0.034 (0.020)	0.074 (0.045)	-1.275*** (0.325)	0.281** (0.099)
Years 4-5	0.138*** (0.024)	0.132* (0.064)	0.134*** (0.026)	0.131* (0.065)	-0.663 (0.740)	0.246 (0.377)
Years 6-9	0.123** (0.057)	0.119 (0.105)	0.128** (0.052)	0.117 (0.098)	-1.313** (0.548)	1.660*** (0.500)
Strong ties × First 0-1 years	-0.132 (0.094)	-0.140 (0.095)	-0.159** (0.071)	-0.163** (0.067)	0.965*** (0.276)	-0.859*** (0.123)
Strong ties × Years 2-3	-0.068* (0.035)	-0.108** (0.042)	-0.023 (0.026)	-0.065** (0.023)	2.096*** (0.518)	-0.461*** (0.129)
Strong ties × Years 4-5	-0.183*** (0.029)	-0.184*** (0.025)	-0.154*** (0.040)	-0.164*** (0.034)	1.062 (1.377)	-0.381 (0.530)
Strong ties × Years 6-9	-0.118* (0.057)	-0.130** (0.057)	-0.112* (0.058)	-0.126** (0.051)	2.349** (0.935)	-2.420*** (0.674)
N	196,779	196,779	144,364	144,364	53,278	75,951
Number of cells	1,330	1,330	738	738	74	95
R-squared	0.910	0.914	0.791	0.804	0.704	0.760
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Cohort FE	Yes	Yes	Yes	Yes	No	No
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country × Trend	Yes	Yes	Yes	Yes	Yes	Yes
Cohort × Trend	Yes	Yes	Yes	Yes	No	No
Country × Trend <sup>2</sup>	No	Yes	No	Yes	No	No
Cohort × Trend <sup>2</sup>	No	Yes	No	Yes	No	No
Population	All	All	Supporter	Supporter	Homoph.	Non Homoph.
Weights	Counterfactual					

Notes: Dependent variable: share of individuals in the cell agreeing or strongly agreeing with the idea that gays and lesbians are free to live their life as they want. Cells where more than 60% of individuals agreed or strongly agreed on the fact that “gays and lesbians are free to live their life as they want” in wave 1 of the ESS are classified as “Supporters”. Homophobic is a dummy variable equal to unity when individuals from the cell come from a country classified as homophobic. Regressions are weighted using a constant counterfactual weight. Statistical significance: \*\*  $p < 0.01$ , \*  $p < 0.05$ ,  $p < 0.1$ .

#### 5.4.4 The nature of ties or the role of media

Up to now we have assumed that the nature of the social ties (with or without strong ties) was the main driver of the differential dynamic response of SSM laws on individual’s opinions about gay rights. However, this implies ignoring the possibility that individuals differing in their dominant ties may also differ in the nature of the activities they do during their free time and these activities may actually be the reason why they have a more or less positive opinion about gay rights. One of the activities which has recently been pointed as a major driver of social values is exposure to media (see Manning and Masella, 2018). If individuals without dominant strong ties spend more time exposed to media, they are likely to be more influenced by the dominant views presented in

these media. In the European case, most of these media’s views were rather positive following the approval of SSM laws. As revealed by Table H.2 in Appendix H, in Europe, exposure to media<sup>52</sup> is associated with a significant and positive impact on attitudes towards homosexuals, suggesting that medias were transmitting a positive view of the homosexual community and its rights. If people without strong ties had been relatively more exposed to media than people with strong ties, they may have developed a more positive opinion about gay rights not because of the nature of their ties but rather because of their greater exposure to the positive opinions spread by media. Figure H.1 in Appendix H represents daily exposure to TV-news distinguishing between individuals with and without strong ties. When considering time exposure to TV above one hour and a half, there are essentially no differences between individuals with and without strong ties. Surprisingly, the proportion of people that does not watch at all TV-news is larger among people without strong ties. The proportion of people that watches TV-news less than 30 minutes per day is larger among individuals without strong ties. In contrast, the proportion of people watching TV news between 30 minutes and one hour and a half is larger among individuals with strong ties. All in all, individuals without strong ties are significantly less exposed to TV-news<sup>53</sup> than individuals with strong ties, suggesting that their more positive dynamic response following SSM law approval is not explained by a relatively more important media exposure.

#### 5.4.5 Selection on unobservables

Despite the inclusion of several control variables and fixed effects, our treatment effects could still be biased due to selection on unobservables. To assess the magnitude of this bias, we follow the method proposed by Oster (2019), who measures the influence of omitted variable bias by either placing bounds on the treatment effect, or calculating the degree of selection on unobservables relative to observables that would be necessary to explain away the treatment effect.<sup>54</sup> The method relies on assumptions about the values of two parameters: the degree of selection on unobservables relative to observables ( $\delta$ )<sup>55</sup> and the hypothetical R-squared from a regression of the outcome on all observables and unobservables ( $R^{max}$ ).<sup>56</sup> In addition, Oster (2019) assumes that selection on unobservables cannot be greater than selection on observables, and the two sources of selection

<sup>52</sup>Exposure to media corresponds to TV watching, news/politics/current affairs on average weekday. The question is available in all ESS waves from 2002 to 2016.

<sup>53</sup>Significant test are not reported here but are available from the authors upon request.

<sup>54</sup>The ratio of selection on unobservables to selection on observables can be interpreted as the magnitude by which the significant effect of the treatment is due to selection bias.

<sup>55</sup>To be consistent with Oster (2019), we use  $\delta$  to denote the degree of selection on unobservables relative to observables. Note though that this  $\delta$  is not related with the  $\delta$  of our model, *i.e.* the rejection rate of the social norm.

<sup>56</sup>Oster (2019) shows, like Altonji et al. (2005), that simply comparing coefficient changes with the addition of control variables is not enough to show that bias from unobservables is negligible. Such changes must also be scaled by changes in R-squared. But unlike Altonji et al. (2005), Oster (2019) relaxes the assumption that  $R^{max} = 1$  and allows for measurement errors in the data. Oster (2019) suggests to use  $R^{max} = 1.3R^2$ , as she shows that this hypothetical R-squared allows to reproduce 90% of treatment parameters from randomized control studies published in top economic journals between 2008 and 2013, against only 20% when  $R^{max} = 1$ .

are positively correlated, *i.e.* bias from unobservables moves the coefficient estimate in the same direction as that from observables. Thus, the lower bound for  $\delta$  is zero and the upper bound is one, in absolute terms.<sup>57</sup>

We report in Table H.3 the corresponding parameters for each coefficient estimated in Table 2:  $\hat{\beta}$  corresponds to the lower or the upper bound of the coefficient under the assumption of equal degree of selection on observables and unobservables ( $\delta = 1$ )<sup>58</sup>;  $\delta$  represents the degree of selection on unobservables relative to observables that would be necessary to explain away the treatment effect (*i.e.* obtain an estimated coefficient equal to zero). According to Oster (2019), the true coefficient should range between the coefficient estimates obtained when including all control variables and assuming  $\delta = 0$  (provided in Table 2) and  $\hat{\beta}$ , which is estimated using  $R^{max}$  and assuming  $\delta = 1$ . If this range of values does not include zero, we can conclude that the coefficient estimate is robust. For most coefficients in our preferred specifications, reported in columns (3) and (4), the  $\hat{\beta}$  parameter has the same sign as the coefficient estimate, meaning that the interval does not include 0, therefore supporting robustness of our estimates. In addition, the  $\delta$  parameters indicate that in most cases selection on unobservables would have to be almost equal to selection on observables in order to explain away the treatment effects.<sup>59</sup>

## 6 Conclusion

We analyze how recent SSM laws adopted across Europe have contributed to favor gay-friendly opinions among people depending on their social ties. Using a simplified dyadic model, we show that strong ties promote the acceptance of the social norm conveyed by the law when it clashes with the local social norm, whereas the opposite applies in case the law and the local social norm are in line.

We test these theoretical predictions using the 2002-2016 European Social Surveys and a pseudo-panel dynamic difference-in-difference setting relying on the progressive adoption of SSM laws in European countries. Our results reveal that strong ties do indeed induce a slower increase over time in gay-friendly opinions following the adoption of SSM law in communities where the local social norm is in line with the law (*i.e.* communities with a majority of gay-rights supporters, immigrant communities from non-homophobic countries). In contrast, strong ties make gay-friendly opinions increase relatively more over time when the law clashes with the local social norm (*i.e.* in immigrant communities from homophobic countries). In accordance with the theoretical model, the law has therefore induced among these latter communities an increase in the rejection rate of the social norm conveyed by the law (*i.e.* acceptance of gay rights).

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<sup>57</sup> $\delta$  can take a negative value if, to get a zero coefficient, the correlation of unobservables with the treatment has to be opposite of that of observables.

<sup>58</sup>Note that  $\delta = 1$  is the rule-of-thumb threshold suggested by Oster (2019).

<sup>59</sup>We report in the online appendix the same parameters associated to coefficients estimated on the immigrant sample. As for the whole sample, these parameters support robustness of our estimates.

This paper contributes to the debate about the impact of laws on people's attitudes. With regard to SSM laws, it allows to understand how these may have improved attitudes, which could eventually reduce discrimination towards same-sex couples. Using US data Sansone (2019) indeed shows how changes in attitudes towards homosexuals have influenced their performance in the US labor market. More generally, our paper documents another mechanism making a law ineffective when the law conflicts with prevailing norms, as an alternative to that suggested in the literature (see Acemoglu and Jackson, 2017). Beyond the absence of whistle-blowing the law's ineffectiveness may result from the nature of social ties.

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## A Appendix: The model

### A.1 Flows

Entry and exit flows of dyads from each state between  $t$  and  $t + dt$  are given by:

$$\dot{d}_{II_t} = d_{IU_t}(\alpha + \omega pi_t) - 2\delta d_{II_t} \quad (11)$$

$$\dot{d}_{IU_t} = \delta 2d_{II_t} + 2d_{UU_t}\omega pi_t - \delta d_{IU_t} - d_{IU_t}(\alpha + \omega pi_t) \quad (12)$$

$$\dot{d}_{UU_t} = \delta d_{IU_t} - 2d_{UU_t}\omega pi_t \quad (13)$$

These dynamic equations reflect the flows across dyads. From equation (11) we see that the variation in the number of dyads where both members accept the social norm equals the inflow coming from individuals belonging to a dyad where one member is integrated but not the other minus the proportion of individuals that suffers a shock and starts rejecting the social norm. The dynamics of  $d_{IU_t}$ -dyads (equation (12)) equals the inflows coming from integrated dyads that decide to reject the social norm after a shock,  $2\delta d_{II_t}$ , and from non-integrated dyads where one of the members decides to accept the social norm after socially interacting,  $2d_{UU_t}\omega pi_t$ . Outflows equal the proportion of people suffering an exogenous shock that makes them become non-integrated  $\delta d_{IU_t}$  plus the proportion that decides to accept the social norm after socially interacting with weak and strong ties. Finally, the dynamics of  $d_{UU_t}$ -dyads equals inflows from the  $d_{IU_t}$ -segment  $\delta d_{IU_t}$  minus outflows resulting from the acceptance of the social norm after socially interacting.

### A.2 Steady state population composition

At the equilibrium,  $\dot{d}_{UU_t} = \dot{d}_{IU_t} = \dot{d}_{II_t} = 0$ . Setting these net flows equal to zero leads to

$$d_{II}^* = \frac{(\alpha + \omega pi)d_{IU}^*}{2\delta} \quad (14)$$

$$d_{IU}^* = \frac{2\omega pi}{\delta} d_{UU}^* \quad (15)$$

where  $d_{UU}$  is given by:

$$d_{UU}^* = \frac{1}{2} - d_{II}^* - d_{IU}^* \quad (16)$$

Furthermore, the number of integrated people equals:

$$i^* = 2d_{II}^* + d_{IU}^* \quad (17)$$

and since the population is normalized to unity we have:

$$u^* = 1 - i^* \quad (18)$$

**Definition:** A steady state dyad equilibrium flows is a quintuple  $(i^*, u^*, d_{UU}^*, d_{IU}^*, d_{II}^*)$  so that equations (14), (15), (16), (17) and (18) are satisfied.

1. There always exists a steady-state equilibrium  $\mathcal{N}$  where all non-integrated individuals do not do not accept the social norm whereby only  $d_{UU}$ -dyads exist, namely  $d_{II}^* = d_{IU}^* = i^* = 0$ ,  $d_{UU}^* = 1/2$  and  $u^* = 1$ .

2. If

$$\delta < \frac{\omega p + \sqrt{\omega p(4\alpha + \omega p)}}{2} \quad (19)$$

there exists an interior steady-state equilibrium  $\mathcal{I}$  where  $0 < i^* < 1$  is defined by :

$$i^* = \frac{\sqrt{4\delta\alpha + \alpha^2 + 2\alpha\omega p + \omega^2 p^2} - 2\delta - \alpha + \omega p}{2\omega p} \quad (20)$$

Because of (18) we have  $0 < u^* < 1$  and  $0 < d_{UU}^* < 1/2$  is given by:

$$d_{UU}^* = \frac{\delta^2}{\omega p(\alpha + \omega p) + \omega p\sqrt{4\delta\alpha + \alpha^2 + 2\alpha\omega p + \omega^2 p^2}} \quad (21)$$

while the other dyads are given by:

$$d_{IU}^* = \frac{2\omega p i^*}{\delta} d_{UU}^* \quad (22)$$

$$d_{II}^* = \frac{\omega p i^* (\alpha + \omega p i^*)}{\delta^2} d_{UU}^* \quad (23)$$

If (19) holds, an interior equilibrium always exists. If the rate at which individuals reject the social norm  $\delta$  is sufficiently low then an interior equilibrium exists otherwise individuals reject with very high probability the social norm and mostly become non-integrated so that the steady state equilibrium  $\mathcal{N}$  prevails. In the interior steady state equilibrium  $\mathcal{I}$  we can determine the share of people  $i^*$  that has accepted the social norm, as well as those among them with an integrated strong tie ( $d_{II}^*$ ) or with a non integrated strong tie ( $d_{IU}^*$ ).

## B Appendix: European Social Survey (ESS)

**Table B.1:** Countries included in the sample - yearly observations

	Year SSM law <sup>a</sup>	Number of observations in year... <sup>b</sup>								Total nb obs
		2002	2004	2006	2008	2010	2012	2014	2016	
BE	2003	1606	1567	1572	1497	1477	1613	1535	1546	12413
CH	.	1845	1912	1620	1615	1290	1318	1344	1360	12304
CZ	.	1177	2588	0	1831	2147	1745	1952	2082	13522
DE	2017	2611	2470	2524	2463	2660	2599	2691	2537	20555
DK	2012	1333	1328	1340	1420	1371	1440	1315	0	9547
EE	.	0	1653	1288	1393	1542	2037	1769	1791	11473
ES	2005	1514	1467	1645	2286	1680	1713	1694	1766	13765
FI	2017	1759	1756	1642	1932	1634	1940	1827	1718	14208
FR	2013	1367	1645	1794	1826	1531	1711	1683	1810	13367
GB	2014	1842	1671	2024	2078	2109	1978	1800	1731	15233
HU	.	1509	1340	1348	1348	1398	1803	1549	1435	11730
IE	2015	1873	2064	1526	1609	2313	2403	2144	2501	16433
NO	2009	1883	1563	1484	1335	1339	1344	1173	1362	11483
PL	.	1803	1495	1496	1415	1529	1669	1440	1525	12372
PT	2010	1358	1840	1973	2039	1880	1923	1098	1148	13259
SE	2009	1767	1702	1679	1588	1296	1643	1557	1373	12605
SI	.	1350	1050	1107	1118	1175	1103	1084	1160	9147

Notes: <sup>a</sup> missing if SSM not legalized by 2018. <sup>b</sup> 0 when the country is not included in the wave.

**Table B.2:** Sample composition

	All	Immigrants
15-25 years old	0.089	0.076
15-25 years old	0.169	0.211
15-25 years old	0.173	0.212
15-25 years old	0.172	0.175
55-99 years old	0.360	0.288
Female	0.523	0.539
Immigrant	0.090	1.000
Homophobia in home country <sup>a</sup>	0.383	0.383
Has a partner	0.665	0.661
Meets socially with others at least once a week	0.637	0.649
Has a partner and Meets socially with others at least once a week	0.395	0.404
Has someone to talk to about intimate matters	0.908	0.899
Considers that friends or family are important	0.989	0.988
Gay-friendly opinion <sup>b</sup>	0.740	0.682
Strongly agree	0.340	0.316
Agree	0.400	0.366
Neither agree nor disagree	0.134	0.135
Disagree	0.076	0.100
Strongly disagree	0.050	0.083
Important to follow customs and traditions	0.491	0.533
Important to make own decision and be free	0.688	0.711
Important to understand different people	0.633	0.707
Important that people are treated equally and have equal opportunities	0.745	0.798

Notes: <sup>a</sup> among the immigrant population. <sup>b</sup> gathers "Strongly agree" and "Agree" to the statement "Gay men and lesbians should be free to live their own life as they wish".

## C Appendix: Motivation

**Table C.1:** Date of approval of SSM, registered partnership, parenting rights and other anti-discrimination legislations.

	SSM	Registered partnership	Parenting rights of same-sex parents	Anti-discrimination legislation
Belgium	2003	2000	2006	Ordinance related to the Fight Against Discrimination and Equal Treatment in the Employment field in 2008 for the region of Brussel (including transgender) + Decree on the Fight Against certain forms of discrimination and on the implementation of the principle of equal treatment in 2010 (including sexual orientation and gender reassignment)
Switzerland	-	from 2001 to 2007 depending on the Canton	stepchild in 2018	Anti-discrimination law voted in 2018 and approved by referendum in 2020
CzechRepublic	-	2006		Anti-discrimination Law in 2009 last amended 2014 (including sexual orientation)
Germany	2017	from 2001 to 2017 depending on the Länder	stepchild in 2005 + successive adoption in 2013 and joint adoption in 2017	General Act on Equal Treatment in 2006 last amended in 2013 (including sexual identity)
Denmark	2012	1989 to 2012	stepchild in 1999 and joint adoption in 2010	Act on Prohibition of Discrimination due to Race 1971 last amended in 2000 (including sexual orientation) + Act on Prohibition of Discrimination in the Labour Market etc. in 1996 last amended in 2013 (including sexual orientation)
Estonia	-	2016 and recognition of marriage performed abroad between 2016 and 2019	stepchild in 2016 + medically motivated in 2016	Chancellor of Justice Act in 1999 last amended in 2015 (including sexual orientation) + Equal Treatment Act in 2008 last amended in 2014 (including sexual orientation)
Spain	2005	1998 to 2008 depending on the Region	2005	Law on Fiscal, Administrative and Social measures in 2003 last amended in 2014 (including sexual orientation)
Finland	2017	2002 to 2017	stepchild in 2009 and joint adoption in 2017	Non-Discrimination Acts in 2014 (including sexual orientation)
France	2013	1999	2013	Law relating to the fight against discriminations in 2001 last amended in 2016 (including sexual orientation and gender identity) + law relating to the adaptation of National Law to Community Law in matters of discrimination in 2012 last amended in 2016 (including sexual orientation and gender identity)
Great Britain	2014	2005	from 2005 to 2013	Equality Acts in 2006 last amended in 2016 (including sexual orientation and gender reassignment) + Employment Equality (Sexual Orientation) in Northern Ireland in 2003 last amended in 2005
Hungary	-	2009		Act on Equal Treatment and the Promotion of the Equality of Opportunities in 2003 last amended in 2016 (including sexual orientation, sexual identity)
Ireland	2015	from 2011 to 2015	2017	Employment Equality Acts in 1998 last amended in 2015 (including sexual orientation) + Equal Status Acts in 2000 last amended in 2015 (including sexual orientation)
Norway	2009	from 1983 to 2009	stepchild in 2002 and joint adoption in 2009	Sexual Orientation Anti- Discrimination in 2013 last amended in 2014 (including sexual orientation, gender identity and gender expression)
Poland	-	unregisterd cohabitation in 2012		Act on the Implementation of Certain Provisions of the European Union in the Field of Equal Treatment in 2010 last amended in 2016 (including sexual orientation)
Portugal	2010	2001	2016	Law in 2009 last amended in 2016 (including sexual orientation and gender identity)
Sweden	2009	from 1995 to 2009	2003	Discrimination Act in 2008 last amended in 2016 (including transgender identity or expression and sexual orientation)
Slovenia	-	2006	stepchild in 2011	Employment Relationship Act in 2013 (including sexual orientation) + Protection against Discrimination in 2016 (including sexual orientation, gender identity and gender expression)

Sources: European Commission: "A comparative analysis of non-discrimination law in Europe", 2017, Wikipedia, the Ilga Europe website and HumanRights.ch. Parenting rights of same-sex parents covers adoption of stepchild, successive adoption and joint adoption. Are reported only the dates of anti-discrimination laws that cover sexual orientation, (trans)gender identity or gender expression.

**Table C.2:** Opinions about gay rights before SSM adoption: countries having adopted SSM vs. countries having not adopted SSM.

	(1)	(2)	(3)	(4)
Before SSM	0.250*** (0.043)	0.310*** (0.007)	0.316*** (0.007)	0.292*** (0.004)
N	150780	150780	150780	150780
Number of cells	1330	1330	1330	1330
R-squared	0.484	0.886	0.918	0.925
Country FE	No	Yes	Yes	Yes
Cohort FE	No	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes
Country $\times$ Trend	No	No	Yes	Yes
Cohort $\times$ Trend	No	No	Yes	Yes
Country $\times$ Trend <sup>2</sup>	No	No	No	Yes
Cohort $\times$ Trend <sup>2</sup>	No	No	No	Yes
Population	All	All	All	All

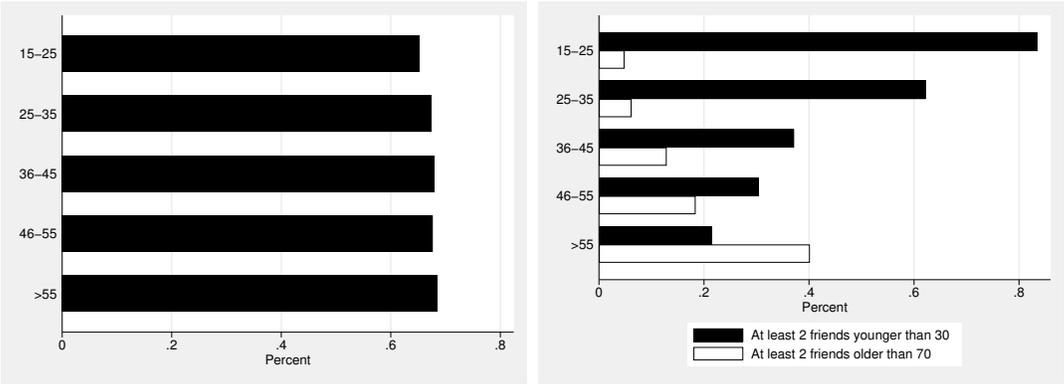
Notes: Dependent variable : share of individuals in the country-age-gender cell agreeing or strongly agreeing with the idea that gay and lesbians are free to live their life as they want. “Before SSM ” is a dummy variable that equals unity for the period before adoption when considering countries that have adopted SSM and zero for countries that have not adopted SSM. For countries having adopted SSM, we ignore the period after SSM adoption. The cohort refers to a particular age-gender group, as specified in Section 4. Robust standard errors in parentheses. Regressions are weighted using a counterfactual weight equal to the average population in the cell over the whole considered sample period (“Counterfactual”). Statistical significance: \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

**Table C.3:** Opinions about gay rights before 2010 in countries adopting SSM before 2010, countries adopting SSM after 2012 and countries having not yet adopted SSM.

	(1)	(2)	(3)	(4)
Followers	0.006 (0.025)	-0.009 (0.006)	0.009 (0.006)	0.108*** (0.010)
Non-adopters	-0.249*** (0.053)	-0.303*** (0.007)	-0.307*** (0.005)	-0.317*** (0.001)
N	82822	82822	82822	82822
Number of cells	1330	1330	1330	1330
R-squared	0.475	0.919	0.930	0.939
Country FE	No	Yes	Yes	Yes
Cohort FE	No	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes
Country $\times$ Trend	No	No	Yes	Yes
Cohort $\times$ Trend	No	No	Yes	Yes
Country $\times$ Trend <sup>2</sup>	No	No	No	Yes
Cohort $\times$ Trend <sup>2</sup>	No	No	No	Yes
Population	All	All	All	All

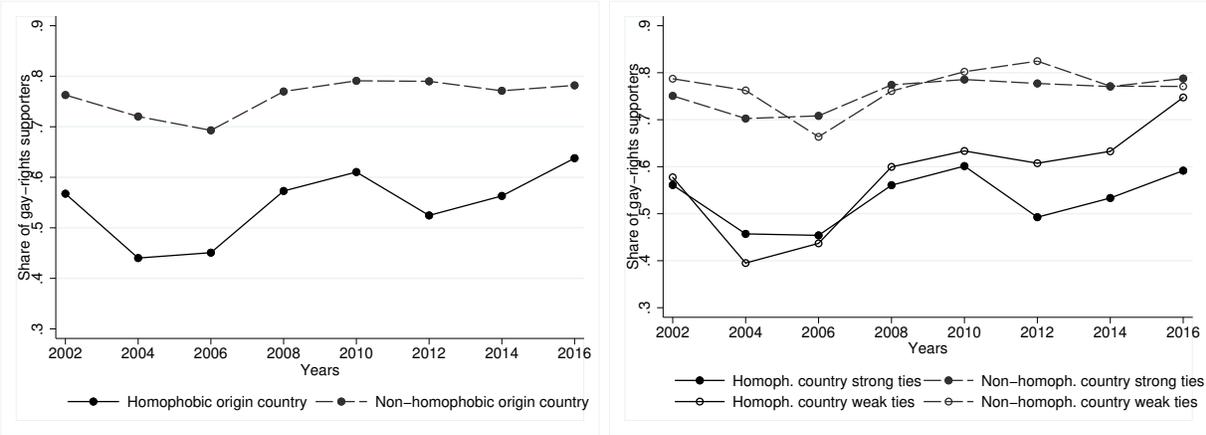
Notes: Dependent variable : share of individuals in the country-age-gender cell agreeing or strongly agreeing with the idea that gay and lesbians are free to live their life as they want. The considered period to study attitudes towards homosexuals is 2002-2010. The reference category includes countries which have adopted SSM before 2010. “Followers” include countries which have adopted SSM after 2012. “Non-adopters” are countries that did not adopt SSM between 2002 and 2016. The cohort refers to a particular age-gender group, as specified in Section 4. Robust standard errors in parentheses. Regressions are weighted using a counterfactual weight equal to the average population in the cell over the whole considered sample period (“Counterfactual”). Statistical significance: \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

**Figure C.1:** The role of age in social interactions. Panel A: Strong sense of belonging to age group. Panel B: Friends younger than 30 and friends older than 70 by age range



Source: European Social Survey 2008. Panel A: Proportion of individuals by age-range that when asked about the sense of belonging to an age group provide a rank of at least 5 in a scale going from 0 (no sense of belonging) to 10 (strong sense of belonging). Panel B: Proportion of individuals by age-range that declares having at least 2 friends younger than 30 (black bars) and 2 friends older than 70 (white bars).

**Figure C.2:** “Gay men and lesbians should be free to live their own life as they wish”: average opinion of immigrants depending on the country of origin and the nature of social ties



Source: European Social Survey (2002-2016).

## D Appendix: Endogeneity of ties and the meaning of $\delta$

**Table D.1:** The influence of SSM approval on partnership.

	(1)	(2)	(3)
First 0-1 years	0.022 (0.017)	-0.007 (0.011)	0.010 (0.014)
Years 2-3	-0.020 (0.014)	-0.026* (0.014)	-0.004 (0.007)
Years 4-5	-0.022 (0.020)	-0.021 (0.014)	-0.005 (0.013)
Years 6-9	0.009 (0.016)	-0.007 (0.018)	0.013 (0.022)
N	196,779	196,779	196,779
Nb cells	1,330	1,330	1,330
R-squared	0.005	0.817	0.833
Country FE	No	Yes	Yes
Cohort FE	No	Yes	Yes
Year FE	No	Yes	Yes
Country $\times$ Trend	No	No	Yes
Cohort $\times$ Trend	No	No	Yes
Country $\times$ Trend <sup>2</sup>	No	No	No
Cohort $\times$ Trend <sup>2</sup>	No	No	No
Population	All	All	All
Weights	Counterfactual	Counterfactual	Counterfactual

Notes: Dependent variable : share of individuals in the cell that live in partnership. The cohort refers to a particular gender-age group, as specified in Section 4. Regressions are weighted using a counterfactual weight equal to the average population in the cell over the whole considered sample period (“Counterfactual”). Robust standard errors in parentheses. Statistical significance: \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

**Table D.2:** Variation of the rejection rate,  $\delta$ , following the approval of SSM

	(1)	(2)	(3)	(4)
After SSM adoption	-0.084*** (0.001)	-0.165*** (0.002)	-0.290*** (0.002)	-0.178*** (0.003)
N	140262	140262	140262	140262
R-squared	0.033	0.244	0.391	0.584
Country FE	No	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes
Country $\times$ Trend	No	No	Yes	Yes
Country $\times$ Trend <sup>2</sup>	No	No	No	Yes
Population	All	All	All	All

Notes: Dependent variable: share of cells in a given country whose negative opinion about gay rights has increased between two waves. “After SSM adoption” is a dummy variable that equals unity once the country has approved SSM, zero otherwise. Robust standard errors in parentheses. Regressions are weighted with the design/post-stratification weights in combination with population size weights (“Standard”). Statistical significance: \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

## E Appendix: Time-varying composition of cells in terms of social ties and gay-rights supporters

**Table E.1:** The influence of SSM approval on the opinion about gay rights: time-varying social ties composition.

	(1)	(2)	(3)	(4)
Strong ties <sub>t</sub>	0.086 (0.055)	0.018 (0.019)	0.011 (0.018)	0.012 (0.018)
First 0-1 years	0.181* (0.087)	0.016 (0.042)	0.033 (0.037)	0.043 (0.039)
Years 2-3	0.225** (0.087)	0.044*** (0.011)	0.058*** (0.018)	0.079 (0.047)
Years 4-5	0.273*** (0.087)	0.066*** (0.015)	0.088*** (0.026)	0.085 (0.065)
Years 6-9	0.268*** (0.087)	0.047*** (0.015)	0.084* (0.040)	0.074 (0.083)
Strong ties <sub>t</sub> × First 0-1 years	-0.104* (0.058)	-0.026 (0.042)	-0.032 (0.035)	-0.035 (0.038)
Strong ties <sub>t</sub> × Years 2-3	-0.119** (0.056)	-0.060*** (0.012)	-0.057*** (0.013)	-0.068*** (0.013)
Strong ties <sub>t</sub> × Years 4-5	-0.206*** (0.058)	-0.076*** (0.013)	-0.088*** (0.014)	-0.089*** (0.014)
Strong ties <sub>t</sub> × Years 6-9	-0.135** (0.055)	-0.026 (0.021)	-0.045*** (0.011)	-0.046*** (0.012)
N	196779	196779	196779	196779
Number of cells	1330	1330	1330	1330
R-squared	0.147	0.877	0.910	0.915
Country FE	No	Yes	Yes	Yes
Cohort FE	No	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes
Country × Trend	No	No	Yes	Yes
Cohort × Trend	No	No	Yes	Yes
Country × Trend <sup>2</sup>	No	No	No	Yes
Cohort × Trend <sup>2</sup>	No	No	No	Yes
Population	All	All	All	All
Weights	Counterfactual	Counterfactual	Counterfactual	Counterfactual

Notes: Dependent variable: share of individuals in the cell agreeing or strongly agreeing with the idea that gays and lesbians are free to live their life as they want. The cohort refers to a particular gender-age group, as specified in Section 4. Robust standard errors in parentheses. Regressions are weighted using a counterfactual weight equal to the average population in the cell over the whole considered sample period (“Counterfactual”). Statistical significance: \*\* \* $p < 0.01$ , \* \* $p < 0.05$ , \* $p < 0.1$ .

**Table E.2:** The influence of SSM approval on the opinion about gay rights: time-varying supporter composition and constant social ties composition.

	(1)	(2)	(3)	(4)
Strong ties	-0.014*	0.004	0.004	0.006
	(0.007)	(0.020)	(0.018)	(0.017)
First 0-1 years	0.022	0.054**	0.062**	0.083**
	(0.022)	(0.022)	(0.025)	(0.032)
Years 2-3	0.052	0.027*	0.039**	0.078**
	(0.031)	(0.014)	(0.015)	(0.033)
Years 4-5	0.086**	0.046**	0.069***	0.098**
	(0.031)	(0.018)	(0.022)	(0.045)
Years 6-9	0.097***	0.051***	0.077**	0.099
	(0.013)	(0.011)	(0.034)	(0.066)
Strong ties $\times$ First 0-1 years	0.009	-0.070**	-0.067**	-0.072***
	(0.030)	(0.027)	(0.023)	(0.023)
Strong ties $\times$ Years 2-3	0.012	-0.038*	-0.037*	-0.048**
	(0.037)	(0.021)	(0.017)	(0.022)
Strong ties $\times$ Years 4-5	-0.064	-0.071**	-0.079**	-0.083**
	(0.045)	(0.026)	(0.031)	(0.031)
Strong ties $\times$ Years 6-9	-0.017**	-0.043*	-0.045***	-0.047***
	(0.008)	(0.023)	(0.011)	(0.011)
N	163439	163439	163439	163439
Number of cells	791	791	791	791
R-squared	0.105	0.727	0.784	0.792
Country FE	No	Yes	Yes	Yes
Cohort FE	No	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes
Country $\times$ Trend	No	No	Yes	Yes
Cohort $\times$ Trend	No	No	Yes	Yes
Country $\times$ Trend <sup>2</sup>	No	No	No	Yes
Cohort $\times$ Trend <sup>2</sup>	No	No	No	Yes
Supporters	Supporter <sub>t</sub>	Supporter <sub>t</sub>	Supporter <sub>t</sub>	Supporter <sub>t</sub>
Weights	Counterfactual	Counterfactual	Counterfactual	Counterfactual

Notes: Dependent variable: share of individuals in the cell agreeing or strongly agreeing with the idea that gays and lesbians are free to live their life as they want. The cohort refers to a particular gender-age group, as specified in Section 4. Cells where more than 60% of individuals agree or strongly agree on the fact that “gays and lesbians are free to live their life as they want” are classified as “Supporters”. Robust standard errors in parentheses. Regressions are weighted using a counterfactual weight equal to the average population in the cell over the whole considered sample period (“Counterfactual”). Statistical significance: \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

## F Appendix: Gender differences

**Table F.1:** The influence of SSM approval on the opinion about gay rights : the role of gender and social ties.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Strong ties	0.282*** (0.029)	0.038* (0.022)	0.041* (0.021)	0.042* (0.021)	-0.087*** (0.023)	-0.000 (0.021)	0.003 (0.016)	0.005 (0.015)
First 0-1 years	0.282*** (0.049)	0.079** (0.030)	0.084*** (0.028)	0.096** (0.037)	0.071* (0.039)	0.067** (0.025)	0.075** (0.030)	0.073* (0.040)
Years 2-3	0.314*** (0.069)	0.017 (0.016)	0.032 (0.024)	0.069 (0.052)	0.109** (0.039)	0.052*** (0.009)	0.065*** (0.021)	0.065 (0.043)
Years 4-5	0.378*** (0.073)	0.051** (0.020)	0.078*** (0.026)	0.096 (0.061)	0.129*** (0.039)	0.081*** (0.016)	0.107** (0.042)	0.094 (0.065)
Years 6-9	0.387*** (0.049)	0.105*** (0.024)	0.122*** (0.038)	0.142 (0.082)	0.133*** (0.039)	0.043** (0.017)	0.096 (0.060)	0.057 (0.083)
Strong ties × First 0-1 years	-0.221*** (0.032)	-0.090** (0.032)	-0.081** (0.033)	-0.075** (0.031)	0.021 (0.021)	-0.080** (0.030)	-0.080*** (0.025)	-0.080*** (0.024)
Strong ties × Years 2-3	-0.237*** (0.063)	-0.038** (0.016)	-0.037** (0.013)	-0.043*** (0.013)	0.027 (0.023)	-0.059*** (0.016)	-0.060*** (0.020)	-0.069*** (0.018)
Strong ties × Years 4-5	-0.305*** (0.066)	-0.040*** (0.010)	-0.063*** (0.016)	-0.063*** (0.012)	-0.055 (0.040)	-0.107*** (0.017)	-0.118*** (0.015)	-0.132*** (0.015)
Strong ties × Years 6-9	-0.276*** (0.028)	-0.087*** (0.019)	-0.101*** (0.017)	-0.104*** (0.017)	0.023 (0.023)	-0.019 (0.023)	-0.042*** (0.010)	-0.043*** (0.009)
N	101822	101822	101822	101822	94957	94957	94957	94957
Number of cells	665	665	665	665	665	665	665	665
R-squared	0.368	0.891	0.927	0.933	0.170	0.869	0.903	0.910
Country FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Cohort FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Country × Trend	No	No	Yes	Yes	No	No	Yes	Yes
Cohort × Trend	No	No	Yes	Yes	No	No	Yes	Yes
Country × Trend <sup>2</sup>	No	No	No	Yes	No	No	No	Yes
Cohort × Trend <sup>2</sup>	No	No	No	Yes	No	No	No	Yes
Population	Female	Female	Female	Female	Male	Male	Male	Male

Notes: Dependent variable: share of individuals in the cell agreeing or strongly agreeing with the idea that gays and lesbians are free to live their life as they want. The cohort refers to a particular gender-age group, as specified in Section 4. Strong dominant is a dummy variable equal to unity if more than 60% of individuals in the cell have dominant strong ties. Robust standard errors in parentheses. Regressions are weighted using a counterfactual weight equal to the average population in the cell over the whole considered sample period (“Counterfactual”). Statistical significance: \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

**Table F.2:** The influence of SSM approval on the opinion about gay rights : the role of gender and social ties among supporters.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Strong ties	0.098 (0.079)	-0.002 (0.015)	-0.014 (0.018)	-0.008 (0.021)	-0.038** (0.014)	0.014 (0.020)	0.016 (0.018)	0.017 (0.017)
First 0-1 years	0.061 (0.081)	0.013 (0.016)	0.028 (0.022)	0.052* (0.029)	0.038*** (0.004)	0.061** (0.024)	0.070** (0.032)	0.054 (0.046)
Years 2-3	0.093 (0.094)	-0.034 (0.021)	-0.011 (0.028)	0.044 (0.045)	0.076*** (0.002)	0.040*** (0.012)	0.055* (0.026)	0.031 (0.049)
Years 4-5	0.158 (0.097)	-0.004 (0.023)	0.031 (0.038)	0.072 (0.050)	0.096*** (0.002)	0.076*** (0.018)	0.099** (0.044)	0.059 (0.074)
Years 6-9	0.166* (0.081)	0.037 (0.021)	0.060 (0.041)	0.099 (0.064)	0.100*** (0.002)	0.062*** (0.019)	0.105 (0.065)	0.034 (0.095)
Strong ties × First 0-1 years	-0.018 (0.081)	-0.030 (0.025)	-0.025 (0.027)	-0.022 (0.025)	-0.018 (0.015)	-0.062** (0.023)	-0.067*** (0.020)	-0.063** (0.022)
Strong ties × Years 2-3	-0.035 (0.093)	0.012 (0.021)	0.017 (0.020)	0.010 (0.024)	0.001 (0.025)	-0.019 (0.023)	-0.025 (0.024)	-0.030 (0.018)
Strong ties × Years 4-5	-0.078 (0.094)	0.002 (0.019)	-0.005 (0.031)	-0.015 (0.027)	-0.056** (0.025)	-0.073*** (0.017)	-0.081*** (0.014)	-0.094*** (0.018)
Strong ties × Years 6-9	-0.071 (0.079)	-0.060*** (0.011)	-0.033** (0.014)	-0.043** (0.017)	-0.009 (0.018)	-0.031* (0.015)	-0.036*** (0.008)	-0.040*** (0.007)
N	81767	81767	81767	81767	62597	62597	62597	62597
Number of cells	393	393	393	393	345	345	345	345
R-squared	0.139	0.763	0.833	0.852	0.189	0.698	0.743	0.765
Country FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Cohort FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Country × Trend	No	No	Yes	Yes	No	No	Yes	Yes
Cohort × Trend	No	No	Yes	Yes	No	No	Yes	Yes
Country × Trend <sup>2</sup>	No	No	No	Yes	No	No	No	Yes
Cohort × Trend <sup>2</sup>	No	No	No	Yes	No	No	No	Yes
Population	Fem. support.	Fem. support.	Fem. support.	Fem. support.	Male support.	Male support.	Male support.	Male support.

Notes: Dependent variable: share of individuals in the cell agreeing or strongly agreeing with the idea that gays and lesbians are free to live their life as they want. The cohort refers to a particular gender-age group, as specified in Section 4. Cells where more than 60% of individuals had agreed or strongly agreed on the fact that “gays and lesbians are free to live their life as they want” in wave 1 of the ESS are classified as “Supporters”. “Fem. support.” refers to these cells among women, while “Male support.” refers to these cells among men. Strong dominant is a dummy variable equal to unity if more than 60% of individuals in the cell have dominant strong ties. Robust standard errors in parentheses. Regressions are weighted using a counterfactual weight equal to the average population in the cell over the whole considered sample period (“Counterfactual”). Statistical significance: \*\*  $p < 0.01$ , \*  $p < 0.05$ , \*  $p < 0.1$ .

## G Appendix: Immigrant sample

**Table G.1:** The influence of SSM approval on the opinion about gay rights over the immigrant population

	(1)	(2)	(3)	(4)	(5)	(6)
First 0-1 years	0.007 (0.027)	-0.040* (0.020)	-0.052* (0.026)	-0.013 (0.027)	-0.019 (0.025)	-0.028 (0.032)
Years 2-3	0.056** (0.023)	-0.015 (0.030)	-0.020 (0.042)	0.025* (0.013)	0.011 (0.029)	0.005 (0.033)
Years 4-5	0.112*** (0.037)	-0.032 (0.045)	-0.006 (0.032)	0.110*** (0.031)	0.017 (0.050)	0.029 (0.034)
Years 6-9	0.098** (0.034)	-0.034 (0.033)	0.055 (0.056)	0.105*** (0.027)	0.031 (0.033)	0.076 (0.055)
N	129,229	129,229	129,229	93,373	93,373	93,373
Number of cells	169	169	169	121	121	121
R-squared	0.045	0.304	0.323	0.079	0.343	0.356
Country FE	No	Yes	Yes	No	Yes	Yes
Year FE	No	Yes	Yes	No	Yes	Yes
Country $\times$ Trend	No	No	Yes	No	No	Yes
Population	All immig	All immig	All immig	Supporters	Supporters	Supporters
Weights	Counterfactual	Counterfactual	Counterfactual	Counterfactual	Counterfactual	Counterfactual

Notes: Dependent variable : share of individuals in the cell agreeing or strongly agreeing with the idea that gay and lesbians are free to live their life as they want. Cells where more than 60% of individuals had a agreed or strongly agreed on the fact that “gays and lesbians are free to live their life as they want” in wave 1 of the ESS are classified as “Supporters”. Regressions are weighted using a constant counterfactual weight equal to the product between the share of immigrants from homophobic countries in country  $c$  in 1990 times the total stock of immigrants from homophobic countries during the considered sample whole period (“Counterfactual”). Overfitting issues prevent us from including non-linear trends. Robust standard errors in parentheses. Statistical significance: \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

**Table G.2:** The influence of SSM approval on the opinion about gay rights over the immigrant population: the role of social ties

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Strong ties	0.052 (0.034)	0.306*** (0.070)	0.290*** (0.069)	0.015 (0.018)	0.213** (0.081)	-0.062 (0.082)	0.057 (0.055)	0.025 (0.018)	-0.085* (0.040)
First 0-1 years	0.028 (0.021)	0.019 (0.014)	0.001 (0.024)	-0.006 (0.015)	-0.027 (0.034)	-0.077* (0.040)	0.114** (0.052)	0.070*** (0.016)	0.124*** (0.016)
Years 2-3	0.051 (0.036)	0.006 (0.023)	-0.007 (0.046)	0.081 (0.057)	-0.003 (0.028)	-0.058 (0.055)	0.049 (0.049)	-0.015 (0.033)	0.064* (0.035)
Years 4-5	-0.104 (0.097)	-0.028 (0.109)	-0.013 (0.117)	-0.031 (0.102)	-0.064 (0.131)	-0.081 (0.090)	0.051 (0.050)	-0.002 (0.023)	0.168*** (0.046)
Years 6-9	-0.087 (0.065)	0.009 (0.089)	0.065 (0.111)	-0.003 (0.064)	-0.014 (0.110)	0.053 (0.052)	0.132** (0.050)	0.057 (0.041)	0.279*** (0.072)
Strong ties × First 0-1 years	-0.022 (0.047)	-0.071*** (0.008)	-0.054*** (0.017)	-0.003 (0.033)	-0.074** (0.024)	0.074*** (0.017)	-0.124** (0.057)	-0.102*** (0.008)	-0.203*** (0.020)
Strong ties × Years 2-3	0.019 (0.047)	-0.015 (0.017)	0.005 (0.030)	0.013 (0.060)	-0.039 (0.029)	0.143*** (0.036)	-0.014 (0.054)	0.015 (0.019)	-0.119*** (0.023)
Strong ties × Years 4-5	0.261** (0.120)	0.024 (0.154)	0.029 (0.155)	0.282** (0.103)	0.150 (0.140)	0.288** (0.125)	0.022 (0.061)	0.005 (0.045)	-0.204*** (0.048)
Strong ties × Years 6-9	0.239*** (0.064)	-0.016 (0.107)	-0.009 (0.106)	0.302*** (0.069)	0.088 (0.120)	0.168* (0.092)	-0.069 (0.057)	-0.053* (0.027)	-0.307*** (0.079)
N	129,229	129,229	129,229	53,278	53,278	53,278	75,951	75,951	75,951
Number of cells	169	169	169	74	74	74	95	95	95
R-squared	0.127	0.388	0.400	0.117	0.594	0.701	0.150	0.655	0.743
Country FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Year FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Country × Trend	No	No	Yes	No	No	Yes	No	No	Yes
Population	All immigrants			Homophobic			Non Homophobic		
Weights	Counterfactual			Counterfactual			Counterfactual		

Notes: Dependent variable: share of individuals in the cell agreeing or strongly agreeing with the idea that gays and lesbians are free to live their life as they want. Cells where more than 60% of individuals had agreed or strongly agreed on the fact that “gays and lesbians are free to live their life as they want” in wave 1 of the ESS are classified as “Supporters”. Homophobic is a dummy variable equal to unity when individuals from the cell come from a homophobic country. Strong dominant is a dummy variable equal to unity if more than 60% of individuals in the cell have dominant strong ties. Regressions are weighted using a constant counterfactual weight equal to the product between the share of immigrants from homophobic countries in country  $c$  in 1990 times the total stock of immigrants from homophobic countries during the considered sample whole period (“Counterfactual”). Overfitting issues prevent us from including non-linear trends. Robust standard errors in parentheses. Statistical significance: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

## H Appendix: Results from the robustness analysis

**Table H.1:** Event study for SSM approval

	(1)	(2)	(3)	(4)	(5)
Strong ties	0.026 (0.016)	0.031 (0.018)	0.366*** (0.080)	-0.206 (0.327)	0.019 (0.045)
6-9 years before	0.026 (0.016)	0.032 (0.024)	0.080* (0.044)	0.077 (0.147)	0.115*** (0.030)
4-5 years before	0.042*** (0.014)	0.064*** (0.021)	0.148*** (0.028)	0.156 (0.089)	0.166*** (0.025)
2-3 years before	0.019 (0.016)	0.046 (0.036)	0.109*** (0.015)	0.110*** (0.025)	0.132*** (0.021)
First 0-1 years	0.094*** (0.018)	0.099*** (0.018)	0.119*** (0.031)	0.023 (0.047)	0.267*** (0.026)
2-3 years after	0.062*** (0.013)	0.067*** (0.017)	0.077* (0.040)	-0.004 (0.078)	0.171*** (0.026)
4-5 years after	0.095*** (0.020)	0.100*** (0.024)	0.082 (0.114)	0.053 (0.097)	0.292*** (0.040)
6-9 years after	0.093** (0.038)	0.098** (0.039)	0.113 (0.086)	0.197*** (0.040)	0.360*** (0.047)
Strong ties $\times$ First 0-1 years	-0.084*** (0.015)	-0.091*** (0.013)	-0.126*** (0.027)	0.009 (0.058)	-0.301*** (0.028)
Strong ties $\times$ 2-3 years after	-0.057*** (0.013)	-0.064*** (0.019)	-0.074* (0.038)	0.044 (0.066)	-0.221*** (0.036)
Strong ties $\times$ 4-5 years after	-0.089*** (0.024)	-0.096*** (0.026)	-0.052 (0.161)	0.079 (0.284)	-0.324*** (0.047)
Strong ties $\times$ 6-9 years after	-0.066*** (0.015)	-0.073*** (0.019)	-0.089 (0.112)	-0.159 (0.324)	-0.439*** (0.044)
Strong ties $\times$ 6-9 years before	-	-0.008 (0.020)	-	-	-
Strong ties $\times$ 4-5 years before	-	-0.024 (0.021)	-	-	-
Strong ties $\times$ 2-3 years before	-	-0.029 (0.046)	-	-	-
N	196,779	196,779	129,229	53,278	75,951
Number of cells	1,330	1,330	169	74	95
R-squared	0.914	0.914	0.438	0.775	0.860
Country FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Country $\times$ Trend	Yes	Yes	Yes	Yes	Yes
Pre-trend	Common	Heterogenous	Common	Common	Common
Population	All	All	All immigrants	Homophobic	Non homophobic

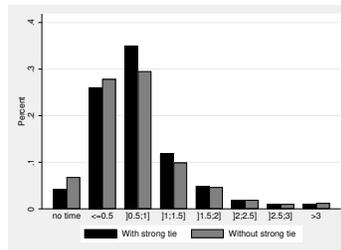
Notes: Dependent variable: share of individuals in the cell agreeing or strongly agreeing with the idea that gays and lesbians are free to live their life as they want. Homophobic is a dummy variable equal to unity when individuals from the cell come from a country classified as homophobic. In columns (1) and (2), regressions are weighted using a counterfactual weight equal to the average employment in the cell over the whole considered sample period. For immigrants, regressions are weighted using a constant counterfactual weight equal to the product between the share of immigrants from homophobic countries in country  $c$  in 1990 times the total stock of immigrants from homophobic countries during the considered sample whole period. Overfitting issues prevent us from including non-linear trends. Robust standard errors in parentheses. Statistical significance: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

**Table H.2:** The influence of media exposure on the opinion about gay rights.

	(1)	(2)	(3)	(4)
First 0-1 years	0.076** (0.026)	-0.008 (0.016)	-0.003 (0.005)	0.014 (0.022)
Years 2-3	0.072 (0.046)	-0.022* (0.010)	-0.033 (0.038)	-0.051 (0.040)
Years 4-5	0.074* (0.040)	0.003 (0.013)	-0.026 (0.047)	-0.061 (0.049)
Years 6-9	0.132*** (0.035)	0.007 (0.022)	-0.038 (0.069)	-0.078 (0.072)
<i>Media exposure (Ref: 0 min)</i>				
Less than 30 min	-0.908 (0.674)	0.394*** (0.111)	0.210*** (0.058)	0.215*** (0.068)
30min-1h	-0.695 (0.464)	0.512*** (0.146)	0.270** (0.094)	0.266** (0.105)
More than 1h	-1.101** (0.485)	0.559*** (0.141)	0.324** (0.115)	0.338*** (0.100)
N	172,784	172,784	172,784	172,784
Number of cells	1,330	1,330	1,330	1,330
R-squared	0.177	0.890	0.913	0.921
Country FE	No	Yes	Yes	Yes
Cohort FE	No	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes
Country × Trend	No	No	Yes	Yes
Cohort × Trend	No	No	Yes	Yes
Country × Trend <sup>2</sup>	No	No	No	Yes
Cohort × Trend <sup>2</sup>	No	No	No	Yes
Population	All	All	All	All

Notes: Dependent variable: share of individuals in the cell agreeing or strongly agreeing with the idea that gays and lesbians are free to live their life as they want. The cohort refers to a particular gender-age group, as specified in Section 4. Media exposure corresponds to the time devoted to watching TV news/politics/current affairs on average weekday. The question is available in all ESS waves from 2002 to 2016. Robust standard errors in parentheses. Regressions are weighted using a counterfactual weight equal to the average population in the cell over the whole considered sample period (“Counterfactual”). Statistical significance: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

**Figure H.1:** Time spent watching TV news/politics/current affairs on average weekday by type of ties.



Source: European Social Survey 2002-2016. The X-axis is defined by hours.

**Table H.3:** The influence of SSM approval on the opinion about gay rights: the role of social ties. Treatment effect bounds using Oster (2019) method

		(1)	(2)	(3)	(4)
Strong ties	Coef.	0.111	0.0250	0.0260	0.0260
	$\beta$	1.186	0.00300	0.0120	0.0130
	$\delta$	-4.188	1.123	1.697	1.800
First 0-1 years	Coef.	0.201*	0.081***	0.087***	0.094***
	$\beta$	45.59	36.04	13.87	11.76
	$\delta$	0.0390	0.541	0.800	0.824
Years 2-3	Coef.	0.231**	0.045***	0.056***	0.073*
	$\beta$	36.54	-6.476	-3.928	-16.59
	$\delta$	0.0370	0.248	0.405	0.381
Years 4-5	Coef.	0.266**	0.070***	0.092***	0.0910
	$\beta$	29.74	-34.96	0.355	26.28
	$\delta$	0.126	0.828	1.360	0.809
Years 6-9	Coef.	0.277**	0.074***	0.101**	0.0930
	$\beta$	20.89	-3.249	-11.00	-38.69
	$\delta$	0.0440	0.369	0.415	0.149
Strong ties $\times$ First 0-1 years	Coef.	-0.124	-0.094***	-0.088***	-0.087***
	$\beta$	-34.09	-3.579	-1.984	-1.787
	$\delta$	-0.0180	-0.550	-0.742	-0.772
Strong ties $\times$ Years 2-3	Coef.	-0.125	-0.060***	-0.056***	-0.061**
	$\beta$	-23.65	-2.374	-1.129	-1.128
	$\delta$	-0.0160	-0.322	-0.429	-0.470
Strong ties $\times$ Years 4-5	Coef.	-0.189**	-0.078***	-0.089***	-0.090***
	$\beta$	-25.61	-1.309	-0.482	-0.400
	$\delta$	-0.0470	-0.892	-1.422	-1.570
Strong ties $\times$ Years 6-9	Coef.	-0.143*	-0.054**	-0.066***	-0.066***
	$\beta$	-12.65	-1.018	-0.517	-0.475
	$\delta$	-0.0180	-0.304	-0.519	-0.549
N		196,779	196,779	196,779	196,779
Number of cells		1,330	1,330	1,330	1,330
R-squared		0.157	0.878	0.912	0.916
Country FE		No	Yes	Yes	Yes
Cohort FE		No	Yes	Yes	Yes
Year FE		No	Yes	Yes	Yes
Country $\times$ Trend		No	No	Yes	Yes
Cohort $\times$ Trend		No	No	Yes	Yes
Country $\times$ Trend <sup>2</sup>		No	No	No	Yes
Cohort $\times$ Trend <sup>2</sup>		No	No	No	Yes
Population		All	All	All	All
Weights		Counterfactual	Counterfactual	Counterfactual	Counterfactual

Notes: Dependent variable: share of individuals in the cell agreeing or strongly agreeing with the idea that gays and lesbians are free to live their life as they want. The cohort refers to a particular gender-age group, as specified in Section 4. Strong dominant is a dummy variable equal to unity if more than 60% of individuals in the cell have dominant strong ties. Regressions are weighted using a counterfactual weight equal to the average population in the cell over the whole considered sample period ("Counterfactual").  $\beta$  is the lower or upper bound on the coefficient under the assumption of equal degree of selection on included control variables and on unobservables (*i.e.*  $\delta = 1$ ).  $\delta$  is the ratio of selection on unobservables to selection on observables required to obtain a coefficient of zero. The calculation assumes  $R^{max} = 1$ , which is the hypothetical R-squared from a regression including all observables and unobservables. Statistical significance: \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .