Roots of Gender Equality: the Persistent Effect of Beguinages on Attitudes Toward Women

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Abstract

This paper is concerned with the historical roots of gender equality. It proposes and empirically assesses a new determinant of gender equality: gender-specific outside options in the marriage market. In particular, enlarging women's options besides marriage —even if only temporarily— increases their bargaining power with respect to men, leading to a persistent improvement in gender equality. We illustrate this mechanism focusing on Belgium, and relate gender-equality levels in the 19th century to the presence of medieval, female-only communities called *beguinages* that allowed women to remain single amidst a society that traditionally advocated marriage. Combining geo-referenced data on beguinal communities with 19th-century census data, we document that the presence of beguinages was instrumental in decreasing the gender gap in literacy. The reduction is sizeable, amounting to a 5.3% drop in gender educational inequality.

Keywords: Economic Persistence, Culture, Institutions, Religion, Gender Gap.

JEL: I25, J16, N33, O15, O43, Z12.

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1 Introduction

The role of women in the society is heavily influenced by cultural norms, which prescribe —among others— whether they can work, earn income and, in general, enjoy the same rights as men's. Scholars have shown that gender equality positively impacts economic outcomes ranging from historical human capital accumulation (Carmichael et al. (2016)) to present-day economic growth (Klasen (2002) and Klasen and Lamanna (2009)). Moreover, attitudes toward women seem to be very persistent (Fernández and Fogli (2009)) and their origins have been traced back to cultural shocks and gender-specific physiologic endowments —see, among others, Becker and Woessmann (2008), Grosjean and Khattar (2017), and Alesina et al. (2013).

This paper is concerned with the deep determinants of gender equality and puts forward a new mechanism to explain variations in social norms regarding the role of women in society. In particular, we propose a new economic explanation related to female bargaining power in the marriage market and how alternative opportunities for women increase it. We illustrate the relevance of such mechanism focusing on the Belgian context, where the historical presence of medieval, female-only, semi-religious communities called *beguinages* allowed women to remain single and independent of men in stark contrast to the customs of the time. Beguines also enjoyed financial freedom since they supported themselves working for pay and, contrary to nuns, retained and accumulated wealth. Combining information on the geographic location of beguinages with Belgian census data, we show that municipalities where beguine communities thrived reached higher levels of gender equality by the mid-19th century. In particular, we find a 5.3% reduction in the gender literacy gap, our preferred measure of gender equality. We address the possibility that beguines' location decisions obeyed pre-existing local conditions in terms of gender-egalitarian attitudes relying on a series of robustness tests: alternative variable coding, the adoption of an exogenous variable that leverages towns' network, an IV approach, and propensity score matching.

This study supports the idea that gender roles and gender equality are strikingly persistent and determine present-day attitudes towards women.[1] However, our explanation departs from those advanced in the existing literature, which typically ascribe the origins of gender roles to gender-based specialisation predating industrialisation. For instance, Alesina et al.

[1] In general, cultural beliefs are deeply rooted and tend to evolve slowly. Several studies document persistence for a wide range of characteristics, including antisemitism and trust. See, for instance, Voigtlander and Voth (2012), Becker et al. (2016) or Lowes et al. (2017). Giuliano and Nunn (2017) analyse under which conditions culture persists or changes.

(2013) maintain that gender-specific endowments facilitated economic specialisation, prompting gender roles. The comparative advantage of men in manoeuvring the plough explains why the descendants of plough-agriculturalists are today less gender-egalitarian. Similarly, Hansen et al. (2015) show that today women work less in societies that transitioned earlier to agriculture. The proposed channel operates through differential fertility across modes of living, diverting agriculturalist women's time from market work to childcare. Galor and Weil (1996) propose a theoretical framework encompasing the previous findings. It emphasises the importance of differential physical endowments —in terms of strength— and their complementarity to physical capital. The endowment imbalance between genders generates economic specialisation as long as physical capital is absent: men work and women bear children.

Besides physiological determinants, scholars have shown that certain cultural and economic aspects are associated with a gender bias. Alesina and Giuliano (2010) relate strong family ties to gender inequality, although probably both variables co-evolved.[2] Grosjean and Khattar (2017) stress that historical scarcity of women improved their position in Australia during the 17th and 18th century. Today, these traditional roles persist.[3] Fernández and Fogli (2009) analyse the behaviour of second-generation migrants in the US: female labour force participation in the parents' country of origin explains the behaviour of their daughters. Finally, Giuliano (2018) provides an extensive literature review on the historical origins of gender roles.

The two-step mechanism we postulate, instead, combines female empowerment through girls' bargaining power —facilitated by the presence of beguinages— with the intergenerational transmission of a gender-egalitarian culture. Initially, the very existence of beguinages provides an additional option to girls: besides marriage or monastic life, they were given the possibility of remaining single and financially independent. The availability of a viable outside option (to marriage) improves the bargaining power of women, which in turn brings about a progressive reduction of the gender gap. The improved status of women favours the emergence of more gender-egalitarian norms, which are then perpetuated across generations through a cultural transmission mechanism à la Bisin and Verdier (2001). In that sense, children in towns where beguines located were exposed firstly to beguines themselves, and secondly to peers who were already more favourable towards gender-equal norms. Role modelling is a possible competing

[2]Bertocchi and Bozzano (2019) validate this result using historical Italian data. Tur-Prats (2018) associates the stem family type to domestic, intimate-partner violence in Spain.

[3]Their argument builds on the relative shortage of women, while this is irrelevant in our setting. However, we both emphasise the importance of the marriage market.

channel. We can partly dismiss it: we find that the sheer *accessibility* to beguinages explains gender equality. Hence, the transmission of gender norms operates even absent direct contact with beguines. Instead, viable alternatives to marriage is pivotal in delivering gender equality: non-enclosed feminine monasteries also enhance women's position. These offer a more constrained alternative to marriage —compared to beguinages— but definitely lack the role modelling dimension.

By focusing on semi-monastic communities, our paper is also linked to the strand of the literature analysing the legacy of religious institutions on economic performance. For instance, Valencia Caicedo (2018) assesses the positive effects of historical Jesuit Missions in Latin America on modern-day human capital and technological progress. Waldinger (2017) related the presence of Catholic missions in Mexico to increased literacy and educational attainment. Similar results extend also to Protestant missionaries in Africa, as in Cagé and Rueda (2016). Andersen et al. (2017) associate the presence of the industrious Cistercian Order in England with faster productivity growth long after monasteries were disbanded. Finally, Akçomak et al. (2016) study how a Catholic sect that valued literacy to understand the Gospel —the Brethren of the Common Life— affected Dutch male literacy rates.

Our study is also related to the literature focusing on intra-couple bargaining. Female education reinforces their status and aligns family preferences to women's, as described by Iyigun and Walsh (2007) and Doepke and Tertilt (2009). Giuliano (2018) argues that matrilineal societies favour gender equality by providing a safety net for women, raising women's bargaining power. Gottlieb and Robinson (2016) and Jayachandran (2015) discuss this hypothesis. Our paper bridges the gap between these two strands of the literature, suggesting that even a temporary improvement in women's bargaining position can have long-lasting effects on gender equality.

To the best of our knowledge, this paper is the first to systematically explore the relationship between pre-industrial, female-only urban associations and gender equality in the long run. Our contribution singles out the importance of female associations in improving gender equality, well beyond the life-cycle of the original institutions. Moreover, we propose a novel mechanism based on women's bargaining power, never explored in this literature, to explain the enduring association between female communities and gender equality.

The rest of the paper is organised as follows: Section 2 introduces the historical background of the beguinal movement. Sections 3 and 4 describe the different data sources and the empirical

strategy. The latter is supplemented by robustness tests, including an IV approach. A theoretical model in Section 5 illustrates the suggested mechanism that rationalises our findings. Section 6 concludes.

2 Historical Background

The beguinal movement started in the late 12th century in the Northern Sea region,[4] fully flourishing in the next two centuries, and has left several beguinages across the Low Countries, France and Germany.[5] It consisted of self-supporting, female-only, semi-religious communities that offered single women of all social strata the opportunity to work and conduct an independent life in a society that disapproved that option.[6]

Records of pre-beguine communities first appear around the city of Huy around 1181. Several analogous groups arose nearby in subsequent years, dotting the region comprising Aachen, Nivelles and Vilvoorde. Simultaneously, two beguinages flourished in Cambrai and Valenciennes —in present-day France—, see Simons (2010, Appendix I). Bowie's (1990, p. 14) chronology is similar and also points to the same Belgian region as the cradle of the beguine movement.[7] From its early configuration as groups of itinerant, devote women, the movement settled in definitive spaces within towns. We can distinguish two main types of beguinages: convent and court.[8] In the first sort, the most common, beguines lived close to each other in the same neighbourhood

[4]The economic literature argues that the gender-egalitarian culture of the Northern Sea region, documented in historically high levels of female employment (De Moor and Van Zanden (2010)), was conducive to economic development. In particular, gender equality enabled human capital accumulation by aligning family's fertility with women's preferences for less offspring (Carmichael et al. (2016)). However, we do not attempt to explain why that region was more gender-egalitarian, to begin with. Instead, we are concerned with differences in gender equality *within* this area.

[5]In 1998, the UNESCO recognised some of them as World Heritage for their "outstanding example [... as] a religious movement characteristic of the middle ages, associating both secular and conventual values".

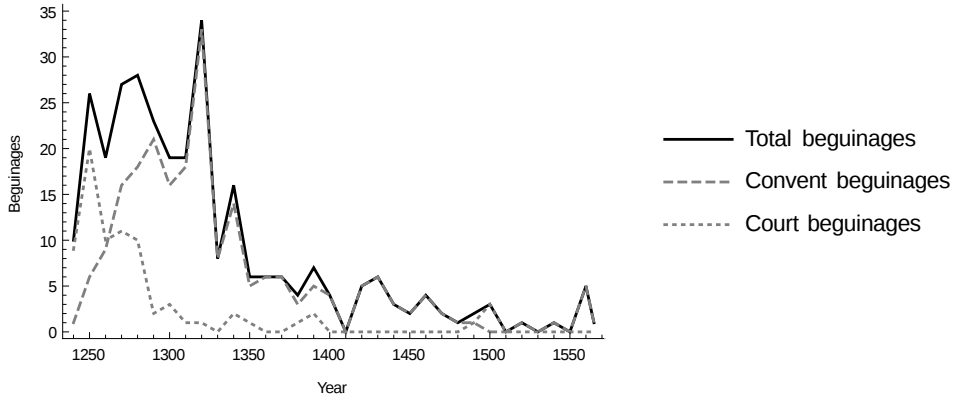
[6]Poor and well-off women joined beguinages alike. Destitute girls and women who sought poverty as a Catholic ideal became members, see McDonnell (1954, p. 146) and Geybels (2004). On the other hand, daughters of wealthy citizens and noble-men entered the community, at times accompanied by their maids, see McDonnell (1954, p. 97-99) and Geybels (2004, p. 111).
The Mistresses of the beguinages in Ghent indicate that "young beguines received their education [...]" in the beguinage, although the "fruit of their work" earned them a living, see Vander Schelden (1862, p. 2 and p. 12); own translation from French. Beguinages combined contemplative lifestyle and work (McDonnell (1954, p. 146-149)). Indeed, admittance to a beguinage required the capacity of supporting oneself through work or personal finances (Geybels (2004, p. 114-118)) and beguines' laboriousness put them "in competition with guilds and craftsmen" (*Ibid.* p. 63). Beguine occupations included "carding, spinning, weaving and bleaching [... ,] making of bobbin lace, sewing, embroidery, making rosaries and baking communion wafers". "[L]abour was compatible with the ideals of the vita apostolica [... because] the disciples in Jesus's day also had to support themselves". (*Ibid.* p. 115-116). Caretaking and teaching were other profitable sources of income.

[7]These initial arrangements differed from the concept of beguinage that developed later. However, they featured several women who followed a spiritual life outside convents.

[8]Geybels (2004, p. 105-106) distinguishes between "town pattern" beguinages, "court beguinages" and what he calls "miscellaneous beguinages".

and followed a common rule under the direction of a superior.[9] Although court beguinages were rarer, this type developed earlier and left a greater imprint on city life. In fact, court beguinages were erected with the purpose of accommodating the community and consisted of several dwellings, gardens, workshops and a chapel.

Figure 1: Number of beguinages created by decade.



Note: Data on beguinage foundations per decade from Simons (2010), Table 1. Own elaboration.

The expansion of beguinages during the middle ages was uneven. Across the Low Countries, after an initial surge, the creation of beguinages stagnated at 20 per decade and then steadily decreased. Figure 1 represents the number of beguinages created every decade between 1241 and 1565. Overall, 111 cities hosted a beguinage: 70 located in Belgium, 22 in France, 17 in the Netherlands, and 2 in Germany. The number of municipalities that had at least one beguinage over time is depicted in Figure 2 separately for Belgium and for all countries. After an initial momentum in the creation of new beguinages, the movement reached its zenith between the 14th and the 16th centuries, when the number of beguinages stabilised. Afterwards, their popularity declined.

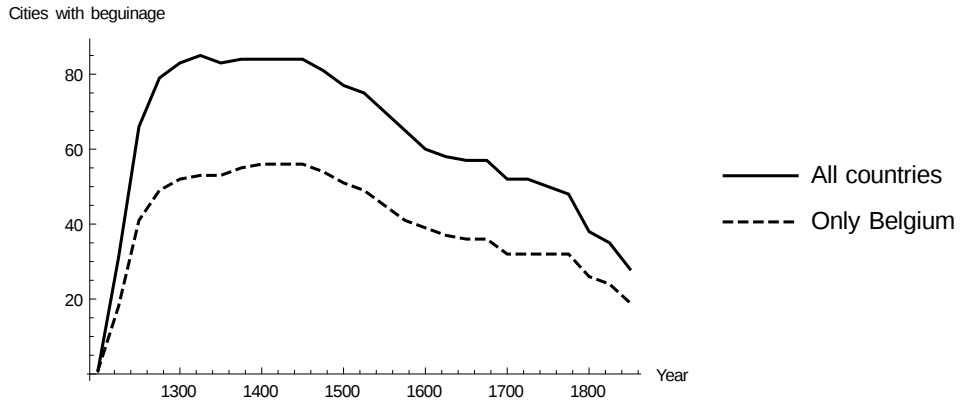
Beguinages differed greatly in terms of the population they hosted. Estimates are scarce but attest to the popularity of the movement.[10] For instance, Mechelen's beguinage hosted up to 1900 beguines in 1500 while that of Nivelles counted 51 beguines in 1284, shortly after its creation. However, historians document a decreasing trend between 1300 and 1900. By the mid-19th century those beguinages still operating counted less than 10 inhabitants.[11]

[9] See, among others, Geybels (2004, p. 50) and Mommaers and Dutton (2004, p. 21).

[10] See Simons (2010, Table 3, p. 56-59; Appendix II), McDonnell (1954, p. 64) and Geybels (2004, pp. 69, 136, 143, 145 and 147).

[11] Some pious men, known as *beghards*, emulated the lifestyle of beguines but never reached their reputation and size. Beghards were sorts of small guilds, as they were essentially craftsmen in the textile industry.

Figure 2: Number of cities with at least one beguinage.



Note: Data on beguinage foundations per decade from Simons (2010), Table 1. Own elaboration.

Although beguinages were preferentially established in relatively larger towns, communities also settled in hamlets or small boroughs counting less than 200 houses in 1437. This was the case of Bousval, Maleves-Sainte-Marie-Wastinnes, Thorembais-les-Beguines and Grez-Doiceau. At that time, the average town had 187 dwellings,[12] and the larger —Brussels, Leuven and Antwerp— counted 6376, 3579 and 3440 houses.

The beguine movement stands out from other religious communities especially because beguines never constituted an Orthodox religious order.[13] Albeit religiosity and pious life guided the beguinages' foundation and daily routine,[14] these communities radically differed from monastic convents. First, beguines did not take poverty vows, allowing them to retain property and accumulate wealth. Second, they could leave the beguinage at will to marry or to reintegrate the secular society. Family ties were generally maintained.[15]

Third, these communities were actively involved and well integrated into the everyday social life of medieval cities. As thoroughly depicted by Simons (2010), whether court beguinages were intended to do so or not, they attracted women from rural areas who could find work there in a safe and supportive environment. Alongside prosperous beguines lived others of more modest

[12]The data on municipal size during 1437 is from Cuvelier (1912) and is restricted to the historical Brabant province. It comprises 439 towns, of which 22 had a beguinage.

[13]To Denisart, "beguines are pious women whose status is [...] between religious and secular"; own translation from French, see Vander Schelden (1862, Document V, p. XXV-XXVI).

[14]McDonnell (1954, p. 5) and Béthune (1883, p. 90).

[15]Warnkönig (1836, p. 350) defines them as "women [...] who wear a particular monastic clothing, live together in a space not forbidden to outsiders [...], to lead a chaste and pious life under a superior and following their own statutes. They are not obliged by vows to renounce the world forever"; own translation from French. Vander Schelden (1862, Document V, p. XXV-XXVI) confirms this characterisation adding that "beguines need not give up family relationships or friendships [...]". Bishop Malderus of Antwerp similarly characterises beguines, especially noting the lack of vows, see McDonnell (1954, p. 121-122). Mommaers and Dutton (2004, p. 20) portray a similar arrangement.

background who supported themselves as teachers, maids, nurses, textile workers, or small business owners. In fact, while beguines promised to lead a humble life, this did not prevent them from having real-world occupations.[16] Beguines served in hospitals and leper houses, and the nursing of individuals in private homes, both for charitable reasons and in order to earn a small income. Some beguines were farmers in nearby fields, herded animals or grew vegetables for the local market. The bulk of the evidence, however, suggests that most beguine workers were labourers in the textile industry and earned their living from commerce: for instance, a few traded cloth locally and interregionally in Bruges, Ghent, and Arras, while in Tournai will records provide documentary evidence of a draper employing forty fellow beguines.[17]

The movement further distinguished from Catholic orders because beguines lacked common rules and a central coordinating authority.[18] Despite their non-adherence to traditional monastic standards and although communities were independent of any male authority, beguines were tolerated and even granted spaces by the secular society.[19] In general, the Holy See and local bishops supported the beguine movement.[20] However, the Council of Vienna (1311-12) demonised beguines, and the persecution of heretic movements harassed them particularly in the Rhineland region, despite the fact that the beguine movement was never considered as such.[21] Accusations did not last long, though, and the Pope Clement VI completely exonerated the movement from previous charges in 1328.

Beguines' peculiar freedom of choice and self-determination rapidly propagated and, as soon as 1260, a literary work portrayed the beguines among other religious orders.[22] Indeed, beguinages were the forerunners of women's associations, guaranteeing the necessary social and

[16]McDonnell (1954, p. 131) provides an analogous characterisation based on Béthune (1883, p. 74): "[t]he beguinage was a retreat, especially well adapted to an urban society, where women living in common could pursue chastity without a vow and earn a livelihood by suitable work". See also Bowie (1990, p. 25).

[17]McDonnell (1954, p. 5) underlines their charitable work.

[18]According to Geybels (2004, p. 59), the beguine movement was "poorly organised [...] with each community possessing its own statutes". It always lacked common rules (McDonnell (1954, p. 134)) and ecclesiastical opposition was partly founded on this, see Frédéricq (1889, p. 168-169, par. 172).

[19]French and Belgian beguines enjoyed powerful patronage and were granted privileges, including land donations, see Vander Schelden (1862) and McDonnell (1954, p. 6, Ch. X and Ch. XI). Clerical tolerance is also emphasized, and beguines' lifestyle was praised and recommended by prelates and the Roman Curia.

[20]Simons (2010, p. 124-125) indicates that clergymen accepted beguines as "a sign of diversity" within the Church, and others simply saw beguines as women who "contributed to purify the faith". However, some initial opposition is recorded because they preached and "interpreted the mysteries of Scripture". See also footnote 19.

[21]See Frédéricq (1889, p. 168-169, par. 172) and Geybels (2004, p. 56-65).

[22]The poem "*Ci encoumence li diz des Beguines*" written by the Parisian *trouvère* Rutebeuf around 1260 caricatures beguines *"If a beguine marries, that is her vocation, because her vows or profession are not for life. Last year she wept, now she prays, next year she'll take a husband. Now she is Martha, then she is Mary; now she is chaste, then she gets a husband."*. The author of this piece and other foreign visitors in the southern Low Countries expressed surprise over the public behaviour of women: they were usually shocked by women's relative freedom of movement and action.

financial protection for single women who joined the community, in a society where staying single was stigmatised.[23] Because of their independence from male authority, Bowie (1990, p. 13) considered the beguines "the first European women's movement".

Finally, De Moor (2014) reviews and dismisses the traditional explanations for the rise and success of the beguine movement. More in detail, the view that beguines sheltered urban girls unable to marry because of skewed urban sex rations is dubious because most beguines came from the countryside. Similarly, beguinages were not a substitute for monasteries, because each community located geographically separated and attracted different women. The author evinces that —besides devotional reasons— beguines were often motivated by professional opportunities. In that sense, joining a beguinage was a deliberate choice to stay single and do remunerated work, independently of a male breadwinner.

3 Data

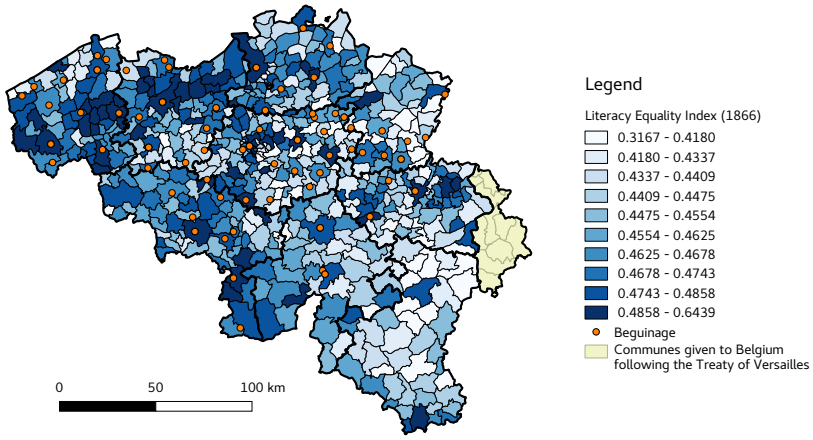
We combine several data sets to establish an empirical relationship between medieval beguine communities and female agency while accounting for a rich set of potential confounders.

Historical Presence of Beguines. Beguinage location, foundation and dissolution dates are reported by Simons (2010). The author combines a wide variety of sources to overcome the lack of historical records and the fact that beguinages were rarely established through a formal act of foundation. He documents 143 sites that can be positively defined as beguinages, with few records grouping multiple small beguinages in the same town. Using this information, we compile a new data set that features the exact location of each beguinage and relate it to Belgian municipalities existing in 1866. We restrict our attention to beguinages located within the borders of modern Belgium, where 70 municipalities hosted at least a community. Figure 3 depicts their location.

Ideally, one would like to have information on the number of beguines living in each municipality, but such data is scarce and only available for selected beguinages. We circumvent this limitation by creating two proxy variables that convey the intensive and extensive margin of such presence. The first one is a binary indicator that takes value one when a municipality

[23]The cartulary of the beguinage in Ghent supports this perspective, see Geybels (2004, p. 47).

Figure 3: Distribution of beguinages and literacy equality index.



Note: This map depicts present-day Belgian municipalities. The literacy equality index is computed for each historical municipality during 1866 and aggregated using population-weighted averages. Provincial boundaries follow historical limits. Due to the skewness of the data, the map displays it by deciles.

had, at any point in time and for any duration, at least one beguinage:

$$Beguinage_i = \begin{cases} 0 & \text{if } municipality_i \text{ never had a beguinage,} \\ 1 & \text{if } municipality_i \text{ had, at least, one beguinage.} \end{cases} \tag{1}$$

The second measure consists of a continuous variable that accounts for different durations (t) of beguinages (j) in municipalities (i). Since it is possible that a municipality hosted more than one beguinage, we aggregate the impact of different beguine communities coexisting or succeeding in the same town in the variable *exposure*:

$$Exposure_i = \sum_{j \in i} t_{i,j}. \tag{2}$$

Census Data. Following Bertocchi and Bozzano (2019), we use census data to assess gender equality comparing female-to-male literacy rates.[24] This source offers widespread coverage and consistent measurement across regions, with a final sample comprising 2553 municipalities with complete information. Data to proxy gender equality with literacy ratios are only available at the municipal level starting from the 1866 census.[25] Analysing 19th-century census data mitigates the influence of the labour market and welfare state measures implemented in the following century, especially compulsory education. Moreover, it allows to control for migratory patterns and reduces concerns related to the involvement of women in the early industrialisation

[24] In our context, a literate individual is someone able to read and write.

[25] Census data from 1846 onwards have been recently digitised by the HISSTAT/LOKSTAT project of the University of Ghent. Older national censuses from the years 1800-1830 are archived as manuscripts in Belgium, France and the Netherlands.

of Belgium. Finally, historical data alleviates the fact that variation in gender norms tends to be confounded over time by other events and institutional shocks.

In the first half of the 19th century, education was not compulsory for children and traditional roles preferentially educated sons over daughters. Therefore, comparing female-to-male literacy rates is meaningful as it reflects how women were perceived with respect to men at a time in which schooling was an expensive investment.[26] Locations valuing women comparatively more and equating them to men are expected to educate both genders in similar manners.

We proxy gender equality by taking the ratio of literacy levels between women and men. For each municipality i, it amounts to:

$$literacy\,equality\,index_i = \frac{Number\,of\,literate\,women_i}{Number\,of\,literate\,men_i} \tag{3}$$

which relates the number of literate women to the number of literate men.

Alternative definitions of this ratio are considered for sensitivity checks. These are, for each municipality i:

$$female\,literacy\,share_i = \frac{Number\,of\,literate\,women_i}{Number\,of\,literate\,women_i + Number\,of\,literate\,men_i}, \tag{4}$$

recording the share of literate women within the literate population, and

$$female\,literacy\,index_i = \frac{Share\,of\,literate\,women_i}{Share\,of\,literate\,men_i} \tag{5}$$

comparing female and male literacy rates. Higher values of any index correspond to more favourable attitudes towards women. Notice that the inclusion of men in the denominator is meaningful since plain literacy rates may vary across regions for diverse reasons. Its inclusion smooths out part of these underlying, idiosyncratic characteristics.

Other variables derived from the census comprise population, nuptiality and the share of international and domestic migrants by gender, the sex ratio and an indicator variable for the 10% most populous municipalities.

Education Providers. The empirical analysis takes into account the presence of two education providers that promoted literacy and hence could confound our outcome of interest. First, elementary education was traditionally offered almost exclusively by church-related institutions prior to and during the 19th century. According to Ruyskensvelde (2016, p. 28), schooling became compulsory at the end of the 19th century, whereas previous efforts —notably the *Nothomb law* of 1842— failed.[27] Our data set documents the presence of monasteries at

[26] Clearly, the parental decision on whether to educate a daughter or a son is influenced by other factors we control for in the regressions. See Section 3 for a more comprehensive description.

[27] Financial problems and opposition from the Church doomed the success of the 1842 education bill. Although

the municipal level, as they historically provided education and could have fostered human capital in the area.[28,29] Information includes monasteries' foundation and dissolution dates, the order to which they belonged and whether the community was masculine or feminine. We limit our observations to monasteries founded before 1800. Although both beguines and traditional nuns were devoted to the study of the scriptures, the latter were more inclined to a cloistered, contemplative life, and therefore were less integrated with the secular society.

Secondly, we introduce the geographical distance from each municipality to Leuven, which hosted the unique university in Belgium from its constitution in 1425 until 1817 when Liège and Ghent universities were established. Being close to the unique university might have raised awareness of the benefits of education or it may have intensified the local supply of books, teachers and professors.[30]

Other Controls. In a pre-modern society, the degree of economic development is likely to exert an influence on literacy levels and gender roles. To take into account the extent of industrialisation, we introduce the number of steam engines per capita at the municipal level using data from van Neck (1979, p.468-476). We incorporate additional variables obtained using GIS solutions: latitude, longitude, distance to the closest river[31] and to the closest large city.[32] The proximity to waterways and urban areas is a predictor of industrialisation, and we argue that the presence of close-by factories may affect the incentives on whether to educate children.

During the 19th century, agriculture was an important activity, and we introduce measures to capture its extents. In particular, we include agricultural caloric yields, soil types and crop-specific yield for staple crops: barley, buckwheat, rye, wheat, and white potatoes. The economic literature indicates that historical agricultural productivity, measured by its caloric yield, has shaped gender roles through economic specialisation. On the other hand, contemporaneous yield levels affect the marginal productivity of labour, and hence the returns to education. For these reasons, the variable takes on different values before and after 1550 (Galor and Özak (2016)).

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the reform contributed to increasing literacy rates, by 1880 39% of the population was still illiterate while this figure was as high as 51% in 1843.

[28]Information on monasteries has been derived from Cottineau (1939), Berlière (1955), Michel (1923) and Department of History, The Ohio State University (2016). Monasteries were assigned to the relevant municipality existing in 1866. For instance, the priory of Oignies is located in the town of Aiseau although its name suggests it was in Oignes. Most religious institutions were suppressed, and their properties auctioned after the Napoleonic invasion.

[29]Unfortunately, contemporaneous information on schools is only available at the provincial level.

[30]The presence of this university should not directly encourage women to pursue higher education because they were not admitted until 1880, first at *Université Libre de Bruxelles*. Therefore, we expect distance to Leuven to have a negative impact on our measures of compared literacy, if any.

[31]We use shape-files from European Environment Agency (2017) tracing all major European rivers.

[32]The 50 most populated cities are classified as large municipalities.

Carranza (2014) documents that soil types determine female employment in agriculture, and a long tradition of female participation in agriculture can generate persistence. Following her intuition, we compute the share of clayey, silty or sandy soil in a 10 km-radius area around each municipality. Similarly, crop-specific yield measures from FAO's Global Agro-Ecological Zones (GAEZ) account for the possibility that women had a comparative advantage in given crops.[33]

Table 1 provides the summary statistics for the main variables.

4 Regression Analysis

Our baseline econometric specification is an OLS model, where the unit of observation is a Belgian municipality existing in 1866:

$$outcome_{i(j)} = \alpha\, beguinage_{i(j)} + \beta X_{i(j)} + \gamma_j + \epsilon_{i(j)}. \tag{6}$$

$outcome_{i(j)}$ measures gender equality and is observed for municipality i belonging to canton j, $beguinage_{i(j)}$ is a variable attesting the historical presence of a beguinage, $X_{i(j)}$ is a set of covariates, γ_j are fixed-effects at the canton level, and $\epsilon_{i(j)}$ denotes the error term.[34] As detailed in Section 3, we proxy gender equality using mid-19th-century literacy differentials between genders derived from census data.

We argue that beguinages offered marriageable girls an additional option besides marriage or monastic life. In turn, access to a broader choice-set raised their bargaining power, allowing them to improve their status in the society.[35] As described in Section 5, we postulate that the ensuing more gender-egalitarian view of the society is transmitted horizontally across generations (as in Bisin and Verdier (2001)), fossilising in a local culture of higher equality between genders. In that sense, children in towns with a beguinage were first exposed to beguines; and second, to peers who were becoming more favourable towards women.

Table 2 presents the results of increasingly demanding OLS regressions. Columns 1) and 2) present the raw correlation between the presence of beguinages and $literacy\, equality\, index_i$.[36]

[33] Crop yield data is provided by FAO/IIASA (2011). These measure production capacity for several crops based on geographic and climatic characteristics. In our setting, we consider low-input and rain-fed cultivation, mimicking medieval characteristics; and intermediate level of inputs and the use of irrigation to better account for 19th-century agricultural techniques.

[34] Cantons are the administrative level immediately above municipalities. Belgium counted 193 cantons in 1886 and each contained between one and 40 municipalities.

[35] Complementing this channel, beguines acted as role modellers by successfully and independently conducting their own lives without the intervention of men, which signalled their merit and equal role with respect to males. On top of pious donations, beguinal independence was sustained by means of work —including high-level, prestigious professions as teachers—. Moreover, their occupations contributed to tightening the relationship between beguines and townspeople.

[36] Appendix B presents the results when the dependent variable is $female\, literacy\, share_{i(j)}$ and

Table 1: Summary statistics.

	Mean	*Std.Dev.*	*Min.*	*Max.*
Beguinage presence				
Beguinage (0/1)	0.026	0.159	0	1
Intensity: No Beguinage	0.974	0.159	0	1
Intensity: 1 Beg., $<$ 200 years	0.007	0.086	0	1
Intensity: 1 Beg., $>$ 200 years	0.012	0.108	0	1
Intensity: $>$ 1 Beg., $>$ 200 years	0.003	0.054	0	1
Intensity: $>$ 3 Beg., $>$ 200 years	0.004	0.061	0	1
Exposure (centuries)	0.134	1.065	0.000	22.440
Outcomes				
Literacy equality index, 1866	0.822	0.137	0.236	1.808
Female literacy share, 1866	0.448	0.042	0.191	0.644
Female literacy index, 1866	0.856	0.122	0.256	1.601
Controls				
Total men, 1866 (thousands)	0.949	2.622	0.009	74.169
Total women, 1866 (thousands)	0.944	2.909	0.009	83.736
Nuptiality men, 1866	0.360	0.036	0.181	0.669
Nuptiality women, 1866	0.398	0.037	0.202	0.626
Fem. monastery	0.030	0.184	0	2
Masc. monastery	0.024	0.170	0	3
Other monastery	0.072	0.259	0	1
Distance to river (km)	9.082	8.757	0.002	52.396
Distance to Leuven (km)	69.560	33.467	0.000	167.249
Distance to beguinage (km)	16.265	18.164	0.000	122.010
Distance to large city (km)	18.577	19.988	0.000	114.328
Steam engines per 1000 people	0.071	0.689	0.000	12.493
Potential caloric yield before 1550	2142.122	72.760	1908.810	2305.816
Potential caloric yield after 1550	8894.732	310.662	8292.416	9780.832
Potatoes, yield; pre-1550	3595.284	228.123	2726.000	3933.000
Potatoes yield; post-1550	7206.351	450.825	5698.000	7724.000
Wheat yield; pre-1550	2507.358	73.550	2328.000	2687.000
Wheat yield; post-1550	5992.998	239.711	5163.000	6353.000
Barley yield; pre-1550	2507.358	73.550	2328.000	2687.000
Barley yield; post-1550	5992.998	239.711	5163.000	6353.000
Rye yield; pre-1550	1545.315	57.366	1337.000	1735.000
Rye yield; post-1550	3368.416	96.500	2972.000	3637.000
Buckwheat yield; pre-1550	1032.003	38.934	911.000	1122.000
Buckwheat yield; post-1550	1597.474	55.684	1486.000	1734.000
Observations	2553			

Columns 3) and 4) introduce canton fixed-effects as an additional regressor, tackling regional variation in attitudes towards women. In Columns 5) and 6), exogenous variables related to geography are incorporated, namely, latitude, longitude, distance to Leuven, to the sea and to the closest river, caloric yield, soil types, crop-specific productivity and the presence of monasteries. Finally, Columns 7) and 8) incorporate demographic variables measured in 1866, including the number of men and women, marriage rate, sex ratio, the percentage of domestic and international migrants for each gender and an indicator variable for the 10% most populous municipalities.[37] In all specifications, we provide Conley standard errors in addition to standard errors clustered at the canton level. The former control for spatial correlation and we use a 20 km bandwidth together with a Bartlett kernel.

Results show that municipalities where medieval beguine communities established displayed higher levels of gender equality in 1866 when the institution already decayed or hosted only a few women if any. The association remains valid across all specifications and regardless of how the presence of beguinages is measured. In the most comprehensive specification, the presence of a beguine community increases the variable $literacy\,equality\,index_{i(j)}$ by 4.4 percentage points, that is, 5% of its average value. The size of the effect we estimate is meaningful and equivalent to a 2% increase in the number of literate women. Alternatively, increasing the presence of beguinages by one standard deviation raises gender equality approximately as much as moving one standard deviation away from the city of Leuven, which hosted a university promoting education only for men, thus deflating our outcomes of interest. It should be noted that this result is based on the regression reported in Column 7) of Table 2 where some controls are potentially outcome variables. This is suggested by the drop in coefficients of interest in Columns 7) and 8) while before they were relatively stable. If that were the case, the effect of the presence of beguinages would be greater, meaningfully raising $literacy\,equality\,index_{i(j)}$ by 12.5 percentage points, equal to 15% of its average value, according to Column 5). Either way, a longer presence of beguines is always related to increased female agency.

We argue that the presence of a beguinage in a town increased girls' bargaining power by improving their outside options. We test this mechanism exploiting the presence of feminine monasteries because these also enlarged women's choice-set. However, we stress that entering a traditional convent conveyed less freedom and benefits than joining a beguinage. In particular,

$female\,literacy\,index_{i(j)}$. These are similar to those presented in Table 2 and indicate a strong association between beguinages and gender equality.

[37] Note that these variables may depend on the presence of beguinages.

Table 2: Beguinages and literacy equality.

	Dep. variable: Lit. equality index, 1866							
	Baseline		Fixed-effects		Geography		All	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Beguinage (0/1)	0.144		0.153		0.128		0.044	
	(0.019)***		(0.019)***		(0.019)***		(0.013)***	
	[0.018]***		[0.017]***		[0.016]***		[0.011]***	
Exposure (centuries)		0.021		0.022		0.017		0.006
		(0.003)***		(0.003)***		(0.003)***		(0.003)**
		[0.003]***		[0.003]***		[0.003]***		[0.003]**
Fixed-effects	No	No	Canton	Canton	Canton	Canton	Canton	Canton
Geography	No	No	No	No	Yes	Yes	Yes	Yes
Demography	No	No	No	No	No	No	Yes	Yes
Observations	2549	2549	2549	2549	2549	2549	2549	2549
R^2	0.030	0.029	0.203	0.200	0.219	0.214	0.433	0.432

Note: This table presents the results of OLS regressions relating the presence of beguinages to increased gender equality proxied by the variable $literacy\,equality\,index_{i(j}$, see main text for a description. Columns 1) and 2) include only the presence of beguinages as a regressor. Columns 3) and 4) add fixed-effects at the canton level. In Columns 5) and 6) exogenous variables are incorporated, namely, the presence of monasteries, latitude, longitude, distance to Leuven, to the sea and the to closest river, caloric yield, soil types and crop productivity. Finally, Columns 7) and 8) incorporate demographic variables measured in 1866, including, the number of men and women, nuptiality, sex ratio, the share of domestic and international migrants and a dummy for the 10% most populous municipalities. Standard errors clustered at the canton level in parenthesis and Conley standard errors, with a Bartlett kernel and a cut-off distance of 20 km in brackets. $^{*}\,p < 0.1$, $^{**}\,p < 0.05$, $^{***}\,p < 0.01$.

Table 3 assesses whether gender equality was larger in towns with a monastery for women, for the sub-sample of towns without a beguinage. Column 1) considers feminine monasteries altogether, while Column 2) distinguishes between open and cloistered ones according to the Catholic order they belonged to.[38] Regressions exclude municipalities that hosted a beguinage.

Based on the results, the presence of feminine monasteries increased gender equality, more so for religious orders that interacted with the population. Arguably, open monasteries offered girls an alternative option besides marriage while cloistered life indicates sheer vocation. Thus, our results point to a more general pattern: the availability of a non-stigmatised environment for young marriageable girls —either religious or semi-religious— that contributed to the improvement of women's status in the local society.[39] Moreover, results preclude an alternative interpretation based on monasteries only promoting literacy, insofar masculine monasteries did so as well.[40]

4.1 Robustness

Beguinage location itself may be explained by town-specific attitudes regarding women, in particular, a local culture accepting beguines' lifestyle. In that sense, previous correlations would only indicate the perpetuation of these characteristics, and the mechanism we ascribe to beguinages would become suspect. We conduct a series of robustness checks to alleviate this concern, before turning to an IV approach later. These more demanding specifications reinforce the previous findings, lending additional credence to our hypothesis. In the interest of readability, we report only the results of regressions including the largest set of regressors (i.e. specifications control for geographical and agricultural characteristics, demographic and development indicators as well as canton fixed-effects).[41]

First, Table 4 restricts the sample to municipalities with a similar culture and attitudes towards women by selecting only towns located at close distance from a beguinage: 5 km, 10 km and 20 km, in Columns 1) and 2), 3) and 4), and 5) and 6), respectively. The underlying idea is that those municipalities near the ones chosen by beguines did not hold different views on gender roles ex-ante. In other words, municipalities sufficiently close can be considered substitutes in

[38] Cloistered orders include the Annoncides, Carthusian, Colettine, Dominicans and Trappists.

[39] Nowadays, similar networks of women leaving their families to find mutual protection and support in other women are present in a few developing societies. These groups are described in Appendix A.

[40] Using the entire sample and further controlling for beguinage presence does not change the results.

[41] As before, removing variables that are potential outcomes from regressors delivers larger estimates for the presence of beguinages. Hence, our baseline coefficients can be seen as lower bounds of the estimation of interest.

Table 3: Literacy and gender equality; monasteries.

	Dep. variable: Lit. eq. index, 1866	
	(1)	(2)
Fem. monastery	0.047	
	(0.019)**	
	[0.018]***	
Fem. monastery		
No monastery		Ref.
1 open		0.047
		(0.024)**
		[0.022]**
2 open		0.306
		(0.008)***
		[0.016]***
1 closed		0.039
		(0.059)
		[0.053]
1 unknown		0.011
		(0.029)
		[0.028]
Masc. monastery	−0.010	−0.008
	(0.013)	(0.013)
	[0.012]	[0.012]
Other monastery	0.012	0.013
	(0.019)	(0.019)
	[0.017]	[0.018]
Fixed-effects	Canton	Canton
Geography	Yes	Yes
Demography	Yes	Yes
Observations	2479	2479
R^2	0.407	0.407

Note: This table presents the results of OLS regressions relating the presence of monasteries to increased gender equality. It documents higher levels of gender equality in towns that offered more alternatives to girls. See main text for a discussion of the mechanism. Column 1) introduces the number of monasteries for each gender while Column 2) distinguishes, among feminine monasteries, those that belonged to open or enclosed Catholic orders. "No monasteries present" is the omitted reference category. Geography: latitude, longitude, distance to Leuven, to the sea and rivers, caloric yield, soil types and crop productivity. Demography: number of men and women, nuptiality, sex ratio, the share of internal and external migrants and a dummy for the 10% most populous municipalities. Regressions include canton fixed-effects. Municipalities that hosted a beguine community are excluded from the sample. Standard errors clustered at the canton level in parenthesis and Conley standard errors, with a Bartlett kernel and a cut-off distance of 20 km in brackets. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 4: Beguinages and literacy equality; sub-samples by distance.

	Dep. variable: Lit. equality index, 1866					
	5Km		10Km		20Km	
	(1)	(2)	(3)	(4)	(5)	(6)
Beguinage (0/1)	0.040		0.042		0.047	
	(0.020)**		(0.015)***		(0.013)***	
	[0.015]***		[0.013]***		[0.012]***	
Exposure (centuries)		0.007		0.007		0.007
		(0.004)*		(0.003)**		(0.003)**
		[0.003]**		[0.003]***		[0.003]**
Fixed-effects	Canton	Canton	Canton	Canton	Canton	Canton
Geography	Yes	Yes	Yes	Yes	Yes	Yes
Demography	Yes	Yes	Yes	Yes	Yes	Yes
Observations	371	371	1114	1114	2060	2060
R^2	0.664	0.664	0.518	0.517	0.436	0.435

Note: This table presents the results of OLS regressions relating the presence of beguinages to increased gender equality. Columns 1) and 2) consider only municipalities located less than 5 km from a beguinage, 3) and 4) increase the distance up to 10 km and 5) and 6) further expand it to 20 km. Geography: latitude, longitude, distance to Leuven, the sea and rivers, caloric yield, soil type and crop productivity. Demography: population, nuptiality and %age of domestic and international migrants by gender, sex ratio and a dummy for the 10% most populous towns. Regressions include canton fixed-effects. Standard errors clustered at the canton level in parenthesis and Conley standard errors, with a Bartlett kernel and a cut-off distance of 20 km in brackets. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

terms of attitudes towards women. Overall, results indicate a positive and significant effect of beguine communities on gender equality. Moreover, the estimated coefficients are stable. Further adding beguinage fixed-effects and clustering the standard errors at that level does not change the results.[42]

Second, in Table 5, we use distance to the closest beguinage as the main regressor. The idea is to depart from indicators exhibiting numerous zeros such as $beguinage_{i(j)}$ (about 3% of the municipalities ever had a beguinage). Distance to the closest beguinage, measured in log-km, solves this issue as it varies continuously. Related, we follow Shiode and Shiode (2011) and exploit towns' network structure and define an Inverse Distance Weighting indicator of exposure to the historical beguinal presence (IDW), relying on the distance decay effect. It is based on the simple notion that the interaction between two communities declines as the distance between them increases. The IDW_i indicator summarises the influence of any known beguinage on a given municipality, with an effect that is inversely proportional to its distance. This measure effectively considers the town's relative isolation in the network. More in detail, it is calculated

[42]These results are available from the authors upon request.

as follows: $IDW_{i(j)} = \log\left(\frac{\sum_k {}^1/_{Dist(i(j),k(j))}\mathbb{1}(Beguinage_{k(j)})}{\sum_k {}^1/_{Dist(i(j),k(j))}}\right)$. The adoption of this indicator as the independent variable contributes to our identification in two ways. First, it corrects for the endogeneity in the location choice. The identification assumption, in this case, is that, for municipality $i(j)$, the presence of a beguinage in another municipality j is uncorrelated with unobserved determinants of gender norms. Second, it captures spillover effects: even in towns not hosting a beguine community, girls had the opportunity of moving elsewhere to enter the movement. Besides using the indicator variable $\mathbb{1}(Beguinage_{k(j)})$, we also weigh observations by $exposure_{i(j)}$ to account for the availability of beguinages over time.

Table 5: Literacy and gender equality; distance.

	Dep. variable: Lit. equality index, 1866		
	(1)	(2)	(3)
Min. Distance Beg. (log-km)	−0.015		
	(0.005)***		
	[0.005]***		
IDW		0.085	
		(0.024)***	
		[0.022]***	
IDW, exposure			0.103
			(0.029)***
			[0.025]***
Fixed-effects	Canton	Canton	Canton
Geography	Yes	Yes	Yes
Demography	Yes	Yes	Yes
Observations	2549	2475	2475
R^2	0.432	0.438	0.438

Note: This table presents the results of OLS regressions relating the presence of beguinages to increased gender equality proxied by the variable $literacy\,equality\,index_{i(j)}$, see main text for a description. Column 1) employs distance to the closest beguinage in log-km, Column 2) introduces IDW as regressor while Column 3) uses the IDW weighted using *exposure*. Geography: latitude, longitude, distance to Leuven, the sea and rivers, caloric yield, soil type and crop productivity. Demography: population, nuptiality and %age of domestic and international migrants by gender, sex ratio and a dummy for the 10% most populous towns. Regressions include canton fixed-effects. Standard errors clustered at the canton level in parenthesis and Conley standard errors, with a Bartlett kernel and a cut-off distance of 20 km in brackets. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

The results of this exercise are in line with our previous findings: being further away from a beguinage reduces gender equality. Moreover, the results we obtain when using $IDW_{i(j)}$ indicate higher gender equality in towns better connected to beguine municipalities. In that sense, a closer location to clusters of beguinages offered girls multiple alternatives to avoid marriage, presenting them even a broader choice set compared to a single beguinage. This raises gender equality levels. Also, Table 4 only captures the marrying opportunity cost effect for girls and

not any role modelling effect.

In Appendix B, we conduct a series of additional robustness checks that further validate the uncovered relation by altering the definition of the treatment and control sample and considering alternative independent variables. First, Table 8 introduces alternative measures of beguinage presence: a new variable accounting for the presence of beguinages combining features of $beguinage_i$ and $exposure_i$, and a modified version of $exposure_{i(j)}$ not considering time-overlapping beguinages. Second, we control for the sensitivity of the variable $IDW_{i(j)}$, by proposing an alternative measure, although the resulting estimates are in line with the baseline ones. In particular, removing towns with a beguinage from the sample provides similar results. Furthermore, assuming disconnected networks between linguistic communities yields equivalent results. Third, at the time of the census, there were few beguinages operative. We remove such towns from the sample to capture the cultural legacy of these communities and not the contemporaneous effect they exerted on the local population. We also introduce male literacy rates as regressor and further control for municipal charters, the instrument we use later. We follow Valencia Caicedo (2018) and compare the effect of beguinages that were abandoned soon after they were established to those that remained. It can be argued that any town beguines selected had similar attitudes towards gender equality. If our estimates only captured this aspect and not social changes induced by the presence of beguines, shortly-lived beguinages should influence gender attitudes. We do not find evidence of that as Table 12 indicates. Furthermore, we estimate the effect of beguinages on equality using propensity score matching. Supplementing these robustness checks, we generate placebo beguinages to dismiss concerns arising from the low number of beguinages present in the sample. For this purpose, the sample is divided, using total population, in quantiles and the expected number of beguinage is calculated for each. A municipality in each quantile receives a placebo beguinage with probability equal to the quantile-specific expected number of beguinages. Based on 100 repetitions, we find that in less than 15% of the cases placebo beguinages are significant. Finally, following Oster (2016) we estimate the strength of selection on unobservables necessary to diminish the estimated parameters of interest down to zero, when using the limited and full set of controls. In our case, selection on unobservables should be larger than on observables for the limited set of controls, considering an increase in the potential R^2 of 30%. When the full set of controls is included, results indicate possible selection on unobservables only when the main regressor is *exposure* and when the potential R^2 is increased above 25% for $Beg.(0/1)$.

Instrumental Variable Approach. In order to better address the potential endogeneity of beguinage location, we instrument the historical presence of beguines exploiting exogenous changes in the local organisation of power that occurred before the advent of the movement. Considering that beguines supported themselves working in several crafts, teaching and trading, locations facilitating market access should have attracted these communities more. The privilege to set-up markets and guilds, among others, were typically granted in municipal charters, documents conveying additional rights to selected municipalities. Indeed, in the medieval European context, some towns were awarded a semi-independent status through the acquisition of new privileges encoded in charters. A municipality receiving a charter was granted partial exemption from wars for its citizens, often allowing the opportunity to wall the town, trade, mint currency, set up a municipal judicial system, and establish guilds. Municipal charters, in fact, decentralised decision-making.[43]

This change in the local powers and structures could be achieved for various motives. Some lords founded villages and immediately endowed them with a municipal charter.[44] Other towns benefited from their strategic position and obtained a municipal charter in exchange for defence.[45] A few Lords sought increasing trade and urban development and granted charters to this end.[46] Finally, some towns gained this privileged status by siding with a Lord at times of conflict or because of specific local circumstances.[47] In any case, granting a municipal charter was a prerogative of the ruler: not all cities that ever requested this special status obtained it.

In light of the benefits conveyed by municipal charters in terms of trade and economic activity in general, and considering beguines' occupations, beguinages were more likely to establish in towns already enjoying a municipal charter. Moreover, the more decentralised

[43]The majority of these documents simply transposed privileges already bestowed to other municipalities, effectively copying them. In most cases, Belgian municipalities celebrated their independence erecting a *belfry*: a monumental, fortified building that served as a court, prison, archive and treasure chamber and doubled as watching and bell tower. Eastern cities under the control of the Prince-Bishop of Liège constructed, instead, small, decorated columns named *perron*. Interestingly, when the city of Liège capitulated in 1467 its *perron* was dismantled and moved to Bruges for ten years. The peace treaty remarked that "the Duke wanted nothing left standing from the ancient Liège constitution, nor from public liberties, the legacy of a distant past".

[44]This is the case of Herentals, Hoogstraten and Landen.

[45]Ath, Geraardsbergen, Maaseik, Vilvoorde, Stokkem and Zoutleeuw received charters for being border posts against powerful regional rivals.

[46]Joan and Margaret II, Countesses of Flanders, Henry I, Duke of Brabant, and Philip I, Count of Flanders, were among the group of nobles who promoted these reforms. Their reformation spirit benefited the cities of Antwerp, Damme, Eeklo, Landen, Oostende and Roeselare.

[47]Bruges and Kortrijk were involved in a local conflict confronting Thierry of Alsace and William Clito. The Lord of Ghent delegated the resolution of internal turmoil to the citizens by issuing a charter. Phillip II of France bought off Tournai's inhabitants offering them a municipal charter. As an example of a more peculiar motivation, the Prince-Bishop of Liège granted Huy the first Belgian charter to reward the city for its involvement in the reconstruction of the cathedral. Abbot Lèonius interceded with Thierry, count of Flanders and a friend of his, to grant a municipal charter to his vassals of Poperinge.

administrative framework of chartered towns made it easier for beguines to obtain the terrain to erect their communal buildings, sometimes also as a donation. In view of these characteristics, municipal charters are employed as a dummy instrument to predict locations that beguines chose to establish communities. In order to have a clear identification strategy, we consider only municipal charters that were bestowed *before* the 13th century, as beguinages were only founded after this time. Imposing this restriction assures that beguinages did not exert any influence in obtaining a municipal charter. In addition, the choice of pre-13th-century municipal charters rules out towns seeking a charter with the goal of attracting beguines. In total, 42 Belgian municipalities were granted a municipal charter before the 13th century.[48] Among the 70 towns with a beguinage, 32 held a charter before beguines settled.

Since trade and overall economic activity historically led to population growth and increased returns to human capital, municipal charters may have promoted female literacy beyond operating exclusively through the presence of beguine communities. In order to strengthen our exclusion restriction, we emphasise that the outcome of interest is not literacy in absolute terms but gender equality in this dimension. In this regard, we see female-to-male literacy measures as indicators of female agency. Moreover, if municipal charters boosted the demand for schooling, this alleged higher education would bias our estimates downward, as men were traditionally favoured over women in education investments. We can also dismiss that municipalities that hosted a beguinage grew faster.[49]

Additionally, we argue that towns that never hosted a beguinage were comparable in terms of acceptance of female independence. Similarly, places where beguines settled should be comparable in terms of gender equality. In the Appendix, supplementary estimates measure the effect of having received a municipal charter separately for towns with and without a beguine community.[50] If, indeed, municipal charters directly promoted female literacy, municipalities that received a charter should score higher in female-to-male literacy on this sample. Results in Column 1) do not support this theory. We repeat the same procedure focusing on municipalities that never hosted a beguinage in Column 2), obtaining similar conclusions. Finally, Panel C) of Table 11 in the Appendix includes municipal charters as regressor, showing that municipal

[48] These are: Aalst, Aarschot, Antwerp, Ath, Beringen, Borgloon, Brugge, Bruxelles, Damme, Deinze, Dendermonde, Diest, Diksmuide, Eeklo, Ghent, Geraardsbergen, Gistel, Halen, Halle, Harelbeke, Hasselt, Herentals, Hoogstraten, Huy, Kortrijk, Landen, Leuven, Lier, Maaseik, Ninove, Oostende, Oudenaarde, Poperinge, Roeselare, Sint-Truiden, Soignies, Stokkem, Thurnhout, Tournai, Vilvoorde, Ypres and Zoutleeuw.

[49] We use data from Cuvelier (1912) on municipal size in 1438 and compute population growth rate between this date and 1886. Unfortunately, the geographical coverage is limited to the historical province of the Brabant.

[50] See Table 13.

charter did not contribute to gender equality.

IV Results. Table 6 presents the findings of the IV approach when beguinage location is instrumented using municipal charters. In Columns 1) and 2), the dependent variable is $literacy\,equality\,index_{i(j)}$, Columns 3) and 4) focus on $female\,literacy\,share_{i(j)}$ and the remaining use $female\,literacy\,index_{i(j)}$. In general, F-statistics are well above 10, indicating that regressions are not biased due to the inclusion of weak instruments. IV estimations follow Wooldridge (2010) procedure 21.1 that correctly accounts for the non-linearity of the first-stage when the independent variable of interest is $beguinage_i$.[51] This method differs from standard 2SLS by introducing the estimated value of the endogenous variable as an instrument. The IV procedure for $exposure_{i(j)}$ follows the conventional two-step estimator.

Table 6: Beguinages and Literacy equality, IV.

	Lit. eq. index, 1866		Fem. lit. share, 1866		Fem. lit. index, 1866	
	(1)	(2)	(3)	(4)	(5)	(6)
Beguinage (0/1)	0.075***		0.018***		0.069***	
	(0.019)		(0.006)		(0.019)	
Exposure (cent.)		0.013**		0.004**		0.013**
		(0.005)		(0.002)		(0.005)
Fixed-effects	Canton	Canton	Canton	Canton	Canton	Canton
Geography	Yes	Yes	Yes	Yes	Yes	Yes
Demography	Yes	Yes	Yes	Yes	Yes	Yes
1st-st. F-val.	54.9	28.4	54.9	28.4	54.9	28.4
Mun. charter	2.644***	3.103***	2.644***	3.103***	2.644***	3.103***
	(0.586)	(0.121)	(0.586)	(0.121)	(0.586)	(0.121)
Observations	973	2549	973	2549	973	2549
R^2	0.470	0.428	0.448	0.406	0.264	0.228

Note: This table presents the results of IV regressions relating the presence of beguinages to increased gender equality where the presence of beguinal communities is instrumented using municipal charters. Geography: latitude, longitude, distance to Leuven, to the sea and to rivers, caloric yield, soil types and crop productivity. Demography: the number of men and women, nuptiality, sex ratio, the percentage of domestic and international migrants and a dummy for the 10% most populous municipalities. Standard errors clustered at the canton level. $^{*}\,p < 0.1$, $^{**}\,p < 0.05$, $^{***}\,p < 0.01$.

Overall, results from the instrumented specification indicate that beguinages had a positive, significant and enduring effect on gender equality. Moreover, even if our approach cannot assuage all the possible endogeneity concerns, this exercise is useful insofar it highlights that beguine communities were instrumental in maintaining a higher regard for women for over 600 years. However, a clearer identification strategy limiting the IV approach only to cases where obtaining

[51] In this case, the first-stage follows a probit model. Columns 1), 3) and 5) of Table 6 report this statistic.

a municipal charter was arguably more exogenous delivers similar results.[52]

In Appendix B, we provide multiple robustness tests of the IV specification that further confirm previous findings and generally strengthen the results. These are the same, when applicable, to those performed for the OLS analysis.

5 A Model of Cultural Transmission

So far, our research unveiled an enduring relationship between beguine communities and gender equality. Possible explanations include beguines lifting girls' literacy rates as teachers, role-modelling effects and increased female bargaining power. However, the previous Sections evince that neither role-modelling nor beguinal teaching efforts caused the increase in gender equality we measure.

Consequently, we propose a theoretical model to explain our results emphasising girls' bargaining power as the relevant mechanism at play. It illustrates how beguinages triggered a shift in values that could spread beyond the beguinal population itself, influencing gender outcomes for centuries. We believe this captures the essence of what beguinages offered to young girls, while other potential mechanisms are left unexplored.

In this framework, cultural change in gender roles operates through the marriage market. We consider a population of men —denoted by m— and women —f— in equal number who randomly meet in the local marriage market. Before getting married, they bargain non-cooperatively over the share of the constant marital surplus generated by a union, denoted by y.[53] Let $s_t^{m,f} \in (0,1)$ be the couple-specific share men appropriate and $t = 1, 2, ..$ denote the time period. Agents will agree to the wedding if they enjoy their share of marital surplus more than their life as single.

Individuals are characterised by their outside option in case they do not marry. Women f are assumed to be homogeneous in their outside option $u_f \in (0, y)$ and we posit that heterogeneous men m follow a Type I Pareto distribution with scale parameter x_t and shape parameter $\alpha = 2$ such that $u_{m,t} \sim Pareto_I(x_t, 2)$.[54] The initial average type of men is: $\mu_0 = \frac{\alpha x_0}{\alpha - 1}$.

[52] Reasons considered include charters bestowed upon newly founded cities, conflict, and other miscellaneous instances. The result of this more demanding specification validates our previous findings. However, the estimated coefficient becomes less precise because the instrument is able to predict fewer beguine communities. These results are not reported but are available upon request.

[53] Many aspects are typically encompassed in the notion of marital surplus: children and other household public goods, but also other psychological and sociological amenities, as self-realisation and social recognition.

[54] A Type I Pareto distribution with value 2 for the shape parameter allows obtaining closed-form solutions.

The potential couples' negotiation problem follows Nash bargaining:

$$\max_{s_t^{m,f}} \quad \left(s_t^{m,f} y - u_{m,t}\right)^{\beta} \left(\left(1 - s_t^{m,f}\right) y - u_f\right)^{1-\beta}, \tag{7}$$

where $\beta \in (0,1)$ denotes men's bargaining power and is assumed to be constant.

At the optimum, men who marry enjoy the share $s_t^{m,f\star} = \frac{u_{m,t}(1-\beta)+\beta(y-u_f)}{y}$, which is decreasing in u_f Matched individuals for which $u_{m,t} + u_f > y$ cannot agree on a sharing rule. Consequently, men at the right tail of the distribution will stay single. Both very demanding men and the women matched with them are better off if they do not marry.

Each *married* couple has one daughter and one son. To obtain a tractable model, daughters inherit the constant type u_f of their mothers while sons are horizontally socialised. In particular, sons' type follows a Type I Pareto distribution with $\alpha = 2$ and the average son type equals the average share of surplus that married men obtain in the bargaining process. In other words, following Bisin and Verdier (2001), a son observes married couples to infer the minimum amount he should demand in the bargaining process. This average equals:

$$\mu_{t+1} = E\left(s_t^{m,f\star} y\right) = y \frac{\int_0^{y-u_f} s_t^{m,f\star} f(u_{m,t}) \mathrm{d}u_{m,t}}{\int_0^{y-u_f} f(u_{m,t}) \mathrm{d}u_{m,t}} = \beta(y-u_f) + (1-\beta)\frac{2x_t(y-u_f)}{x_t - u_f + y}$$

Since the average of a Type I Pareto distribution is given by $\frac{\alpha x}{1-\alpha}$ we can rewrite the previous expression in terms of μ_t[55]:

$$\mu_{t+1} = (y-u_f)\left(\beta + \frac{2(\beta-1)\mu_t}{-\mu_t + 2u_f - 2y}\right). \tag{8}$$

Equation 8 describes the dynamic evolution of μ over generations. For sufficiently large values of the initial μ_0, $\mu_{t+1} < \mu_t \forall t$.[56]

In order to study the long-term evolution of gender norms, we focus on the change of men's values over generations, as captured by μ. We analyse the unique, asymptotically steady-state

[55] We assume $\alpha = 2$ and $\mu_0 < 2 * (y - u_f)$. The latter is a technical condition to have a non-zero denominator for the expected average of the truncated distribution.

[56] More in detail, the condition on μ_0 reads $\mu_0 > \frac{1}{2}(u_f - y)(\beta - \sqrt{\beta(8+\beta)})$. This is not particularly restrictive considering medieval gender norms according to which husbands were in charge of household administration and were considered the legal guardians of their wives.

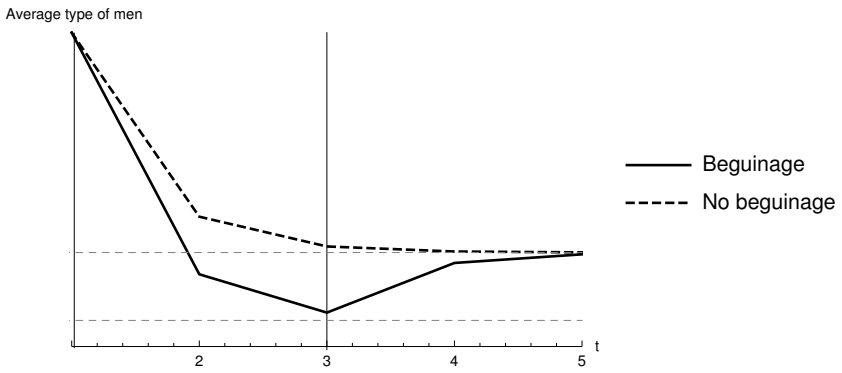
level of μ_t given by:[57]

$$\lim_{t\to\infty} \mu_t = \mu^\star = \frac{1}{2}(y - u_f)\sqrt{\beta}\left(\sqrt{8+\beta} - \sqrt{\beta}\right). \tag{9}$$

Starting from this model, we discuss how the presence of a beguinage in the municipality may have influenced the beliefs about the status of women. We maintain that becoming a beguine was a competing alternative to marriage that broadened girls' choice-set. In particular, women in municipalities with a beguinage enjoyed an increased outside option ($u_f^{beguinage} > u_f$) and could bargain a better status within the couple if married. In this scenario, a larger share of selfish men will remain single, leading to a selection of values in the married population and to a lower steady-state level of μ in the long run. It can be shown that $\mu^\star_{beguinage} < \mu^\star$.[58]

Figure 4 illustrates the evolution of the average attitude of men over time under two different scenarios: a no-beguinage case (dashed line) and a case in which a beguinage is founded in a municipality and dissolves after some time (solid line). After the closure of the beguinage, women face the baseline outside option u_f.

Figure 4: Evolution over Time.



Note: This Figure displays the evolution of the average attitude of men under two different scenarios: a no-beguinage case (dashed line) and a case in which a beguinage is founded (solid line). assumes $\beta = 0.65$ and $x = 5$ for both cases and $u_f^{beguinage} = 1.2 > u_f = 1$. The beguinage is operative for three periods.

The presence of a beguinage, even for a limited period of time, results in less male-egotistic values in the society. While the beguinage operates, the values converge to a different, lower steady-state and once the beguinage disappears, the values start diverging from that path,

[57] The speed of convergence to the steady-state accelerates with β. In that sense, higher bargaining power for men increases the speed with which the share of egotistic men is eroded over time.

[58] A possible extension of the model could consider that men's bargaining power decreases with female's outside option. This would produce a set of different steady-states whose exact value would depend on beguinage's duration, assuming it closes at some point of time.

returning to the no-beguinage equilibrium. Such evolution is in line with our empirical observation of more gender-equal values in municipalities that enjoyed a beguinal institution for some time.

6 Conclusion

This paper proposes a novel mechanism to explain the differences in gender equality, grounded in the strengthening of women's bargaining power and enabled by the broadening of their alternatives to marriage. We argue that this improved position in the marital decisions positively affected women's outcomes, closing the gap with men's. The intergenerational transmission of a gender-egalitarian view of the society generated persistence. Our theory on the deep roots of gender roles complements the existing economic literature that mainly emphasises physiological differences.

We illustrate our mechanism focusing on the Belgian setting, explaining how medieval *beguine* communities broadened the set of girls' options besides marriage. Beguines were single women independent of men, living a semi-religious life outside the recognised orders in self-supporting communities. These unique characteristics allowed them to delay marriage and offered an alternative to monastic seclusion amid a society that traditionally disapproved such lifestyle. Specifically, we show that medieval beguinages —founded between 1207 and 1500— were instrumental in generating higher local levels of gender equality in 1866. In particular, we estimate a 5.3% reduction in the gender literacy gap, our baseline measure of gender equality. We develop a theoretical framework to rationalise the uncovered relationship.

Our study elucidates the importance of female opportunity cost of getting married to lessen gender inequalities and promote the diffusion of egalitarian roles. Female associations —beguinages— are crucial in our setup: they provide the actionable threat if nuptial negotiation turns unsuccessful, thus raising female's bargaining power. Appendix A describes modern-day associations that could trigger analogous societal changes. Other social arrangements that can equally promote gender equality are the traditions of uxorolocality and neolocality. The pivotal, common element is the provision of a safety-net for women that de facto allows them a higher claim on the marital surplus by reducing their fear for recrimination. In that sense, the social acceptance of a previously rebuked behaviour operates similarly, as it happened for women joining the labour force after World War II.

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Appendices

A Analogous Institutions

Despite the fact that beguinages are indeed a phenomenon unique to the cities of the Low Countries, in the recent past we can observe other large, female-only prime examples of lay efforts to construct artificial families and communities within an urban setting (Lynch (2003)). Nowadays, there exist other institutions resembling beguinal social customs: they are collective arrangements formed by groups of women in order to overcome certain common problems by setting rules regarding membership, and the use of the resources and services the group owns collectively. Another key feature is the adoption of de facto celibacy beyond apparent religious concerns.

One of these institutions is called Zishunu: an ancient custom that originated from indigenous groups in southwestern China and consists of a group of women called *Sworn Spinsters*. Zishunu literally means self-combed women and depicts the local customs of girls forming sisterhoods who ritually pinned up their hair, and openly took elaborate vows not to marry and to remain childless. Evidence of such practices can be found in local publications and prospered well into the end of the 19th century, when almost all of them worked in silk reeling factories and, from the 1930s, as domestic servants in Hong Kong and Singapore. Their vow of celibacy, beyond apparent religious concerns, represents a commitment device of high-intensity labour supply and therefore made their employers invest more in their human capital match them to more important working positions (Fong et al. (2018)).

Another instance is the one of women seeking the solidarity and protection of other women to escape misogynistic marriages. This is the case of a community in Tanzania that has embraced an age-old tradition of heterosexual women marrying women. In fact, in the Kurya community in Tarime District of the Mara region in northern Tanzania, the so-called *Nyumba Nthobu* tribal law is used by women who are not able to inherit property due to patriarchal cultural constraints.[59] Marriage between the two women is justified by the bride price paid before marriage, since there is no intimate relationship between the two women. In some cases, Nyumba Ntobhu can be a polygamous marriage, as the older woman marries two younger women. This custom enables them to claim the children born by the other woman[60] as their own and is a way of providing

[59] Barren women or old women who do not have sons to inherit their property and whose daughters have moved away to their husbands' villages cannot take over property in the line of succession.

[60] A man is typically selected from the clan of the old woman for reproduction purposes with the young woman.

security for their old age. The culture is also being used as an escape for child marriage, female genital mutilation, and domestic violence. From an empirical historical lens, and in line with the results of our paper, this constitutes another suggestive illustration of how encouraging women to be independent in a safe community might be conducive to a widespread culture of gender equality.

B Additional Results

This section reports additional estimates corroborating our main findings, relying on both the OLS and the instrumented specification. Furthermore, we provide results based on propensity score matching.

OLS Results. As mentioned in the main section, we proxy gender equality using alternative variables measuring gender differences in literacy levels. Panels A) and B) of Table 7 follow the same structure of Table 2 with $female\,literacy\,share$ and $female\,literacy\,index$ measuring gender equality, respectively. Considered together, these results indicate a strong correlation between the presence of beguinages and gender equality.

Table 7: Beguinages and literacy equality

	Baseline		Fixed-effects		Geography		All	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Panel A: Dep. variable: Female lit. share, 1866							
Beguinage (0/1)	0.041		0.043		0.036		0.012	
	(0.004)***		(0.005)***		(0.005)***		(0.004)***	
	[0.004]***		[0.004]***		[0.004]***		[0.003]***	
Exposure (centuries)		0.006		0.006		0.005		0.002
		(0.001)***		(0.001)***		(0.001)***		(0.001)**
		[0.001]***		[0.001]***		[0.001]***		[0.001]**
R^2	0.025	0.024	0.204	0.201	0.218	0.214	0.410	0.410
	Panel B: Dep. variable: Female lit. index, 1866							
Beguinage (0/1)	0.055		0.061		0.048		0.041	
	(0.011)***		(0.012)***		(0.012)***		(0.012)***	
	[0.011]***		[0.011]***		[0.011]***		[0.011]***	
Exposure (centuries)		0.008		0.007		0.005		0.006
		(0.002)***		(0.002)***		(0.002)**		(0.003)**
		[0.002]***		[0.002]***		[0.002]**		[0.002]**
R^2	0.005	0.005	0.205	0.203	0.217	0.215	0.234	0.233
Fixed-effects	No	No	Canton	Canton	Canton	Canton	Canton	Canton
Geography	No	No	No	No	Yes	Yes	Yes	Yes
Demography	No	No	No	No	No	No	Yes	Yes
Observations	2549	2549	2549	2549	2549	2549	2549	2549

Note: This table presents the results of OLS regressions relating the presence of beguinages to increased gender equality proxied by the variable $female\,literacy\,share_i$ and $female\,literacy\,index$; see main text for a description. Columns 1) and 2) include only the presence of beguinages as a regressor. Columns 3) and 4) add fixed-effects at the canton level. In Columns 5) and 6) exogenous variables are incorporated, namely, the presence of monasteries, latitude, longitude, distance to Leuven, to the sea and to the closest river, caloric yield, soil types and crop productivity. Finally, Columns 7) and 8) incorporate demographic variables measured in 1866, including the number of men and women, nuptiality, sex ratio, the share of internal and external migrants and a dummy for the 10% most populous municipalities. Standard errors clustered at the canton level in parentheses and Conley standard errors, with a Bartlett kernel and a cut-off distance of 20 km, in brackets.
$^{*}\,p < 0.1$, $^{**}\,p < 0.05$, $^{***}\,p < 0.01$.

In Table 8 we introduce a new independent variable, $intensity_i$ that combines features of $beguinage_i$ and $exposure_i$. This variable consists of a five-level index formally defined as follows:

$$Intensity_i = \begin{cases} 0 & \text{if no beguinage has even been recorded,} \\ 1 & \text{if 1 beguinage has been present and } exposure_i < 200, \\ 2 & \text{if 1 beguinage has been present and } exposure_i \geq 200, \\ 3 & \text{if more than 1 beguinage has been present and } exposure_i \geq 200, \\ 4 & \text{if more than 3 beguinages have been present and } exposure_i \geq 200. \end{cases} \tag{10}$$

The results suggest a positive association between the presence of beguinages and gender equality, in line with our previous estimates. Moreover, the effect of beguine communities is larger for intermediate levels of beguinage presence. We also introduce a modified version of the variable $exposure_i$. This alternative specification considers the total number of years during which any beguine community was present it a municipality, but does not aggregate the values for those overlapping in time. Taken together, using alternative outcomes and independent variables gives more credence to the association between female-only communities and gender equality.

Table 8: Alternative independent variable

	Dep. variable: Lit. equality index, 1866	
	(1)	(2)
Intensity		
No Beg.	Ref	
1 Beg., $<$ 200 years	0.075	
	(0.023)***	
	[0.014]***	
1 Beg., $>$ 200 years	0.151	
	(0.031)***	
	[0.018]***	
$>$ 1 Beg, $>$ 200 years	0.223	
	(0.057)***	
	[0.037]**	
$>$ 3 Beg., $>$ 200 years	0.093	
	(0.024)***	
	[0.037]	
Alt. exposure (centuries)		0.008
		(0.003)***
		[0.003]***
Fixed-effects	Canton	Canton

Continued on next page

Table 8 – *Continued from previous page*

	Dep. variable: Lit. equality index, 1866	
	(1)	(2)
Geography	Yes	Yes
Demography	Yes	Yes
Observations	2549	2549
R^2	0.222	0.985

Note: This table presents the results of OLS regressions relating the presence of beguinages to increased gender equality proxied by the variable $literacy\,equality\,index_i$, see main text for a description. The main regressor is the variable $intensity_i$ in Column 1), while Column 2) uses a modified version of $exposure_i$. Geography: latitude, longitude, distance to Leuven, to the sea and to rivers, caloric yield, soil type and crop productivity. Demography: population, nuptiality and %age of domestic and international migrants by gender, sex ratio and a dummy for the 10% most populous towns. Regressions include canton fixed-effects. Standard errors clustered at the canton level in parenthesis and Conley standard errors, with a Bartlett kernel and a cut-off distance of 20 km in brackets. $^{*}\,p < 0.1$, $^{**}\,p < 0.05$, $^{***}\,p < 0.01$.

Table 9 removes towns with a beguinage from the sample, following Bratti et al. (2017). Similarly, Table 10 follows the same logic as Table 5 but assumes disconnected networks along linguistic borders. In general, the results we obtain under these alternative specifications are qualitatively equivalent to our baseline results, indicating a more gender equal society among municipalities more connected or exposed to beguinages.

Table 9: Literacy and gender equality, distance: no beguinages

	Dep. variable: Lit. equality index, 1866		
	(1)	(2)	(3)
Min. Distance Beg. (log-km)	−0.010		
	(0.008)		
	[0.007]		
IDW		0.087	
		(0.052)*	
		[0.044]**	
IDW, exposure			0.145
			(0.046)***
			[0.039]***
Fixed-effects	Canton	Canton	Canton
Geography	Yes	Yes	Yes
Demography	Yes	Yes	Yes
Observations	2479	2406	2406
R^2	0.407	0.412	0.414

Continued on next page

Table 9 – *Continued from previous page*

	(1)	(2)	(3)

Note: This table presents the results of OLS regressions relating the presence of beguinages to increased gender equality proxied by the variable *literacy equality index*$_i$, see main text for a description. Column 1) employs distance to the closest beguinage in log-km, Column to 2) introduces IDW as regressor while Column 3) uses the IDW weighted using *exposure*. The sample only comprises towns without a beguinage. Geography: latitude, longitude, distance to Leuven, to the sea and to rivers, caloric yield, soil type and crop productivity. Demography: population, nuptiality and %age of domestic and international migrants by gender, sex ratio and a dummy for the 10% most populous towns. Regressions include canton fixed-effects. Standard errors clustered at the canton level in parenthesis and Conley standard errors, with a Bartlett kernel and a cut-off distance of 20 km in brackets. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 10: Literacy and gender equality; distance: linguistic borders.

	Dep. variable: Lit. equality index, 1866			
	(1)	(2)	(3)	(4)
IDW, Border	0.067			
	(0.018)***			
	[0.017]***			
IDW, Border, No Beg.		0.066		
		(0.031)**		
		[0.028]**		
IDW, Border, exposure			0.077	
			(0.021)***	
			[0.018]***	
IDW, Border, exposure, No Beg.				0.096
				(0.030)***
				[0.026]***
Fixed-effects	Canton	Canton	Canton	Canton
Geography	Yes	Yes	Yes	Yes
Demography	Yes	Yes	Yes	Yes
Observations	2474	2405	2474	2405
R^2	0.438	0.412	0.438	0.414

Note: This table presents the results of OLS regressions relating the presence of beguinages to increased gender equality proxied by the variable *literacy equality index*$_i$, see main text for a description. Column 1) employs IDW as regressor, while Column 3) uses the IDW weighted using *exposure*. Columns 2) and 4) remove municipalities with a beguinage from the sample and use as regressor those reported in Columns 1) and 3), respectively. In all cases, IDW assumes disconnected networks along linguistic borders. Geography: latitude, longitude, distance to Leuven, to the sea and to rivers, caloric yield, soil type and crop productivity. Demography: population, nuptiality and %age of domestic and international migrants by gender, sex ratio and a dummy for the 10% most populous towns. Regressions include canton fixed-effects. Standard errors clustered at the canton level in parenthesis and Conley standard errors, with a Bartlett kernel and a cut-off distance of 20 km in brackets. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

In addition, since few municipalities had an operating beguinage in 1886, Panel A) of Table 11 disentangles its effects from the cultural legacy lingering from dismantled communities. We do so by excluding from the sample municipalities that had an operating beguinage in 1866.

This removes 17 municipalities from the baseline sample.[61] Results indicate that the cultural imprint left by beguine communities shaped the perception of women. In general, these results are indistinguishable from the main specification. Panel B) introduces male literacy rate as regressor, evidencing that our findings are not caused by women catching up in literacy.[62] Male literacy is always significantly positive. However, the historical presence of beguinages continues to appear as an important predictor of female agency, although its magnitude decreases and becomes non-significant for the variable $exposure_i$. Finally, in Panel C), municipal charters, the instrument used in IV regressions, are included as an additional covariate. Municipal charters granted towns the possibility of establishing a market and guilds and conveyed other benefits. Moreover, they indicated relatively prosperous towns. Results evidence that beguine communities boosted gender equality beyond any possible effect introduced by changes in the local administration.

Table 11: Beguinages and literacy equality; robustness 2.

	Lit. eq. index, 1866	
	(1)	(2)
	Panel A: No open beguinage	
Beguinage (0/1)	0.047	
	(0.014)***	
	[0.012]***	
Exposure (centuries)		0.007
		(0.003)**
		[0.003]**
Observations	2539	2539
R^2	0.429	0.428
	Panel B: Male literacy rate	
Beguinage (0/1)	0.031	
	(0.012)***	
	[0.011]***	
Exposure (centuries)		0.004
		(0.003)
		[0.002]
Male lit. rate, 1866	0.267	0.268
	(0.027)***	(0.027)***
	[0.025]***	[0.025]***

Continued on next page

[61] The municipalities that had an ongoing beguinage in 1866 are, with the closing year between brackets: Aalst (1953), Kortijk (2001), Diksmuide (1914), Hasselt (1886), Herenthals (2001), Momalle (1899), Hoogstraten (1972), Liège (1869), Lier (1970), Nieuwpoort (1914) and Turnhout (1994).

[62] Notice that male literacy rates may be an outcome variable of historical beguinal presence.

Table 11 – *Continued from previous page*

	Lit. eq. index, 1866	
	(1)	(2)
Observations	2549	2549
R^2	0.469	0.469
	Panel C: Municipal charter	
Beguinage (0/1)	0.038	
	(0.016)**	
	[0.014]***	
Exposure (centuries)		0.004
		(0.003)
		[0.003]
Municipal charter	0.018	0.027
	(0.020)	(0.018)
	[0.020]	[0.018]
Observations	2549	2549
R^2	0.433	0.432
Fixed-effects	Canton	Canton
Geography	Yes	Yes
Demography	Yes	Yes

Note: This table presents the results of OLS regressions relating the presence of beguinages to increased gender equality. Panel A) excludes ongoing beguinages. Panel B) and C) control for male literacy and municipal charters, respectively. Geography: latitude, longitude, distance to Leuven, to the sea and to rivers, caloric yield, soil types and crop productivity. Demography: population, nuptiality and %age of domestic and international migrants by gender, sex ratio and a dummy for the 10% most populous towns. Regressions include canton fixed-effects. Standard errors clustered at the canton level in parenthesis and Conley standard errors, with a Bartlett kernel and a cut-off distance of 20 km in brackets. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

We also follow Valencia Caicedo (2018) and compare the effect of beguinages that were abandoned soon after they were established to those that remained. Table 12 presents the results of regressions including separate indicators for beguinages within the first, 10th, 20th and 30th centiles of the distribution of *exposure* (in Column 1), 2), 3) and 4), respectively) and for longer durations. This specification illustrates that our results are not driven by specific gender-related attitudes that were specific to towns with a beguinage ex-ante. In other words, assuming that beguines selected their location based on the local residents' attitudes towards women, one would expect locations where beguinages were short lived and those where beguine communities endured longer to display very similar gender norms. Hence, if our previous estimates captured only a pre-existing gender equality differential across municipalities, also shortly lived beguinages should appear as predictors of gender outcomes in 1886. The lack of such results reinforces the interpretation that beguines did trigger a change in gender equality that greatly persisted over time.

Table 12: Municipal charters and gender equality.

	Dep. var.: Literacy Equality Index, 1866			
	1st cent.	10th cent.	20th cent.	30th cent.
	(1)	(2)	(3)	(4)
Short beg.	0.025	0.032	0.035	0.037
	(0.032)	(0.028)	(0.018)*	(0.014)**
	[0.031]	[0.027]	[0.017]**	[0.014]***
Long. beg.	0.045	0.044	0.045	0.046
	(0.014)***	(0.014)***	(0.016)***	(0.018)***
	[0.012]***	[0.013]***	[0.014]***	[0.016]***
Observations	2549	2549	2549	2549
R^2	0.429	0.429	0.429	0.429
Fixed-effects	Yes	Yes	Yes	Yes
Geography	Yes	Yes	Yes	Yes
Demography	Yes	Yes	Yes	Yes
Nr of Short beg.	6	7	14	21

Note: This table presents the results of OLS regressions relating the presence of beguinages to increased gender equality. Gender equality is proxied by *literacy equality index*. Column 1) includes separate indicators for beguinages with *exposure* in the first centile of the distribution. Columns 2), 3) and 4) increase it to the 10th, 20th and 30th centiles, respectively. Geography: latitude, longitude, distance to Leuven, to the sea and to rivers, caloric yield, soil types and crop productivity. Demography: number of men and women, marriage rate, the sex ratio, the percentage of domestic and international migrants by gender and an indicator variable taking value one for municipalities above the 10th percentile in terms of population. Arrondissement and canton fixed-effects in Column 1) and 2), respectively since it was not possible to estimate a model in Column 1) with canton fixed-effects. Standard errors clustered at the canton level. $^{*}\ p < 0.1$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$.

IV Results. First, in Table 13, we present some evidence regarding the nil effect of municipal charters on gender equality among towns that had arguably similar attitudes toward women. We do so by analysing the effect of municipal charters on two sub-samples: towns that hosted a beguinge, and towns that never had one. Arguably, if beguines self-selected towns because they were more tolerant towards their lifestyle, attitudes toward women should be similar within each sub-sample. Therefore, we ascertain the effect of municipal charters on gender equality while holding attitudes constant. According to our results, municipal charters did not boost gender equality, giving additional credence to our identification strategy. This result is similar to Panel C) of Table 11.

We also present the results for the alternative robustness checks performed on the IV specification. In particular, Table 14 restricts the sample to municipalities closely located around towns with a beguinage at distances 5 km, 10 km and 20 km, while Table 15 replicates Panel A) and B) of Table 11. In Panel A) of Table 16 the main regressor is the logarithm of the distance from each municipality to the closest beguinage, instrumented by municipal charters. Panel B)

Table 13: Municipal charters and gender equality.

	Dep. variable: Fem. Lit. Eq.	
	Munic. with beguinage	Munic. without beguinage
	(1)	(2)
Municipal charter	−0.008	0.034
	(0.078)	(0.035)
	[0.024]	[0.032]
Fixed-effects	Arrond.	Canton
Geography	Yes	Yes
Demography	Yes	Yes
Observations	70	2479
R^2	0.978	0.404

Note: This table relates municipal charters with gender equality using OLS regressions. Gender equality is proxied by the variable *literacy equality index*$_i$. See the main text for a description. Column 1) includes all municipalities that hosted a beguine community at any moment in time while Column 2) considers those that never hosted one. Geography: latitude, longitude, distance to Leuven, to the sea and to rivers, caloric yield, soil types and crop productivity. Demography: number of men and women, marriage rate, the sex ratio, the percentage of domestic and international migrants by gender and an indicator variable taking value one for municipalities above the 10th percentile in terms of population. Arrondissement and canton fixed-effects in Column 1) and 2), respectively since it was not possible to estimate a model in Column 1) with canton fixed-effects. Standard errors clustered at the canton level. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

introduces the alternative definition for $exposure_{i,j}$ as the main regressor.

Table 14: Beguinages and Literacy equality; IV, robustness 1.

	Dep variable: Lit. eq. index, 1866					
	5Km		10Km		20Km	
	(1)	(2)	(3)	(4)	(5)	(6)
Beguinage (0/1)	0.053***		0.090***		0.097***	
	(0.018)		(0.025)		(0.024)	
Exposure (centuries)		0.009*		0.008*		0.013**
		(0.005)		(0.004)		(0.006)
Observations	301	371	723	1114	955	2060
R^2	0.633	0.659	0.516	0.516	0.464	0.434
1st-stage F-val.	213.1	24.4	147.4	3.7	153.7	3.8
Fixed-effects	Canton	Canton	Canton	Canton	Canton	Canton
Geography	Yes	Yes	Yes	Yes	Yes	Yes
Demography	Yes	Yes	Yes	Yes	Yes	Yes

Continued on next page

Table 14 – *Continued from previous page*

	Dep variable: Lit. eq. index, 1866					
	5Km		10Km		20Km	
	(1)	(2)	(3)	(4)	(5)	(6)

Note: This table presents the results of IV regressions where the presence of beguine communities is instrumented using municipal charters. Columns 1) and 2) consider only municipalities located less than 5 km from a beguinage, Columns 3) and 4) increase the distance up to 10 km and Columns 5) and 6) further expand it to 20 km. Geography: latitude, longitude, distance to Leuven, to the sea and to rivers, caloric yield, soil types and crop productivity. Demography: number of men and women, nuptiality, sex ratio, the percentage of domestic and international migrants and a dummy for the 10% most populous municipalities. Standard errors clustered at the canton level. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 15: Beguinages and literacy equality; IV, robustness 2.

	Lit. eq. index, 1866		Fem. lit. share, 1866		Fem. lit. index, 1866	
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: No open beguinage					
Beguinage (0/1)	0.096***		0.025***		0.089***	
	(0.021)		(0.006)		(0.021)	
Exposure (centuries)		0.019**		0.006**		0.019**
		(0.008)		(0.002)		(0.008)
Observations	831	2539	831	2539	831	2539
R^2	0.463	0.424	0.440	0.403	0.245	0.226
1st-stage F-val.	163.0	14.3	163.0	14.3	163.0	14.3
	Panel B: Male literacy rate					
Beguinage (0/1)	0.057***		0.012**		0.050***	
	(0.017)		(0.005)		(0.017)	
Exposure (centuries)		0.008*		0.002		0.008
		(0.005)		(0.001)		(0.005)
Male lit. rate, 1866	0.205***	0.268***	0.069***	0.093***	0.213***	0.280***
	(0.035)	(0.026)	(0.011)	(0.009)	(0.037)	(0.027)
Observations	973	2549	973	2549	973	2549
R^2	0.494	0.468	0.475	0.455	0.296	0.283
1st-stage F-val.	197.4	30.5	197.4	30.5	197.4	30.5
Fixed-effects	Canton	Canton	Canton	Canton	Canton	Canton
Geography	Yes	Yes	Yes	Yes	Yes	Yes
Demography	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table presents the results of IV regressions relating the presence of beguinages to increased gender equality where the presence of beguine communities is instrumented using municipal charters. Panel A) removes ongoing beguinages from the sample. Panel B) includes male literacy rates as additional control. Geography: latitude, longitude, distance to Leuven, to the sea and to rivers, caloric yield, soil types and crop productivity. Demography: number of men and women, nuptiality, sex ratio, the percentage of domestic and international migrants and a dummy for the 10% most populous municipalities. Standard errors clustered at the canton level. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 16: Beguinages and literacy equality; IV, robustness 3.

	Lit. eq. index, 1866	Fem. lit. share, 1866	Fem. lit. index, 1866
	(1)	(2)	(3)
	Panel A: Distance to beguinage as regressor		
Dist. to closest beg. (log-km)	-0.038^{**}	-0.011^{**}	-0.038^{**}
	(0.016)	(0.005)	(0.016)
Observations	2549	2549	2549
R^2	0.426	0.405	0.226
1st-stage F-val.	34.7	34.7	34.7
	Panel B: Alternative definition of exposure		
Exposure (centuries)	0.013^{**}	0.004^{**}	0.013^{**}
	(0.005)	(0.002)	(0.005)
Observations	2549	2549	2549
R^2	0.431	0.409	0.232
1st-stage F-val.	35.547	35.547	35.547
Fixed-effects	Canton	Canton	Canton
Geography	Yes	Yes	Yes
Demography	Yes	Yes	Yes

Note: This table presents the results of IV regressions relating the presence of beguinages to increased gender equality; the presence of beguine communities is instrumented using municipal charters. Panel A) features as the main independent variable the distance to the closest beguinal community, in log-km. See main text for a discussion regarding the benefits of a continuous variable. Panel B) employs a modified version of the variable $exposure_i$. See main text for a description. Geography: latitude, longitude, distance to Leuven, to the sea and to rivers, caloric yield, soil types and crop productivity. Demography: number of men and women, nuptiality, sex ratio, the share of internal and external migrants and a dummy for the 10% most populous municipalities. Standard errors clustered at the canton level. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Propensity score matching. In order to identify the effect of the presence of beguine communities on gender-related outcomes while reducing the bias due to confounding variables, we implement propensity score matching on our original sample. Ideally, treated and control municipalities should be matched using some pre-beguinage characteristics on attitudes towards women at the municipal level. Unfortunately, this information is not available. Instead, municipalities are first matched on exogenous covariates thus mitigating concerns on the threat to identification posed by unobservables. These are latitude and longitude, distance to the sea and to rivers and cereal productivity. In a second matching exercise, predictors include the distance to Leuven and the presence of monasteries at the municipal level to consider the regional organisation of power and wealth concentration.

Table 17 displays the positive relationship between the historical presence of beguine communities and gender equality obtained with this alternative estimation approach. It establishes

Table 17: Propensity score matching.

	Lit. eq. index, 1866	
	Basic Matching	Extended Matching
	(1)	(2)
Stratified matching	0.078**	0.052*
	(0.031)	(0.027)
Observations	2560	2560
Treated	70	70
Controls	1542	1513
Kernel matching	0.080***	0.063**
	(0.028)	(0.027)
Observations	2560	2560
Treated	70	70
Controls	2483	2483
Nearest neig. matching	0.097***	0.071**
	(0.025)	(0.032)
Observations	2560	2560
Treated	70	70
Controls	44	45

Note: This table presents the results of propensity score matching relating the presence of beguinages to increased gender equality. Matches are identified using stratified, kernel and nearest neighbour matching, respectively. Matches are performed using latitude, longitude, distance to the closest river and to the sea, and crop-specific productivity in Column 1). Column 2) additionally employs the presence of monasteries and the distance to Leuven to match municipalities.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

that beguine presence at the local level left a great imprint on gender equality, still measurable in the 19th century. In general, the magnitude of coefficients is slightly larger the one of the baseline OLS specification presented in Column 7) of Table 2.

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