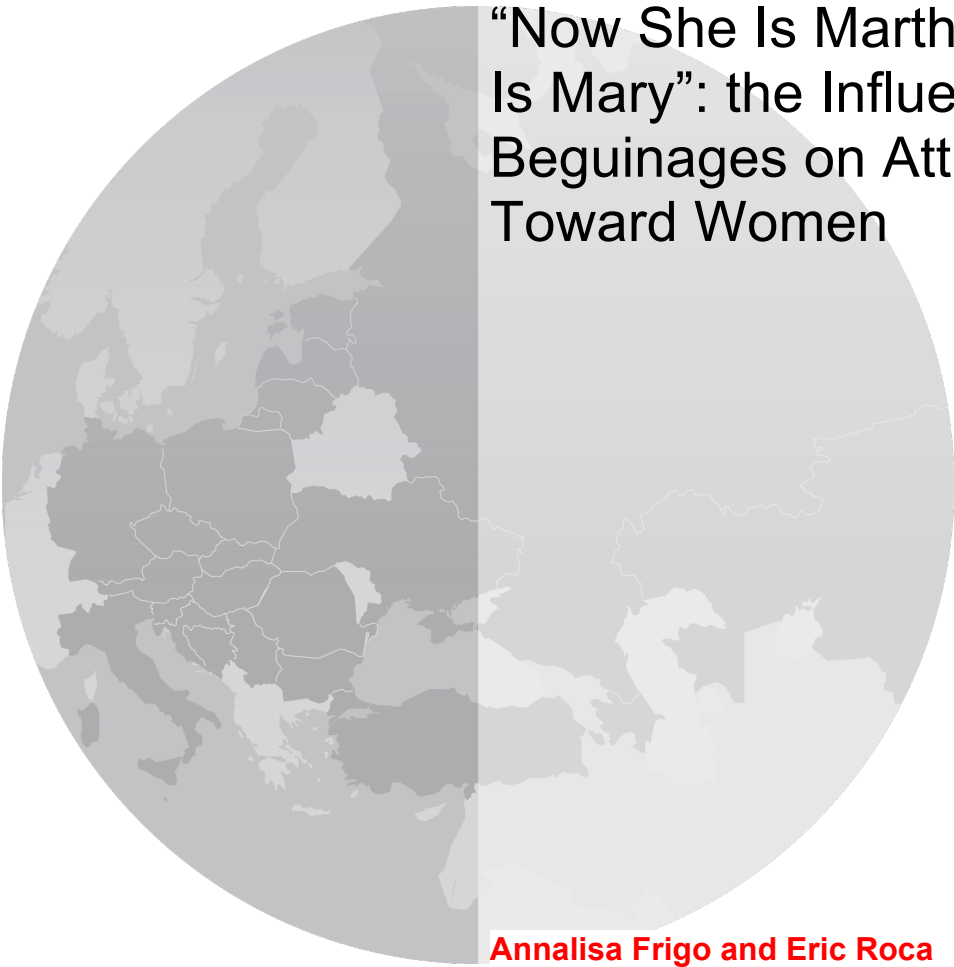




“Now She Is Martha, then She Is Mary”: the Influence of Beguinages on Attitudes Toward Women

Annalisa Frigo and Eric Roca



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Abstract

When 12th-century young women in Belgium decided to live together and care for themselves in communities without male intervention, they triggered a change in attitudes toward women. They led a religious life of contemplation and prayer while earning a living as labourers or teachers. Contrary to nuns, they never took formal vows nor lived cloistered. This paper follows the legacy of these “feminist” forerunners, called beguines, during the 19th century and shows the long-lasting effects they had on gender-related outcomes, in particular, gender equality, even in places where they had disappeared a long time ago. Using novel data featuring the precise location of each beguine community in Belgium combined with 19th century census data, we show that wage and literacy differentials between men and women reduced in municipalities exposed to the presence of a beguinage in the past. Using changes in the political organisation through which some villages became more attractive to beguines, we establish that the variation in gender literacy and wages is indeed related to the presence of beguinages. Our results are in line with the extensive empirical evidence documenting the persistence of gender norms and institutions.

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

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

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1 Introduction

Attitudes toward women, including their role in society, vary considerable across countries. These perceptions, together with beliefs, have been shown to impact important economic outcomes. For instance, De Moor and Van Zanden (2010) suggest that the more gender-equal society of the Northern Sea region, fostered by the European marriage pattern, was conducive of higher female participation rates in the labour market. Similarly, Carmichael et al. (2016) propose that female agency reduces fertility rates and that investments in human capital follow suit.

This paper contributes to the understanding of the origins of gender roles, and in particular, of gender equality. We follow the legacy of the introduction and spread of beguine communities, which took place in modern-day Belgium and the Netherlands during the Middle Ages, and relate the presence of beguines with increased female agency after beguinages faded around 600 years later. The beguine movement started in the 12th century and consisted on female-only communities that offered women of all socio-economic strata the opportunity of remaining single, in the midst of a society that encouraged marriage or monastic enclosure. Besides facilitating singleness, beguines, in emulation of Jesus' disciples, self-supported themselves by means of work, including teaching, crafts and running businesses. Although religiosity was an important component of beguines' everyday life, they differed from monastic convents as beguines never took formal vows, they could retain and accumulate wealth and they could leave the beguinage at any moment. Moreover, beguine communities always lacked a unified, common rule to abide to and were completely independent from any male authority. Finally, these communities were actively involved and well integrated in everyday social life. All these characteristics granted women the possibility of deliberately delaying marriage, weakening the trade-off between family and professional choices, either lay or religious. Being independent of any male authority, the beguine movement has been considered the "first feminist movement".¹ The presence of these single women at the local level, participating by themselves in trades and activities independently from any male authority should have promoted a culture of gender-equality. Additionally, by broadening the options women had beyond marriage or monastic life, female bargaining power and agency should improve, leading to better outcomes for women.

We are able to show that localities where beguine communities settled were characterized by a more gender-equal society, measured comparing agricultural wages and literacy rates between genders, in the mid-19th century, long after beguinages ceased functioning or diluted into communities housing merely few women. We create a new detailed data-set including information on beguinage characteristics, their foundation year, and dissolution time. This is supplemented with information pinpointing the exact location of each beguinage of the Low Countries. Our results indicate an increase of 0.078 literate women per literate men in municipalities that hosted a beguinage, which corresponds to almost 10% of

¹Pancieri (2016).

the average value for that ratio; the fraction literate women represented among total literate population rises by 2.2 percentage points and the ratio of female-to-male literacy rates augments by 2.6 percentage points. Additionally, female-to-male agricultural wages increase by 4.3% in localities where beguine communities settled.

Furthermore, we control for the endogeneity of beguinage location using a novel instrument: changes in the local political framework that led to a relative decentralisation of power, manifested in municipal charters. Municipal charters were privileges granted to municipalities by the sovereign, including the possibility to organize markets and guilds, as well as a municipal judicial system. Municipalities had to secure a payment before obtaining a charter. Consequently, only wealthy towns could afford it. These advantages attracted beguines since they specialized in market activities. In order to avoid reverse causality, only charters granted before the advent of beguinages are considered. Our previous findings remain. We also show results are not caused by the instrument itself: among towns that had a beguinage, those that received a municipal charter did not differ from the others. Moreover, even if our instrument encouraged the acquisition of human capital, historically men were privileged over women; which would be against our premise.

This paper contributes to the strand of literature studying the origin of gender-related norms. For instance, Alesina et al. (2013) suggest that ancestral agricultural techniques, specifically the use of the plow, had detrimental effects on female labour force participation in present times. Authors explain that in plow-cultivating societies, men had a comparative advantage due to their more developed upper torso and the capacity of exerting short bursts of intense physical effort while women remained confined in household activities. Also, plow cultivation is less compatible with childcare, compared with shifting agriculture. Similarly, the value attached to women has been shown to vary with female productivity. Qian (2008) documents how in post-Maoist China, regions that were suitable to tea cultivation evolved a sex ratio closer to natural values after tea prices rose. She argues that women had a comparative advantage in picking tea leaves over men which increased female earning possibilities and, hence, their relative value at the family level, resulting in less sex-driven abortions or female infanticide. Opposite results surfaced in orchard-type cultivation areas, where men had a comparative advantage.

More broadly speaking, this paper also contributes to the literature analyzing the long lasting effects of institutions and how they matter for economic outcomes. Akçomak et al. (2016) trace how a Catholic sect, the Brethren of the Common Life whose members emphasized the importance of literacy to understand the Gospel, locally affected Dutch male literacy rates. Moreover, cities that hosted the sect produced more books. Valencia Caicedo (2014) reports that Jesuit missions in South America, which promoted basic literacy and crafts among the indigenous population, had a definitive contribution in present day literacy rates and manual crafts, despite being expelled from the continent in 1767.

The remaining of the paper is organized as follows. Section 2 presents relevant literature on the

long-run economic effects of institutions and gender roles, and introduces the historical background on the beguine movement. Section 3 and 4 describes the different data sources and the empirical part using an OLS and IV framework in Subsections 4 and 4.3, respectively. The latter is supplemented by robustness tests in Subsection 4.4 and propensity score matching in Subsection 4.5. Finally, Section 5 concludes.

2 Context

2.1 Related Literature

Recent economic literature points out that a sizeable fraction of the variation in economic performance around the world is driven by factors related to historical accidents, culture, geography, and colonial and pre-colonial traits. Part of the theoretical and empirical research on cultural transmission is motivated by the resilience of traits across generations. In turn, cultural transmission arguably plays an important role in the formation of social norms and ideological tenets, like attitudes towards family and fertility practices, and attitudes in the job market. To the extent that cultural values carry over from parent to offspring, a cumulative reinforcing process of growth through cultural change has been envisioned (Spolaore and Wacziarg (2013)) by researchers in the field of growth and development economics. Michalopoulos and Papaioannou (2017) reviewed the major contributions in this topic, showing how moments of historical significance in European and American history have shaped both contemporary economic outcomes, political developments, and people's beliefs and attitudes. The long shadow of historical institutions as a determinant of economic outcomes is analysed by several scholars. For instance, Becker et al. (2016) estimate the positive relationship between historical affiliation with the Habsburg Empire and its lasting effects on trust and corruption in local public services. In the same vein, it has been showed by Lowes et al. (2015) that descendants of the inhabitants of the Kuba Kingdom displayed a higher cheating behaviour and were less likely to follow rules than those living in neighbouring regions. Authors put forward the idea that the institutionally organized kingdom crowded out individual incentives to transmit rule-complying behaviour to children. Michalopoulos et al. (2016) show how, in Africa, individuals descending from ethnicities that relied more on agriculture for subsistence are more likely to be more educated and wealthier today. Nunn (2008) presents more evidence of the effects of historical events on economic development by linking slave trade with decreased economic growth. The channels he considers include the fact that ethnicities particularly targeted by enslavers could not develop strong ties among villages, impeding the creation of larger communities, and thus generating more fractionalization.

Among cultural traits, scholars have shown their persistence and argued that many arose from gender-based specialization predating industrialization and going as back as the neolithic revolution several

millenia in the past. Alesina et al. (2013) study the evolution and persistence of cultural norms about gender roles and division of labour. They find contemporary rates of female participation in labour, entrepreneurial and political activities to be significantly lower for the descendants of societies that traditionally practiced plow agriculture. Traditional plow agriculture is also associated with cultural attitudes disavouring gender equality. The key role of cultural transmission is confirmed analysing female labour force participation of second-generation migrants living in the United States. Authors explain that in plow-cultivating societies, men had a comparative advantage due to their more developed upper torso and the capacity of exerting short bursts of intense physical effort while women remained confined in household activities. Also, plow cultivation is less compatible with childcare, compared with shifting agriculture. In a similar vein, albeit much recently, political transformation in post-Mao China increased returns to tea cultivation. Qian (2008) documents how regions that were suitable to tea cultivation evolved a sex ratio closer to natural values after tea prices rose, in comparison with Chinese usually skewed sex ratios. She argues that women had a comparative advantage in picking tea leaves over men which increased female earning possibilities and, hence, their relative value at the family level, resulting in less sex-driven abortions or female infanticide. Opposite results surfaced in orchard-apt cultivation areas, where men had a comparative advantage. Grosjean and Khattar (2015) explain regional differences in the relative position women have in Australia using the extremely skewed sex ratio the island witnessed during the 17th and 19th centuries, when its population consisted mostly of English male convicts. In regions that historically had a more disproportionate sex ratio in favour of men, women were found to work less and hold fewer high ranking positions. These same regions today are found to be more conservative with respect to female roles in society and show decreased female labour force participation. A more far-fetched relationship between early agricultural transition in food production and present-day social outcomes is provided by Hansen et al. (2015). Authors show that societies that relied for longer time on agriculture to provide subsistence tend to show today less equal gender roles, including female participation rates in the labour market. The connection authors put forward to explain the reasons leading longer agricultural tradition to decreased female agency is that agriculturalists enjoyed higher fertility rates and women specialised in child-care, reducing their involvement in activities outside the home sphere. Alternatively, social groups relying on agriculture to achieve subsistence spend more time processing food, a task in which women specialized, which prevented them from working in the fields. Geography, in particular soil types, has also been showed to influence female labour force participation rates and infant sex-ratio in the Indian context, see Carranza (2014). Loamy soils allow the practice of deep tillage, a farming technique in which men alone can perform all tasks without the help of women. Hence, in loamy regions women traditionally participated less in farming activities and had a lower relative value. Tur-Prats (2015) relates domestic violence in Spain with family types, arguing that in stem families coresidence of wife and mother-in-law increased wife's farming productivity, which would be dampened under violence. Alternatively, mothers-in-law can provide monitoring, which decreases the need to resort to violence. An empirical analysis confirms her hypothesis, showing that regions characterised by the stem family type

are associated with lower levels of intimate-partner violence. Bertocchi and Bozzano (2016) reports that gender equality is curbed by younger bridal age in the Italian context during the mid-19th century. Giuliano (2017) provides a recent literature review on the historical origins of gender roles.

Finally, since Weber's seminal publication on the Protestant work ethic as a causal factor in industrialization (1905), this growing consensus extends on the enduring role played by religious institutions in explaining economic success. Indeed, scholars stress that productivity outcomes associated with some religious traits tend to be highly persistent. In particular, the impact of religious orders on productivity has been studied by Valencia Caicedo (2014), who assesses the effects of Jesuit Missions in Latin America. He finds a positive association between historic presence of Jesuit missionaries and modern day human capital and technological progress across colonized countries. Andersen et al. (2016) explore the role of the Catholic Order of Cistercians in England. They argue that the counties more exposed to Cistercian monasteries experienced faster productivity growth from the 13th century onwards, well before the Reformation. The presence of Cistercian abbeys, promoting a local culture of hard work and effort, is linked with an increased productivity in English counties almost three centuries after the dissolution of these monasteries. Finally, the closest paper in spirit to ours is by Akçomak et al. (2016). It traces how a Catholic sect, the Brethren of the Common Life whose members emphasized the importance of literacy to understand the Gospel, locally affected Dutch male literacy rates. Moreover, cities that hosted the sect produced more books. However, the measure on literacy is far from being universally measured as they consider only whether grooms marrying in Amsterdam, but native of other cities, signed their marriage declaration.

To the best of our knowledge, however, no one in the economic literature has focused on the legacy of religious orders on gender norms, and the economic influence of beguinages has never been quantitatively investigated. In fact, lay and semi-religious movements of the high and late Middle Ages have received scant attention from scholars in social and economic history, mainly due to the scarcity of definitive primary sources.

2.2 Historical Background

The beguinal movement started flourishing in the 12th century and has left a substantial number of beguinages across the Low Countries, France and Germany. It consisted on self-supporting, female-only communities that offered women of all strata² the opportunity of remaining single in a society that advised against that option, allowing them to study and work.³ Although religiosity and pious life guided

²Poor and well-being women are reported as living as beguines. McDonnell (1954, p. 146) notes that some beguines owned nothing but a bed and a chest of clothes. Geybels (2004) describes the beguine movement as women embracing poverty as a Catholic ideal. There are also reports of wealthy beguines: McDonnell (1954, p. 97-99) names a few beguines who were daughters of noble-men and well-off citizens, including money-changers and merchants. Also, Geybels (2004, p. 111) comments that, amongst the population living in a beguinage, one could find maids of wealthy beguines.

³The Great-Ladies and Mistresses of the two beguinages in Ghent described these as places where "[...] young beguines received their education [...]" and highlighted their laboriousness noting that "[...] the vast majority [of beguines] live modestly

the foundation and daily routine of beguinages,⁴ these communities radically differed from monastic convents. First, women did not take poverty vows, allowing them to retain any property and accumulate wealth. Second, women could leave the beguinage any moment to marry or to reintegrate into secular society. Third, these communities were actively involved and well integrated in everyday social life of medieval cities: not only they were tolerated (and even granted lands),⁵ but also their members busily participated in social life, doing charitable and remunerated work.⁶ Family ties were generally maintained.⁷ These female-only institutions have been forerunners of women associations, guaranteeing the necessary social and financial protection to single women who moved from the countryside to the town to join the community, in a society where staying single was stigmatized.⁸ Because of its independence of any male authority, the beguines have been considered the “first pre-industrial feminist movement”.⁹ Moreover, 13 beguine sites even became a well-known touristic attraction, when in 1998 the United Nations Educational, Scientific, and Cultural Organization (UNESCO) recognized them as World Heritage for their “outstanding example of an architectural ensemble associated with a religious movement characteristic of the Middle Ages, associating both secular and conventual values”. Despite these fascinating aspects, these veritable single-sex clusters were considered “rather inconsequential women without history”¹⁰ and have therefore attracted relatively few scholars’ attention. Nonetheless, in recent years, the interest with respect to the beguines has increased thanks to Simons’s extensive review of all the beguine communities in the Medieval Low Countries, focusing on the period from the beginning of the 13th to the middle of the 16th century. His major contribution is the clear description

with their little patrimony or the fruit of their work [...]”, see Vander Schelden (1862, p. 2 and p. 12); own translation from French. Geybels (2004, p. 63) notes that during the “fourteenth century beguines were selling goods in competition with guilds and craftsmen, who protested strongly against the situation”. Later, in pages 114-118 he emphasizes that admittance to a beguinage required the capacity to self-support oneself through work or own finances. Moreover, “[...] labour was compatible with the ideals of the *vita apostolica* [...] because] the disciples in Jesus’s day also had to support themselves”. Beguine occupations included “carding, spinning, weaving and bleaching [...] making of bobbin lace, sewing, embroidery, making rosaries and baking communion wafers”. Caretaking and teaching were also profitable sources of income. Finally, McDonnell (1954, p. 146-149) writes that beguinages always combined contemplative lifestyle with work.

⁴For instance, McDonnell (1954, p. 5) describes the daily activities of beguines emphasizing that “compulsory prayers” were recommended. One can also read the following rule in Saint Elisabeth’s beguinage cartulary: “item summo mane surgentes, ad ecclesiam convenient, quelibet ad locum suum, quem habeat specialiter deputatum, ut per hoc facilius cuiusque absencia possit deprehendi, et ibi audita missa ac fuis (pro) benefactoribus, nobis nostrisque successoribus, devotis orationibus, ad domos suas redeant, ibi per totam diem orationi vacando vel suis operibus intendendo. In sero vero, post vespas, ad ecclesiam iterum convenient, vacantes orationibus et meditationibus, quosque, facto signo, ad quietem revertantur. Dominicis vero diebus et festis, missis et sermonibus ac aliis opibus spiritualibus insistentes, Deo devotum in omnibus exhibeant famulatum, nec cuiquam, hiis diebus, exire curiam liceat sine magistre principalis licencia speciali.”, see Béthune (1883, p. 90).

⁵Beguines, at least in Belgium, enjoyed powerful patronage and were granted privileges. For instance, Vander Schelden (1862, Document I in Rapport du Collège Échevinal au sujet des Béguinages de Gand. Pièces justificatives) details the original donation of Jeanne, countess of Flandres and Hainaut, of some lands for the construction of a beguinage in Ghent. McDonnell (1954, p. 6) notes that “[i]n Flanders and Walloon, [...] location was provided, generally granted with full title by a seignorial lord or by abbeyes. The secular arm cooperated by conferring privilegia beguinalia including exemption from taxes [...]”. They also received donations and support to preserve their mode of live when threatened by ecclesiastic opposition, see Geybels (2004, p. 50).

⁶This is well noted by Belgian law experts in Vander Schelden (1862, Document V, p. XXV-XXVI). For instance, according to Denisart “beguines are pious women whose status is, according to Van Espen, between religious and secular. As religious, they wear a particular clothing and profess their faith issuing chastity and obedience vows; a type of life they submit to. However, they are not religious because their vows are not perpetual; they can leave anytime and marry. They do not renounce property and they can buy and sell. Even if most of them live in a common place, they do not live together as each has her own separate room. They are not cloistered. Finally, they do not have a common rule approved by the Holy Seer”. Own translation from French.

⁷In Vander Schelden (1862, p. 26) the Great-Ladies and Mistresses note that “beguines need not renounce to family relationships or friendship [...]”. Own translation from French.

⁸The cartulary of the beguinage in Ghent supports this perspective, see Geybels (2004, p. 47).

⁹Bowie et al. (1990, p. 13) refers to them as “the first European women’s movement”.

¹⁰Simons (2010, p. 49).

of what made beguines different from similarly informal but more scattered semi-religious movements groups in Europe.

Record of pre-beguine communities appears first in the area around the city of Huy, where devoted women assisted those in need starting around 1181. Similar groups arose in subsequent years around Nivelles and Oignies (1208), the city of Liège (1212) and around Borgloon, Sint-Truiden and Zoutleeuw, between 1207 and 1245. From there, between 1230 and 1239 seven new beguinages formed in the surrounding area comprising Aachen, Nivelles and Vilvoorde. Simultaneously, during the same years there are records of two beguinages flourishing in present-day France: one in Cambrai and another one in Valenciennes, as documented by Simons (2010, Appendix I). According to Bowie et al. (1990, p. 14), who provides a slightly different chronology, inspired by Lambert le Bègue¹¹ the first group of beguines formed around 1170 in Liège. Women at Mont Cornillon and Huy promptly emulated them during 1182, following a woman called Ivetta. The movement expanded to the region of Oignies and Nivelles a decade later under the auspices of Marie of Oignies.

Although these initial arrangements were different from the concept of beguinage that developed later, they nonetheless comprised several women who decided to follow a spiritual life outside convents.¹² Moreover, these groups of beguines had connections among them, as beguines often visited each other. Tracing the history of beguinages, we can distinguish two different types of them: convent and court beguinages.¹³ In the first one, the most common, beguines lived close to each other in the same neighbourhood and followed some common rules under the direction of a superior.¹⁴ They often lacked, though, a private chapel as well as other facilities common to court beguinages. Although, overall, court beguinages are rarer, this type developed earlier and with more intensity. As the residences they occupied were erected in open spaces with the unique purpose of accommodating the community, court beguinages typically left a greater imprint on city life. They comprised several dwellings for beguines, gardens, buildings in which women could work (e.g. a bakery, brewery, etc.) and a chapel. Anyhow, the lack of a unified rule brought about a wide spectrum of different hybrid arrangements.

The expansion of beguinages across the Low Countries landscape was unequal during Medieval time. Following an initial surge after the beginning of the movement, their creation stagnates at around 20 new beguinages after 1290 and then steadily decreases (albeit the exceptional decade of 1311-1320 when 34 beguinages were created). Figure 1 represents the number of beguinages created every decade between 1241 and 1565. Data follows Table 1 in Simons (2010, p. 49). Overall, there is evidence of beguinages existing in 111 different cities, of which 70 locate in Belgium, 17 in the Netherlands, two

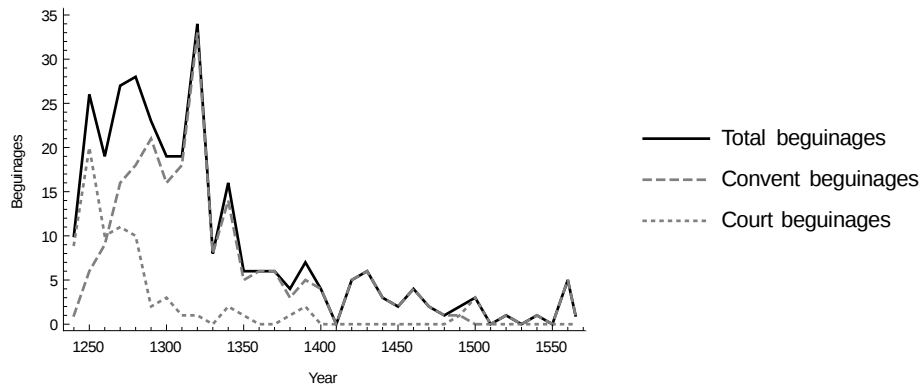
¹¹The similarity of his appellation and the name of the movement is not a coincidence (*le Bègue* means, in French, the stutterer). In fact, it has been put forward as the origin of the term beguines. Other theories propose the simple, plain color beguine habits had (beige); the Dutch word *begen* (meaning to beg, but even the existence of that word is disputed); and the name of the legendary founder of the movement: St. Begga. This last origin is typically regarded as impossible because the explanation was ascribed long after the formation of the movement, see Geybels (2004, p. 42-45).

¹²Many of these early beguines joined formal, religious communities later in their lives.

¹³Geybels (2004, p. 105-106) describes more precisely the types of beguinages, distinguishing among "town pattern" beguinages, "court beguinages" and what he calls "miscellaneous beguinages".

¹⁴See, for instance, Geybels (2004, p. 50); as well as Mommaers and Dutton (2004, p. 21).

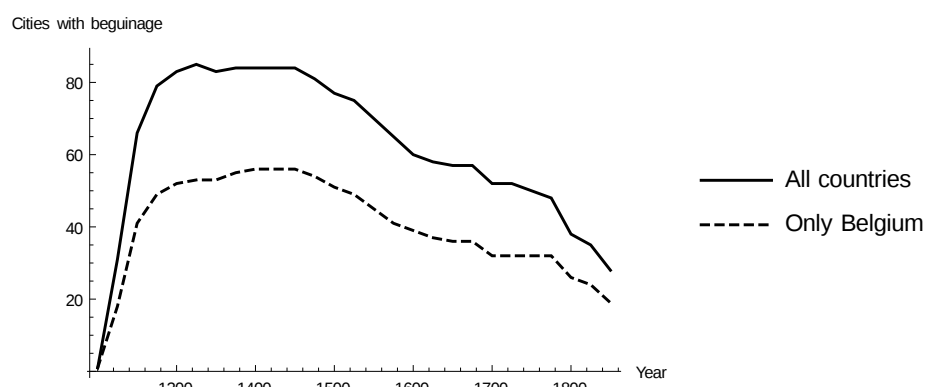
Figure 1: Number of beguinages created by decade



Data on beguinage foundations per decade from Simons (2010). Own elaboration.

in Germany and 22 in France. Besides the total number of beguinages, another telling feature is the number of municipalities that had at least one beguinage at any point in time as it gives a sense of how much beguinages lasted. Figure 2 displays this information for each 25 years for Belgium and all countries. After an initial momentum in the creation of new beguinages, the movement stagnates between the 14th and the 16th centuries, when the number of beguinages stabilized. Afterwards, its popularity declines.

Figure 2: Number of cities with at least one beguinage



Data on beguinage foundations per decade from Simons (2010). Own elaboration.

Beguinages greatly differed in terms of the population they hosted. Table 3 in Simons (2010, p. 56-59) provides estimates for the number of members in some beguinages over time. Values range from just two people in Halen to 1900 beguines in Mechelen. The beguinage of Wijngaard in Bruges had a slightly declining population between 1439 and 1455, dipping from 152 to 138 women, as described in Simons (2010, Appendix II). McDonnell (1954, p. 64) reports some findings concerning the beguinage

of Nivelles during the middle of the 13th century. Besides some sources claiming up to 2000 inmates,¹⁵ later revisions state that during the 21st February of 1284, there were 51 beguines. This seems to have represented a large congregation.¹⁶ Finally, Geybels (2004, pp. 69, 136, 143, 145 and 147) reports beguine population at various locations at different times: during the 18th century, in Leuven, beguine population declined from 300 to 180 beguines. A similar fate occurred in Antwerpen between 1671 and 1777, dropping from 300 to 170. During 1687, in Diest, 282 beguines lived in the beguinage. In 1833 there were only 62 and during 1928 just two. The beguinage in Lier hosted more than 300 beguines during the 14th century. In Napoleonic times, beguine population had been already decimated to 200 members. The great splendor of Mechelen beguinage is also mentioned. The figure coincides with that previously reported, albeit being slightly smaller: 1800 beguines during the year 1500 and 1200 during 1577, when the beguinage was devastated and beguines had to relocate. Some pious men, later known as *beghards*, emulated the lifestyle of beguines, but never reached their reputation and numerosity. In fact, this male counterpart of the beguines could only be related to sorts of small guilds, as they were essentially craftsmen in the textile industry.

The beguine movement stands out from other religious and semi-religious communities for its swift popularity, and especially for an additional peculiarity: beguines never constituted an orthodox religious order, as they did not have to take solemn religious vows meant to be permanent; they did not renounce their property; and could leave the beguinage at any time to marry or simply go back to their original social network.¹⁷ Moreover, the movement even lacked a common rule or a central coordinating authority.¹⁸ This peculiar freedom of choice and self-determination of beguines rapidly propagated, as has been highlighted in the poem "*Ci encoumence li diz des Beguines*" written by the Parisian *trouvère* Rutebeuf around 1260.

*"If a beguine marries, that is her vocation,
because her vows or profession are not for life.
Last year she wept, now she prays,*

¹⁵This figure is reported by a Dominican friar, see Cantimpré (1997, p. 522).

¹⁶McDonnell (1954) cites the original Latin source which states "multitudo permaxima beghinarum".

¹⁷The particular character of beguines, not pertaining neither to an ecclesiastical order neither being completely secular is emphasized by many authors. For instance, Warnkönig (1836, p. 350) defines them as "women or widows who wear a particular monastic clothing, life together in a space not forbidden to outsiders, some in individual houses, some, normally novices, in convents, to lead a chaste and pious life under the supervision of a superior and following their own statutes. They are not obliged by vows to renounce the world forever"; own translation from French. Bishop Malderus of Antwerp (1563-16633) regrets beguines did not follow a monastic lifestyle but praises the supreme effort they undertook: "Although it is more meritorious to devote oneself to God by means of solemn vows of chastity, obedience and poverty, Belgian women are inclined to prefer the free practice of a thing over the practice of the same thing for being held to it by a vow. They would rather live voluntarily in perpetual chastity than do so because of a commitment. They prefer to simply obey rather than take a vow of obedience. They choose to make a moderate use of temporal goods and regularly donate some of their possessions for charitable or religious purposes rather than being forced to give up their possessions all at once and live in poverty. Briefly, they make up for the fruits of binding vows by the merits of repeating their free submission.", Mommaers and Dutton (2004, p. 20) quoting L.J.M. Philippen, "Begijnhoven en Spiritualiteit", in *Ons Geestelijk Erf* 3 (1929), 169; see also footnote 6 for a similar depiction.

¹⁸The lack of a common rule is one of the most salient characteristics of the movement. McDonnell (1954, p. 134) notes it; while Geybels (2004, p. 59) describes it as "poorly organized, almost amorphous movement with each community possessing its own statutes and regulations which, although similar in aim and content, never transcended diocesan lines at best". Part of the ecclesiastical opposition against the movement was also founded on the lack of a common rule, see Frédéricq (1889, p. 168-169, par. 172).

*next year she'll take husband.
Now she is Martha, then she is Mary;
now she is chaste, then she gets a husband."*

The literary work reveals that the reputation of beguines was well-known in 13th-century Paris, insofar as the satirist includes the beguines in the list of orders he harshly disapproves.¹⁹ Moreover, the composition further stresses the beguines' flexibility and ostensible freedom on how to conduct their lives. Despite their non-adherence to traditional monastic standards, and contrary to what the poem may suggest, beguines were not only tolerated²⁰ (i.e. they were granted spaces by the secular society) but also integrated in contemporary social life, doing charitable and remunerated work.²¹ In fact, beguinages differ from enclosed convents²² as the former often had their own vegetable garden, schools, and hospitals or leprosaria, thus providing various work opportunities.²³ Varying forms of occupation have been observed, either within the court of the beguinage, as embroidery and textile production, or more in touch with the external society, as nurses, small business owners or teachers. Indeed, while they did promise to lead a humble and modest life, this did not prevent them from following real-world occupations.²⁴

As regards the position of the Church toward beguines, there is little evidence that ecclesiastic authorities took any systematic action against beguines, especially in the Low Countries. The relationship between the communities and the local bishops and the Holy Seer varied over time and place. During the early times of the beguine movement, around 1260 and 1274, some opposition to the beguine movement is recorded as beguines intended to preach in public and "interpreted the mysteries of Scripture". Yet, other clergymen accepted them as "a sign of diversity" within the Church while others simply saw beguines as a group of women who "contributed to purify the faith", as reported by Simons (2010, p. 124-125). The most dramatic episode was the execution of Marguerite Porete in 1310 in Paris. The Council of Vienna (1311-12) challenged the general opinion on beguines describing them as "an abominable sect of [...] faithless women".²⁵ Other charges accumulated, including the lack of vows of

¹⁹Rutebeuf's chief topics are the iniquities of the friars and the defence of the secular clergy.

²⁰McDonnell (1954, Ch. X and Ch. XI) illustrates how the Belgian and French monarchs favoured the establishment of beguinages and beguines. Moreover, in page 409 the author insists on the high degree of clerical as well as secular toleration French and Flemish-Dutch beguines enjoyed. These women were praised and their mode of life recommended by prelates and the Roman curia. Meanwhile, they received donations and privileges from noblemen and women, including protection from the aristocracy.

²¹For instance, Geybels (2004, p. 114-118) enumerates activities undertaken by beguines, including charitable work directed to poor children. Vander Schelden (1862, p. 2) and McDonnell (1954, p. 5) also emphasize their charitable work. John Malderus, bishop of Antwerp wrote: "[...] beguines] might be kinder to the poor if something were left [from their income]", see McDonnell (1954, p. 121-122). Educating poor children is also mentioned in Bowie et al. (1990, p. 25-26), which provides the figure of 272 children being taught in the beguinage of Leuven during 1646. At that time, students outnumbered beguines.

²²Caesarius Heisterbach noted, quite lyrically, that "in the midst of worldly people they were spiritual, in the midst of pleasure seekers they were pure and in the midst of noise and confusion they led a serene, hermetical life", see Bowie et al. (1990, p. 14) and McDonnell (1954, p. 121-122). The former also draws the distinction between cloistered women and beguines: "[...] beguines] surpassed in charity those who were cloistered".

²³See Geybels (2004, p. 105-106) for a description of beguinage organisation.

²⁴McDonnell (1954, p. 131) provides a similar characterization based on the 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 (*ex voto vel sine voto*) and earn a livelihood by suitable work". See also Bowie et al. (1990, p. 25).

²⁵Kloppenborg and Hanegraaff (1995, p. 72-73)

obedience, the fact that they kept property and absence of an approved rule.²⁶ This was followed by the mandate of suppressing beguinages in the Rhineland region, and by enquires led by bishops on beguine communities trying to dismiss such a way of living.²⁷ In 1318, the papal letter *Ratio Recta* fueled even more the already tense situation advocating in favour of pursuing the detection of heretic movements. Nonetheless, the bull prescribed not to harass beguines who observed and followed the commandments of the Church and to allow them to retain their habits and their way of life. Another bull, *Sacrosanta Romana*, issued in 1319, diminished the condemnations made during the Council of Vienna. Finally, Pope Clement VI fully accepted the beguine movement in the Low Countries with the bull *Persones vacantes*.²⁸ As a result, although beguines were exonerated in 1328 and some communities continued to flourish for decades, the beguine movement was severed except for well established beguinages.²⁹ Moreover, small court beguinages could not properly defend their cases and as a consequence some shut down.³⁰ During the Counter-Reformation, according to Geybels (2004, p. 66), some priests revived beguine communities, among them Nicolaus Eschius, Wilhelmus Michiels and Frederick Lumnus in Diest, Tongeren and Antwerp, respectively. The continuing popularity of the movement was hindered during the religious troubles of the 16th century, where most beguinages in the northern, mainly Protestant, part of the Netherlands disappeared around the Reformation.

Several explanations have been put forward for the success of the beguine movement, the most traditional and mutually related being the unbalanced sex ratio and the reduced access to convents. Somewhat similar was the inquiry conducted by German historians, and in particular Karl Bücher, who termed the phenomenon *Frauenfrage*, aimed at explaining why women appeared to outnumber men in German medieval cities. The origin of such sex imbalance would lie on men departing to the Crusades, joining religious orders or entering priesthood. Other scholars argue that beguine houses served as charitable foundations for indigent and unmarried women, as numerous young women from different social strata were leaving the rural areas and moving to the cities looking for the solidarity and protection of beguinages. Recent research casts doubts on these premises. Skewed sex ratios in cities during the time could explain the need to find a suitable alternative for girls who now were over-represented in the marriage market and for whom a suitable partner did not exist. Nonetheless, as Simons (2010) points out, typical beguine girls came mostly from nearby rural villages, in general not further than 20km away. Given that typical migration flows from the countryside to cities comprised more women than men³¹ and considering the close distance that separated a beguine from the kin network, it would have been possible for these girls to return back home and marry. Some historians interpreted beguinages as a solution for women who faced difficulties in gaining access to a convent as women wanting to lead a religious life

²⁶The decree against German beguines and beghards is contained in Frédéricq (1889, p. 168-169, par. 172).

²⁷A more detailed list of grievances and accusations is presented in Geybels (2004, p. 56-65).

²⁸For further details, see McDonnell (1954, p. 539) and Geybels (2004, p. 63).

²⁹Exact dates of exoneration for different beguinages are provided in McDonnell (1954, p. 541-542) for the Belgian case and McDonnell (1954, p. 546-547) for French beguinages. See also citations therein.

³⁰German beguinages were especially severed. According to McDonnell (1954, p. 477), the difference lied on the fact that French and Belgian beguines were wealthier and enjoyed influential patronage whilst German ones were poorer and did not have the protection of powerful authorities.

³¹Mols (1956) calls this feature one the "laws of urban immigration".

with vows in monastic houses had to pay a considerable large dowry. This shortage of options would have promoted the establishment of beguinages. In that sense, Geybels (2004, p. 47) explains that landowners encouraged daughters to join religious orders as a way to avoid estate division. Although during beguinages' early times the movement mainly attracted noble women who indeed had difficulties in finding a place in a convent, which is in line with the previous statement, the argument cannot explain the sustained impetus of beguinages when entrance to religious orders eased. Moreover, Moor (2014) argues that beguinage communities and convents located geographically separated and each attracted different women. Most causes pointing towards lack of alternative opportunities for young women as the success of beguinages are reviewed and dismissed by Moor (2014), who provides empirical evidence on the actual long-run causes of the movement in the Low Countries. Contrary to prior research, De Moor claims that -beside devotional reasons- a significant number of women were motivated by professional opportunities; living the life of a beguine was a deliberate and unilateral choice made by the individual woman to stay single and do remunerated work, independently of a male breadwinner. Using detailed biographical records (including place of birth, beguinage location and age at taking vows) from beguinages she shows that becoming a beguine was likely a deliberate choice to remain single rather than marrying. First, girls entering a beguine community were older than those entering a convent, ruling out the vocational possibility. Interestingly, the fact that mean age at marriage coincided with the estimate of age at entrance to a beguinage suggests it was an alternative to conjugal life. De Moor's interpretation is that, although some beguines left their communities to marry, the majority joined in the first place to escape from marriage. This cultural shift paved the way to the so-called European Marriage Pattern, dominating in north-western Europe from the late Middle Ages onwards, and characterized by the presence of women marrying late or living as singles.³²

3 Sample and Identification Strategy

The goal of this paper is to ascertain whether the presence of beguinages during Medieval times changed the perception of women at the municipal level in such a way that one can still detect differences in gender-related economic outcomes during the 19th century. In what follows, the baseline econometric model is a simple OLS regression with fixed effects at the relevant level. It takes the form:

$$outcome_{i,j} = \alpha beguinage_{i,j} + X_{i,j}\beta + \gamma_j + \epsilon_{i,j} \quad (1)$$

where *outcome* is observed for municipality *i* belonging to region *j*, *beguinage* is one of the three

³²See also De Moor and Van Zanden (2010)

variables we shall discuss accounting for the presence of a beguinage, $X_{i,j}$ is a set of covariates, γ_j are fixed effects and $\epsilon_{i,j}$ denotes the error term.³³

In order to explore the relationship between the presence of beguine communities and attitudes towards women during Belgian industrialization, we create a new, unique data-set that contains information on both. The unit of observation are Belgian municipalities existing in 1846 and 1866. As regards the dependent variable, using 19th-century data decreases concerns regarding the fact that regional variation in gender norms tends to be diluted over time by confounding historical events and institutional shocks. In this regard, census data from the mid-19th century allow us not only to mitigate the influence of the labour market and welfare state measures that were implemented in the following century, but also to control for migratory patterns. Moreover, they reduce caveats arising from women involvement in the early industrialization of Belgium. Data on our main variable of interest (i.e. the presence of beguinages at the municipal level) is provided by Simons (2010), as he lists all beguines communities that existed beyond reasonable doubt.³⁴ We consider two different sets of outcomes: the degree of equality in agricultural wages, *wage equality in agriculture*, measured using the logarithm of the female-to-male wage in agriculture; and literacy differentials quantified by three variables: *literacy equality index*, *female literacy share* and *female literacy index*.

Other sources of information are combined to provide a comprehensive set of the potential determinants of female agency. These, together with the census data and presence of beguinages are described in detail in the following section.

3.1 Census Data

Census results at municipality level from 1846 onwards³⁵ have been recently digitized by the HIS-STAT/LOKSTAT project of the University of Ghent. This data source offers widespread coverage and consistent and systematized measurements that do not vary across regions.

The smallest unit of observation for which we have data are municipalities. In 1800, the year in which municipalities were established as independent entities, Belgium had 2776 *communes*. This number remained approximately stable for 160 years. As Belgium followed a process of municipal consolidation, merging many small towns into larger entities, modern sources of information locate important features in municipalities not listed in the 1846-1866 census. We traced all places ever mentioned in any modern data source to the relevant town hosting them during 1846-1866.³⁶

³³We use arrondissement fixed effects when the outcome of interest is *wage equality in agriculture* and regional fixed effects for literacy related outcomes. Using the more precise arrondissement fixed effects in literacy outcomes does not change the results.

³⁴Some beguinages could have been discarded from the list if there were doubts about the exact nature of a community.

³⁵Older national censuses from the years 1800 - 1830 are scattered and stored in manuscript in different archives in Belgium, France and the Netherlands.

³⁶For instance, we collected data on the number of houses during 1438 in the old town of Velthem. This information was imputed to the municipality of Velthem-Beisem that appears in the census. Clearly, Velthem-Beisem is the result of the merger of the former

We first present the agricultural census of 1846. Its objective was to portray the exact situation of Belgium in the primary sector. Following the cadastre of 1834 for all provinces except Limbourg and Luxembourg, which were surveyed later, officials collected information on various issues including the number of hectares devoted to different crops, total production in tonnes and in Belgian francs, number of draft animals and livestock, etc. It also contains information on average wages paid in agriculture to men and women. This is a telling piece of information as, even though men had been historically paid more than women, we can explore whether we observe significant differences in the female-to-male ratio of wages that can be linked to the presence of beguinages. To this end, for each municipality i , we compute the logarithm of the relative average wage of women with respect to men:

$$wage\ equality\ in\ agriculture_i = \log \left(\frac{Average\ wage\ women\ in\ agriculture_i}{Average\ wage\ men\ in\ agriculture_i} \right). \quad (2)$$

This measure constitutes a good proxy for gender attitudes since it reflects the difference in wages between genders employed in similar occupations. Even if tasks and rewards for men and women were different, the index would remain meaningful to our purpose. If this was the case, insofar the set of tasks performed by men and the set of women's duties did not to vary across Belgium, the gender wage-gap will capture how regions, depending on the presence of beguinages, rewarded differently the same two sets of activities. Notice that, in any case, higher values for this index correspond to more favourable attitudes towards women.

The second outcome variable on which we test our hypothesis is gender differentials in literacy. Similar to us, in the Italian context, Bertocchi and Bozzano (2016) proxies gender-equality using the female-to-male literacy rate ratio. The oldest data available on literacy is contained in the 1866 census. For most of the population, education during childhood was not compulsory and traditional roles preferentially educated men over women. Therefore, comparing female-to-male literacy rates is meaningful as it reflects how women were perceived with respect to men through the choice of educating them.³⁷ Regarding literacy, we construct three different variables relating female-to-male literacy rates. These are, for each municipality i :

$$literacy\ equality\ index_i = \frac{Number\ of\ literate\ women_i}{Number\ of\ literate\ men_i} \quad (3)$$

which relates the number of literate women in a given municipality with the number of literate men;

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

with the town of Beisem.

³⁷Clearly, parental decision on whether to educate a daughter or a son are influenced by other factors we should control for in the regressions. See Section 3.3 for a more comprehensive description of them.

recording the share of literate women among the literate population; and

$$female\ literacy\ index_i = \frac{Share\ of\ literate\ women_i}{Share\ of\ literate\ men_i} \quad (5)$$

that compares female and male literacy rates. As was the case before, higher values for these indexes correspond to more favourable attitudes towards women. The final sample comprises 2553 municipalities. There are 158 municipalities for which no recorded information regarding population is available for the years 1846 and 1866.

3.2 Historical Presence of Beguines

As introduced in Section 2.2, the beguine historiography has been updated and expanded by Walter Simons, historian of the Low Countries, who thoroughly reviews the social environment of religious movements in the high and late Middle Ages. Despite the paucity of documentation, he manages to portrait the beguine movement through the collective use of a wide variety of sources. Archival records left by circa 300 beguine communities are the main pieces of evidence available and allow Simons to pinpoint the features characterizing beguines while discarding some misconceptions that perpetuated in previous studies (Miller (2014)). Medieval hagiographies and canonical church decrees provide qualitative detail on their way of life, as well. Unfortunately, beguinages were rarely established through a formal act of foundation. Simons' conservative approach led to shortlist no more than 143 sites that can be positively defined beguinages. Some of these records group a set of small beguinages in the same town or, in other instances, some cities are listed more than once if they registered more than one relevant community of beguines. We restrict our focus to the influence of beguines in present-day Belgium, where 70 municipalities hosted beguinages.

Ideally, we would like to have information on the number of beguines living in each city. Unfortunately, such information is only available for few beguinages. We circumvent this limitation creating three proxy variables that convey information in that sense. The first one is a simple binary indicator that takes value one when a municipality had, at any point in time and for any duration, at least one beguine.

$$Beguine_i = \begin{cases} 0 & \text{if } municipality_i \text{ never had a beguine,} \\ 1 & \text{if } municipality_i \text{ had, at least, one beguine.} \end{cases} \quad (6)$$

The information contained in this indicator is not finely grained and, consequently, we expand it by considering more than the mere presence of a community. The second variable consists on a continuous variable that accounts for different duration (t) of beguinages (j) for each municipality (i). Since it is possible that a municipality witnessed more than one beguine during the course of history, in order to

aggregate the impact of different beguine communities coexisting or succeeding in the same town we create the variable *exposure* which sums the duration of all the beguinages ever founded in the city:

$$Exposure_i = \sum_{j \in i} t_{ji}. \quad (7)$$

Our last variable related to beguines' presence consists in a five-level index called *intensity* that combines features of the previous two indicators. It is formally defined as follows:

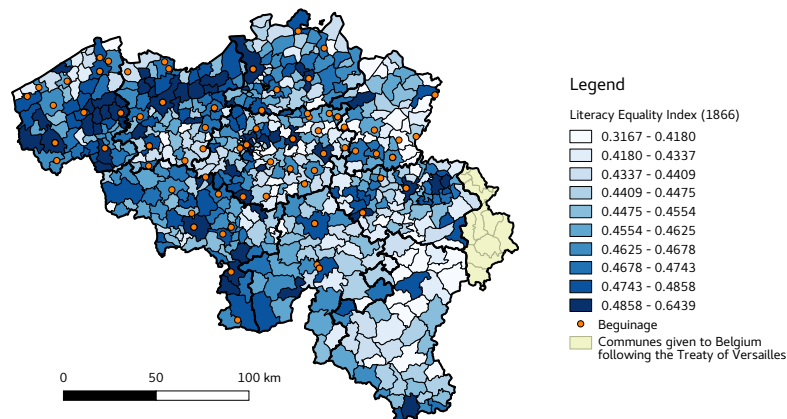
$$Intensity_i = \begin{cases} 0 & \text{if no beguinage has even been recorded,} \\ 1 & \text{if 1 beguinage has been present and } exposure_i < 200, \\ 2 & \text{if 1 beguinage have been present and } exposure_i > 200, \\ 3 & \text{if more than 1 beguinage have been present and } exposure_i > 200, \\ 4 & \text{if more than 3 beguinage have been present and } exposure_i > 200. \end{cases} \quad (8)$$

Finally, for each municipality in the census we compute the distance (as the crow flies) to the closest beguinage. This variable is not that informative *per se* because Belgium is a relatively small country and, given the location of beguinages, a large number of municipalities were close to one except in the southern provinces and to a lesser extent northern ones, see Figure 3 and Table 1. We will use this information later as part of a robustness check in Subsection 4.4.

3.3 Other Data

Besides the presence of beguinages, some potential confounding factors might also exert an influence on both agricultural workers' salaries and literacy rates. First, sex ratios can partially determine the wage equality index between genders due to effects on labour supply. Moreover, the local marriage market and, consequently, the number of spinsters and bachelors are typically influenced by very skewed sex ratios in the population. In the sample, in 1866 sex ratios ranged from 0.55 in Leopoldsburg to 1.41 in Mesen, Hermelgem and Nederzwalm, with a mean value of 0.959. Data for 1846 show a minimum sex ratio of 0.286 in Hemiksem and above 1.3 in 43 municipalities. Nonetheless, we do not observe a correlation between this variable and our variable *wage equality in agriculture* (the correlation between them is equal to 0.0022). This information, together with other descriptive statistics, is summarized in Table 1. We discuss other potential confounders in the following paragraphs.

Figure 3: Distribution of beguinages and literacy equality index



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

3.3.1 Education providers

The presence of monasteries at the municipal level may be correlated with human capital and the intensity of religiosity in the area and therefore it is controlled for.³⁸ In fact, education was traditionally offered by the church or church-related institutions. It is worth highlighting that although both beguines and traditional nuns were devoted to the study of the scriptures, the latter were more inclined to cloistered life, and therefore lacked integration with the secular society. Our data-set includes information on their 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 1800.³⁹ Similarly, we introduce the distance to Leuven, which hosted the unique university in Belgium from its constitution in 1425 until 1817 when Liège and Ghent universities were created. Being close to the unique university might have raised awareness regarding the benefits of education or it may have intensified the supply of books, teachers, and professors in the area. Notice, though, that the presence of a university should

³⁸Information on monasteries from Cottineau (1939), Berlière (1955), Michel (1923) and Department of History, The Ohio State University (2016).

³⁹For each monastery, a careful investigation was conducted in order to assign it to one of the Belgian municipalities existing in 1846 and 1866. For instance, the priory of Oignies is listed as belonging to the municipality of Aiseau-Presles instead of the town of Oignies as its name might suggest. Aiseau-Presles, a municipality existing in present-day Belgium, resulted from the fusion of Aiseau and Presles, two independent municipalities listed in the 1846 census. Some additional research revealed this priory actually established in Aiseau. All religious institutions were suppressed and their properties auctioned after the Napoleonic invasion.

not directly encourage women to pursue higher education because women were not admitted to the university 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.

3.3.2 Regional and Other Controls

In a pre-modern society, the degree of economic development is likely to exert an influence on literacy level, as well as on agricultural wages. Although we do not have other detailed information on economic indicators at the municipal level, we introduce some data at a more aggregate level. First, population density at the canton level is computed using canton's area from *Annuaire Statistique de la Belgique*⁴⁰ which is combined with total population from the censuses. Although during the 19th century Belgium was already in a post-Malthusian period with declining fertility (see Lesthaeghe (2015)), population densities can still reflect comparative economic development across regions. Indeed, population density presents great variation, ranging from 24 people per square kilometer in the canton of Arendonck to 17682 in the canton of Bruxelles. To take into account the extent of industrialisation, we introduce the number of steam engines per individual at the municipal level using data from Neck (1979, p. 468-476). Since this indicator is quite noisy, we include a wealth indicator at the regional level. Universal suffrage for men in Belgium was only introduced in 1919.⁴¹ Before, only men who paid a certain tax were allowed to register to vote. Since the threshold was uniform across Belgium, the number of men registered at each province divided by provincial population can be used to proxy for relative provincial development.⁴² Furthermore, we use the professional decomposition of tax-payers to distinguish places where wealth originated in agriculture from places in which industry was important. The percentage professors represented among tax-payers is included to capture the relative supply of education. Data on registered voters comes from the 1873 *Annuaire statistique de la Belgique*.⁴³ Following the *Annuaire statistique de la Belgique*, we augment the data-set with information on land usage at the provincial level during 1834.⁴⁴ Official statistics provide a comprehensive list of land usages at the provincial level, detailing more than 20 possible uses. Categories include lands devoted to agricultural work, buildings and forests; but also rivers, quarries and cemeteries, for instance.

Finally, we incorporate some additional variables that are obtained using GIS solutions: distance from each municipality to the closest river⁴⁵ and to the closest large city⁴⁶ as well as agricultural caloric yields and soil types. Distance to rivers and to large cities are included in order to capture the extent

⁴⁰Ministère de l'intérieur (1872, p. 2-19).

⁴¹Between 1894 and 1919 a tempered universal suffrage was in place. Under this system, all men could vote but the votes of those who paid a certain tax or had a diploma were valued twice or three more times.

⁴²We implicitly assume that all tax-payers had the same willingness to participate in the elections. We also assume the same rate of tax-evasion.

⁴³Ministère de l'intérieur (1873, p.58-63).

⁴⁴Ministère de l'intérieur (1870, p. 18-19). Limbourg and Luxembourg provinces present this data for 1845.

⁴⁵We use shape-files from European Environment Agency (2017) tracing all major European rivers.

⁴⁶We consider large municipalities the 50 cities with most inhabitants.

of industrialisation and economic development in general. The early industrialisation of Belgium in the European context meant the creation of new occupations in cities where factories were established. This may generate different incentives regarding whether or not to educate children as well as play an important role in determining agricultural wages through competition for workers. Agricultural caloric yield takes on different values before and after 1550, see Galor and Özkan (2016). Caloric yields before the Columbian exchange might have shaped gender roles due to economic specialization, for instance, because men had a comparative advantage in agriculture. Caloric yields after the Columbian exchange measure agricultural productivity and, hence, affect the marginal productivity of labour. The last variable describes the type of soil in a 10km-radius area around each municipality as the percentage of that area that is clayey, silty or sandy. Carranza (2014) shows in the Indian context a gradient between female labour force participation and soil types. A long tradition of female participation in agriculture may directly affect their agricultural wages as well as indicate a better position within the household as an income generators. Hence, women taking part in agriculture may enjoy greater levels of agency.

Table 1: Summary statistics

Variable	Mean	Sd	Max	Min
Beg (0/1)	0.0274	0.163	1	0
Total time with a beg. (centuries)	0.142	1.097	22.44	0
No beguinage	0.973	0.163	1	0
1 beguinage, <200 years	0.00783	0.0882	1	0
1 beguinage, >200 years	0.0125	0.111	1	0
>1 beguinage, >200 years	0.00313	0.0559	1	0
>3 beguinages, >200 years	0.00392	0.0625	1	0
Total men, 1846 (thousands)	0.858	2.198	59.50	0.0190
Total women, 1846 (thousands)	0.862	2.361	64.37	0.0170
Total men, 1866 (thousands)	0.949	2.622	74.17	0.00900
Total women, 1866 (thousands)	0.944	2.909	83.74	0.00900
Population density, canton level	1962.0	4003.3	176825.3	245.9
Nuptiality women, 1846	0.382	0.0334	0.537	0.237
Nuptiality women, 1866	0.398	0.0373	0.626	0.202
Lit. equality index, 1866	0.822	0.137	1.808	0.236
Female lit. share, 1866	0.448	0.0424	0.644	0.191
Female lit. index, 1866	0.856	0.122	1.601	0.256
Wage equality index in agri., 1846	0.641	0.142	1.222	0.178
Fem. monasteries	0.0313	0.189	2	0
Masc. monasteries	0.0259	0.175	3	0
Other monasteries	0.0149	0.121	1	0
Distance to Leuven (km)	68.59	32.91	165.8	0.377
Min. distance to beguinage (km)	16.27	18.16	122.0	0
Min. distance to big town (km)	17.97	19.24	113.6	0
Potential caloric yield before 1550	2142.1	72.76	2305.8	1908.8
Potential caloric yield after 1550	8894.7	310.7	9780.8	8292.4
Distance to closest river (km)	9.082	8.757	52.40	0.00230
Steam engines per 1000 people	0.0715	0.689	12.49	0

4 Regression Analysis

In this section we discuss the first set of results, obtained running Equation 1, as introduced in Section 3.

4.1 OLS Approach

4.1.1 Wage Equality in Agriculture

The first level of analysis of the proposed relationship between beguinage presence and female agency establishes that municipalities characterized by beguine presence tend to be also characterized by greater levels of gender equality measured using female-to-male wages in agriculture. Although in a historical context women earned less than men, the comparison of wage-differentials across municipalities remains meaningful as it effectively captures how rewards and payments for male and female activities varied. An implicit assumption of ours considers male and female tasks to be homogeneous, this is, even if activities between genders were different, those on which each gender specialized had to be the same; otherwise comparisons become meaningless.

Table 2 presents the results from OLS regression analysis of female equality captured by gender-differences in agricultural wages on beguinage presence in the most comprehensive specification. In line with our theory of beguine activities becoming role-setters at the local level by their example and endurance in conducting business and administering without male intervention, and the tempering effects it had on male prevalence, we find that locations that hosted a beguine community are related with increased levels of female agency. The relationship holds true for all indicators of female beguinage available: in Column 1) the indicator takes the form of the binary variable *beguinage_i*; Column 2) exploits the five-level indicator *intensity_i*; while in Column 3) the presence of beguine communities is assessed by the accumulated number of years beguines were present at each locality, indicated by the variable *exposure_i*. Correlations obtained comparing 2507 Belgian municipalities, of which 70 hosted a beguinage, are strong and significant. In light of potential confounding effects, the econometric model controls for several possible determinants of between-gender wage dispersion. This vector of controls includes demography-related indicators, in particular, total population broken down by gender, a dummy variable for municipalities above the 7th decile of population, male and female literacy rates, percentage of internal and foreign migrants at the municipal level for both genders, the share of ever-married women at the municipal level; location-specific geographic characteristics, more precisely, historical and contemporaneous potential caloric yield, distance to rivers and to the closest largest municipality; and indicators of economic development and industrialization: population density at the canton level and the number of steam engines per capita at the municipal level. Finally arrondissement fixed effects are

included to further control for other local characteristics affecting agriculture. In particular, results reveal that introducing an additional beguinage increases the average wage of women compared to men by 4.3%, amounting to almost 18% percent of the standard deviation of *wage equality in agriculture_i*. Panel A) of Table 12 in the Appendix further establishes that results are robust to the gradual inclusion of covariates. In order to preserve space only main coefficients are displayed. Thus, Column 1) presents regressions including the same covariates here described. Column 2) characterizes the raw correlation between female agency during the 19th-century, measured using the logarithm of the female-to-male wage ratio in agriculture, and historical municipal presence of beguine communities when no other controls are included in regressions. Finally, Columns 3) to 6) include one set of regressors at a time.⁴⁷

⁴⁷Column 4) expands the set of controls reported in Table 2 by including soil types in a 10km-radius area around each municipality. Variables measure the share of that surface that is of silty, sandy and clayey type.

Table 2: Beguinages and the logarithm of female-to-male wages in agriculture

	Logarithm female-to-male wages in agriculture, 1846					
	(1)		(2)		(3)	
Beg (0/1)	0.0413**	(2.17)				
No beg.			Ref.			
1 beg., <200 years			0.0310	(1.10)		
1 beg., >200 years			0.0440	(1.58)		
>1 beg., >200 years			0.0310	(0.65)		
>3 beg., >200 years			0.110**	(2.02)		
Total time with a beg. (centuries)					0.00889**	(2.10)
Total men, 1846 (thousands)	0.0160	(0.69)	0.0213	(0.86)	0.0218	(0.94)
Total women, 1846 (thousands)	-0.0149	(-0.69)	-0.0212	(-0.91)	-0.0225	(-1.03)
Big town	-0.00401	(-0.39)	-0.00337	(-0.32)	-0.00233	(-0.23)
Share of literate men, 1866	-0.101	(-1.10)	-0.103	(-1.12)	-0.104	(-1.13)
Share of literate women, 1866	0.0607	(0.76)	0.0621	(0.78)	0.0624	(0.78)
Female nuptiality, 1846	0.0453	(0.29)	0.0460	(0.29)	0.0409	(0.26)
Potential caloric yield, pre-1550	0.000564*	(1.92)	0.000566*	(1.92)	0.000570*	(1.94)
Potential caloric yield, post-1550	-0.0000165	(-0.28)	-0.0000167	(-0.28)	-0.0000181	(-0.31)
Distance to big municipality (km)	0.00225**	(2.59)	0.00226**	(2.60)	0.00224**	(2.58)
Distance to river (km)	0.00417***	(3.80)	0.00419***	(3.82)	0.00419***	(3.82)
Population density, canton level	0.386	(0.14)	0.441	(0.17)	0.519	(0.20)
Steam engines per 1000 people	0.00584	(1.04)	0.00557	(1.00)	0.00581	(1.05)
Arrondissement FE	Yes		Yes		Yes	
Migration	Yes		Yes		Yes	
Use of land	Yes		Yes		Yes	
Observations	2507		2507		2507	

t statistics in parentheses. Standard errors clustered at the canton level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

This Table presents the results of OLS regressions analysis, at the municipal level, of the logarithm of female-to-male agricultural wages on the presence of beguinages. In Column 1) the main regressor the binary variable *beguinage_i*. Column 2) introduces the five-level indicator *intensity_i* to account for the presence of beguine communities and Column 3) assesses their presence using the accumulated number of years of beguine presence at the municipality level, *exposure_i*. All regressions includes arrondissement fixed effects and control for gender-specific migration and use of land.

In general, a clear association between historical municipal presence of beguinage communities and female agency surfaces. Inspecting Column 2) of Table 2 further indicates the association is mostly driven by municipalities classified at the top-level of the five-level indicator denoting important presence of beguines attested by the combination of more than three beguine communities whose combined presence exceeded 200 years. In these cases, the average increase in the female-to-male agricultural wage ratio rises to 11%, compared to 4.13% when presence of beguinages reported by the mere presence of a community. Considering the total number of years with beguinage presence as an indicator of beguines' presence and intensity reveals similar results. Thus, Table 2 establishes that beguinages exerted a lingering effect of gender roles when these are accounted for using gender-based wage-equality measures. Results also revealed other factors besides beguine communities promoting gender-equality through agriculture. First, potential caloric yield before 1550, a measure that considers only the species that are native to Eurasia, increases wage equality. Localities characterized by relatively good soil conditions for agriculture before the Columbian exchange should, on average, be more agrarian. Female involvement in agricultural tasks is more compatible with simultaneous child-care and, at the same time, women complement men in farming activities through gender specialization in certain tasks. In comparison, activities characteristic of barren areas and pastureland are less compatible with simultaneous child-care. Hence, the coefficient can be interpreted as the legacy of these specialization patterns. In line with the positive coefficient associated with distance to large municipalities, being close to a river can signal the presence of industrial areas that use waterways either as source of power or for transportation. Competition between industries and land-owners for masculine labour force can generate the result observed.⁴⁸ Although appealing, the positive (albeit not significant) coefficient associated with the number of steam engines per capita casts doubts on this explanation. A more literate population has no impact on gender-equality in agricultural wages. One explanation is that education is not a required input in farming activities and, thus, its marginal productivity is not relevant.

4.1.2 Gender Equality in Literacy

Educational achievement, and in particular, female-to-male literacy rates provides a second dimension on which to test the theory that beguinages had enduring effects on female agency. The theory abounds on beguines setting an example of female independence and autonomy amid a society favouring more traditional roles for women, specifically, marriage or monastic life. Moreover, before the advent of compulsory education and all over the period of beguinages splendor, social norms dictated men to be favoured over women in gaining access to education. Hence, locations valuing comparatively more women and equating them to men are expected educate both gender in similar manners. This provides the occasion to test if, indeed, closer levels of literacy between genders ensue in municipalities where beguine communities were found. Moreover, the inclusion of men in ratios is meaningful since plain literacy

⁴⁸This result would require a biased demand for masculine labour in industries.

rates may vary across regions for diverse reasons. Male inclusion smooths out part of the underlying, idiosyncratic characteristics. Finally, it is important to remember that beguine communities, since their foundation, promoted literacy among their members and in the hosting municipality. Evidence documented by Simons (2010), indicates that Herentals and Avesnes beguinages had special schoolhouses, attested in 1462 and 1537. The specific mention of schoolhouses is, according with the author, suggestive of rather large numbers of children. The school of the court beguinage at Kortrijk had 24 pupils in 1491, and 34 girls resided students in the beguinage of Diest in 1526. The most extensive information available comes from the main beguinage of Antwerp, where seven beguines taught school. They had 57 young girls in their care, who lived in their teachers' houses. In the 13th and early 14th centuries, some beguines were certainly highly educated and employed Bible translations and commentaries in vernacular language for religious instruction. The value beguines attributed to literacy could permeate into the surrounding society and induce a change in social values.

Before turning our attention to regression analysis, we should comment on the state of the Belgian education system during the middle of the 19th century. According to Ruyskensvelde (2016, p. 28), education was not compulsory in Belgium until the end of the 19th century. There were some efforts to provide it free of charge only in 1842 following the introduction of the so-called *Nothomb law* that mandated each municipality to have a school to which pupils could attend for free. Before, the education system was dominated by the Catholic church. Financial problems and opposition from the Church doomed the success of the education bill and, although the reform contributed to increase literacy rates, by 1880 still 39% of the population was illiterate while this figure was as high as 51% during 1843. According to the data contained in the census, literacy rates varied between 8.0% and 93.8% for men and between 5.3% and 92.0% for women. To better account for the development of the public education system and in order to isolate the effects of the presence of beguine communities on compared literacy rates from it, regressions feature additional covariates. First, the number of adult schools per 10000 inhabitants during 1851, at the provincial level, using data from *Annuaire statistique de la Belgique* is included.⁴⁹ 1851 marks the first year for which there is complete information for all nine Belgian provinces.⁵⁰

Secondly, the historical exposition to educational providers is likely to exert a direct influence in literacy rates, especially if literacy or, more broadly, human capital was conducive of large returns. Hence, local availability of education institutions during the pre-industrial era is expected to wield an influence on 19th-century realized literacy rates, either promoting male education and therefore abating female-to-male ratios or encouraging feminine education and fostering them. In order to capture historical exposition to educational providers regressions include the number of monasteries at the municipal

⁴⁹The relevant source of information is Ministère de l'intérieur (1870, p. 106-113).

⁵⁰This same document provides information on the number of primary schools. However this variable is not included in regressions as it affects a relatively small percentage of the total population. Moreover, considering that the *Nothomb law* and the censuses are virtually simultaneous, we do not consider the possible effects of the former on measured literacy rates relevant. In any case, the introduction of this variable in the regressions does not alter the main results.

level distinguishing between those institutions that hosted only men and women. Monasteries for which the gender of the hosted population is unknown are included as a third category.

The effects of the presence of beguines on feminine educational outcomes are evaluated considering three major variables to avoid ascribing an association based on a unique variable and to remain as general as possible: a *literacy equality index* between men and women, measured as the ratio between the number of literate women over the number of literate men; the share literate women represented over the total literate population, called *female literacy share*; and a *female literacy index* that relates the share of literate women to the share of literate men.

Table 3: Beguinages and female literacy, 1

	Literacy Equality Index, 1866					
	(1)		(2)		(3)	
Beg (0/1)	0.0789***	(4.68)				
No beg.			Ref.			
1 beg., <200 years			0.0458**	(2.14)		
1 beg., >200 years			0.112***	(4.50)		
>1 beg., >200 years			0.102***	(2.84)		
>3 beg., >200 years			-0.121	(-1.54)		
Total time with a beg. (centuries)					0.00784**	(2.50)
Total men, 1866 (thousands)	-0.123***	(-2.94)	-0.147***	(-3.85)	-0.120***	(-2.82)
Total women, 1866 (thousands)	0.115***	(2.99)	0.139***	(3.97)	0.112***	(2.84)
Share of women ever married, 1866	-0.549***	(-6.38)	-0.539***	(-6.37)	-0.546***	(-6.29)
Big town	0.0462***	(7.18)	0.0458***	(7.39)	0.0486***	(7.39)
% men born in town, 1866	0.803**	(2.17)	0.773**	(2.10)	0.817**	(2.20)
% men born in Belgium, 1866	0.653*	(1.75)	0.624*	(1.68)	0.658*	(1.76)
% men born abroad, 1866	Ref.		Ref.		Ref.	
% women born in town, 1866	-0.780**	(-2.37)	-0.737**	(-2.26)	-0.803**	(-2.45)
% women born in Belgium, 1866	-0.538*	(-1.69)	-0.501	(-1.58)	-0.552*	(-1.73)
% women born abroad, 1866	Ref.		Ref.		Ref.	
% of electors out of population, 1866	9.852***	(3.99)	9.769***	(3.96)	9.864***	(3.99)
% indust. among voters	-0.0205	(-0.10)	-0.00576	(-0.03)	-0.0288	(-0.14)
% cult. among voters	-0.0309	(-1.00)	-0.0327	(-1.04)	-0.0278	(-0.91)
% professors among voters	-0.146	(-0.25)	-0.141	(-0.25)	-0.0990	(-0.17)

Continued on next page

Table 3 – continued from previous page

	Literacy Equality Index, 1866					
	(1)		(2)		(3)	
Population density, canton level	-0.00000157	(-1.22)	-0.00000161	(-1.26)	-0.00000174	(-1.36)
Steam engines per 1000 people	0.00406	(1.02)	0.00519	(1.28)	0.00408	(1.02)
Wage equality index in agri., 1846	-0.0534**	(-2.34)	-0.0536**	(-2.33)	-0.0540**	(-2.36)
Fem. monas.	0.0342**	(2.13)	0.0455***	(2.62)	0.0402**	(2.37)
Masc. monas.	-0.0143	(-0.94)	-0.0113	(-0.77)	-0.0141	(-0.91)
Other monas.	-0.0161	(-0.83)	-0.0217	(-1.15)	-0.0130	(-0.66)
Schools per 10000 people, 1851	0.00904*	(1.94)	0.00907*	(1.95)	0.00914*	(1.97)
Distance to Leuven (km)	0.000552***	(2.90)	0.000557***	(2.94)	0.000554***	(2.92)
Regional FE	Yes		Yes		Yes	
Observations	2507		2507		2507	

t statistics in parentheses. Standard errors clustered at the canton level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

This Table presents the results of OLS regressions analysis, at the municipal level, of the *female equality index* on the presence of be-guinages. In Column 1) the main regressor the binary variable *beguinage_i*. Column 2) introduces the five-level indicator *intensity_i* to account for the presence of beguine communities and Column 3) assesses their presence using the accumulated number of years of be-guine presence at the municipality level, *exposure_i*. All regressions includes arrondissement fixed effects and control for gender-specific migration.

Results from OLS regression relating gender equality, based on compared literacy rates measures, and beguinage presence are detailed in Table 3 when gender equality is constructed using the variable *literacy equality index_i*. Outcomes when gender equality is traced using the variables *female literacy share_i*, and *female literacy index_i* are relegated to the Appendix in Tables 10 and 11, respectively in order to save space and ease the exposition since results are consistent across specifications. Aligned with the expectations, we find that municipalities where beguinages were established are related with increased levels of female agency, proxied by literacy differentials between genders. Results are compatible with the narrative of female agency being promoted and incentivized by the presence of beguine communities focusing, at least partly, on providing education and, in general, attesting gender equality in their doings. The previous association remains relevant independently of how beguinage presence is accounted for. In Column 1) locations that hosted a beguinage are identified by the binary variable *beguinage_i*, Column 2) introduces *intensity_i* as main regressor, combining both presence of beguines and duration, while Column 3) accounts only for duration using *exposure_i* as principal variable. Correlations are strong and significant; displaying relatively large effects of beguinage presence on literacy rates: a one standard deviation increase in the variable *beguinage_i* is roughly equivalent to an identical increment in the number of schools per 10000 individuals. A back-of-the-envelope computation further sheds light into this comparison, showing that it corresponds to the construction of around 650 new schools for adults. Results here discussed control for several potential determinants of literacy and include demography-related indicators, in particular, total population broken down by gender, a dummy variable for municipalities above the 7th decile of population, the gender wage differential in agriculture, percentage of internal and foreign migrants at the municipal level for both genders, the share of ever-married women at the municipal level; location-specific geographic characteristics, more precisely, distance to rivers and to the closest largest municipality; and indicators of economic development, industrialization and education: population density at the canton level, the number of steam engines per capita at the municipal level, adult schools per 10000 individuals at the provincial level, the share registered voters represented among total population and the relative importance of professors, industrialists and agriculturists among voters. Regional fixed effects are also added to capture cultural traits. Panels B), C) and D) of Table 12 in the Appendix prove that results are robust to the inclusion of one set of covariates at a time. Column 2) establishes a time-persistent significant correlation between historical beguinage presence and female agency during the 19th century for all three indicators of compared literacy. In Columns 3) to 6) explanatory variables are included. Only when beguinage presence is reported using *female literacy index_i* and covariates include soil types as in Column 6) of Panel D) the variable *exposure_i* is not significant.

Regression analysis reveals, besides the historical presence of beguinages, other determinants gender equality in literacy rates. First, although expected, the coefficient associated with the number of male and female municipal residents has a negative and positive effect compared literacy, respectively. Far more interesting is the negative coefficient associated with female nuptiality rates. Large nuptiality rates are related with comparatively fewer women being literate per literate men. This result can arise

in the marriage market and follow from individual expectations. In particular, women who do not expect to marry shall acquire marketable abilities, basic literacy being one, to self-sustain themselves through a gainful occupation. Conversely, those women who expect to marry can rely on their husbands to provide income. Although the male breadwinner type of household was not the main socio-economic model in Belgium at the time, see Van Den Eeckhout (1993) for a comprehensive study on how much men and women contributed to household income, we believe this constitutes a good explanation. Municipal size is also found to exert a positive influence on the number of literate women for each literate man. This variable, together with the positive coefficient associated with the share electors represented among total population can be interpreted as supportive evidence for the fact that more developed and richer regions were characterized by more gender-equal attitudes. The number of feminine monasteries shows a positive coefficient which is in line with our assumption that education, prior to the introduction of publicly funded schools, was a responsibility of the Church. Interestingly, only feminine monasteries have an impact on our outcome of interest, probably reflecting the effects of segregated education by gender. Finally, the number of adult schools displays a positive, significant coefficient. Despite the fact that this variable is measured at the provincial level and only represents a bold proxy for the availability of education institutions, it suggests that women more than men took advantage of these schools. Finally, distance to the city of Leuven, with its university offering top-level education only to men, affect negatively the outcome variable. This result can arise from university professors, scholars and students moving to Leuven and surrounding areas in relatively large numbers to offer and complete their education, which would increase the denominator of *literacy equality index*_{*i*}.

In accordance with the theory, results indicate that a robust association between beguinage presence and gender equality exists. The uncovered relationship surfaces using four different indicators of female agency, namely, wage equality between genders in agriculture and different measures of compared literacy between genders. Moreover, the analysis features three different indicators to register the presence of beguinages at the municipal level: a binary indicator stating their presence, the accumulated time beguine communities settled in each municipality and a five-level indicator capturing different exposure levels and offering more flexibility in the estimation. Results are consistent across all the specifications. Overall, empirical evidence indicates that greater opportunities for women during medieval time crystallized, modifying female's general perception persistently, enduring well beyond beguinages golden age and lasting until the mid-19th century, a time when the institution already decayed and beguinages hosted only few women, if any.

4.2 Instrumental Variable Approach

OLS regression analysis was useful in establishing the correlation between variables. Nonetheless, potential endogeneity of beguinage location invites to develop an instrumental variable approach exploiting

changes in the local organization of power that occurred before the advent of beguinages. Owing to beguines' occupations and their involvement in urban activities, municipalities that enjoyed the possibility to organize a market and to establish guilds should have attracted beguinages more. These privileges, among others, were granted in municipal charters, documents rulers issued conveying these additional rights to selected municipalities that requested it and after securing a large, one-time payment.

4.2.1 Municipal Charters

In the medieval European context, rulers resorted to trade various privileges for payments with municipalities in order to improve their finances. Privileges were encoded in charters awarded to towns, given effectively rise to semi-independent municipalities. Municipalities receiving a charter were granted a set of privileges: partial exemption from wars for its citizens, often allowing the possibility to wall the town, a municipal judicial systems, and the possibility to organize a market, to trade, to mint currency and to establish guilds. Municipal charters, in fact, decentralized decision-making. Belgian municipalities celebrated their independence erecting a *beffroi*, a monumental, fortified tower that served as court, prison, archive and treasure chamber and doubled as watching and bell tower. Eastern Belgian cities under the control of the Prince-Bishop of Liège constructed, instead, small, decorated columns named *perron*.⁵¹ Obtaining these privileges was costly and benefits conveyed by municipal charters catered mostly merchants, hence only relatively prosperous towns could obtain them.⁵² On the other hand, granting a municipal charter was a prerogative of the monarch. Therefore, not all cities that ever requested this especial status obtained it. In any case, municipal charters signal relatively prosperous and vibrant cities of the Middle Ages. Finally, the majority of municipal charters simply transposed privileges already bestowed to other municipalities, effectively copying them. Municipal charters typically present only minor variations between the rights conveyed and ensuing benefits should be comparable.

In light of the economic benefits conveyed by municipal charters in terms of trade and easing economic activities in general, and considering beguines' occupations, beguine communities were more likely to establish in towns already enjoying a municipal charter. Moreover, beguines received terrain to build communities, often as donations, from wealthy and affluent donors that were more plausible to reside in developed municipalities. In view of these characteristics, municipal charters are employed as instrument to trace locations that beguines chose to establish communities. In order to have a clear identification strategy, we consider only municipal charters that were granted before the 13th century. Most beguinages were only founded during and after the 13th century. Hence, imposing this restriction assures that beguinages did not influence municipal charter obtainment. Additionally, the use pre-13th

⁵¹ 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 long pass".

⁵² Interestingly, the Prince-bishop of Liège granted to the town of Huy the first charter in Belgium to reward the city for its involvement in the reconstruction of the cathedral after a fire destroyed it.

century municipal charters also precludes towns from obtaining a charter seeking to attract a beguinage. In total, 50 Belgian municipalities were granted a municipal charter before the 13th century.⁵³ Out of the 70 towns with a beguinage identified, 32 located in municipalities holding a charter.

Considering the implications in terms of trade the instrument had at the local level, concerns regarding the validity of the exclusion restriction can be risen. In the view that trade and increased economic activity in general can lead to population growth and increase human capital returns, municipal charters may increase literacy rates beyond operating exclusively through the presence of beguine communities. In order to alleviate the concern, the outcome of interest is not literacy but gender equality. In this regard, we see female-to-male literacy measures as proxies for female agency. Therefore, even if municipal charters boosted demand for education, insofar female increases in schooling propensity are less or equal to that of men, the hypothesized higher demand for education would be biased against our results. Moreover, in general men were traditionally favoured over women in education investments, hence reducing female agency measures related with literacy comparisons. Incidentally, population sizes during 1438 can be used to test whether municipal charters were conducive to greater city growth rate. These data is compiled by Cuvelier (1912) and presents the number of households rather than total population figures. This was the traditional system before the advent of modern census techniques.⁵⁴ Unfortunately, the geographical coverage of this data only includes the historical province of the Brabant, leaving aside much of present-day Flanders, Limbourg and Luxembourg and the domains under the Prince-bishopric of Liège. Results do not support the hypothesis that municipalities that were granted a municipal charter before the 13th century grew larger by mid-19th century. Finally, we compare municipalities that hosted a beguinage, distinguishing among these those that were also granted a municipal charter and those that did not enjoy one. Focusing on municipalities hosting a beguinage provides a comparable sample in terms of female freedom acceptance. If, indeed, municipal charters directly promoted female literacy, municipalities that received a charter should score higher in female-to-male literacy measures on this sample. Results from regression analysis reported in Table 4 do not support the theory since towns that secured a municipal charter did not score higher. Moreover, those municipalities that obtained a municipal charter before the 13th had fewer steam engines, in per capita terms and in absolute terms (results not reported in the present paper).⁵⁵ Therefore, earlier industrialisation of municipalities enjoying a charter cannot drive differences in compared literacy rates. This result is in accordance with Desmet et al. (2015) that sustain medieval guilds opposed to labour-saving technologies.

⁵³The list of these municipalities includes: Hamont-Achel, Gistel, Dixmude, Ninove, Saint-Trond, Looz, Antoing, Izegem, Eupen, Lokeren, Montaigu-Zichem, Bilzen, Bree, Herck-la-Ville, Bastogne, Durbuy, Mailes, Ostende, Roulers, Dilsen-Stokkem, Maaseik, Deinze, Eeklo, Beringen, Hasselt, Termonde, Bruxelles, Diest, Hal, Anvers, Lierre, Turnhout, Louvain, Landen, Hoogstraten, Herenthals, Halen, Aarschot, Vilvorde, Audenarde, Tournai, Damme, Gand, Alost, Ypres, Ath, Harelbeke, Poperinge, Soignies, Bruges, Courtrai, Léau, Grammont and Huy. These names correspond to present-day Belgian municipalities, some of them being the result of the merger of multiple municipalities that existed and are accounted for in the 1866 census, for instance, Hamont-Achel. In these cases, municipal charters are attributed to the constituent part that actually received it in medieval times.

⁵⁴The 1438 proto-census of had as objective to tax municipalities in order to help the monarch in his war efforts.

⁵⁵Interestingly, the coefficient associated with municipal charters is only negative after controlling for the presence of beguinages.

Table 4: Exclusion restriction test

	(1)		(2)		(3)	
	Literacy Equality Index, 1866		Female Literacy Share, 1866		Female Literacy Index, 1866	
Charter granted before 13th century	-0.0301	(-0.83)	-0.00283	(-0.34)	-0.0121	(-0.47)
Total men, 1866 (thousands)	0.0172	(0.50)	0.000477	(0.06)	0.0549**	(2.59)
Total women, 1866 (thousands)	-0.00933	(-0.32)	0.00102	(0.14)	-0.0460**	(-2.57)
Share of women ever married, 1866	-2.610***	(-4.21)	-0.569***	(-3.86)	-1.692***	(-3.81)
Big town	0.00687	(0.13)	0.00743	(0.51)	-0.0174	(-0.46)
% of electors out of population, 1866	-3.514	(-0.48)	-0.992	(-0.56)	-4.961	(-0.67)
% indust. among voters	-0.195	(-0.16)	-0.0920	(-0.31)	0.362	(0.44)
% cult. among voters	0.207	(1.42)	0.0651*	(1.78)	0.137	(1.47)
% professors among voters	-1.277	(-0.70)	-0.527	(-1.05)	-1.973	(-1.50)
Population density, canton level	-0.0000115	(-1.26)	-0.00000263	(-1.22)	-0.00000787	(-1.07)
Steam engines per 1000 people	-0.00608	(-0.31)	0.000810	(0.17)	-0.00382	(-0.26)
Wage equality index in agri., 1846	-0.110	(-0.79)	-0.0203	(-0.57)	-0.0203	(-0.21)
Fem. monas.	0.00992	(0.44)	0.000626	(0.12)	0.00203	(0.12)
Masc. monas.	-0.0467*	(-1.77)	-0.0101	(-1.56)	-0.0348*	(-1.82)
Other monas.	-0.0214	(-0.36)	-0.00568	(-0.37)	0.00103	(0.02)
Schools per 10000 people, 1851	-0.0212	(-1.33)	-0.00494	(-1.28)	-0.0133	(-1.04)
Distance to Leuven (km)	0.00122*	(1.87)	0.000224	(1.48)	0.000358	(0.77)
Migration	Yes		Yes		Yes	
Regional FE	Yes		Yes		Yes	
Observations	68		68		68	

t statistics in parentheses. Standard errors clustered at the canton level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

This Table presents the results of OLS regressions analysis, at the municipal level, of of female-to-male literacy ratios on the presence of beguinages. It holds constant attitudes toward women by restricting the sample to municipalities where beguine communities settled. Regressions suggest that, for these municipalities, receiving a municipal charter did not improve female-to-male literacy ratios. In Column 1) the main regressor is the binary variable *beguinage_i*. Column 2) introduces the five-level indicator *intensity_i* to account for the presence of beguine communities and Column 3) assesses their presence using the accumulated number of years of beguine presence at the municipality level, *exposure_i*. All regressions include regional fixed effects and control for gender-specific migration. Asymptotic validity of clustered standard errors is weak due to the low number of observations.

4.3 IV Regression Analysis

Among the three indicators stating beguinage presence at the local level, no appropriate econometric technique exists to correctly estimate a multinomial first-stage equation, as *intensity_i* would require. For this reason, this part of the paper considers only the remaining two indicators to attest beguinages: the binary indicator *beguinage_i*, and the continuous index *exposure_i*. Concerning the variable *beguinage_i*, IV estimations follow the procedure devised by Maddala (1986) who developed a maximum likelihood estimator that jointly estimates the two equations.⁵⁶ Incidentally, it also offers greater flexibility than classical two-step approaches that need, for consistency, to include all excluded variables as instruments. In our context, it implies explaining beguinage establishment dated during the 13th-16th centuries with data from the mid-19th century.⁵⁷ The econometric specification we use for the binary endogenous beguinage presence is:

$$\begin{aligned} outcome_{i,j} &= \alpha beguinage_{i,j} + X_{i,j}\beta + \gamma_j + \epsilon_{i,j}, \\ beguinage_{i,j} &= \Phi \left(\hat{\alpha} charter_{i,j} + z_{i,j}\hat{\beta} + \hat{\gamma}_j + \mu_{i,j} \right), \end{aligned} \quad (9)$$

where, as before, *outcome_{i,j}* can either refer to wage or literacy differences between genders; *beguinage_{i,j}* captures the presence of a beguinage at the municipal level using a binary variable; *X_{i,j}* is the same set of controls discussed earlier and $\epsilon_{i,j}$ is the error term. The right-hand-side variable *charter_{i,j}* represents our instrument and we denote other covariates included in the second stage as *z_{i,j}*. We emphasize that, differently from the classical two-step regression, our first stage does *not* include all the exogenous covariates that appear in the second stage. On the other hand, the first stage for *exposure_{i,j}* follows the conventional two-step procedure. Lacking an a correct indicator on which to decide whether a given instrument is strong enough under Maddala's technique, tables will report the F-value corresponding to the same regression estimated under two-step least squares.⁵⁸

4.3.1 Wage Equality in Agriculture

Table 5 provides causal evidence of the positive effects of beguinage presence at the municipal level on female agency. Limitations on available econometric techniques prevent the inclusion of *intensity_i* as a regression in a IV context. Column 1) identifies beguinages using the binary variable *beguinage_i* and the estimation follows Maddala (1986). In Column 2) beguinage presence is accounted for using *exposure_i*

⁵⁶This maximum likelihood is deemed more efficient than Wooldridge's procedure 18.1.

⁵⁷As a robustness check, Table 13 in the Appendix compares the results of the IV specification between Maddala's method and classical two-step least squares.

⁵⁸Probit models regressing *beguinage_i* on municipal charters, presence of monasteries and regional fixed-effects attain a pseudo-*R*² of 0.4056. Removing municipal charters from the vector of covariates dwindles it to 0.2302, indicating that municipal charters are a good predictor of beguinage presence.

and the regression follows a classical two-step least squares. In general, F-stats are well above 10, indicating that regressions are not biased due to the inclusion of weak instruments.⁵⁹ Point estimates under the IV specification are larger in magnitude than OLS results reported in Table 2, although coefficients remain significant. IV estimates suggest that beguinages increased the female-to-male agricultural wages by 7.3%.

4.3.2 Gender Equality in Literacy

Having established a causal relationship between the presence of beguine communities and increased gender equality measured using agricultural wages, Table 6 further abounds on the causal association between the variables. Columns 1) and 2) use as indicator of female agency the variable *literacy equality index_i*, in Columns 3) and 4) it is attested using *female literacy share_i* and in Columns 5) and 6) gender equality is proxied by *literacy index_i*. Odd-numbered Columns have *beguinage_i* as independent variable accounting for the presence of beguinages at the municipal level and estimations follow Maddala (1986). Even-numbered Columns include *exposure_i* as main regressor and follow a two-step least squares procedure. The strength of the instrument differs from the previous case because regressions focusing on literacy include a different set of controls that necessarily appear in the first-stage. In any case, the instrument remains strong throughout specifications, displaying and F-stat of 61.76 and 30.21, when endogenous variables are *beguinage_i* and *exposure_i*, respectively.⁶⁰ Results, in general, confirm that beguinage presence at the municipal level definitely contributed to gender equality, measuring it using female-to-male literacy outcomes. Coefficients associated with *beguinage_i* increase with respect to OLS estimates while remain close the OLS counterpart for *exposure_i*. Only in Columns 5) and 6), when the left-hand side variable is *literacy index_i* accounts of beguine communities are not statistically significant.

⁵⁹The F-stat corresponding to Column 1) was computed using a two-step least squares regressions were *beguinage_i* is instrumentized using municipal charters granted before the 13th century.

⁶⁰The F-stat corresponding to Columns 1), 3) and 5) was computed using a two-step least squares regressions were *beguinage_i* is instrumentized using municipal charters granted before the 13th century.

Table 5: Beguinages and wages in agriculture, IV

	Logarithm of female-to-male wages in agriculture, 1846			
	(1)		(2)	
Beg. (0/1)	0.0736***	(2.65)		
Total time with a beg. (centuries)			0.0130*	(1.74)
Total men, 1846 (thousands)	0.0190	(0.82)	0.0248	(1.05)
Total women, 1846 (thousands)	-0.0181	(-0.84)	-0.0271	(-1.18)
Big town	-0.00406	(-0.40)	-0.00219	(-0.22)
Share of literate men in 1866	-0.101	(-1.11)	-0.104	(-1.15)
Share of literate women in 1866	0.0608	(0.77)	0.0610	(0.78)
Share of women ever married, 1846	0.0449	(0.29)	0.0431	(0.28)
Potential caloric yield pre-1550	0.000567*	(1.95)	0.000575**	(1.98)
Potential caloric yield post-1550	-0.0000161	(-0.28)	-0.0000188	(-0.32)
Distance to closest big municipality (km)	0.00226***	(2.63)	0.00225***	(2.63)
Distance to closest river (km)	0.00418***	(3.86)	0.00423***	(3.90)
Population density, canton level	0.000000474	(0.18)	0.000000695	(0.27)
Steam engines per 1000 people	0.00596	(1.08)	0.00585	(1.07)
1st stage F-stat	65.72		30.63	
Arrondissement FE	Yes		Yes	
Migration	Yes		Yes	
Use of land	Yes		Yes	
Observations	2507		2507	

t statistics in parentheses. Standard errors clustered at the canton level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

This Table presents the results of IV regressions analysis, at the municipal level, of the logarithm of female-to-male agricultural wages on the presence of beguinages, instrumented by municipal charters. Column 1, follows Maddala (1986) and $beguinage_i$ is predicted using controls measured during the 13th-16th centuries: municipal charters and regional fixed effects. Column 2, follows a classical two-step least squares, with all second stage covariates included in the first stage. Second stages always includes arrondissement fixed effects. All regressions control for gender-specific migration and use of land.

Table 6: Beguinages and literacy, IV

	(1) Literacy equality, 1866	(2)	(3) Literacy share, 1866	(4)	(5) Literacy index, 1866	(6)
Beg. (0/1)	0.0841*** (3.56)		0.0242*** (2.97)		0.0293 (1.17)	
Total time with a beg. (centuries)		0.0199*** (2.95)		0.00579*** (3.05)		0.00813 (1.60)
Total men, 1866 (thousands)	-0.123*** (-2.96)	-0.106** (-2.54)	-0.0322*** (-2.92)	-0.0272** (-2.48)	0.0281* (1.66)	0.0354* (1.94)
Total women, 1866 (thousands)	0.114*** (3.01)	0.0951** (2.49)	0.0301*** (2.99)	0.0244** (2.42)	-0.0245 (-1.62)	-0.0329* (-1.96)
Share of women ever married, 1866	-0.549*** (-6.37)	-0.543*** (-6.29)	-0.161*** (-6.51)	-0.160*** (-6.45)	-0.139* (-1.91)	-0.137* (-1.89)
Big town	0.0462*** (7.21)	0.0483*** (7.26)	0.0143*** (7.67)	0.0149*** (7.77)	0.0185*** (3.27)	0.0192*** (3.41)
% of electors out of population, 1866	9.846*** (4.00)	9.660*** (3.93)	3.298*** (4.27)	3.243*** (4.20)	10.92*** (4.64)	10.83*** (4.62)
% indust. among voters	-0.0203 (-0.10)	-0.0000477 (-0.00)	-0.0106 (-0.17)	-0.00436 (-0.07)	-0.00326 (-0.02)	0.00700 (0.03)
% cult. among voters	-0.0309 (-1.00)	-0.0320 (-1.05)	-0.00996 (-1.05)	-0.0104 (-1.09)	-0.0250 (-0.79)	-0.0258 (-0.81)
% professors among voters	-0.149 (-0.26)	-0.151 (-0.27)	-0.0439 (-0.24)	-0.0450 (-0.25)	-0.118 (-0.22)	-0.124 (-0.23)

Continued on next page

Table 6 – continued from previous page

	(1)	(2)	(3)	(4)	(5)	(6)
	Literacy equality, 1866		Literacy share, 1866		Literacy index, 1866	
Population density, canton level ($\times 1000$)	-0.00156 (-1.22)	-0.00127 (-0.99)	-0.000525 (-1.34)	-0.000436 (-1.11)	-0.00132 (-0.92)	-0.00117 (-0.82)
Steam engines per 1000 people	0.00406 (1.02)	0.00394 (1.02)	0.000994 (0.89)	0.000956 (0.88)	-0.00244 (-0.76)	-0.00250 (-0.79)
Wage equality index in agri., 1846	-0.0535** (-2.35)	-0.0547** (-2.39)	-0.0162** (-2.27)	-0.0165** (-2.31)	-0.0177 (-0.79)	-0.0182 (-0.81)
Fem. monas.	0.0331* (1.81)	0.0277 (1.34)	0.00784 (1.64)	0.00624 (1.20)	0.0306* (1.87)	0.0275* (1.67)
Masc. monas.	-0.0146 (-0.97)	-0.0158 (-1.05)	-0.00291 (-0.68)	-0.00322 (-0.76)	-0.0150 (-1.49)	-0.0156 (-1.55)
Other monas.	-0.0166 (-0.86)	-0.0186 (-0.94)	-0.00420 (-0.73)	-0.00478 (-0.82)	-0.00410 (-0.25)	-0.00534 (-0.33)
Schools per 10000 people, 1851	0.00904* (1.95)	0.00907** (1.96)	0.00304** (1.99)	0.00304** (2.00)	0.00512 (1.13)	0.00512 (1.13)
Distance to Leuven (km)	0.000552*** (2.91)	0.000564*** (2.97)	0.000169*** (2.86)	0.000173*** (2.93)	0.000397** (2.11)	0.000402** (2.14)
First-stage F-stat	61.76	30.21	61.76	30.21	61.76	30.21
Region FE	Yes		Yes		Yes	
Migration	Yes		Yes		Yes	
Observations	2507		2507		2507	

t statistics in parentheses. Robust standard errors clustered at the canton level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

This Table presents the results of IV regressions analysis, at the municipal level, of female-to-male literacy ratios on the presence of beguinages, instrumented by municipal charters. Columns 1) and 2) use as indicator of female agency the variable *literacy equality index_i*, in Columns 3) and 4) it is attested using *female literacy share_i* and in Columns 5) and 6) gender equality is proxied by *literacy index_i*. Odd-numbered Columns have *beguinage_i* as independent variable accounting for the presence of beguinages at the municipal level and estimations follow Maddala (1986). Even-numbered Columns include *exposure_i* as main regressor and follow a two-step least squares procedure. All regressions include regional fixed-effects and control gender-specific migration.

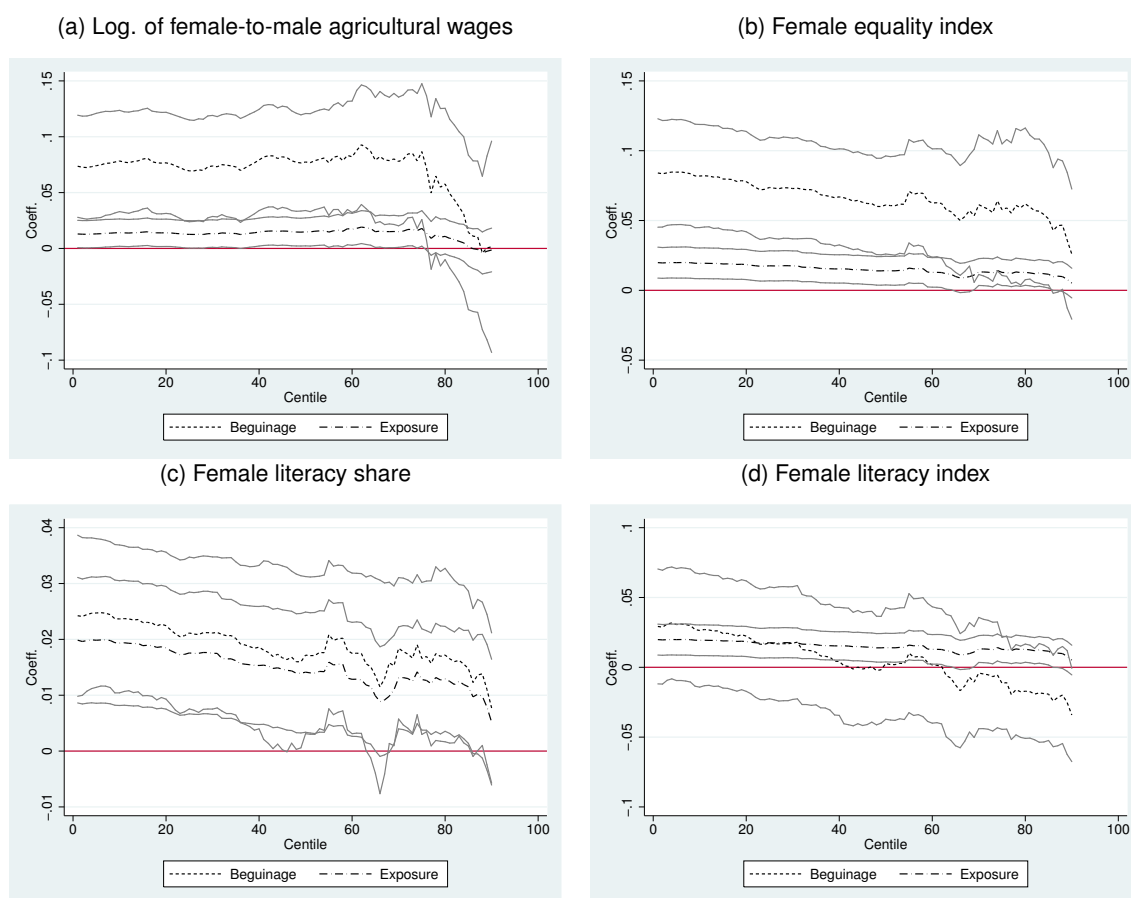
Overall, results from the instrumental variable approach indicate beguines had a positive, significant and enduring effect on female outcomes, providing evidence of the long-lasting effects beguine communities exerted on female agency during the 19th century. Women in municipalities where beguinages established between the 13th and 16th centuries had during the 19th century outcomes in terms of wages and literacy more similar to men's.

4.4 Robustness

Findings presented so far are robust to the choice of different sub-samples and to the inclusion of additional covariates. First, Figure 4 evidences that results are not driven by relatively large municipalities by running regressions analogous to those in Subsection 4.3 but including only municipalities whose total population during 1866 was above each centile, up to the 90th⁶¹. Confidence intervals are represented at the 10% level, with standard errors clustered at the canton level. In view of the outcome, only when the sample is composed of exclusively large municipalities IV beguinages halt being a predictor of female agency. Results from the same exercise based on OLS analysis instead of IV estimations are reported in Figure 5 in the Appendix. Second, besides concerns regarding municipal sizes, Table 7 restricts the sample to municipalities with a similar local culture and attitudes toward women by selecting only to municipalities that are located at close distances from a beguinage: 5km, 10km and 20km. The underlying assumption is that those municipalities near the ones chosen by beguines did not hold different views with respect to women. Thus, municipalities sufficiently close can be considered substitutes in terms of gender culture and female agency. In all regressions we include closest beguinage fixed-effects and standard errors are clustered at that same level. Results for literacy-related outcomes are similar to those obtained under the IV approach while presence of beguinages becomes insignificant at the 10km level for gender wage equality. Overall, results indicate positive and significant effects of beguine communities on gender equality.

⁶¹Small sample sizes do not allow to estimate the econometric model above the 90th centile.

Figure 4: Regression coefficients by centile of population



Note: This Figure plots the coefficient associated with $beguinage_i$ and $exposure_i$ from an IV regression analysis of the logarithm of female-to-male agricultural wages in Panel A), and female equality index, female literacy share and female literacy index in Panels B), C) and D), when $beguinage_i$ and $exposure_i$ are instrumented by municipal charters. The sample includes municipalities whose population is above the centile indicated in the x-axis. Confidence intervals at the 90%, standard errors clustered at the canton level.

Table 7: Robustness: Distance to Beguinages, IV

	(1) Beguinage < 5km	(2) Beguinage < 10km	(3) Beguinage < 20km
Panel A: Wage equality index			
Beg. (0/1)	0.0646** (2.35)	0.0388 (1.42)	0.0526* (1.95)
Total time with a beg. (centuries)	0.0136* (1.78)	0.00770 (1.14)	0.00903 (1.38)
Observations	365	1097	2033
Panel B: Literacy equality index			
Beg. (0/1)	0.0951*** (2.75)	0.102*** (3.96)	0.0941*** (3.73)
Total time with a beg. (centuries)	0.0173** (2.47)	0.0192*** (3.23)	0.0212*** (3.16)
Observations	365	1097	2033
Panel C: Female literacy share			
Beg. (0/1)	0.0286*** (2.81)	0.0310*** (4.27)	0.0278*** (3.86)
Total time with a beg. (centuries)	0.00518*** (2.64)	0.00582*** (3.62)	0.00621*** (3.30)
Observations	365	1097	2033
Panel D: Female literacy index			
Beg. (0/1)	0.0279 (0.94)	0.0348 (1.46)	0.0354 (1.26)
Total time with a beg.	0.00584 (1.06)	0.00679 (1.59)	0.00846* (1.70)
Observations	365	1097	2033

t statistics in parentheses. Standard errors clustered at the closest beguinage level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

This Table presents the results of IV regressions analysis, at the municipal level, of the logarithm of female-to-male agricultural wages in Panel A) and of female-to-male literacy ratios on the presence of beguinages in Panels B), C) and D), instrumented by municipal charters. Column 1) considers only municipalities less than 5km from the closest beguinage, Column 2) extends this distance 10km and Column 3) includes all municipalities less than 20km from the closest beguinage. Rows featuring $beguinage_i$ as independent variable accounting for the presence of beguinages at the municipal level are estimated following Maddala (1986). Those with $exposure_i$ as main the regressor follow a two-step least squares procedure. Regressions in Panel A) include arrondissement level fixed-effects. Panels B), C) and D) include regional fixed-effects. All regressions include closest beguinage fixed-effects.

Additionally, Table 8 provides, in Panel A), evidence that results surfacing for literacy-related outcomes are not caused by women catching up in literacy with men directly introducing male literacy rates as an additional explanatory variable. Panel B) disentangles the effects of the beguinage as operating institution from changes in culture due to historical exposure to beguinages excluding from regressions municipalities that had an on-going beguinage during 1846 or 1866. This removes 17 municipalities from the baseline sample.⁶² Panel C) establishes that results are also robust to the inclusion of the distance as the crow flies to the closest beguinage as additional control. The size of the coefficients barely changes and they all remain significant; both when the outcome of interest is the wage equality index as well as for all three female-to-male literacy-related indicators. Distance to the closest beguinage is never a significant predictor of gender equality. Finally, Panels D) and E) present results from an OLS analysis. In Panel D), municipalities where beguine communities established are removed from the sample and all towns less than five kilometers away from an actual beguinage are treated as if a beguine community had established there. False beguinages do not have any predictive power regarding gender equality, suggesting effects from beguinage presence are local and spillover effects, affecting neighbouring communities, negligible. In Panel E), municipal charters, the instrument used in IV regressions, are included as an additional covariate, evidencing that beguinage communities boosted gender equality beyond any possible effect introduced by municipal charters. Municipal charters, in general, do not affect female equality.

⁶²The municipalities that had an on-going beguinage during 1846 are, with the closing year between brackets: Aarschot (1856), Aalst (1953), Bilzen (1849), Kortrijk (2001), Diksmuide (1914), Edigen (1847), Hasselt (1886), Herenthals (2001), Momalle (1899), Hoogstraten (1972), Liège (1869), Lier (1970), Nieuwpoort (1914), Nivelles (1862), Sint-Truiden (1860), Tienen (1857) and Turnhout (1994). During 1866 only the municipalities of Aalst, Kortrijk, Diksmuide, Hasselt, Herenthals, Momalle, Hoogstraten, Lier, Nieuwpoort and Turnhout had a working beguinage.

Table 8: Additional robustness tests

	(1)		(2)		(3)		(3)
	Agr. wage		Lit. Eq. Index		F. Lit. Share		F. Lit. Index
Panel A: Male literacy rates							
Beg (0/1)			0.0712*** (3.07)		0.0193** (2.25)		0.0158 (0.64)
Total time with a beg. (centuries)			0.0178*** (2.62)		0.00511*** (2.68)		0.00621 (1.20)
Observations			2507		2507		2507
Panel B: Excluding on-going beguinages							
Beg (0/1)	0.0857*** (2.64)		0.0694** (2.33)		0.0185 (1.22)		0.0418 (1.32)
Total time with a beg. (centuries)	0.0153 (1.46)		0.0211** (2.05)		0.00624** (2.13)		0.0120 (1.63)
Observations	2497		2497		2407		2407
Panel C: Distance to closest beguinage							
Beg (0/1)	0.0737*** (2.65)		0.0814*** (3.44)		0.0235*** (2.93)		0.0286 (1.16)
Total time with a beg. (centuries)	0.0131* (1.70)		0.0192*** (2.81)		0.00562*** (2.91)		0.00797 (1.56)
Observations	2507		2507		2507		2507
Panel D: Placebo beguinage in municipalities less than 5km from a beguinage							
Placebo beguinage	0.00378 (0.24)		-0.00431 (-0.41)		-0.000926 (-0.28)		-0.00112 (-0.10)
Observations	2439		2439		2439		2439

Continued on next page

Table 8 – continued from previous page

	(1)		(2)		(3)		(3)	
	Agr. wage		Lit. Eq. Index		F. Lit. Share		F. Lit. Index	
	Panel E: Municipal charter as regressor							
Beg (0/1)	0.0342	(1.37)	0.0720***	(3.17)	0.0197***	(3.51)	0.0221	(1.47)
No beg.	Ref.		Ref.		Ref.		Ref.	
1 beg., <200 years	0.0255	(0.85)	0.0469**	(2.01)	0.0147**	(2.14)	0.0132	(0.75)
1 beg., >200 years	0.0330	(0.93)	0.115***	(3.44)	0.0298***	(4.27)	0.0359*	(1.75)
* >1 beg., >200 years	0.0173	(0.32)	0.105***	(2.62)	0.0273**	(2.49)	0.0383	(1.10)
>3 beg., >200 years	0.106*	(1.97)	-0.121	(-1.54)	-0.0325	(-1.52)	-0.0422	(-1.28)
Total time with a beg. (centuries)	0.00766	(1.47)	0.00427	(1.08)	0.00105	(0.99)	0.00225	(0.80)
Observations	2507		2507		2507		2507	

t statistics in parentheses. Robust standard errors clustered at the canton level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

This Table presents, in Panels A), B), and C), the results of IV regressions analysis, at the municipal level, of of the logarithm of female-to-male agricultural wages on the presence of beguinages, in Column 1), and of female-to-male literacy ratios on the presence of beguinages, in Columns 2), 3) and 4), instrumented by municipal charters. Column 2) use as indicator of female agency the variable *female equality index_i*, in Column 3) it is attested using *female literacy share_i* and in Columns 4) gender equality is proxied by *literacy index_i*. Panel A) establishes that results are robust to the inclusion of male literacy rates as explanatory variable, thus ruling out women catching up with men. Panel B) shows that results are not caused by on-going beguinages by removing municipalities where an on-going beguinage was present at census time. Panel C) demonstrate that results are robust to the inclusion of distance to the closest beguinage as explanatory variable. Panel D) treats all municipalities less than 5km from a beguinage as having had one and excludes municipalities where beguinages established from the sample. It proves that the effects of beguinages on gender equality were local. Panel E) includes municipal charters as additional control, evidencing that beguinage communities boosted gender equality beyond any possible effect introduced by municipal charters. Coefficients for municipal charters are not reported, although these are not significant except for the variable *literacy equality index_i* and *female literacy share_i* when the main control is *exposure_i*. Column 1) includes arrondissement fixed-effects and Columns 2), 3) and 4) regional fixed-effects.

Table 14 in the Appendix replicates Table 7 using an OLS analysis while Table 15 replicates Panels A), B) and C) of Table 8.

Additionally, placebo beguinages are generated 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 quartiles; and the expected number of beguinage is calculated for each quartile. Each municipality in each quartile receives a placebo beguinage with probability equal to the quartile-specific expected number of beguinages and regressions following the specification of Table 2 and Table 3 are run. Based on 100 repetitions, results show that only in 16% of the occasions placebo beguinages influenced gender equality, thus ruling out that increased female agency was the outcome from a random assignment.

4.5 Propensity Score Matching

In light of the results indicating a relationship between the presence of beguine communities during the 13th and 16th centuries and gender equality during the mid-19th century, this Subsection provides further evidence of the strength of that association employing propensity score matching techniques. Instead of relying on cross-sample comparisons, estimates under propensity score matching only consider pairs of municipalities which are, *ex-ante*, equally likely to receive a beguinage but differ in actually hosting one. Ideally, municipalities would be matched using some pre-beguinage characteristics on attitudes towards women at the municipal level. Unfortunately, this information is not available. Instead, municipalities are matched on the basis of the following variables: whether a municipality received a municipal charter before the 13th century; the presence of monasteries, classified by gender; and regional fixed effects. In a second matching exercise, we expand the set of controls including the presence of castles at the municipal level to take into account the regional organisation of power; the potential caloric yield of land before 1550; and the number of predicted houses during 1438.⁶³

⁶³This variable is constructed using the sample of historical Brabant municipalities, for which information on the number of houses in 1438 is available. Houses during 1438 is regressed against municipal population during 1846, and results of that regression are extrapolated to predict the number of houses during 1438. If precise information regarding the number houses in 1438 exists, the actual number instead of the prediction.

Table 9: Beguinages and female literacy, propensity score matching

Matching algorithm	Treated/Controls	(1)	(2)	(3)
		Literacy equality, 1866	Literacy share, 1866	Literacy index, 1866
Panel A: Matching on basic covariates				
Stratification	68/2484	0.053* (1.794) [†]	0.015* (0.007) [†]	0.009 (0.016) [†]
Radius (r=0.1)	33/2480	0.165** (0.021)	0.047** (0.005)	0.063** (0.014)
Radius (r=0.0005)	39/2459	0.151** (0.030)	0.042** (0.007)	0.064** (0.016)
Kernel	70/2483	0.056* (0.031) [†]	0.016* (0.008) [†]	0.012 (0.025) [†]
Nearest neighbour	70/2460	0.055* (0.035)	0.016* (0.010)	0.012 (0.030)
Panel B: Matching on expanded covariates				
Stratification	68/2308	0.047* (0.030) [†]	0.013* (0.009) [†]	0.016 (0.024) [†]
Radius (r=0.1)	30/2475	0.146** (0.021)	0.042** (0.006)	0.053** (0.015)
Radius (r=0.0005)	29/1237	0.125** (0.037)	0.034** (0.008)	0.059** (0.019)
Kernel	70/2483	0.044 (0.038) [†]	0.013* (0.009) [†]	0.016 (0.024) [†]
Nearest neighbour	70/38	0.012 (0.045)	0.004 (0.013)	0.010 (0.034)

Standard errors in parenthesis. [†] bootstrapped standard errors based on 50 iterations. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

This Table presents the results of beguinage presence on female-to-male literacy measures based on propensity score matching analysis. In Panel A), matches are based on municipal charters before the 13th century, monasteries and regional fixed effects. Panel B) expands the set of covariates present in Panel A) with castle presence, potential caloric yield before 1550 and the number of predicted houses in 1438.

Table 9 establishes, comparing pairs of municipalities that were equally likely to host a beguinage, that beguine presence at the local level left an great imprint on gender equality, still measureable during the 19th century. Table 9 reports only results for female-to-male literacy comparisons because agricultural wages are determined by factors that cannot be accounted for in this econometric specification.⁶⁴ In general, coefficients range from slightly below the equivalent OLS counterpart to well above them, depending on the matching algorithm. Moreover, when the match is performed using a richer set of covariates, as in Panel B), the coefficients further drop.⁶⁵ Nonetheless, they are in line with our previous findings and provide strong evidence in favor of the hypothesis under examination: the presence of beguines in the urban environment instigated changes in cultural values of local populations, which worked to influence gender parity in human capital and labour market outcomes in the long term.

5 Conclusion

This paper provides, for the first time, evidence of the long-lasting effects semi-religious communities exerted on gender attitudes. The unique characteristics of beguine communities as clusters of single women living together, leading a religious life of contemplation and prayer while earning a living and well integrated and important actors of municipal life granted them the title of the “first feminine movement” (Panciera (2016)). These communities thrived amidst a society that disapproved women not marrying or entering monastic, spiritual life. We follow their legacy, finding that municipalities that hosted a beguinage during Medieval times treated women more equally with respect to men during the 19th century. We gauge the relative stance society had with respect to women comparing the wages perceived by men and women in the agricultural sector and also measuring the relative levels of literacy. Using a unique data-set containing precise information about beguinage locations in Belgium combined with 19th century census information, we detected a lingering impact on modern gender roles influenced by the self-same cultural attitudes in the Middle Ages. More precisely, we find that Belgian municipalities in which beguine communities settled during Medieval times are characterized in 1866 by female education levels closer to those men received and by a larger wage equality index in the agricultural sector. These findings are consistent with the values and attitudes that characterized the beguine movement. Therefore, the gender norms attached to the role of the beguine successfully spread from within the walled beguinages to the society in general. Concluding, our results suggest that, even in contemporary small urban or rural communities, it may be worth promoting female associations as an effective channel to exacerbate gender inequalities and promote the spread of gender-equal norms across populations.

⁶⁴ Indeed, no effect of beguinages on the female-to-male agricultural wage ratio is observed.

⁶⁵ This exercise based on propensity score matching ignores many important determinants of female-to-male literacy rates as highlighted in the previous sections. For example, nuptiality rates are missing. Likewise, other estimation techniques that allow to control for confounding factors show a positive influence of beguinages on women closing the gap with men with respect to literacy.

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Appendices

A Analogous Institutions

Nowadays, there exist other female-only 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, use of the resources and services the group owns collectively, and management of these assets. For example, in one of these institutions women seek 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.⁶⁶ 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 Nthobu 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 woman⁶⁷ as their own and is a way of providing security for their old age. The culture is also being used as an escape for child marriage, female genital mutilation, and domestic violence.

Another example is the one of Zishunu, an ancient custom that originated from indigenous groups in southwestern China and consists in 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 after the Qianlong period (1736– 1795) 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 labor supply and therefore made their employers invest more human capital on them and matching them to more important working positions.

B Additional Tables and Figures

⁶⁶Barren 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.

⁶⁷A man is typically selected from the clan of the old woman for reproduction purposes with the young woman.

Table 10: Beguinages and female literacy, 2

	Female Literacy Share, 1866					
	(1)		(2)		(3)	
Beg (0/1)	0.0220***	(5.25)				
No beg.			Ref.			
1 beg., <200 years			0.0148**	(2.38)		
1 beg., >200 years			0.0300***	(5.61)		
>1 beg., >200 years			0.0275***	(2.86)		
>3 beg., >200 years			-0.0325	(-1.51)		
Total time with a beg. (centuries)					0.00213**	(2.53)
Total men, 1866 (thousands)	-0.0323***	(-2.91)	-0.0388***	(-3.83)	-0.0316***	(-2.79)
Total women, 1866 (thousands)	0.0302***	(2.97)	0.0368***	(3.96)	0.0294***	(2.83)
Female nuptiality, 1866	-0.161***	(-6.51)	-0.159***	(-6.47)	-0.161***	(-6.45)
Big town	0.0143***	(7.64)	0.0142***	(7.80)	0.0150***	(7.87)
% men born in town, 1866	0.248**	(2.13)	0.240**	(2.07)	0.252**	(2.16)
% men born in Belgium, 1866	0.215*	(1.81)	0.208*	(1.76)	0.217*	(1.82)
% men born abroad, 1866	Ref.		Ref.		Ref.	
% women born in town, 1866	-0.240**	(-2.41)	-0.229**	(-2.31)	-0.246**	(-2.49)
% women born in Belgium, 1866	-0.179*	(-1.81)	-0.169*	(-1.71)	-0.183*	(-1.85)
% women born abroad, 1866	Ref.		Ref.		Ref.	
% of electors, 1866	3.301***	(4.26)	3.282***	(4.24)	3.305***	(4.26)
% indust. among voters	-0.0107	(-0.17)	-0.00718	(-0.11)	-0.0131	(-0.21)
% agric. among voters	-0.00997	(-1.04)	-0.0104	(-1.08)	-0.00908	(-0.96)
% professors among voters	-0.0424	(-0.23)	-0.0414	(-0.22)	-0.0291	(-0.16)

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Table 10 – continued from previous page

	Female Literacy Share, 1866					
	(1)		(2)		(3)	
Pop. density ($\times 1000$), canton level	-0.000528	(-1.35)	-0.000543	(-1.39)	-0.000578	(-1.47)
Steam engines per 1000 people	0.000991	(0.89)	0.00130	(1.16)	0.000999	(0.89)
Wage equality index in agri., 1846	-0.0162**	(-2.26)	-0.0162**	(-2.25)	-0.0163**	(-2.28)
Fem. monas.	0.00834**	(2.09)	0.0114***	(2.70)	0.0100**	(2.41)
Masc. monas.	-0.00278	(-0.64)	-0.00195	(-0.47)	-0.00271	(-0.61)
Other monas.	-0.00396	(-0.69)	-0.00542	(-0.96)	-0.00307	(-0.53)
Schools per 10000 people, 1851	0.00304**	(1.98)	0.00304**	(1.98)	0.00306**	(2.00)
Distance to Leuven (km)	0.000169***	(2.85)	0.000171***	(2.88)	0.000170***	(2.87)
Regional FE	Yes		Yes		Yes	
Observations	2507		2507		2507	

t statistics in parentheses. Standard errors clustered at the canton level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

This Table presents the results of OLS regressions analysis, at the municipal level, of *female literacy index* on the presence of beguinages. In Column 1) the main regressor the binary variable *beguinage_i*. Column 2) introduces the five-level indicator *intensity_i* to account for the presence of beguine communities and Column 3) assesses their presence using the accumulated number of years of beguine presence at the municipality level, *exposure_i*. All regressions includes arrondissement fixed effects and control for gender-specific migration.

Table 11: Beguinages and female literacy, 3

	Female Literacy Index, 1866					
	(1)	(2)	(3)			
Beg (0/1)	0.0266**	(2.20)				
No beg.			Ref.			
1 beg., <200 years			0.0141	(0.88)		
1 beg., >200 years			0.0378**	(2.21)		
>1 beg., >200 years			0.0405	(1.25)		
>3 beg., >200 years			-0.0417	(-1.26)		
Total time with a beg. (centuries)					0.00360	(1.46)
Total men, 1866 (thousands)	0.0279	(1.62)	0.0198	(1.16)	0.0300*	(1.72)
Total women, 1866 (thousands)	-0.0243	(-1.57)	-0.0160	(-1.04)	-0.0267*	(-1.69)
Share of women ever married, 1866	-0.139*	(-1.91)	-0.136*	(-1.87)	-0.138*	(-1.90)
Big town	0.0185***	(3.25)	0.0184***	(3.26)	0.0193***	(3.43)
% men born in town, 1866	0.637**	(2.19)	0.627**	(2.16)	0.641**	(2.21)
% men born in Belgium, 1866	0.442	(1.51)	0.432	(1.48)	0.444	(1.51)
% men born abroad, 1866	Ref.		Ref.		Ref.	
% women born in town, 1866	-0.640**	(-2.39)	-0.625**	(-2.33)	-0.647**	(-2.42)
% women born in Belgium, 1866	-0.328	(-1.25)	-0.315	(-1.20)	-0.333	(-1.27)
% women born abroad, 1866	Ref.		Ref.		Ref.	
% of electors out of population, 1866	10.92***	(4.63)	10.89***	(4.61)	10.91***	(4.62)
% indust. among voters	-0.00333	(-0.02)	0.00214	(0.01)	-0.00386	(-0.02)
% cult. among voters	-0.0250	(-0.78)	-0.0257	(-0.80)	-0.0242	(-0.76)
% professors among voters	-0.116	(-0.21)	-0.114	(-0.21)	-0.104	(-0.19)

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Table 11 – continued from previous page

	Female Literacy Index, 1866					
	(1)		(2)		(3)	
Population density, canton level	-0.00000132	(-0.92)	-0.00000134	(-0.93)	-0.00000134	(-0.93)
Steam engines per 1000 people	-0.00245	(-0.76)	-0.00205	(-0.64)	-0.00245	(-0.76)
Wage equality index in agri., 1846	-0.0176	(-0.79)	-0.0177	(-0.79)	-0.0179	(-0.80)
Fem. monas.	0.0312**	(2.20)	0.0348**	(2.32)	0.0322**	(2.23)
Masc. monas.	-0.0149	(-1.47)	-0.0137	(-1.39)	-0.0149	(-1.47)
Other monas.	-0.00381	(-0.24)	-0.00579	(-0.36)	-0.00321	(-0.20)
Schools per 10000 people, 1851	0.00512	(1.12)	0.00513	(1.13)	0.00515	(1.13)
Distance to Leuven (km)	0.000397**	(2.10)	0.000399**	(2.12)	0.000398**	(2.11)
Regional FE	Yes		Yes		Yes	
Observations	2507		2507		2507	

t statistics in parentheses. Standard errors clustered at the canton level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

This Table presents the results of OLS regressions analysis, at the municipal level, of *female literacy share* on the presence of beguinages. In Column 1) the main regressor the binary variable *beguinage_i*. Column 2) introduces the five-level indicator *intensity_i* to account for the presence of beguine communities and Column 3) assesses their presence using the accumulated number of years of beguine presence at the municipality level, *exposure_i*. All regressions includes arrondissement fixed effects and control for gender-specific migration.

Table 12: Beguinages and other determinants of female-to-male equality

	Benchmark		No controls		Demography		Land		Human capital		All	
	(1)		(2)		(3)		(4)		(5)		(6)	
Panel A) Wage equality in agriculture												
Beg (0/1)	0.0413**	(2.17)	0.0515***	(2.69)	0.0324*	(1.70)	0.0388**	(2.42)	0.0457***	(2.79)	0.0415**	(2.17)
No beg.	Ref.		Ref.		Ref.		Ref.		Ref.		Ref.	
B=1,T<200	0.0310	(1.10)	0.0280	(0.89)	0.0329	(1.22)	0.0343	(1.19)	0.0359	(1.24)	0.0303	(1.06)
B=1,T>200	0.0440	(1.58)	0.0791***	(2.77)	0.0320	(1.14)	0.0399	(1.47)	0.0435	(1.62)	0.0449	(1.61)
B>1,T>200	0.0310	(0.65)	0.0486	(0.98)	0.00664	(0.14)	0.0179	(0.40)	0.0281	(0.66)	0.0317	(0.65)
B>3,T>200	0.110**	(2.02)	0.0150	(0.34)	0.0822	(1.45)	0.0586**	(2.04)	0.0847***	(2.63)	0.107*	(1.97)
Exposure	0.00889**	(2.10)	0.00722***	(2.80)	0.00678	(1.57)	0.00505**	(2.10)	0.00653***	(2.62)	0.00900**	(2.10)
Observations	2507		2509		2507		2509		2509		2507	
Panel B) Literacy equality index												
eg (0/1)	0.0789***	(4.68)	0.144***	(7.71)	0.0802***	(4.66)	0.142***	(7.59)	0.118***	(6.44)	0.0802***	(4.19)
No beg.	Ref.		Ref.		Ref.		Ref.		Ref.		Ref.	
B=1,T<200	0.0458**	(2.14)	0.0620***	(2.63)	0.0457**	(2.13)	0.0614**	(2.58)	0.0525**	(2.34)	0.0332	(1.47)
B=1,T>200	0.112***	(4.50)	0.153***	(4.69)	0.112***	(4.17)	0.151***	(4.70)	0.148***	(4.94)	0.113***	(4.05)
B>1,T>200	0.102***	(2.84)	0.233***	(6.79)	0.122***	(4.91)	0.236***	(6.24)	0.186***	(4.01)	0.115**	(2.47)
B>3,T>200	-0.121	(-1.54)	0.208**	(13.96)	-0.0741	(-1.07)	0.196***	(14.95)	0.118***	(4.40)	-0.0276	(-0.45)
Exposure	0.00784**	(2.53)	0.0212***	(7.65)	0.00878***	(2.89)	0.0207***	(7.37)	0.0168***	(5.44)	0.0103***	(3.08)
Panel C) Literacy share index												
Beg (0/1)	0.0220***	(5.25)	0.0407***	(9.21)	0.0219***	(5.48)	0.0399***	(8.90)	0.0335***	(7.23)	0.0220***	(4.59)
No beg.	Ref.		Ref.		Ref.		Ref.		Ref.		Ref.	
B=1,T<200	0.0148**	(2.38)	0.0196***	(2.91)	0.0143**	(2.30)	0.0195***	(2.85)	0.0171***	(2.71)	0.0112*	(1.72)
B=1,T>200	0.0300***	(5.61)	0.0422***	(5.98)	0.0297***	(5.41)	0.0414***	(5.90)	0.0407***	(6.10)	0.0301***	(4.81)
B>1,T>200	0.0275***	(2.86)	0.0645***	(7.94)	0.0320***	(5.05)	0.0653***	(6.84)	0.0520***	(4.43)	0.0303**	(2.47)
B>3,T>200	-0.0325	(-1.51)	0.0593***	(16.15)	-0.0207	(-1.09)	0.0552***	(17.68)	0.0335***	(4.75)	-0.00929	(-0.55)
Exposure	0.00213**	(2.53)	0.00596***	(8.12)	0.00233***	(2.96)	0.00579***	(7.78)	0.00471***	(5.50)	0.00266***	(2.98)

Continued on next page

Table 12 – continued from previous page

	Benchmark		No controls		Demography		Land		Human capital		All	
	(1)		(2)		(3)		(4)		(5)		(6)	
Panel D) Literacy share index												
Beg (0/1)	0.0266**	(2.20)	0.0550***	(5.00)	0.0288**	(2.56)	0.0494***	(4.41)	0.0403***	(3.38)	0.0272**	(2.19)
No beg.	Ref.		Ref.		Ref.		Ref.		Ref.		Ref.	
B=1,T<200	0.0141	(0.88)	0.0277*	(1.71)	0.0126	(0.79)	0.0275	(1.63)	0.0208	(1.34)	0.0135	(0.81)
B=1,T>200	0.0378**	(2.21)	0.0627***	(3.48)	0.0386**	(2.30)	0.0554***	(3.04)	0.0567***	(3.34)	0.0395**	(2.32)
B>1,T>200	0.0405	(1.25)	0.101***	(5.11)	0.0594**	(2.53)	0.0951***	(3.78)	0.0698**	(2.21)	0.0380	(1.14)
B>3,T>200	-0.0417	(-1.26)	0.0478***	(3.11)	-0.0149	(-0.58)	0.0376**	(2.14)	-0.00909	(-0.36)	-0.0451	(-1.16)
Exposure	0.00360	(1.46)	0.00764***	(4.60)	0.00447**	(2.07)	0.00654***	(3.71)	0.00483**	(2.30)	0.00320	(1.26)
Observations	2507		2549		2507		2519		2519		2519	

This Table presents the results of OLS regressions analysis, at the municipal level, of the logarithm of female-to-male agricultural wages, in Panel A) and female-to-male literacy ratios, in particular, *literacy equality index_i*, *female literacy share_i* and *female literacy index_i* in Panels B), C) and D), respectively on the presence of beguinages. Column 1) replicates OLS results from Table 2 for Panel A) and Tables 3, 10 and 11 in Panels B), C) and D), respectively. Column 2) displays the raw correlation between presence of beguinage and outcomes of interest. Column 3) includes demography controls: number of men and women, female nuptiality, migration and, in Panels B), C) and D) wage equality index. Column 4) introduces an expanded set of land suitability: potential caloric yield pre- and post-1550, land usage and soil types; while Column 5) controls for human capital: large municipality and river distances, pop. registered as voters in 1847, percentage farmers, industr. and prof. among voters, pop. density (canton level), steam engines per capita, and Panels B), C) and D) also include the number of adult schools per 10000 inhabitants, monasteries and distance to Leuven. In Column 6) all the previous variables are included. Fixed effects at the arrondissement level in Panel A) and at the regional levels in Panels B), C) and D).

Table 13: Comparison between etregress and ivregress

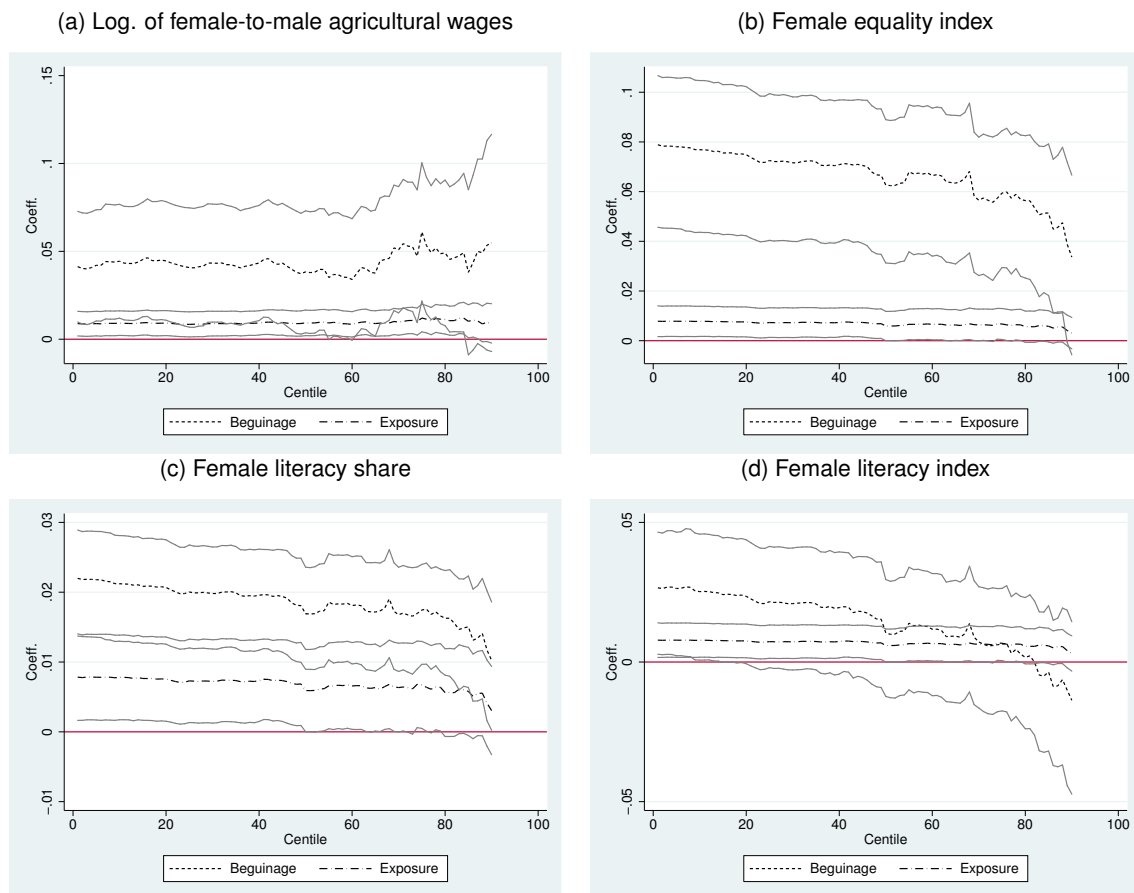
	Coefficient of Beg. (0/1)		
	Estimation	Coefficient	<i>t</i> statistic
Wage equality index in agri., 1846	etregress	0.0736***	(2.65)
	ivregress	0.0639*	(1.83)
Lit. equality index in 1866	etregress	0.0841***	(3.56)
	ivregress	0.102***	(3.10)
Lit. women / total lit. population	etregress	0.0242***	(2.92)
	ivregress	0.0297***	(3.24)
Share lit. women / share lit. men	etregress	0.0293	(1.17)
	ivregress	0.0417	(1.62)

t statistics in parentheses. Standard errors clustered at the canton level.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

This table presents only the coefficients associated to the binary variable recording whether a municipality ever had a beguinage. The controls included in the first stage change between specifications: *etregress* rows include only a binary indicator tracing municipalities with a municipal charter; presence of monasteries at the municipal level, distinguishing between those for men, women, and unknown; and regional fixed effects. Regressions follow Maddala (1986). *ivregress* includes the entire set of covariates present in the second stage, see main text and Table 6 for further details. The econometric model follows classical two-step least squares.

Figure 5: Regression coefficients for centiles of population



Note: This Figure plots the coefficient associated with $beguinage_i$ and $exposure_i$ from an OLS regression analysis of the logarithm of female-to-male agricultural wages in Panel A), and female equality index, female literacy share and female literacy index in Panels B), C) and D). The sample includes municipalities whose population is above the centile indicated in the x-axis. Confidence intervals at the 90%, standard errors clustered at the canton level.

Table 14: Robustness: Distance to Beguinages, OLS

	(1)		(2)		(3)	
	Beguinage< 5km		Beguinage< 10km		Beguinage< 20km	
Panel A: Wage equality index						
Beg. (0/1)	0.0600**	(2.01)	0.0379	(1.63)	0.0359*	(1.69)
No beg.	Ref.		Ref.		Ref.	
1 beg., <200 years	0.0549	(1.30)	0.0386	(1.06)	0.0409	(1.24)
1 beg., >200 years	0.0558	(1.40)	0.0386	(1.23)	0.0295	(1.04)
>1 beg., >200 years	0.0941**	(2.04)	-0.00348	(-0.08)	0.0178	(0.37)
>3 beg., >200 years	0.135*	(1.84)	0.114*	(1.68)	0.104	(1.62)
Total time with a centuries. (beg)	0.0106**	(2.13)	0.00755*	(1.80)	0.00739*	(1.72)
Observations	365		1097		2033	
Panel B: Female equality index						
Beg. (0/1)	0.0830***	(3.75)	0.0870***	(4.90)	0.0798***	(4.63)
No beg.	Ref.		Ref.		Ref.	
1 beg., <200 years	0.0678**	(2.45)	0.0578**	(2.36)	0.0554**	(2.36)
>1 beg., >200 years	0.0947***	(3.00)	0.108***	(4.15)	0.102***	(4.03)
>1 beg., >200 years	0.102*	(1.75)	0.132***	(3.31)	0.112***	(2.90)
>3 beg., >200 years	-0.0177	(-0.28)	-0.0758	(-1.19)	-0.0843	(-1.19)
Total time with a beg. (centuries)	0.0113**	(2.56)	0.0126***	(3.64)	0.00947***	(2.73)
Observations	365		1097		2033	

Continued on next page

Table 14 – continued from previous page

	(1)		(2)		(3)	
	Beguinaage< 5km		Beguinaage< 10km		Beguinaage< 20km	
Panel C: Female literacy share						
Beg. (0/1)	0.0231***	(3.77)	0.0249***	(5.42)	0.0223***	(5.13)
No beg.	Ref.		Ref.		Ref.	
1 beg., <200 years	0.0206**	(2.59)	0.0188**	(2.59)	0.0176**	(2.54)
1 beg., >200 years	0.0249***	(2.89)	0.0291***	(4.74)	0.0271***	(4.77)
>1 beg., >200 years	0.0293**	(2.06)	0.0385***	(3.99)	0.0306***	(3.13)
>3 beg., >200 years	-0.000617	(-0.04)	-0.0181	(-1.10)	-0.0215	(-1.15)
Total time with a beg. (centuries)	0.00321***	(2.80)	0.00364***	(4.04)	0.00263***	(2.87)
Observations	365		1097		2033	
Panel D: Female literacy index						
Beg. (0/1)	0.0198	(1.05)	0.0288**	(2.32)	0.0263**	(2.23)
No beg.	Ref.		Ref.		Ref.	
1 beg., <200 years	0.0303	(1.14)	0.0282	(1.41)	0.0260	(1.43)
1 beg., >200 years	0.0142	(0.60)	0.0293*	(1.71)	0.0273	(1.61)
>1 beg., >200 years	0.0266	(0.47)	0.0588	(1.52)	0.0462	(1.38)
>3 beg., >200 years	-0.0368	(-0.76)	-0.0624	(-1.57)	-0.0326	(-0.95)
Total time with a beg. (centuries)	0.00241	(0.62)	0.00445	(1.65)	0.00365	(1.42)
Observations	365		1097		2033	

t statistics in parentheses. Standard errors clustered at the closest beguinage level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

This Table presents the results of OLS regressions analysis, at the municipal level, of the logarithm of female-to-male agricultural wages in Panel A) and of female-to-male literacy ratios on the presence of beguinages in Panels B), C) and D). Column 1) considers only municipalities less than 5km from the closest beguinage, Column 2) extends this distance 10km and Column 3) includes all municipalities less than 20km from the closest beguinage. Regressions in Panel A) include arrondissement level fixed-effects. Panels B), C) and D) include regional fixed-effects. All regressions include closest beguinage fixed-effects.

Table 15: Additional robustness tests, OLS

	(1)		(2)		(3)		(3)
	Agr. wage		Lit. Eq. Index		F. Lit. Share		F. Lit. Index
Panel A: Male literacy rates							
Beg. (0/1)		0.0699***	(4.13)		0.0190***	(4.53)	0.0181 (1.53)
No beg.		Ref.			Ref.		Ref.
1 beg., <200 years		0.0441**	(2.14)		0.0142**	(2.39)	0.0125 (0.85)
1 beg., >200 years		0.101***	(4.00)		0.0262***	(4.87)	0.0271 (1.60)
>1 beg., >200 years		0.0804**	(2.23)		0.0202**	(2.14)	0.0199 (0.59)
>3 beg., >200 years		-0.137*	(-1.82)		-0.0379*	(-1.86)	-0.0569* (-1.80)
Total time with a beg. (centuries)		0.00565*	(1.76)		0.00139	(1.61)	0.00152 (0.60)
Observations		2507			2507		2507
Panel B: Excluding on-going beguinages							
Beg. (0/1)	0.0522**	(2.41)	0.0724***	(3.76)	0.0200***	(4.22)	0.0264** (2.08)
No beg.	Ref.		Ref.		Ref.		Ref.
1 beg., <200 years	0.0315	(1.11)	0.0459**	(2.14)	0.0148**	(2.38)	0.0142 (0.89)
1 beg., >200 years	0.0715**	(1.97)	0.116***	(3.29)	0.0303***	(4.16)	0.0433** (2.13)
>1 beg., >200 years	0.0344	(0.69)	0.103***	(2.82)	0.0275***	(2.82)	0.0421 (1.31)
>3 beg., >200 years	0.127**	(2.07)	-0.121	(-1.50)	-0.0329	(-1.49)	-0.0395 (-1.17)
Total time with a beg. (centuries)	1.230**	(2.30)	0.00488	(1.27)	0.00126	(1.22)	0.00330 (1.23)
Observations	2507		2507		2507		2507

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	(1)		(2)		(3)		(3)	
	Agr. wage		Lit. Eq. Index		F. Lit. Share		F. Lit. Index	
	Panel C: Distance to closest beguinage							
Beg (0/1)	0.0415**	(2.08)	0.0755***	(4.41)	0.0210***	(4.71)	0.0256**	(2.06)
No beg. Ref.		Ref.		Ref.		Ref.		
1 beg., <200 years	0.0313	(1.08)	0.0424*	(1.91)	0.0138**	(2.13)	0.0131	(0.77)
1 beg., >200 years	0.0443	(1.57)	0.109***	(4.41)	0.0289***	(5.31)	0.0367**	(2.18)
>1 beg., >200 years	0.0313	(0.66)	0.0995***	(2.76)	0.0268***	(2.77)	0.0398	(1.23)
>3 beg., >200 years	0.110*	(1.97)	-0.126	(-1.60)	-0.0339	(-1.57)	-0.0432	(-1.29)
Total time with a beg. (centuries)	0.00884**	(2.05)	0.00727**	(2.29)	0.00197**	(2.29)	0.00343	(1.40)
Observations	2507		2507		2507		2507	

t statistics in parentheses. Robust standard errors clustered at the canton level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

This Table presents, in Panels A), B), and C), the results of OLS regressions analysis, at the municipal level, of of the logarithm of female-to-male agricultural wages on the presence of beguinages, in Column 1), and of female-to-male literacy ratios on the presence of beguinages, in Columns 2), 3) and 4). Column 2) use as indicator of female agency the variable *literacy equality index_i*, in Column 3) it is attested using *female literacy share_i* and in Columns 4) gender equality is proxied by *literacy index_i*. Panel A) establishes that results are robust to the inclusion of male literacy rates as explanatory variable, thus ruling out women catching up with men. Panel B) shows that results are not caused by on-going beguinages by removing municipalities where an on-going beguinage was present at census time. Panel C) demonstrate that results are robust to the inclusion of distance to the closest beguinage as explanatory variable. Column 1) includes arrondissement fixed-effects and Columns 2), 3) and 4) regional fixed-effects.

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