Examining Cross-Border Influences on Family Dynamics: An Analysis of Non-Marital Birth Rates in the France-Belgium-Luxembourg Border Region (1968-2017)

Background

In Europe since the 1960s, the marked increase in births outside marriage is often identified as a major socio-demographic change (Kiernan, 2004). Some researchers consider the increase in non-marital births to be one of the most important phenomena of contemporary family change, particularly because it represents a break with previous family models (Perelli-Harris et al., 2010). Though non-marital births had already existed in Europe in the 19th century (Shorter et al., 1971), however the past decades have seen an unprecedented increase in this behaviour, reaching levels never seen before with more than 50% of all new-born children being born to non-married women (Kiernan, 2004; Kok, 2009). Cohabiting couples in many countries now enjoy nearly the same legal rights as married couples, reflecting broader shifts in societal acceptance and legal recognition of diverse family forms (Perelli-Harris et al., 2012). In order to understand these family changes in Europe and Western societies, including births outside marriage, numerous theories have emerged and with them a rich empirical literature (Zaidi & Morgan, 2017). These include cultural theories such as the Second Demographic Transition (Lesthaeghe & Van de Kaa, 1986) or the Developmental Paradigm (Thornton, 2001), economic theories (Becker, 1981; Perelli-Harris et al., 2010) and theories based on gender relations such as the Gender Revolution (McDonald, 2000).

Compared to all the aspects of family change analysed in the existing literature, the spatial dimension of these phenomena is certainly one of the least studied, especially studies with a spatio-temporal approach. Studies have explained the spatiotemporal variation in family changes across Europe explaining variation not only exists between countries but also within countries as well (Bleha & Ďurček, 2019; Caltabiano et al., 2019; Klüsener et al., 2013). Few studies have also attempted to explain the spatial diffusion of many aspects of family changes, as in Norway (Vitali et al., 2015) and France (Doignon, 2021). These studies highlight the importance of geographical proximity and urban hierarchy. Moreover there are studies which explain strong geographic divides of non-marital births along borders in Europe (Klüsener et al., 2013). Studies have also evidenced that state and regional borders play a decisive role in explaining the demographic processes as they can constitute strong geographic divides in terms of jurisdiction, cultural and socio-economic conditions (Bocquet-Appel & Jakobi, 1996; J.-M. Decroly & Grasland, 1993; J. M. Decroly & Vanlaer, 1991; Watkins, 2014). While explaining non-marital fertility trends across Europe since 1960, Klüsener et al. (2013), examined the role of states, regions, and their borders in shaping spatial patterns of non-marital fertility. Borders are often spatial discontinuities in the sense that the similarity of regions on either side of the border decreases sharply. As a result, neighbouring regions or countries may have very different levels of non-marital fertility. Even if the intensity of these spatial discontinuities has changed since 1960, nation states and their borders continue to be very important for describing non-marital fertility.

The literature shows that there is spatial diffusion of non-marital births and national and regional border represents spatial discontinuities. The role of national and regional borders as spatial discontinuities in Europe are often studied separately, despite their clear interconnections. Borders can act as barriers to the spread of non-marital births, reinforcing spatial discontinuities that may change or diminish over time. Few studies, like Bleha and Ďurček (2019), have examined how borders affect the spatial diffusion of family changes, but they do not specifically focus on non-marital births. Existing research often lacks a dynamic, spatio-temporal approach and fails to meet key methodological conditions, such as using fine geographic levels, extended timeframes, and multi-country comparisons. This article addresses these gaps by analysing the interaction between borders and the spatial diffusion of non-marital births in Europe. Here, we have chosen the border between France, Belgium and Luxembourg. It is an ideal study area for analysing the relationship between borders and the spatial diffusion of non-marital births. This study area is original in that it contains several different types of border within a small area. Classically, there is the national border between France and Belgium, France and Luxembourg and Belgium and Luxembourg. The linguistic border that divides Belgium into the French-speaking and Flemish-speaking areas. There is a third type of border, on the section of the border between France and Belgium that runs from the Channel to the Lille conurbation, which has the peculiarity of being both a national and a linguistic border. This section of the border separates two different countries, but the populations on either side do not speak the same language (French on the French side, Flemish on the Belgian side). There is also another border in Belgium, which separates Wallonia (French speaking) and German speaking municipalities. Finally, the data available in these three countries make it possible to study non-marital births both at a local geographical level and over a period of

almost half a century (since 1968). It allows us to include the beginning of the diffusion of the phenomenon in both countries. This study area makes it particularly original in relation to the literature. It offers the ideal methodological conditions for testing original hypotheses on the relationship between borders and spatial diffusion, which have never been tested before, either for non-marital births or for any other family change.

Data and Methods

For France and Luxembourg, we have used the data from Civil Registries from 1968 to 2017. For Belgium, we have used the data from Civil Registries from 1968 to 1997, and the data from both the Belgian National Register from 1997 to 2017. The Civil Registries of these countries and the Belgian National Register offer a unique and valuable data source for studying demographic trends due to their high quality, long-term coverage, and detailed annual frequency. One of the main advantages of using these data is that they are available at a very detailed geographical level (municipalities). It enables researchers for a detailed analysis of demographic shifts and trends across different geographical settings and precisely tracking spatial diffusion of demographic behaviours.

The indicator we used is the percentage of non-marital births among all live births. This measure is crude because it does not control for the structure of the population, such as the age structure or the number of married and unmarried women in the regions (Klüsener et al., 2013). Unfortunately, we are forced to use this indicator because the data do not allow us to obtain a better indicator covering the whole period studied, such as the proportion of first births within cohabitation. The percentage of non-marital births is calculated at a local level for each country: the municipalities in Belgium, cantons in Luxembourg and the "cantons-villes" in France. Over the period, there has been alteration in the administrative regional divisions. We retain the territorial breakdown of 2017 for all previous years. This means that the territorial breakdown is constant over time and the number of territorial units remain the same over the entire study period. To further limit statistical variability, annual data are aggregated over 5-year periods, forming a dataset that spans ten periods.

To show the spatial diffusion process, we employ a series of ten descriptive maps, each representing a five-year interval for the whole of Belgium, Luxembourg and the part of France, which shares its border with Belgium. Each map is standardized using a common discretization of values, facilitating comparative analysis across the different periods. Since the distribution of non-marital cohabitation rates is uniform, we use the method of discretisation by equal amplitude classes. The colour pattern remains the same for all periods.

Further, we are interested in explaining the link between the borders and the spatial diffusion of non-marital births. To make it easier, we distinguished several borders: the national borders between the countries (3 borders), the linguistic border between the Flemish-speaking area (*i.e.* Flanders) and the French-speaking area (Wallonia), the France-Flanders border, the France-Wallonia border and the Wallonia-German community border. To study the barrier effect, we measure spatial discontinuities. Here, we examine the first-order differences in non-marital births, which are defined as the absolute difference in the rate of non-marital birth calculated as follows:

$$b_{ij} = |y_i - y_j|$$

Where, b denotes the absolute first-order difference for each pair of region i and neighbour region j.

We calculate this absolute difference for all regions in the France-Belgium-Luxembourg border area and we represent them on the maps by red lines, the thickness of which depends on the intensity of the spatial discontinuity. This shows the extent to which spatial discontinuities are (or are not) found along the different boundaries defined above. The resulting synthesis maps thus represent both the mechanisms of the spatial diffusion process and the spatial discontinuities, providing a holistic view of the evolution of non-marital births in this border region. Then, we differentiate the absolute difference in the rate observed between regions divided by state borders as well the regional borders. Here, the border analysis takes into account the contiguous borders shared by a region. To identify, among all the borders within the cross-border area (defined earlier), which border represents the strongest barrier to the diffusion of non-marital births, we plotted the median of the absolute difference in non-marital births of each border from 1968-2017. This analysis further helps us to find the specific borders on maps that play an important role in the pattern of spatial divides in non-marital births.

Preliminary Findings

The maps (Fig 1) shows the evolution of both non-marital births in the France-Belgium-Luxembourg border area and spatial discontinuities since 1968. From 1968-72, non-marital birth rate was low in the entire study area. The regions where proportion of non-marital births had reached more than 10% in France are easily identifiable and

are scattered in a few local pockets in the Eastern part. We note that the rate was higher (more than 10%) in largest cities such as Metz, Nancy, Lille, and cities at the top of the urban hierarchy (Saint-Quentin, Boulogne-sur-Mer). However, during the same period, the rates in Belgium and Luxembourg were very low, and the maximum was around 10%. Since 1973-77, we see a striking geographic pattern in the diffusion of non-marital births in France. During this time, regions with higher values of non-marital births are in close proximity with each other and there is a clustering in the northern part of France. However, there was little change over this period in Belgium and Luxembourg, where most regions had very low levels (below 6%). Borders do not represent a spatial discontinuity.

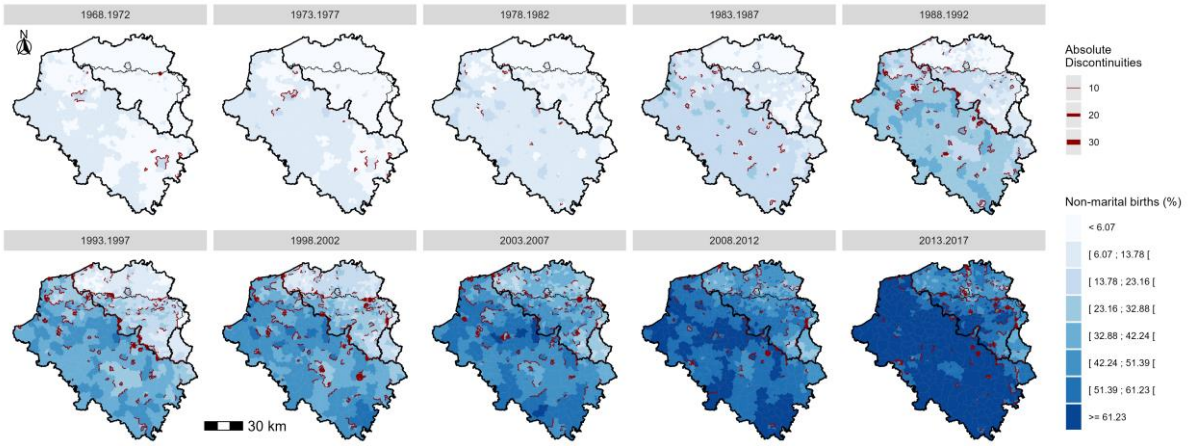
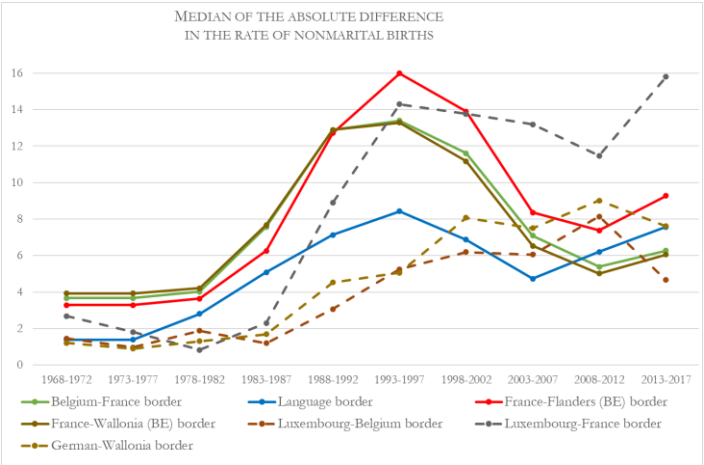


Fig 1: Spatial Discontinuity in Non-marital Birth (France-Belgium-Luxembourg Border)

The process of spatial diffusion continued between 1978 and 1982 in all the three countries. In France, urban areas are characterised by a higher rate than rural areas, which are nevertheless experiencing an increase in non-marital births due to geographical proximity. Lille, the largest city in the study area, had the highest rate at around 23%. During this time in Belgium and Luxembourg, we see the onset of diffusion process with several territories where the rate of non-marital births has risen slightly to over 6%. They are diffusing by geographical proximity in the industrial basins and in the northern half of Wallonia (French-speaking), especially from the large cities (Mons, Charleroi, Namur, Liège). These regions are among the most secularised and have the lowest levels of church attendance in the country. They are also beginning to increase in Flanders, in the two main Flemish cities (Ghent and Antwerp) and along the coast, to more than 6%. In Luxembourg, a rate over 6% is found in the main canton of Luxembourg. Spatial discontinuities are still few. From 1983 to 1987, France saw high rates of non-marital births (>10%) in most regions, with emerging spatial discontinuities around cities and borders. Between 1988 and 1992, non-marital births spread across all areas, with increasing spatial discontinuities. By 2013-2017, the trend continued with very high rates (>60%), a reversal where rural areas surpassed cities in birth rates, and decreasing border discontinuities. In Belgium, from 1983 to 1987, non-marital births were increasing in Wallonia, particularly around Brussels, while diffusion in Flanders remained limited. By 1988-1992, diffusion expanded in both regions, especially after a 1987 law change, with growing spatial discontinuities. From 2013 to 2017, non-marital births continued to spread, particularly in Wallonia, with a slower increase in conservative regions, an urban-rural reversal, and a persistent discontinuity along the French-Flemish border. In Luxembourg, in 1983-87, the cantons along the French border started showing an increase; however, the rate was around 7% for most of the cantons. In 2003-07, most of the cantons showed a rate more than 25% and in the subsequent years, the non-marital birth rate for the cantons increased to 40%.

We also calculated the median absolute difference in non-marital birth rates for each five-year periods for all the defined borders. First, there is the same bell-shaped pattern for all borders. The median absolute difference falls and then rises again over the last 5-10 years. This trend reflects the barrier effect of borders in the spatial diffusion of non-marital births. In simple terms, rates rise and diffuse earlier on one side of a border, for example in France before Belgium, and in Wallonia and Brussels before Flanders. However, when spatial diffusion comes



close to a border, it does not automatically cross it immediately. The median absolute difference along the language border in Belgium ranged from 1.39 in 1968-1972, reaching almost 8.4 in 1993-97, declining to almost 4.7 in 2003-2007 and again increasing reaching almost 7.5 in 2013-2017. The increase in the median absolute difference on this border was the earliest, occurring between 1978 and 1982, compared with 1983 and 1987 for the other borders. This early increase is due to the earlier diffusion of non-marital births in Brussels and Wallonia, particularly in the industrial areas of the northern half of the country. Language border did serve as a barrier in the spatial diffusion of non-marital births as we could see the Flanders has seen an increase in non-marital births much later than the French-speaking Wallonia region. In the recent years we see a higher absolute difference for Luxembourg-France border showing higher spatial discontinuity along the border.

Conclusion

The spatial dynamics of non-marital births in France, Belgium and Luxembourg over the past fifty years provide a fascinating study of how non-marital births have evolved over time and diffused across space. The evolution of border effects, coupled with urban-rural disparities and the broader European socio-political context, has shaped the landscape of non-marital births in complex and varied ways. Understanding these patterns not only contributes to our knowledge of demographic and social changes but also offers insights into the continuing evolution of family behaviours in Europe. This research contributes significantly to our understanding of demographic trends in Western Europe, particularly concerning non-marital births. It highlights the role of spatial diffusion, cultural shifts and policy frameworks in explaining the spatial dynamics of demographic behaviours as discussed in earlier studies.

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