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Abstract

This paper studies contextual effects on fertility at the onset of fertility decline in Sweden. We argue that the community exerts an influence on fertility when individuals belonging to a certain community are more similar to one another (within-area) in their reproductive behaviour than individuals living in another community (between-area). Our hypotheses are that community had a strong influence in the past but that it decreased over time as more individualistic values grew in importance. We expect that the community exerted a greater impact in the low socioeconomic groups as the elite were less constrained by proximity and, therefore, more exposed to new ideas crossing community borders. Using micro-census data from 1880, 1890, and 1900, we use multilevel analysis to estimate measures of intra-class correlation within areas. We measure net fertility by the number of own children under five living in the household to currently married women with their spouses present. Parish is used as proxy for community. Our results indicate that despite average differences in fertility across parishes, the correlation between individuals belonging to the same community is less than 2.5% i.e., only a negligible share of the number of children observed is attributable to true community effects. Contrary to our expectation, we do not find any substantial change over time. However, as expected, community has a greater impact in the low socioeconomic groups. Our findings suggest that it is *who you are rather than where you live* which explains fertility behaviour during the initial stages of the transition.

Keywords: fertility transition; geographical differences, contextual effects

Introduction

Together with the mortality decline, the fertility transition is one of history's greatest discontinuities, a change similar in magnitude to the industrial or Neolithic revolutions, with enormous impacts on the lives of ordinary people. Certain recent scholarship has even considered it an important trigger for the transition from Malthusian stagnation to modern economic growth (Galor 2011; see also Guinnane 2011). Attempting to describe and explain fertility dynamics in historical contexts involves directly or indirectly engaging with fundamental debates regarding the causes of the historical fertility transition, and this has been one of the main tasks of demographers. Large-scale projects such as the European Fertility Project (EFP) have made substantial contributions to our understanding of the fertility transition, but considerable controversy remains, and much of the empirical picture is blurred. There has long been a debate over whether the transition was primarily a response to changing socioeconomic structural conditions (adjustment) or a result of new attitudes, norms and behaviours spreading at approximately the same time in many regions of Europe (innovation diffusion) (Carlsson 1966). Empirical evidence has been obtained in support of both views, although the EFP largely dismissed the adjustment explanations (see, e.g., Coale and Watkins 1986; Cleland and Wilson 1985; Galloway, Lee and Hammel 1994; Brown and Guinnane 2002; Dribe 2009).

The difficulty of empirically disentangling the ultimate causes of the historical fertility transition has led to seek for informative levels of analysis with the aim of better interpreting the process through which demographic dynamics may have operated in the past and may be responsible for changes in the present. Geography, either analysed in the form of a rural-urban differentials (e.g., Coale and Watkins 1986, Sharlin 1986) or of a spatial distribution (e.g., Garret et al. 2001; Lesthaeghe and Lopez-Gay 2013; Szreter 1996), has been considered an important dimension from which to obtain evidence. In fact, spatial patterns in fertility have been, implicitly or explicitly, suggested as indicating diffusion processes, representing community effects on individual behaviour. However, such contextual effects are important in their own right as they imply the inclusion of a meso level of analysis which links macro-social structures and micro-demographic behaviour, thereby overcoming the simplistic interpretation of social dynamics as driven either by structural or individual forces. The recognition of contextual informative levels has led contemporary studies to identify to what extent where people live is of relevance to understand individual decisions. However, the investigation of contextual effects involves a series of theoretical and methodological considerations that go beyond the analysis of between-area differences in average fertility levels, and instead of focusing on the within-area correlation (i.e., clustering).

Our aim is to study fertility behaviour during the early phase of the fertility transition in Sweden by applying multilevel models to micro-level census data covering the entire population (full counts from three different censuses). Our approach is to examine general contextual effects on fertility behaviour to obtain empirical evidence that the communities in which individuals resided had an independent effect on their fertility outcomes. In other words, we ask whether the community had an independent impact on fertility behaviour in addition to measurable individual- and family-level variables. Such an impact would be clear evidence of community effects on fertility and would indirectly support the hypothesis that innovation-diffusion was important in the process of fertility decline. However, lack of community effects cannot in the same way be seen as evidence against innovation diffusion, since it does not capture social interaction within networks stretching over vast geographical distances.

Theoretical background

There is agreement among social scientists regarding the importance of intermediate social contexts in the adoption -and reproduction- of social behaviours as they link macro-social structures and micro-individual actions (Colleran et al. 2014). The recognition of multi-level processes has led to a growing interest in identifying and measuring contextual effects mainly, but not only, in the form of neighbourhood effects. Thus, voting preferences (Pattie and Johnston 2000), (non)migration decisions (Irwin et al. 2004) or secondary school enrolment (Bobonis and Finan, 2009) are some examples in which contexts matter to determining individual actions. In relation to fertility decisions, contemporary studies also provide evidence that local contexts play an important role (e.g., Kulu and Boyle, 2007; Goldstein and Klusener 2010; Boyle et al. 2007).

In the historical context, the geographical variation of fertility behaviour has been understood in terms of contextual effects; that is, geography has been interpreted as a unit of analysis of interest in its own right beyond the individual characteristics of the subjects that belong to those areas. In this line, substantial geographical differences in fertility decline have been shown within countries also after controlling for compositional differences in social structure, age, etc. (see e.g. Garreth et al. 2001; Dribe and Scalone 2014). The recognition of this independent effect in fertility decisions has in fact driven more recent studies to account for geographical information in order to capture potentially unmeasured factors. Moreover, adjusted residual geographical variation on fertility behaviour has been mainly explained as driven by cultural dynamics. For example, Szreter (1996) argued that the new reproductive discourse spread not only socially but also geographically producing strong geographic differences in fertility decline. In the same line, comparing England and France, Lesthaeghe (1980) discussed differences in regional diversity in the decline in terms of different local subcultures related to secularization. These subcultures were assumed to have exerted considerable influence on the reproductive decisions of families, thereby having a direct impact on the timing of fertility decline (see also Lesthaeghe and Lopez-Gay 2013).

The possible link between geography and culture has even been interpreted for some authors as a confirmation of the innovation-diffusion theory over the structural explanation of fertility decline (Palloni, 2001), since geographical variation may suggest the existence of a common dimension (community) beyond the position that individuals occupy within the social structure. However, although contextual effects may be interpreted as an indication of community effects driven by cultural dynamics, this evidence cannot be used to reject innovation-diffusion over structural explanations because culture may be a collective expression of socioeconomic transformation. In this line, Casterline states that even if changes in the economic structure may drive fertility behaviour, one cannot expect that those changes directly affect individual decisions (Casterline 2001). Therefore, culture may be in the pathway between macro-level structures and micro-level behaviours.

In a classic study, first published in 1962, Rogers (2003) outlined a theory of innovation diffusion in which he contended that changes in attitudes toward an idea operate through interpersonal communication within a social system. The social system, defined as a group of interrelated units which join to accomplish a common goal, has a social structure that, through norms, establishes the expected behaviour of its members. Therefore, innovation-diffusion processes operate within an already existing social unit. In this sense, the idea of social system is related to the understanding of “community” developed by the German sociologist Ferdinand Tönnies (2001) who, studying the modernization process, distinguished between community (Gemeinschaft) and society (Gesellschaft). While modern society promotes individualization, community is defined by social bonds and institutions, such as the church or the family, which promote social cohesion. In this context, the community may influence reproductive behaviours by either creating structural opportunities to engage in a particular behaviour or giving rise to social preferences that apply generally. Within a community, the adoption of new behaviours not only depends on the actor's own situation or characteristics but also on the behaviours of other immediate actors (Hedström 1994) belonging to the social system.

The idea of community therefore is indistinguishable from the idea of clustering because people who live in a certain community are expected to behave (and react) similarly to people living in another community. The connection between these two (community and clustering) has been explicitly formulated by considering that the existence of strong clustering of fertility levels along cultural lines could be evidence of either diffusion of a new behaviour (adoption of contraception and a low fertility norm) in areas with lower than expected fertility (structural changes), or of resistance to the new behaviour (rejection of birth control and adherence to a high fertility norm) in areas with higher than expected fertility (Palloni, 2001: 72). Indeed, Palloni interprets geographical variations in fertility levels as a confirmation of the importance of innovation-diffusion in explaining fertility change. However, the assumption that the between-areas level is an indication of within-area effects (clustering) cannot be taken for granted. In fact, the lack of systematic empirical evaluation of both average and individual level variation is a common limitation in the literature.

In this study we are particularly interested in the importance of the parish level since, although it has gradually lost its meaning over time in view of the process of rationalization inherent to modernization, it may represent a good proxy for the community level. The parish was a clerical unit organized around a church; hence, parishioners shared the same clergy -- which could be assumed to be important for innovations in birth control. Moreover, going to the same church every Sunday meant that people socialized with other parishioners on a regular basis. This makes the parish a theoretically relevant unit for studying the impact of social interaction and culture (e.g. Watkins 1990; Kohler 2001). In this regard, the parish is, from a sociological perspective, the formalization of the community beyond a simple administrative unit. But although community is not necessarily linked to any particular geographical or spatial level, community and certain levels of geography may overlap, especially in historical periods when the way individuals related to their peer networks was more influenced by proximity. In geography, diffusion processes are often considered to be strongly spatially determined, intimately linked both to the spread of information and barriers to the acceptance of new ideas (e.g., Hägerstrand 1953). In this sense, the historic fertility transition was quite different from that in the developing world, where rapid and efficient communications, for example through mass media, might well have had an important impact on changing attitudes toward family and childbearing (see Caldwell 1982; Hornik and McAnany 2001).

We study the importance of community-level influence on individual fertility behaviour over and above individual characteristics. We are interested in analysing the difference that place makes in understanding the fertility decline beyond what is in a place (composition). We assume that the community affects fertility behaviour when individuals belonging to a certain community are more similar to one another in their reproductive behaviour than individuals living in another community. This suggests that within-community variation is fundamental to understanding the relevance of the community in determining fertility behaviour.

We study general contextual effects over time (1880, 1890 and 1900) during the first 20 years of the fertility decline, which coincides with a broad modernization process including not only economic but also cultural change (Dribe 2009). In this context, we hypothesize that attitudes about childbearing became less affected by the community over time as individualistic values grew in importance (Lesthaeghe and Wilson 1986). Further, we hypothesize that the effect of the community on fertility behaviour varies depending on socioeconomic status, to the extent that the elite were less constrained by proximity and, therefore, more prone to be exposed to new ideas crossing community borders. Therefore, we expect that the community modifies the individual-level association between socioeconomic status and fertility.

Data

We use micro-level data from three different Swedish censuses (1880, 1890 and 1900). These data were digitized by the Swedish National Archives and published by the North Atlantic Population Project (NAPP, see Ruggles et al. 2011; Sobek et al. 2011), which employs the same format as the Integrated Public Use Microdata Series (IPUMS). We have used the original data coded by the Swedish National Archives within the project SweCens (. The editions of the censuses in 1880, 1890 and 1900 were all produced and encoded according to NAPP principles (Swedish National Archives 2012). All registered individuals are grouped by household. In this way, each individual record reports the household index number and the personal index number within the household. The age, marital status and sex of each person are also registered. Migration status distinguishes whether a person was born in the same county of residence or in another county or country. There are family pointer variables indicating the personal number of the mother, father, or spouse within the household, making it possible to link each woman to her children and husband. The husband-wife and mother-child linkages are reliable as the original Swedish censuses identified each nuclear-family unit and each individual’s position within the unit: *far* (father), *mor* (mother), barn (child) and *ensamstående* (solitaire) (see, Swedish National

Archives 2012). In total, the 1880 census counts approximately 4.6 million individuals in 1.2 million households from 2,530 parishes in 24 counties, while the corresponding figures in the 1890 and 1900 censuses are 4.8/1.3 and 5.2/1.4 million, respectively.

We measure fertility by the number of own children under five living in the household rather than the number of children ever born. We also limit the sample to currently married women with their spouses present. It is therefore an analysis of net marital fertility, or reproduction, rather than an analysis of marital fertility. In a previous study, we compared this type of child-woman ratio to other standard fertility measures (e.g., total marital fertility rate), as well as to another indirect method (the own-children method). We demonstrated that the unadjusted child-woman ratio indicated socioeconomic differentials in gross, or total, fertility very well (Scalone and Dribe 2012; see also Dribe and Scalone 2014). In many ways, this is a more informative measure of fertility, as we expect the number of children surviving to have been what families cared about, rather than number of births. Although some of the fertility transition came about to offset reduced mortality (e.g., Galloway et al. 1998; Reher 1999; Reher and Sanz-Gimeno 2007; see also Dyson 2010), it is obvious that the decline in net-fertility was much more important in the long run (Haines 1998).

Descriptive statistics of the three census datasets are presented in Table 1. We have approximately 600,000 married women (aged 15-54) in each census. The analysis includes measures at the individual and family levels and the county and parish levels. We measure socioeconomic status (SES) by the occupation of the husband. All occupational notations are coded in HISCO (Van Leeuwen, Maas and Miles 2002) within the SweCens project of the Swedish National Archives. Based on HISCO, we classify occupations into different classes following HISCLASS, which is a 12-category classification scheme based on skill level, the degree of supervision, whether manual or non-manual, and whether urban or rural (Van Leeuwen and Maas 2011). It contains the following classes: 1) Higher managers, 2) Higher professionals, 3) Lower managers, 4) Lower professionals and clerical and sales personnel, 5) Lower clerical and sales personnel, 6) Foremen, 7) Medium-skilled workers, 8) Farmers and fishermen, 9) Lower skilled workers, 10) Lower skilled farm workers, 11) Unskilled workers, and 12) Unskilled farm workers. In 1880, approximately 41% belong to the farmer group, while this figure declines to 38% in 1890 and 32% in 1900. A similar decrease occurs for farm workers, whereas the proportion of skilled workers, managers and professionals increase.

Table 1 here

It is not straightforward to measure the employment status of the woman because of the problem of farming. Including all wives in the farming sector as employed would yield much higher estimates than those presented here, where we only include occupations noted in the sources (i.e., we do not consider "wife" as an occupation). For example, only about 0.5% of all married women in the age group 15-54 was gainfully employed outside the farm circa 1900 (see Table 1). According to the 1920 census, the corresponding figure was 4% (Silenstam 1970:56). Most likely, a large number of married women performed various types of work to supplement family income without this being recorded in the sources.

We include four different community-level indicators measured at both the county and parish levels: the proportion of industrial workers in the male population aged 15-64; the number of teachers in basic education per 100 children of school age (7–14); the number of single women participating in the labor force relative to the unmarried female population aged 15–64; and the proportion of immigrants from early-decline counties in the total population. All counties in 1880, 1890 and 1900 with a Coale-Trussel "m" greater than 0.2 (which is commonly taken to indicate the presence of parity-specific birth control) are considered early-transition counties (Coale and Trussel 1974, 1978; data from Dribe 2009). To account for possible non-linear effects, we transform these indicators into categorical variables for low (first quartile), middle (second and third quartiles) and high (fourth quartile) levels.

Methods

We operationalize community by parish of residence. Originally, the parish was a clerical unit organized around a church. Thus, parishioners shared the same clergy, which could have been important for innovations regarding birth control. Moreover, as already mentioned, attending the same church every Sunday meant that individuals socialized with other parishioners on a regular basis, which provided an arena for social interaction and influence. The parish also addressed issues such as poor relief and schooling, and the parishioners interacted at the parish assembly (*sockenstämman*), discussing these and other matters (see, e.g., Aronsson 1992). This makes the parish a theoretically relevant unit for studying the impact of social interaction or culture in the context of late nineteenth century Sweden (cf. Watkins 1990).

Multilevel Linear Regression Analysis (MLRA) is used to model the number of surviving children (aged 0-4) of married women (aged 15-54) (first level) nested within parishes (second level) and parishes within counties (third level). We include the county level as a comparison, and if the hypothesis regarding strong community effects on fertility behavior were correct, we would expect much stronger contextual effects at the parish level than at the county level, as county was merely an administrative construct which cannot be argued to have constituted a community.

MLRA is an appropriate methodology for the analysis of hierarchical data (i.e., individuals nested within the same context) and a suitable method to distinguish between general and specific contextual effects (Duncan et al. 1998, Subramanian 2004), the former of which are expressed as measures of variance or intra-class correlation (Merlo et al. 2005a; Merlo et al. 2009). A measure of intra-class correlation provides us with an idea of the similarity existing between individuals who share a particular context and, therefore, provides the multilevel dimensions that exist behind the social phenomenon under study. Technically, by including a random-term intercept at the community level, MLRA estimates not only the difference between the levels of fertility (mean) in each community with respect to the national mean but also the individual variation existing *within* the community with respect to the overall mean of the community.

We estimate three consecutive models. Model 1 (null model) only estimates the national average number of children per woman and the intercept variance at the mother (σ^2_m), parish (σ^2_p) and county (σ^2_c) levels. MLRA accounts for the interdependence of observations by partitioning the total variance into the different components (levels) studied (Browne et al. 2005; Merlo et al. 2005a).

Level 1: $Y_{ijk} = \beta_{0jk} + e_{0ijk}$

Level 2: $\beta_{0jk} = \gamma_{00k} + u_{0jk}$

Level 3: $\gamma_{00k} = \psi_{000} + v_{0k}$

Where Y_{ijk} is the number of children per woman for individual *i* in parish *j* and county *k;* β_{0jk}; γ_{00k} and ψ_{000} are random intercepts for level 1 (mother), level 2 (parish) and level 3 (county), respectively; and e_{0ijk}, u_{0jk} and v_{0k} are level 1, 2 and 3 random effects, respectively.

Model 2 extends model 1 by including observed individual variables to account for possible compositional confounding and to obtain a better estimation of the variance in the number of children between parishes and counties.

$$\text{Level 1:} \quad Y_{ijk} = \beta_{0jk} + \beta_{1jk}\mathbf{X}_{ijk} + e_{0ijk}$$

$$\text{Level 2:} \quad \beta_{0jk} = \gamma_{00k} + u_{0jk}$$

$$\text{Level 3:} \quad \gamma_{00k} = \psi_{000} + v_{0k}$$

Where $\beta_{1jk}\mathbf{X}_{ijk}$ are level 1(individual) predictors (see table 1).

Model 3 is further extended to include observed variables at the parish and county levels:

$$\text{Level 1:} \quad Y_{ijk} = \beta_{0jk} + \beta_{1jk}\mathbf{X}_{ijk} + e_{0ijk}$$

$$\text{Level 2:} \quad \beta_{0jk} = \gamma_{00k} + \gamma_{01k}\mathbf{W}_{jk} + u_{0jk}$$

$$\text{Level 3:} \quad \gamma_{00k} = \psi_{000} + \psi_{001}\mathbf{Z}_{k} + v_{0k}$$

Where $\gamma_{01k}\mathbf{W}_{jk}$ and $\psi_{001}\mathbf{Z}_{k}$ are level 2 (parish) and level 3 (county) predictors, respectively (see table 1).

To assess the possibility that the effect of community on fertility varies by SES we estimate a set of random slope models to estimate the variance at the parish level as a function of SES). Estimates are made using Restricted Iterative Generalized Least Squares (RIGLS, Goldstein, 1989). To assess the extent to which each level of analysis (mother, parish and county) explains the individual differences in the number of children per woman (i.e., the 'importance' of each level in understanding the differences in the number of children per woman), we calculate the Variance Partition Coefficient (VPC) which is a measure of the proportion of the total variance in the number of children per woman that is explained at each particular level:

$$VPC_c = (\sigma^2_c / (\sigma^2_c + \sigma^2_p + \sigma^2_m)) *100$$

$$VPC_p = (\sigma^2_p / (\sigma^2_c + \sigma^2_p + \sigma^2_m)) *100$$

$$VPC_m = (\sigma^2_m / (\sigma^2_c + \sigma^2_p + \sigma^2_m)) *100$$

Where σ^2_m, σ^2_p and σ^2_c are the variances at the mother, parish, and county level, respectively. We also calculate the intra-class correlation, which is a measure of individual variation, to determine the correlation within a community with respect to number of children per woman (Merlo et al. 2012).

The proportional change in variance (PCV) assesses the extent to which differences in the number of children are attributable to geographical influences or differences in the individual and contextual composition of the geographic units (Merlo et al. 2005b). It indicates the proportional decline in the variance after including additional variables in the model. The PCV is obtained as follows:

$$PVC_c = ((\sigma^2_{c\text{-model\_null}} - \sigma^2_{c\text{-model\_co}})/ \sigma^2_{c\text{-model\_null}}) *100$$

$$PVC_p = ((\sigma^2_{p\text{-model\_null}} - \sigma^2_{p\text{- model\_co}}) / \sigma^2_{p\text{-model\_null}}) *100$$

$$PVC_m = ((\sigma^2_{m\text{-model\_null}} - \sigma^2_{m\text{- model\_co}}) / \sigma^2_{m\text{-model\_null}}) *100$$

Where $\sigma^2_{m\_model\_null}$, $\sigma^2_{p\_model\_null}$, and $\sigma^2_{c\_model\_null}$ are the variances at the mother, parish, and county level, respectively, estimated for the null models, and $\sigma^2_{m\_model\_co}$, $\sigma^2_{p\_model\_co}$, and $\sigma^2_{c\_model\_co}$ are the corresponding variances estimated for the models including additional variables.

We also plot the shrunken parish- and county-level residuals. Shrunken residuals are calculated by multiplying the row residuals at each level by a shrinkage factor, which is (for the parish level) the parish variance divided by the parish-level variance plus the individual-level variance over the number of individuals in the parish:

$$\text{Shrinkage factor} = \sigma^2_{p} / \sigma^2_{p} + (\sigma^2_{m}/n_{j})$$

The shrunken residuals reveal how each specific level (parish or county) differs from the overall country mean (Rasbash et al. 2012). The analyses are performed using the statistical package MLWIN 2.26 (Centre for Multilevel Modelling, University of Bristol, UK).

Results

Before turning to our main analysis, some brief comments will be made regarding the fixed component of the model (all estimates are displayed in appendix table A1). Overall, the individual-level variables have the expected signs, and the magnitudes are also quite sizable. For example, higher SES is related to lower net fertility, although there is not a perfect gradient. The upper and upper-middle classes experience an earlier decline than the working classes, and this difference persists throughout the early phase of the fertility decline. Employed women have lower net fertility than women without a registered occupation, and in most cases, migrants have lower net fertility than non-migrants. The community-level variables also have the expected signs in most cases, but the coefficients are generally small, indicating a weak association between observable factors at the parish and county levels, on the one hand, and net fertility on the other.

Turning to the main focus of our analysis, figures 1-3 depict the parish and county of residence ranked according to the average number of children (0-4) per woman for the null and the full model for each year (1880, 1890 and 1900). The overall population average is represented by a grey horizontal line, and the shrunken residuals and their 95% confidence intervals for each parish and county obtained from the multilevel regression are represented by vertical lines. In all cases, most parishes and counties differ on average from the national mean, which suggests a geographical variability in the number of children per woman across the country. Following the innovation-diffusion explanation, the areas with high fertility levels are assumed to have taken longer to adopt birth control strategies than those with low levels. Without assessing measures of variation, this result may suggest the existence of community effects on fertility.

Figures 1-3 here

As expected, once adjusted by individual and contextual characteristics, the average number of children per woman between parishes and counties are closer to the mean of Sweden, and their confidence intervals are larger than in the null model (i.e., parishes and counties are more similar). This is the case because part of the differences found between areas in the null model is due to compositional differences between them. However, although some confidence intervals overlap, there are still statistically significant differences between certain parishes and counties. This pattern holds for all three census years (see figures 1-3).

Despite the differences observed on average between geographical units, these differences do not inform us of the variability existing within these units (i.e., the extent to which the individuals belonging to a certain community are similar to one another). Table 2 presents a set of multilevel models predicting the number of children per woman. The table reports the average number of children per woman (intercept) and the components of the variance at the three levels of analysis (i.e., random effects) for each model specification and census year.

Table 2 here

The ICC calculated for model 1 indicates that the correlation between individuals belonging to the same community is around 2%. In the same vein, the parish level explains less than 1% of the differences in the number of children per woman as indicated by the VPC_{parish}, while the county explains approximately 1% of the differences. These small percentages mean that while on average there are significant geographical differences at both the parish and county levels (see figures 1-3), there is also substantial individual variability within each of these geographical units. This means that the number of children per woman is primarily explained by the individual or family characteristics of the women who live in those areas (VPC_{mother} around 98%) rather than by community-level influence. The fact that the ICC for the parish level is almost identical to the ICC for the county level also contradicts the hypothesis of a strong, local community-level influence on fertility, as we expect this influence to be most relevant at the parish level.

The inclusion of individual variables (model 2) or individual and contextual variables (model 3) does not considerably change these results. However, the inclusion of individual variables in model 2 reduces the variance (see PVC in the tables) at the individual (in approximately 30% of units), parish (30-40% of units) and county levels (10-20% of units). This means that mother's characteristics were able to explain these percentages of the initial variance observed in the null model. In other words, 30% of the total variance at the individual level in 1880 was explained by the observed individual characteristics included in model 2, and consequently, the remaining 70% were not captured by them. Conversely, the inclusion of contextual variables in model 3 does not produce any change in the variance at the individual or parish level but explains 67% of the very small explained variance at the county level (1.09%). The lack of reduction in the contextual variables included in the models at the parish level (our proxy for community) reflects to a great extent the limitations of census data, as it suggests that the variables included might not have a substantial impact on the individual fertility decisions. In other words, these variables are unable to fully capture the community dimensions (norms, attitudes and values) pointed out by the innovation-diffusion theory.

As expected, the effect of the community, over and above individual characteristics, varies across SES groups (table 3). In general, the ICC controlling for SES is slightly higher than the overall ICC estimated for the whole population without taking SES into account (table 2), which suggests that the community modifies the individual-level association between SES and net fertility (cf. Dribe and Scalone 2014). The ICC for the low-SES group is slightly higher than that of the high-SES group, but the difference is very small. Furthermore, the importance of the community for net fertility increases somewhat over time in both groups but again the differences are quite small. Consistently, the percentage of the variance explained at the community level is also slightly higher for the low-SES group compared to the high-SES group.

Table 3 here

These patterns do not change much over time apart from a slight reduction in the percentage explained at the community level across years, which seems to offer some support for the hypothesis of a reduced community-level influence on net fertility as individualistic values become more prevalent.

Over time, the observed individual characteristics explain less of the individual-level variation in the number of children per woman ($PVC_{1880=}$ 30%; $PVC_{1890=}$ 30%; $PVC_{1890=}$ 27%)

but more of the geographical variations at the parish ($PVC_{1880=}$33% (out of 0.73%); $PVC_{1890=}$43% (out of 0.81%); and $PVC_{1890=}$ 43% (out of 0.81%)) and county levels ($PVC_{1880=}$ 0%; $PVC_{1890=}$ 20% (out of 1.16%); and $PVC_{1900=}$ 10% (out of 1.16%). This increase in the proportional change of variance at the geographical level suggests that the variability observed in the null model is increasingly affected by its individual composition.

Although our hypothesis that community effect had a strong effect on fertility in the past but less important over time is not supported by our data, the fact that individual composition became more important to explain individual fertility is in line with our hypothesis that individual characteristics become more important than community forces over time, and this raises a further question about which are the individual-level variables that better predict net fertility. We found that maternal age and, to a lesser extent SES, were the variables that better predicted net fertility (R^2 0.28 and 0.05, respectively). These two variables however had less explicative power over time (R^2_{1880} 0.29, $R^2_{1890,}$ 0.28, and R^2_{1900} 0.26) (data not shown in tables).

The inclusion of both individual and contextual variables at the parish and county levels (model 3) reduces the variance at the three levels relative to the null model, and as expected, their inclusion reduce the variance to a greater extent at the parish and county levels than in model 2 but does not affect the variance at the individual level. Note however, that the parish and county level explained less than 2% of the overall variance. The observed contextual variables included in model 3 explain between 33 and 57% of the variance at the parish level but between 67-80% at the county level. It is interesting to note that the same contextual variables explain a larger proportion of the total variance at the county level in 1890 (PVC =80%) than in 1900 (PVC =70%), and the same result is observed in model 2 with respect to the inclusion of individual characteristics (PVC_{1890} =20% and PVC_{1900}= 10%).

To examine the extent to which the role of the parish varies across Sweden and therefore has a different effect on individual reproductive behaviour, we make a sensitivity analysis, restricting the sample to those parishes located in the southernmost province of Sweden (the Skåne region) where parishes are smaller and in most cases coincides with the village. This means that the parishioners not only met at church and for communal affairs, but also interacted closely in daily life (e.g., Dribe 2003, Ch. 3). The results (not shown) are similar to those obtained for the whole country (ICC/VPC <1%). Moreover, we perform a sensitivity analysis considering married women who have at least one child older than five years living in the household to evaluate whether our main results capture women who are more reproductively active because they are at the beginning their reproductive lives. The results are also consistent with the main results (i.e., ICC/VPC <1%).

Concluding discussion

Community can be expected to have been important for individual-level fertility behavior, especially during the demographic transition if individual action (i.e., the adoption of, or resistance to, new fertility behavior) not only depended on an individual's characteristics but also on contextual effects (as expressed by measures of individual variation). Our findings, however, did not provide a strong case for this kind of community-level influence. While we found pronounced differences in average fertility between different areas, they were not the result of a community-level impact on individual behaviour. Instead, fertility was almost exclusively determined by maternal (individual- and family-level) characteristics (approximately 98%), regardless of the community to which the mother belonged. This claim was supported by the small ICCs observed at the parish level, which suggested that only a negligible share of the number of children observed was attributable to true community effects. In other words, community-level factors had very little influence on the individual fertility decision because the similarity between the individuals (as measured by the ICC) who lived in the same context was very small. Therefore, if we had moved a randomly selected woman from a high-fertility to a low-fertility context, according to our results, her fertility would have changed very little. In turn, this also implies that the mean differences in fertility between different localities were largely explained by compositional differences and not by some kind of shared experience operating at the community level. These factors could nevertheless have been related to attitudes and norms that we were not able to measure. The important conclusion is that they primarily operated at the individual level and not through any kind of community-level influence. Similar results have been found for contemporary fertility outcomes (e.g., Hank 2002).

Despite this general conclusion, we found that the effect of community on fertility varied depending on SES, which implies that the community modified the relationship between SES and fertility behaviour, which we have also shown in previous studies using a different methodology (Dribe and Scalone 2014; Dribe et al. 2014). We observed that low-SES individuals were more similar to one another in their reproductive behaviours than their high-SES counterparts. This confirms the hypothesis that the elite were less constrained by proximity, and therefore, more receptive to new ideas crossing community borders. However, contrary to expectations, the effect of community increased in both groups over time.

Compared to contemporary studies of educational outcomes or health, our results suggest a much weaker impact of community on fertility outcomes than, for example, class or school on educational outcomes or health district or hospital for health outcomes (e.g., Yu and Thomas 2008; Sellström and Bremberg 2006; Reves et al. 2010). While in these contexts, the shared level could account for approximately 10-20% of total variation, in our case it was 3% or less. In a school or a hospital district, it is of course much more obvious what is being shared (e.g., teachers and doctors) than in a community where the influence would be based more on social interaction and inter-personal relations.

Further analysis is needed in other historical contexts to confirm whether this is a particularity of Sweden or a more general historical phenomenon. Nonetheless, this is the first study that evaluates contextual effects on net fertility from a multilevel perspective in a historical context. We are aware that the lack of contextual effects may be driven by the use of an informative contextual level. However, despite this limitation, our approach provides us with empirical evidence to better interpret between-parish differences. The existence of average differences between parishes would be wrongly interpreted as the indication of relevant community effects on fertility without the assessment of within-parish effects.

What we suggest is that *who you were* rather than *where you lived* explained fertility decisions in the early stages of the fertility transition. To the extent that ideational factors were important, they must have operated at the individual level, e.g., through social stratification systems or other social networks, rather than between geographic areas. The community as such seems to have played much less of a role in reproductive outcomes during this phase of the transition.

References

Aronsson, Peter. 1992. *Bönder gör politik. Det lokala självstyret som social arena i tre smålandssocknar, 1680-1850*. Lund: Lund University Press.

Brown, JC. Guinnane TW. 2002. Fertility transition in a rural, catholic population: Bavaria, 1880-1910. *Population Studies* 56(1): 35–50.

Brown JC, Guinnane TW. 2007. Regions and time in the European fertility transition: problems in the Princeton Project's statistical methodology. *Economic History Review* 60(3): 574–595.

Browne, WJ,Subramanian, SV, Jones K, Goldstein H. 2005. Variance partitioning in multilevel logistic models that exhibit overdispersion. *Journal of the Royal Statistical Society Series A* 168(3): 599–613.

Bobonis G Bobonis J, Finan F. 2009. Neighborhood peer effects in secondary school enrollment decisions. *Review of Economics and Statistics* 91(4): 695-716

Caldwell JC. 1982 *Theory of Fertility Decline*. Academic Press, London

Carlsson G. 1966. The decline of fertility: Innovation or adjustment process. *Population Studies 20*(2): 149–174.

Casterline JB. 2001. Diffusion processes and fertility transition: Introduction, in Casterline JB (ed.), *Diffusion processes and fertility transition. Selected perspectives*. Washington, D.C.: National Academy Press, pp. 1–38.

Cleland JR, Wilson C. 1987. Demand theories of the fertility transition: An iconoclastic view. *Population Studies* 41(1): 5–30.

Coale AJ, Cotts S, Watkins (eds.). 1986. *The decline of fertility in Europe*. Princeton: Princeton University Press.

Coale AJ, Trussell JT. 1974. Model fertility schedules: Variations in the age schedule of childbearing in human populations. *Population Index* 40(2): 185–258.

Coale A J, Trussell JT. 1978. Technical note: Finding the two parameters that specify a model schedule of marital fertility. *Population Index* 44(2): 203–213.

Colleran H, Jasienska G, Nenko I, Galbarczyk A, Mace R. 2014. Community-level education accelerates the cultural evolution of fertility decline. *Proceedings of the Royal Society B* 281(1779): 1–7.

Dribe, M. 2003. *Liv och rörelse. Familj och flyttningar i 1800-talets svenska bondesamhälle*. (Life on the Move. Family and Migration in 19th-century Swedish Peasant Society) Hedemora: Gidlunds.

Dribe M. 2009. Demand and supply factors in the fertility transition: A county-level analysis of age-specific marital fertility in Sweden, 1880–1930. *European Review of Economic History* 13(1): 65–94.

Dribe M, Scalone F. 2014. Social class and net fertility before, during and after the demographic transition: A micro-level analysis of Sweden 1880-1970. *Demographic Research*, 30(15): 429–464.

Duncan C, Jones K, Moon G. 1998. Context, composition and heterogeneity: using multilevel models in health research. *Social Science and Medicine* 46(1): 97–117

Dyson T. 2010. *Population and Development. The Demographic Transition*. London: Zed Books.

Galor O. 2011. *Unified Growth Theory*. Princeton: Princeton University Press.

Galloway PR, Hammel EA, Lee RD. 1994. Fertility decline in Prussia, 1875-1910: a pooled cross-section time series analysis. *Population Studies 48*(1): 135–181.

Galloway PR, Lee RD, Hammel EA. 1998. Infant mortality and the fertility transition: Macro evidence from Europe and new findings from Prussia, in M. R. Montgomery and B. Cohen (eds.), *From Death to Birth: Mortality and Reproductive Change*. Washington D.C.: National Research Council, pp. 182–226.

Garrett E, Reid A, Schürer K, Szreter S. 2001. *Changing Family Size in England and Wales. Place, Class and Demography, 1891–1911*. Cambridge: Cambridge University Press.

Goldstein H. (1989). Restricted unbiased iterative generalized least squares estimation, *Biometrika 76*(3): 622–623.

Goldstein JR, Klusener S. 2010. Culture resurfaces- A geographical analysis of fertility decline in Prussia. *MPIDR Working Paper* WP-2010-012, pp. 1–25.

Guinnane TW. (2011). The historical fertility transition: A guide to economists. *Journal of Economic Literature 49*(3): 589–614.

Haines M R. 1998. The relationship between infant and child mortality and fertility: Some historical and contemporary evidence for the United States, in M. R. Montgomery and B. Cohen (eds.), *From Death to Birth: Mortality and Reproductive Change*. Washington D.C.: National Research Council, pp. 227–253.

Hank K. 2002. Regional social contexts and individual level fertility decisions: a multilevel analysis of first and second births in Western Germany. *European Journal of Population* 18(2): 281–299.

Hedström P. 1994. Contagious collectivities: on the spatial diffusion of Swedish Trade Unions, 1890-1940. *American Journal of Sociology* 99(5): 1157–1179.

Hornik R, McAnany E. 2001. Mass media and fertility change, in J. B. Casterline (ed.), *Diffusion Processes and Fertility Transition. Selected Perspectives* (). Washington DC: National Academy Press, pp. 208–239.

Hägerstrand T. 1953. *Informationsförloppet ur korologisk synpunkt*. Lund: Gleerups.

Irwin M, Blanchard T, Tolbert C, Nucci A, Lyson T. (2004). Why people stay: the impact of community context on nonmigration in the USA. *Population* 59(5): 567-591.

Kohler H. 2001.Fertility and Social Interaction. New York: Oxford University Press.

Kulu H, Boyle PJ. 2009. High fertility in city suburbs: compositional or contextual effects? *European Journal of Population* 25(2): 157-174.

Lesthaeghe R. 1980. On the social control of human reproduction. *Population and Development Review 6(4):* 527–548.

Lesthaeghe R, Lopez-Gay A. 2013. Spatial continuities and discontinuities in two successive demographic transitions. *Demographic Research*. 28(4): 77-136

Lesthaeghe R, Wilson C. 1986. Modes of Production, Secularization, and the Pace of the Fertility Decline in Western Europe, 1870-1930, in A.J. Coale and S.C. Watkins (ed.), The Decline of Fertility in Europe. Princeton, NJ: Princeton University Press, pp. 261-292.

Merlo J, Chaix B, Yang M, Lynch J, Råstam L. 2005a. A brief conceptual tutorial of multilevel analysis in social epidemiology: linking the statistical concept of clustering to the idea of contextual phenomenon. *Journal of Epidemiology and Community Health* 56(6): 443–449.

Merlo J, Yang M, Chaix B, Lynch J, Råstam L. 2005b. A brief conceptual tutorial on multilevel analysis in social epidemiology: investigating contextual phenomena in different groups of people. *Journal of Epidemiology and Community Health* 59(9): 729–736.

Merlo J, Ohlsson J, Lynch KF, Chaix B, Subramanian SV. 2009. Individual and collective bodies: using measures of variance and association in contextual epidemiology. *Journal of Epidemiology and Community Health* 63(12): 1043–1048

Merlo J, Viciana-Fernández FJ, Ramiro-Fariñas D. 2012. Bringing the individual back to small-area variation studies: a multilevel analysis of all-cause mortality in Andalusia, Spain. *Social Science and Medicine 75(8)*: 1477–1487.

Palloni A. 2001. Diffusion in sociological analysis, in J. B. Casterline (ed.), *Diffusion Processes and Fertility Transition. Selected Perspectives*. Washington DC: National Academy Press, pp. 208–239.

Pattie C, Johnston R. 2000. 'People who talk together vote together': an exploration of contextual effects in Great Britain. *Annals of the Association of American Geographers* 90(1):41-66

Reher DS. 1999. Back to the basics: mortality and fertility interactions during the demographic transition. *Continuity and Change 14*(1): 9–31

Rasbash J, Steele F, William J. Brown, Goldstein H. 2012. *A User's Guide to MLwinN. Version 2.26.* London: Centre for Multilevel Modelling. Institute of Education. University of London.

Reher DS, Sanz Gimeno A. 2007. Rethinking historical reproductive change: Insights from longitudinal data for a Spanish town. *Population and Development Review* 33(4): 703–727.

Reeves MJ, Gargano J, Maier KS, Broderick JP, Frankel M, LaBresh KA, Moomaw JC, Schwamm L. 2010. Patient-level and hospital-level determinants of the quality of acute stroke care: a multilevel modeling approach. *Stroke* 41: 2924–2931

Swedish National Archives (2012). *The SweCens NAPP Variable Documentation for the Swedish censuses 1890 and 1900. Version 1.08.* Online document: http://riksarkivet.se/Media/pdf-filer/SweCens_Variable_Documentation_20120104.pdf

Rogers EM. (2003). *Diffusion of Innovations. 5th edition*. New York: Free Press.

Ruggles S, Roberts E, Sarkar S, Sobek M. 2011. The North Atlantic Population Project: Progress and prospects. *Historical Methods* 44(1): 1–6.

Scalone F, Dribe M. 2012. Socioeconomic status and net fertility in the demographic transition: Sweden in 1900 – A preliminary analysis. *Popolazione e storia,* 2010(2): 111–132.

Silenstam P. 1970. *Arbetskraftsutbudets utveckling i Sverige 1870-1965*. Stockholm: IUI.

Santow G. 1995. Coitus interruptus and the control of natural fertility. *Population Studies* 49(1): 19–43.

Sellström E, Bremberg S. 2006. Is there a “school effect” on pupil outcomes? A review of multilevel studies. *Journal of Epidemiology and Community Health* 60: 149–155.

Sharlin, A. 1986. Urban-rural differences in fertility in Europe during the demographic transition. In A. Coale and S. Watkins (eds.), The Decline of Fertility in Europe, pp. 234–260. Princeton: Princeton University Press.

Sobek M, Cleveland L, Flood S, Hall PC, King ML, Ruggles S, Schroeder M. 2011. Big data: large-scale historical infrastructure from the Minnesota Population Center. *Historical Methods* 44(2): 61–68.

Subramanian SV. 2004. The relevance of multilevel statistical methods for identifying causal neighborhood effects. *Social Science and Medicine* 58(19): 1961–1967.

Szreter S. 1996. *Fertility, Class and Gender in Britain 1860-1940*. Cambridge: Cambridge University Press.

Tönnies, Ferdinand.1887. Gemeinschaft und Gesellschaft: Fues Verlag.

Tönnies T. 2001 *Community and Civil Society*: Cambridge University Press

Van Leeuwen MH D, Maas I. 2011. *HISCLASS. A Historical International Social Class Scheme*. Leuven: Leuven University Press.

Van Leeuwen MHD, Maas I, Miles A. 2002. *HISCO: Historical International Standard Classification of Occupations*. Leuven: Leuven University Press.

Watkins, SC (1990). From local to national communities: the transformation of demographic regimes in Western Europe, 1870-1960. *Population and Development Review* 16(2): 241–272.

Yu Gand, Thomas SM. 2008. Exploring school effects across southern and eastern African school systems in Tanzania. *Assessment in Education: Principles, Policy and Practice 15*(3): 283–230.

Table 1. Distribution of covariates (%) by year.

	1880	1890	1900
Individual level variables			
SES			
Higher managers	1.6	2.1	2.2
Higher professionals	1	1	1.2
Lower managers	2.5	2.1	2.6
Lower professionals	2.8	3.4	4.2
Lower clerical and sales personnel	0.8	0.9	1.3
Foremen	1.5	2.3	2.5
Medium skilled workers	9.4	11.2	13
Farmers and fishermen	41.2	37.5	32.4
Lower skilled workers	6.8	9.2	11.9
Lower skilled farm workers	1.3	1.6	1.8
Unskilled workers	9	8.7	8.3
Unskilled farm workers	15.2	14.3	13.4
N.A.	6.9	5.5	5.1
Age of woman			
15-19	0.4	0.4	0.4
20-24	6	5.4	6.5
25-29	13.5	14.1	13.6
30-34	16.7	17.9	15.8
35-39	17.7	17.3	18.2
40-44	16.2	16.2	17.4
45-49	15.7	15.4	15
50-54	13.7	13.2	13
Age difference between spouses			
Wife older	27.9	26.9	26
Husband 0-2 older	21.3	22	22.7
Husband 3-6 older	25.1	25.6	26.3
Husband>6 older	25.6	25.6	24.9
Children>4 years at home			
No	30.9	29.9	29.6
Yes	69.1	70.1	70.4
Woman employed			
No	99.6	99.5	99.4
Yes	0.4	0.5	0.6
Migrant status of the couple			
Both migrants	10	12.4	13.9

Wife migrant, husband non-migrant	7.8	8.6	9.8
Wife non-migrant, husband migrant	9.5	10.2	10.9
Both non-migrants	72.6	68.8	65.3
Parish level variables			
Industrial employment			
Low (1st quartile)	19.5	17.9	15.8
Medium (2nd and 3rd quartiles)	44.5	40.9	37.9
High (4th quartile)	36	41.2	46.3
Teachers/100 children 7-14			
Low (1st quartile)	22	22.3	23.8
Medium (2nd and 3rd quartiles)	58.3	56.3	56.3
High (4th quartile)	19.7	21.4	20
Female labour force participation			
Low (1st quartile)	25.1	24.1	22
Medium (2nd and 3rd quartiles)	48.9	48.1	45.4
High (4th quartile)	26	27.8	32.6
Prop. migrants from early decline parishes			
Low (1st quartile)	14.8	14.3	15.8
Medium (2nd and 3rd quartiles)	53.5	51	45.8
High (4th quartile)	31.8	34.7	38.4
county level variables			
Industrial employment			
Low (1st quartile)	22.82	20.00	19.32
Medium (2nd and 3rd quartiles)	47.59	45.13	45.74
High (4th quartile)	29.59	34.87	39.94
Teachers/100 children 7-14			
Low (1st quartile)	22.78	20.10	17.79
Medium (2nd and 3rd quartiles)	59.42	51.23	57.13
High (4th quartile)	17.80	28.67	25.07
Female labour force participation			
Low (1st quartile)	22.64	21.81	22.84
Medium (2nd and 3rd quartiles)	45.68	45.05	39.73
High (4th quartile)	31.67	33.15	37.43
Prop. migrants from early decline counties			
Low (1st quartile)	23.06	21.73	21.47
Medium (2nd and 3rd quartiles)	57.65	57.75	58.27
High (4th quartile)	19.29	20.53	20.26
N	580 849	586 918	619 096

Source*:* Micro-level census data, SweCens, The Swedish National Archives.

Table 2. Multilevel analyses modeling the number of children with mothers (first level) nested within parishes (second level) and parishes within counties (third level), 1880, 1890 and 1900

	1880			1890			1900		
	Model 1	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
Fixed effect part									
Mean CWR* of Sweden (intercept)	0.876	0.614	0.752	0.887	0.630	0.758	0.869	0.696	0.870
Random effect part									
Components of variance (SE)									
Variance between counties	0.009 (0.003)	0.009 (0.003)	0.003 (0.001)	0.010 (0.003)	0.008 (0.002)	0.002 (0.001)	0.010 (0.003)	0.009 (0.003)	0.003 (0.001)
Variance between parishes	0.006 (0.000)	0.004 (0.000)	0.004 (0.000)	0.007 (0.000)	0.004 (0.000)	0.004 (0.000)	0.007 (0.000)	0.004 (0.000)	0.003 (0.000)
Variance between mothers	0.810 (0.001)	0.567 (0.001)	0.567 (0.001)	0.847 (0.002)	0.598 (0.001)	0.598 (0.001)	0.848 (0.002)	0.616 (0.001)	0.616 (0.001)
Variance Partition Coefficient -VPC-									
VPC_{county}	1.09	1.55	0.52	1.16	1.31	0.33	1.16	1.43	0.48
VPC_{parish}	0.73	0.69	0.70	0.81	0.66	0.66	0.81	0.63	0.48
VPC_{mother}	98.18	97.76	98.78	98.03	98.03	99.00	98.03	97.93	99.03
Intra-class Correlation -ICC-									
ICC_{county}	1.09	1.55	0.52	1.16	1.31	0.33	1.16	1.43	0.48
ICC_{parish}	1.82	2.24	1.22	1.97	1.97	0.99	1.97	2.07	0.96
Proportional Change in Variance -PCV- by the new model									
PVC_{county}	ref	0.00	66.67	ref	20.00	80.00	ref	10.00	70.00
PVC_{parish}	ref	33.33	33.33	ref	42.86	42.86	ref	42.86	57.14
PVC_{mother}	ref	30.00	30.00	ref	29.40	29.40	ref	27.36	27.36
Deviance **	1527900	207106	134	1570477	204922	140	1656880	198107	305
Number of observations	580,849	580,849	580,849	586,918	586,918	586,918	619,096	619,096	619,096

Note: Model 1= null model; Model 2= Model with individual variables; Model 3= model with individual and contextual variables
*Number of children per woman
** Change with respect to previous model
Source: Micro-level census data, SweCens, The Swedish National Archives.

Table 3. Multilevel analyses modeling the number of children with mothers (first level) nested within parishes (second level) and parishes within counties (third level), 1880, 1890 and 1900. Results from random slope models, estimating parishes' random effect as a function of socioeconomic status (SES)

	1880		**1890**		**1900**	
	Model 2	**Model 3**	**Model 2**	**Model 3**	**Model 2**	**Model 3**
Variance Partition Coefficient -VPC-						
VPC $_{Parish\_ low SES}$	1.19	1.04	1.45	0.65	1.70	0.78
VPC $_{Parish\_high SES}$	0.68	0.69	1.31	0.66	1.25	0.63
Intra-class Correlation -ICC-						
ICC $_{parish\_low SES}$	2.72	1.38	2.75	1.47	3.08	1.57
ICC $_{Parish\_high SES}$	2.23	1.04	1.95	0.82	2.18	0.94

Note: Model 2= Model with individual variables; Model 3= model with individual and contextual variables
Source*:* Micro-level census data, SweCens, The Swedish National Archives.

Figure titles:

Figure 1. Differences in average number of children per women by county and parish of maternal residence. 1880.

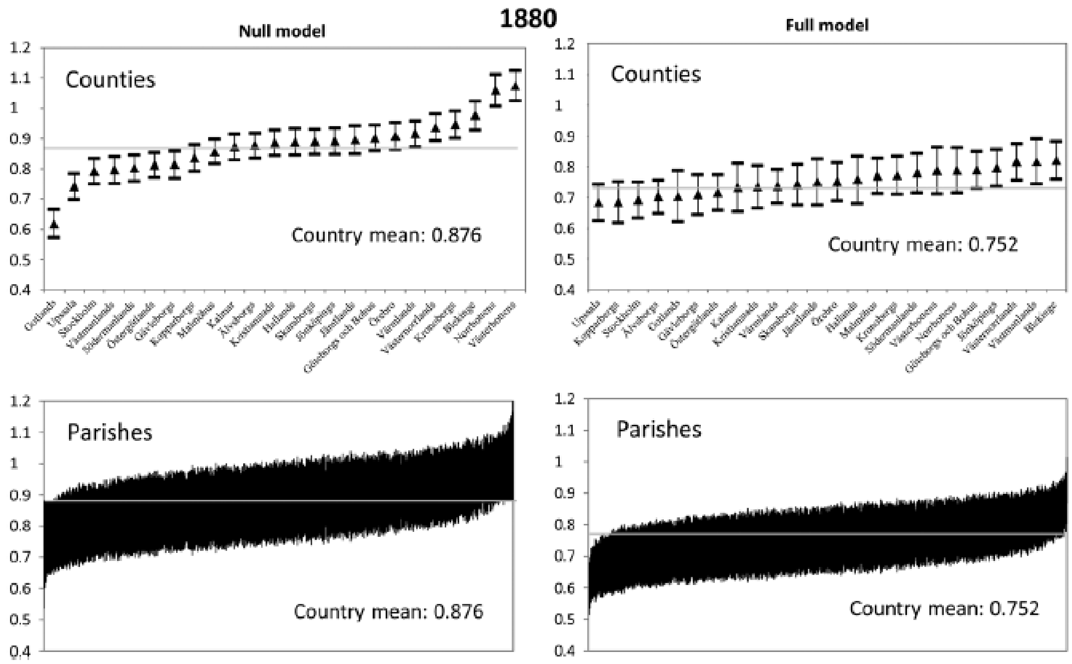

Figure 2. Differences in average number of children per women by county and parish of maternal residence. 1890.

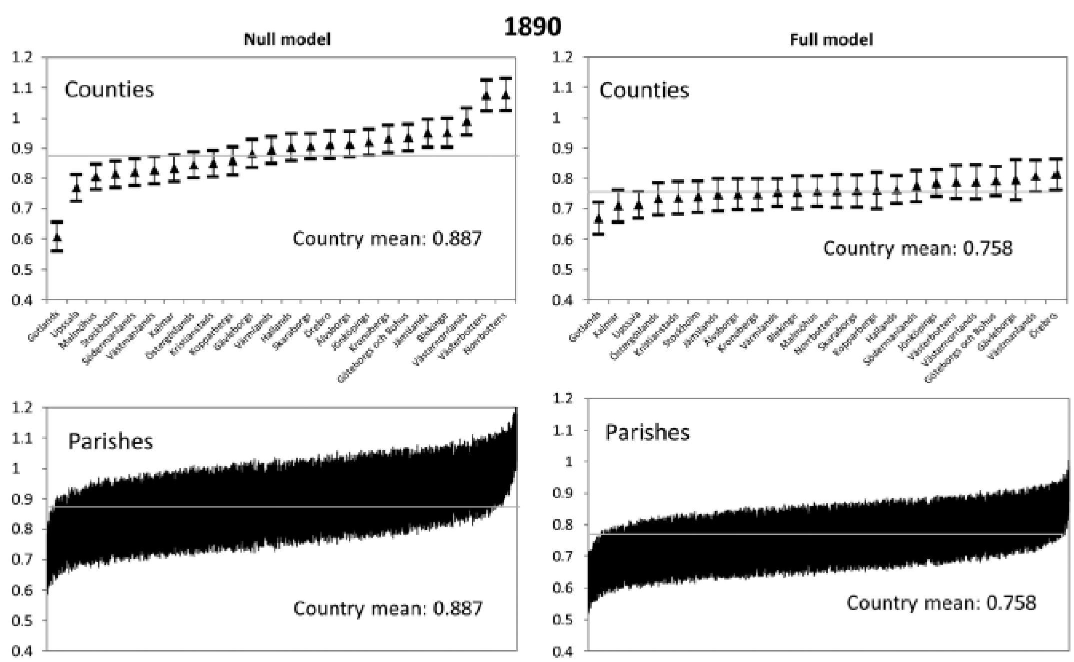

Figure 3. Differences in average number of children per women by county and parish of maternal residence. 1900.