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Socioeconomic Status and Net Fertility during the Fertility Decline: A Comparative Analysis of Canada, Iceland, Sweden, Norway and the United States

Martin Dribe,
Department of Economic History and Centre for Economic Demography, Lund University, Sweden

J. David Hacker, and
Department of History and Minnesota Population Center, University of Minnesota USA

Francesco Scalone
Department of Statistical Sciences, University of Bologna, Italy

Abstract

Most previous work on the historical fertility transition has been macro-oriented, using aggregate data to examine economic correlates of demographic behaviour at regional or national levels, while much less has been done using micro data, and specifically looking at behavioural differentials among social groups. In this paper we study at the impact of socioeconomic status on net fertility during the fertility transition in five Northern American and European Countries (Canada, Iceland, Norway, Sweden and the USA). We use micro-level census data in 1900, containing information on number of children by age, occupation of the mother and father, place of residence and household context. The results show highly similar patterns across countries, with the elite and upper middle classes having considerably lower net fertility early in the transition. These patterns remain also after controlling for a range of individual and community-level fertility determinants and geographical unobserved heterogeneity.

Keywords

Socioeconomic status; fertility; child-woman ratios; net fertility; fertility transition; innovation; adjustment

Introduction

For most of the twentieth century, demographers agreed that fertility behaviour and change were strongly influenced by socioeconomic status(SES) and economic development. The secular decline of fertility, which commenced in most nations in North-western Europe and North America in the late nineteenth century, was assumed to be causally linked to changes in occupational structure associated with industrialization and urbanization, from

Corresponding author: Martin Dribe, Centre for Economic Demography, Lund University, P.O. Box 7083, 22007 Lund, Sweden, Martin.Dribe@ekh.lu.se.

predominately agricultural occupations prior to the decline to increasingly professional, industrial, and other non-agricultural occupations during the transition. According to some accounts elite groups had higher fertility well before the transition, but often experienced early declines long before the decline in the rest of the population (Livi-Bacci 1986; Bardet 1990; Perrenoud 1990; Schneider and Schneider 1996; Skirbekk 2008). Moreover, professional and middle class families were on the vanguard of behavioural change during the transition itself while lower SES and agricultural families were lagging (Haines 1992). SES differentials in fertility widened in the first few decades of the transition(Stevenson 1920), reflecting rapidly changing differentials in access to information, economic aspirations, returns to education, and the cost of raising children. Sub-replacement fertility among college educated and upper class women and high fertility among lower class women alarmed progressive era reformers and social scientists, fuelling eugenic rhetoric on both sides of the Atlantic (Kevles 1985; Szreter 1996). Early twentieth-century demographers lobbied to have fertility questions added to national censuses to study the phenomenon, and demographic analyses of fertility focused on group differentials (e.g., see the 1913 Registrar General report on class differentials in the 1911 fertility census of England and Wales, Notestein(1931) on class differentials in the United States, and Himes (1936) on the "democratization of birth control" from upper to lower class groups).

Class differentials narrowed near the end of the transition, however, as all groups eventually achieved small family sizes. Although there are a few exceptions (e.g., Haines 1979; 1992) research in the last quarter of the twentieth century has de-emphasized the importance of SES and economic development in fertility decline. The findings of the European Fertility Project (EFP), which analysed aggregate fertility data in more than 700 European provinces, famously found only weak or insignificant correlations between the onset of marital fertility decline and various measures of economic development, including measures of the agricultural labour force, education, industrialization, urbanization, and infant mortality (Knodel and van de Walle 1979; Coale and Watkins 1986). The World Fertility Survey project, which examined correlates of fertility behaviour in dozens of developing countries in the 1970s and 1980s, also downplayed the importance of socioeconomic factors (Cleland et al. 1985). Both projects stressed the importance of ideational factors and directed subsequent research toward the study of culture and ideas. Simon Szreter (1996) has argued that the "professional model," employed by early analyst of the 1911 fertility census in Great Britain, seriously distorts our understanding of the fertility transition by putting too much emphasis on social class and too little on spatially-located "communication communities" with unique fertility behaviours and trends.

Recently there has been a renewed interest in the socioeconomic aspects of reproduction. Critics have shown that the aggregate data and measures used by the EFP were inadequate for dating the onset of the transition (Guinnane, Okun and Trussell 1994) and for testing hypotheses (Brown and Guinnane 2007). Using less aggregated data and more sophisticated analyses, studies of the fertility transition in Germany by Galloway, Hammel, and Lee (1994) and Brown and Guinnane (2002) found a significant role for economic factors downplayed in the EFP. In his study of the Swedish fertility transition, Dribe (2009) emphasized the importance of traditional supply and demand variables—education, income, mortality, urbanization and relative female wages. Although not the primary focus, several

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micro-level census analyses of the United States and Canada have reported significant differentials in women's fertility by spouses occupation (Haines 1978; Smith 1996; Hacker 1999; Gauvreau and Gossage 2001; Haan 2005; Gossage and Gauvreau 2007; Haines and Guest 2008). Most recently, Barnes and Guinnane (2012) have re-examined Szreter's evidence from the 1911 census of England and Wales using analysis of variance techniques and found that two-thirds of all variation in marital fertility across couples was explained by variation between social classes. They caution, however, that more research is needed, especially research based on individual-level micro data with adequate geographic controls to account for causal forces at the community level.

In this study we relied on census micro data, collected by the North Atlantic Population Project (NAPP), to look in more detail at socioeconomic differentials in fertility among five national populations (Canada, Iceland, Norway, Sweden, and the United States) around 1900, a time near the early to middle part of their respective fertility transitions. The NAPP data are high-density micro data samples of several late nineteenth and early twentieth-century censuses of nations bordering the Northern Atlantic Ocean. Harmonized sample designs, consistently-constructed variables, and uniform variable coding greatly facilitated the analysis and ensured non-biased comparisons. The high density in most samples made it possible to examine socioeconomic patterns in considerable detail while controlling for spatial heterogeneity. Our aim was first to establish the basic patterns of socioeconomic fertility differentials across these populations and then to look at the extent to which geographic heterogeneity (cf. Garrett et al. 2001, Szreter 1996) and standard explanations for the fertility transition can explain the overall fertility differentials. Before turning to the empirical analysis a theoretical background will be provided followed by a presentation of data and methods.

Theoretical background

In a classic article the Swedish sociologist GöstaCarlsson (1966) made the distinction between innovation and adjustment as the main processes of fertility decline. Even though this framework has later been extended and refined in various ways (e.g. the supply-demand framework by Easterlin and Crimmins (1985) or the “Ready-Willing-Able” model by Coale (1973, see also Lesthaeghe and Vanderhoeft 2001) the basic distinction between innovation-based and adjustment-based explanations has survived, but should be viewed as complementary, rather than competing, explanations (see, e.g. Casterline 2001; Cleland 2001).

By adjustment we mean factors promoting families to change their behaviour following new conditions for childbearing and family life. The demand for children can be defined as the number of children a couple would want if there were no costs to limit fertility (Easterlin and Crimmins 1985). It depends on family income and the costs of children in relation to other goods. Children are assumed to be normal goods, implying that a higher income increases fertility while a higher relative price of children lowers it. The demand for children is also dependent on the preferences of consuming other goods, and a higher demand for consumption of other goods lowers the demand for children. In addition, the demand for child quality is often believed to have increased as a result of economic changes following industrialization and urbanization, through which education and other investments in children have become ever more important (Becker 1991). Thus, demand for child quality has increased at the expense of child quantity, which helps to explain why fertility does not increase together with rising incomes in the process of modern economic growth. Instead, the decline in fertility has been seen as a crucial part, and sometimes even a root cause, of modern economic growth (Galor 2005). Thus, demand for child quality has increased at the expense of child quantity, which helps to explain why fertility does not increase together with rising incomes in the process of modern economic growth. Instead, the decline in fertility has been seen as a crucial part, and sometimes even a root cause, of modern economic growth (Galor 2005, 2011; see also Becker, Cinnirella and Woessmann 2010; Guinnane 2011).

The supply of children is defined as the number of surviving children a couple would get if they made no conscious efforts to limit the size of the family (Easterlin and Crimmins 1985). Thus, it reflects natural fertility as well as child survival. High child mortality constitutes a limit on this potential supply and cultural factors outside the immediate control of the family, such as breastfeeding practices, which influences the level of natural fertility, might also impose such a limit. Declining mortality in the first phase of the demographic transition changed the supply of children, and this was one important factor for the fertility decline (e.g. Galloway, Lee and Hammel 1998; Reher 1999; Reher and Sanz-Gimeno 2007; see also Dyson 2010). However, the magnitude of the mortality decline was much smaller than the decline of fertility, implying that mortality could only have been one of several important determinants of fertility decline (cf. Haines 1998). As stressed by Doepke (2005) net fertility (number of surviving children) also declined in this period and this decline was largely unrelated to mortality. Moreover, there was often a long time lag between the start of the mortality and fertility declines, sometimes 100 years, which makes it even more unlikely that mortality decline was a sufficient cause of fertility decline.

Taken together, the economic, demographic and social changes following the agricultural revolution, industrialization and urbanization of the nineteenth century created new conditions for both working life and family life. These changes included, for instance, the expansion of wage labour outside the home, increasing importance of education, higher proportions of people living and working in cities, less use of children in household production, and better child survival, which in turn led families to adjust their target family size.

At the same time the dominating view in historical demography since the days of the European Fertility Project has been that fertility in pre-transitional Europe was not deliberately controlled but “natural” (Henry 1961). In fact, fertility was not considered to have been within “the calculus of conscious choice” (Coale 1973, p. 65), and the main explanation behind the fertility transition was the innovation of families to adjust fertility within marriage to economic circumstances (e.g. Coale and Watkins 1986). As a consequence, females stopped child-bearing after having reached a certain target family size; in other words, the control was parity-specific. According to this view fertility decline was not so much a response to changing economic and demographic conditions as to the diffusion of new ideas and attitudes about birth control, to a large extent related to broader value changes, secularization, etc. that came about in the period of modernization (e.g. Lesthaeghe 1977; Cleland and Wilson 1985; Casterline 2001; Cleland 2001; Lesthaeghe and Vanderhoeft 2001). In the model of Easterlin and Crimmins (1985) these kinds of changes affects the costs of fertility regulation, which can be defined as the direct monetary costs as well as psychic costs of regulating fertility. New, more positive, attitudes towards fertility control among broader segments of the population will act to lower these costs. In a similar way easy access to modern contraceptive methods will affect these costs.

In this way fertility decline can be seen as a result of both adjustment of behaviour to new socioeconomic circumstances and innovation in the form of new attitudes and methods lowering the costs of fertility control. We expect different socioeconomic groups to have been differently affected by both innovation and adjustment. On the one hand we expect middle and upper classes to have been affected first by changes in adjustment because they held more skilled occupations where returns to education should have increased first, and thus the quantity-quality trade off should have commenced earlier. On the other hand we also believe that cultural change affecting attitudes, secularization, etc. originated in the upper and middle classes and then gradually diffused to lower segments of society (Rogers 1962; Shorter 1977; Frykman and Löfgren 1987; Van de Putte 2007). Thus both explanations point to similar socioeconomic patterns in the decline, namely that the higher socioeconomic groups should experience an earlier fertility decline regardless of context, which is also in accordance with the limited empirical evidence available (e.g. Haines 1992). However, given that this is the pattern observed it is difficult to discriminate between the two explanations, in other words if the predicted socioeconomic differences are explained by innovation or adjustment. In the empirical analysis below we investigate the socioeconomic differentials in the fertility decline in the various contexts studied and add proxies for adjustment and innovation to see how much of the differentials that are captured by these variables, to get some idea of the remaining difference.

Data

We used data from the North Atlantic Population Project (NAPP), which adopted the same format as the Integrated Public Use Microdata Series (IPUMS). The NAPP and IPUMS International projects have focused their efforts on increasing the comparability of census micro data. Despite the wide variety of countries and censuses, demographic and socioeconomic variables have been harmonized and uniformly coded. The NAPP data have been described in detail elsewhere (Ruggles et al. 2011; see also the NAPP website: http://www.nappdata.org). Most scholarly attention has been focused on the complete censuses in the collection: the 1881 census of Canada, the 1881 census of England and Wales, the 1703, 1801, 1880, 1901 censuses of Iceland, the 1865 and 1900 censuses of Norway, the 1881 census of Scotland, the 1900 census of Sweden, and the 1880 census of the United States. These databases include individual-level information for every person enumerated by the census, and thus allow analysis of small areas, small groups, and linkages to other censuses. A number of high-density samples are also available, however, such as the 1901 Canadian census (5+ per cent sample density) and the 1900 United States census (5+ per cent sample density). These samples have sufficient cases to control for unobserved heterogeneity in small geographic units such as counties, municipalities and parishes.

We limited our investigation to an analysis of recent net fertility (the number of own children less than five years old living in the household) among currently married women of age 15-54 in the 1901 census of Canada, 1901 census of Iceland, 1900 census of Norway, 1900 census Sweden, and the 1900 census of the United States (limiting the samples to the age group 15-44 yield very similar results). These census databases provide a large set of geographical, demographic and socio-economic variables. In some cases, only a sample of the census is included, in other cases all the registered individuals are included (see Table 1). Although the complete count databases for these and other countries are available in the NAPP circa 1880, marital fertility had only recently commenced to decline in one of these countries (the United States) by that date (Hacker 2003), and thus social class differences in marital fertility were likely small relative to class differentials in infant and child mortality. As discussed in more detail below, most censuses included in the NAPP reported only living children. Fertility analyses must therefore rely on measures of net marital fertility (the number of children born to married women less the number dying prior to the census). In addition to making a theoretical argument that net fertility is in some ways a preferable measure of fertility behaviour, we argue that social class differentials in marital fertility were large enough circa 1900 to be robust to probable class differentials in infant and childhood mortality (see Scalone and Dribe 2012).

The great advantage of census data is the coverage and the possibility of studying fertility differentials by socioeconomic status across space. However, a challenge to comparative analysis is that areas within countries are not consistently measured and vary by geographic size and the number of observations. In Sweden, Norway and Iceland, we were able to rely on a variable identifying parish, whereas in Canada we used district, which was extracted from the dwelling number. In the United States, the smallest geographic unit consistently measured was the county (see Table 1). Using these geographic units we calculate community-level socioeconomic indicators, for example rates of industrialization, education and female labour force participation.

Although a smaller geographic unit, enumeration district, is available in the 1900 NAPP sample for the United States, it was inconsistently recorded and coded. Moreover, the five per cent sample frequently contains too few cases at the enumeration district level for reliable estimation of group-level components (Clarke 2008). Despite this shortcoming, we are confident that the 2,818 counties identified in the 1900 NAPP sample of the United States captures much of the nation's geographic heterogeneity at the turn of the century. Indeed, as late as the 1950 census, census officials, noting the relative homogeneity across many groups of contiguous counties, defined 501 state economic areas (SEA) to facilitate geographic analyses. SEAs were defined as a single county or a group of contiguous counties with similar economic, climatic, physiographic, and cultural characteristics. Single counties were, for the most part, seen as homogeneous (Bogue 1951).

All registered individuals are grouped by household. In this way, each individual record reports the household index number and the person index within the household. The age, marital status and sex of each person are also registered. Migration status indicates if a person was born in the same state, county or province of residence or elsewhere (data is lacking for Iceland). Because the large variation of the size of the geographic units between different populations, this variable is not fully comparable across, but serves as a rough indication of the importance of medium-range migration. A person's relationship to the household head is also recorded. In addition, there are family pointer variables indicating the personal number within the household of the mother, father, or spouse, making it possible to link each woman to her own children and husband.

The dataset also offers detailed information on occupation, allowing classification into a fairly large number of social groups using the Historical International Standard Classification of Occupations (HISCO) classification system (Van Leeuwen, Maas and Miles 2002), and from that, identification of 12 different historical classes using the HISCLASS system (Van Leeuwen and Maas 2011), an international classification scheme based on skill level, degree of supervision, whether manual or non-manual, and whether residence was in an urban or rural area. The classification system 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.

Our intention was to rely on husband's occupation to identify couples'socioeconomic status according to the HISCLASS system. As a work in progress, however, the NAPP has several limitations. The main disadvantage with the NAPP census data used in this analysis is that a consistent classification scheme for class has yet to be fully implemented for all censuses. As detailed elsewhere (Roberts et al. 2002), individuals' tasks, industry, and class of worker were not consistently recorded across censuses or even within censuses. For the earliest releases of the NAPP datasets, the project staff was forced to rely on a modified version of the HISCO system. Although similar, the “NAPP-HISCO” classification scheme has only about 650 unique codes to HISCO's 1,881 codes. A few new codes were created that are unique to NAPP-HISCO. And while some of the census samples in the NAPP include HISCO and HISCLASS variables, some, such as Canada in 1901, include only the NAPP-HISCO variable. In these cases we relied on existing samples from Sweden that included both the HISCO, NAPP-HISCO, and HISCLASS variables, and a translation table (available from the DAMES node web page:https://dames.cs.stir.ac.uk/) to construct HISCLASS. The US census of 1900 did not use NAPPHISCO but was based on the 1950 Census Bureau occupational classification system (occ50). We used the NAPP-HISCO for the 1880 census together with the occ50 classification to create a transcode table to convert the occ50 into NAPP-HISCO for the 1900 census.

To avoid problems of small numbers in some cases we use a more aggregated classification scheme based on six groups: Elite and upper middle class (HISCLASS 1-6), Skilled workers (HC 7), Farmers (HC 8), Lower skilled workers (HC 9-10), Unskilled workers (HC 11-12). Even though this class scheme has been designed specifically for comparative purposes, there are of course large differences between and within countries in what it actually means to belong to a certain class. This is of special relevance for the group farmers (HC 8), in which both smallholders, medium sized farmers and some really large landowners are included. Some farmers relied primarily on unpaid family labour while others employed relied on mechanization and hired labourers, arrangements that likely affected the cost and benefits of farm children (Guest 1981). Differences between countries in average land holding size, ownership structure, tenure, etc. add to this heterogeneity. Although census officials at the turn of the century deemed the western frontier recently closed, the relatively easy access to farmland in the United States and Canada added to the differences in farming within and across national boundaries. In both countries, land availability, farm prices, climate, crop mix, transport costs, and investment in mechanization varied tremendously north to south and east to west. Naturally, these differences can be expected to affect the class differences in fertility as well. The NAPP data also provide information on labour force participation, that is a derived dichotomous variable identifying whether a person aged 15 and above reports any gainful occupation.

By necessity, our analysis relied on the number of own children currently living in the household as the dependent variable rather than the number of children ever born. It is therefore an analysis of net marital fertility, or reproduction, rather than an analysis of marital fertility. However, as the fertility transition clearly was a decline not only in marital fertility but also in number of children surviving, our focus on net fertility also makes substantive sense. To ensure that we modelled recent net marital fertility, we only used own children less than age 5 and limited the sample to currently married women with spouses present.

We suspected that results of an analysis of marital fertility, if available, would be very similar to our analysis of net marital fertility. A comparison of net fertility (child-woman ratios) and marital fertility (based on the own-children method using SES-specific mortality data) for Malmöhus county in Sweden 1896-1900 indicated very similar results by social class (Scalone and Dribe 2012). Although unadjusted child-woman ratios were underestimated for high mortality groups in relation to low mortality groups, the relative positions of the different socioeconomic groups were the same for the adjusted and unadjusted child-woman ratios. The NAPP sample for the 1900 United States census, which included questions for children ever born, children surviving, and children living in the household, provides an additional opportunity to compare marital fertility and net marital fertility. Because all groups suffered higher rates of infant and child mortality rates than farmers, differentials in net fertility between farmers and non-farmers are larger than differentials in marital fertility (detailed results not shown). The difference is especially noticeable for the group with the highest infant and child mortality rates, unskilled workers. Unskilled workers had marital fertility rates 95 per cent of that of farmers, but net fertility rates only 85 per cent as large. Overall, however, the rank order of groups was unchanged, with the elite group having both the lowest marital fertility and net marital fertility rates and farmers the highest. Regression models for children ever born also produced exactly the same SES gradient as children observed (results not shown), suggesting that differential mortality is not a major part of the net.-fertility differentials we study.

Even assuming some modest bias from group differentials and infant and child mortality, we contend that there are theoretical reasons to prefer analysis of net fertility to marital fertility. A large literature has found a significant relationship between infant and childhood mortality, marital fertility, and fertility decline. In most nations, a higher supply of children caused by mortality decline was likely an important factor in triggering marital fertility decline (Easterlin and Crimmins 1985; Mason 1997; Reher 1999; Dyson 2010), although the United States may have been an exception to this generalization (Haines 2000). Parents practicing significant marital fertility control make decisions to continue, accelerate, postpone, or cease childbearing based on the size and composition of their surviving children, not the size and composition of their children ever born. An infant death among couples not practicing marital fertility control, on the other hand, will interrupt breastfeeding, shortening the postpartum infecundability period, accelerating the next birth, and magnifying group differentials. Thus, behavioural models likely benefit from estimation of net fertility, not gross fertility.

Methods

We estimated the same set of models for all countries. First we estimated ordinary least squares regression (OLS) models to assess the basic association between socioeconomic status and the number of children under 5 for each married woman aged 15-54. In this model we only controlled for age of woman.

$$y_{ij}=\alpha_i+\beta^* Age_{ij}+\varepsilon_i \quad (1)$$

where *i* refers to woman and *j* to geographical unit of residence (e.g. parish). To study the extent to which the relationship between SES and net fertility is explained by unobserved heterogeneity at the community level, we estimateda fixed effects models including a number of individual level control variables(age of woman, age difference between spouses, presence of children over 4, household status).

$$y_{ij}=\alpha_i+\beta_1 * Age_{ij}+\beta_2 * Agediff_{ij}+\beta_3 * Children_{ij}+\beta_4 * Household_{ij}+\gamma_j+\varepsilon_i \quad (2)$$

where γ_j is the geographic unit fixed effects. This model is very efficient in controlling for unobserved heterogeneity between geographic units, as identification of the model completely rests upon variations within each geographical unit. It should, however, be noted that because the size of the geographic units differ substantially between populations, the efficiency of the fixed effects models in capturing unobserved heterogeneity will also differ.

Finally we estimated a full model with measures of innovation and adjustment at the community-level (lowest geographical unit in each country). The full model includes the same set of individual and family-level controls as the fixed effects model and in addition variables measuring adjustment factors (wife's employment status, community-level female labour force participation, the ratio of teachers to school age children and proportion employed in agriculture) and variables capturing innovation factors (individual migrant status, community-level proportion of migrants and child-woman ratio).

$$\begin{aligned} y_{ij}=\alpha_i+\beta_1 * Age_{ij} \\ +\beta_2 * Agediff_{ij} \\ +\beta_3 * Children_{ij} \\ +\beta_4 * Household_{ij} \\ +\beta_5 * Employment_{ij} \\ +\beta_6 * Migrant_{ij} \\ +\beta_7 * FLFP_j \\ +\beta_8 * Teacher_j \\ +\beta_9 * Agremp_j \\ +\beta_{10} * Propmigr_j \\ +\beta_{11} * CWR_j+\varepsilon_i \end{aligned} \quad (3)$$

We lack data on urban residency for Canada, but adding this variable does not change the results significantly for the other countries. Migration status serves to measure the degree of connection to the surrounding society and thus potential for the spread of information and new ideas. The community level child-woman ratio is intended as a measure of the fertility culture in the community, but it is of course difficult to isolate this effect from an effect of previous changes in the adjustment variables. Admittedly, the variables included do not cover all aspects of innovation and adjustment, or of the supply and demand for children, as discussed above. The results are presented as elasticities indicating the proportional change in the number of children of a change in the categorical variable (compared to the reference category).

Table 2 presents the distributions of all variables in the analysis. It reveals considerable differences across countries in social structure. The share of the elite/upper middle class ranges from about 11 percent in Iceland to almost 20 per cent in the United States, while the share of unskilled goes from around 10 per cent in Iceland and Norway to over 20 per cent in Sweden.

Married women's labour force participation is difficult to measure because of the problem of farming and cultural expectations that likely resulted in an undercount of married women's labour force participation. To include all wives in the farming sector as employed would give much higher estimates than the ones presented here, where we have only included occupations noted in the sources (i.e. not wife). For example in the case of Sweden only 0.6per cent of all married women in the age group 15-54 were gainfully employed outside the farm. According to the census of 1920 the corresponding figure was 4 per cent (Silenstam 1970, p.56). The distributions in Table 2also shows big differences in proportion of married women employed in the different countries from 0.5 per cent in Sweden to 12 per cent in Iceland. It is difficult to assess the extent to which these differences reflect real differences in labour force participation among married women or the accuracy in reporting occupations (Carter et al. 1996; Meyer 2009; Inwood and Reid 2010). Nonetheless because it is a theoretically relevant variable it is important to include it despite the apparent under-recording of women's work (estimates of models without this variable do not change the interpretation of other variables).

Age difference between spouses shows some interesting differences between populations. Wife-older heterogamy was more common in the Nordic countries (about 25 per cent) than in North America (12-14 per cent), while husband older heterogamy was more common in North America. The importance of migration also seems to differ quite a bit but it is important to remember that the geographical units on which this variable is based vary considerably in size. Mean number of children below 5, which is our measure of net marital fertility, varies between 0.7 in the United States and 0.9 in Iceland and Norway, with Sweden and Canada in between (0.8). Also in terms of community-level characteristics there is quite a bit of variation between the countries.

Results

We begin by discussing the socioeconomic differences. The basic model in Table 3 shows quite large fertility differentials across socioeconomic groups. Overall the patterns across countries are fairly similar, with the exception of Iceland, that has ha very different socioeconomic pattern. This is probably a result of the special character of Iceland being a small island where patterns of social stratification are different. Although disputed by some, there is a long-standing view of Iceland having less pronounced social stratification and more social equality than other countries (see, e.g., Broddason and Webb 1975). Whether true or not, it is certainly evident that the socioeconomic patterns in fertility were quite different in Iceland compared to both the other Nordic countries and to North America.

Except in Iceland the elite group stands out with low net fertility in all populations. In the United States and Canada farmers have the highest net fertility while this is somewhat less marked in the Nordic countries. Looking at the magnitudes of the coefficients, farmers in Sweden have about 20 per cent more children under 5 than the elite, which should be related to the average number of children under 5 which is 0.8. This indicates that socioeconomic differences are of a considerable magnitude in this basic model.

If we instead look at the workers, unskilled workers have between 16 and 28 per cent more children under 5 than the elite group in Sweden, the United States and Canada, while they have lower net fertility in Iceland and about the same as the elite group in Norway. Lowerskilled workers have 14 to 20 per cent higher child-woman ratios than the elite group, except in Iceland. In other words the socioeconomic patterns differ somewhat between the countries, although the elite/upper middle class appears as a group with low net fertility and farmers a group with high net fertility.

These estimates reflect the gross differences at the national level only controlling for the age of the woman. Comparing the basic model with the fixed effects full model shows that a considerable part of the gross differences can be explained by geographical heterogeneity and individual characteristics not immediately connected to socioeconomic status. This is particularly clear for Sweden and Norway, which can be explained by the lower level of the geographical unit in these countries. In both countries the greatest differential (between farmers and the elite) is reduced by more than 50 per cent in the fixed effects model compared to the OLS model, and the pattern is similar but less extreme for other socioeconomic groups. In the United States and Canada the differences are not as strong between the two models, which is explained by the larger geographical units in these cases. Again Iceland is quite different. In fact, when controlling for geographic heterogeneity there are no statistically significant differences in net fertility between different socioeconomic groups.

These results clearly show that a large part of the gross socioeconomic differentials are in fact explained by structural differences across geographic units, rather than by socioeconomic status as such (cf. Szreter 1996). Nonetheless the basic pattern remains more or less unchanged with low fertility in the elite group in all populations, with the possible exception of Iceland, and the highest levels among farmers in the United States and Canada. Except in Iceland, workers usually have about 10-20 per cent higher child-woman ratios than the elite/upper middle class, while farmers in United States and Canada have around 20-30 per cent more children than the high-status group. These differences are considerable given the powerful control for spatial heterogeneity as well as individual characteristics such as age, age difference between spouses, household status and migration history. It shows that socioeconomic status was an important determinant of net fertility in the early phases of the fertility transition, and that this effect was not a simple by-product of spatial heterogeneity.

Having looked at the socioeconomic differentials, we now turn to the impact of adjustment and innovation factors in accounting for differences in net fertility. Table 4 shows the estimates of the full model. Female employment is clearly related to lower fertility, but the magnitude of the effects differ substantially across the populations. In Iceland the coefficient is small and not statistically significant while in the other four populations they are of a similar magnitude. Here marital net fertility is about 15 to 25 per cent lower when the woman is in the labour force, which is larger or similar to the biggest socioeconomic differences. Hence, despite the concerns about measurement error (under-counting) previously discussed in relation to this variable, the effects are clearly in line with the theoretical predictions and of a quite large magnitude. In Sweden, Norway and Canada there is also an additional negative effect of the female labour force participation rate in the community, but this effect is quite small and in Canada not even statistically significant. Our measure of education (teachers/100 school children) has the expected negative sign in all cases, but is only statistically significant in Norway and the United States. In Sweden there is also a statistically significant positive effect on fertility of a low number of teachers. Hence, high educational orientation in the community is associated with lower net marital fertility and low educational orientation is associated with high fertility. However, also in this case the magnitude of the effect is quite limited. In Norway and Sweden low proportions employed in agriculture is also connected to low net fertility over and above the individual level association between socioeconomic status and fertility, which adds further support to the adjustment hypothesis, but also here the effects are quite small. Taken together, while the individual level measure of female labour force participation yields quite strong effects, at least in some of the countries, the community-level effects are typically quite small on individual net marital fertility.

Looking instead at variables related to innovation, migration status is only weakly connected to fertility and the direction of the association differs across countries. Thus individual migration status seems unimportant for net marital fertility. Partly the diverging results are related to the impact of foreign born. Looking at the United States an estimation excluding foreign born from the sample, gives a more expected negative relationship between both spouses being migrants and net fertility (-4.4 per cent instead of +12 per cent), while in the case of Canada the positive relationship remains but turns insignificant (1.4 per cent instead of 4.4 per cent) (results not shown). At the community level both proportion migrants and child-woman ratios have the expected signs. Living in a community with more migrants reduces fertility while living in a community with a high child-woman ratio is associated with higher net fertility. While the effects of the proportion migrants are rather small the magnitudes of the coefficients for community level child-woman ratio are sizeable. Living in a community with a high child-woman ratio is associated with about 10 to 30 per cent higher net fertility than living in a community with a medium-level child-woman ratio.

By and large, the results are consistent in showing clear socioeconomic differences in net fertility in early stages of the fertility transition. The elite/upper middle class stands out with low fertility while farmers in several cases have the highest. When looking at the traditional explanatory variables, however, the results are quite weak both in terms of innovation and adjustment.

Discussion

Demographers have long been aware of socioeconomic fertility differences in historical and contemporary populations and their general consistency among western populations. In their 1953 study of determinants and consequences of world population trends, for example, the United Nations observed remarkably consistent fertility patterns in Canada, Denmark, England and Wales, France, Germany, Hungary, Italy, Norway, Sweden and the United States. “Generally, it has been observed that the population engaged in agriculture has particularly large families…At the other extreme, professional groups and clerical workers have particularly low fertility (United Nations 1953: 87-88). The importance of SES and economic factors more generally to fertility behaviours in the past, however, was challenged on a number of fronts by research in the late twentieth century, including the relatively weak correlations between socioeconomic variables and the onset of the fertility transition observed by the European Fertility Project (Knodel and van de Walle 1979; Coale and Watkins 1986)and Szreter's criticism of the “professional model” of fertility differentials in Great Britain. Szreter correctly observed that many SES and fertility behaviours are often spatially located, suggesting the possibility that locally-based communication communities, and not SES, was the critical factor in determining fertility. Other causal forces at the community level, including mortality and morbidity may have also played a role.

In this article the aim has been to study socioeconomic differences in fertility during the initial stages of the fertility transition using large scale micro data for five different populations in the north Atlantic region. Micro censuses have the great advantage of offering individual level data spanning entire countries and with sample sizes big enough to enable a careful control of contextual variables and unmeasured spatial heterogeneity. On the other hand we lack a longitudinal perspective, at least until several censuses can be linked to form a panel. Moreover, the number of variables available at the individual level is often quite limited in these kinds of data.

Our approach was to look at socioeconomic differences measured by a reduced version of the HISCLASS scheme adding a number of variables at both the individual/family and the community level. Using community-level fixed effects we also controlled for unobserved spatial heterogeneity. The results showed large socioeconomic differentials in the early stages of the fertility transition. Overall, the elite/upper middle class of professionals, managers, clerical and sales personnel (comprising between 10 and 20 percent of the populations studied) showed considerably lower net fertility (child-woman ratios) than other groups, while in most populations farmers had the highest net fertility. Both findings are clearly in line with expectations. While the elite groups often had higher fertility than other groups in pretransitional contexts, they appear to have experienced early fertility declines well before the start of the general transition (e.g. Livi-Bacci 1986; Bardet 1990; Perrenoud 1990).

What remained clear from the analysis was that socioeconomic status was a very important factor in the fertility transition. Moreover, even though spatial heterogeneity clearly explained some of these differences, half or more remained also after controlling for it. In the full model, including all control variables, marital net fertility was typically about 0.1 higher among workers (unskilled or lower skilled) than among the elite, which should be compared to average child woman ratios of about 0.7-0.8. Between farmers and elite/upper middle class the difference was even larger.

Our results also pointed to considerable similarities between the different populations, with the exception of Iceland which showed a different socioeconomic pattern. They were all at similar phases of the fertility transition and clearly the broad socioeconomic pattern was similar in all populations. These results offer confirming evidence that the middle classes and the elite were forerunners in the fertility transition, and that this seems to be a universal phenomenon at least in the North Atlantic region studied here. Socioeconomic status was an important determinant of fertility also when controlling for a number of individual and community-level factors related to innovation diffusion and adjustment. The reason for the different pattern in Iceland could most likely be explained by the very special character of this country being an island with a total population of a medium sized town in North America. Social stratification was less pronounced in Iceland than in the other countries and it could also be expected that different socioeconomic groups interacted much more closely, and perhaps had less distinctive behaviours, than in the more stratified countries, which contributed to greater similarity in fertility.

It was also evident from our results that both innovation and adjustment factors had predicted relationships to net fertility, even though the size of the effects were often small. Evidently the higher status groups responded quicker to these changes affecting the community. From theory we would expect higher status groups to be more sensitive to both changes in the trade-off between quantity and quality of children, and to new attitudes and norms concerning family limitation. Thus, both adjustment factors and innovation diffusion seem likely to have been important, but the from the data available we could not discriminate between these two sets of explanations.

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Table 1

Basic information of the censuses included.

	Year	Sample Fraction (per cent)	Geo-Unit	Persons	Married Women 15-54
Canada	1901	5	District	264,686	35,642
Iceland	1901	100	Parish	83,139	6,981
Norway	1900	100	Municipality	2,294,599	260,085
Sweden	1900	100	Parish	5,200,111	619,096
United States	1900	5	County	3,852,852	589,526

Source: North Atlantic Population Project (NAPP).

Table 2

Descriptive statistics of the samples.

	SWEDEN	ICELAND	NORWAY	USA	CANADA
Socioeconomic status					
Elite/upper middle class	14.0	11.4	16.7	19.6	17.2
Skilled Workers	13.0	6.6	13.7	11.9	13.2
Farmers	32.4	33.2	33.1	33.8	38.9
Lower Skilled Workers	13.7	22.5	25.0	15.6	11.8
Unskilled Workers	21.7	9.3	9.9	16.8	14.8
NA	5.1	16.9	1.6	2.3	4.3
Woman in the labour force					
Not in labour force	99.4	1.9	93.5	1.4	98.5
In labour force	0.6	12.3	6.5	4.6	1.5
NA	0.0	85.9	0.0	94.0	0.0
Age of woman					
15-19	0.4	0.3	0.6	3.3	1.7
20-24	6.5	6.3	7.5	14.1	10.7
25-29	13.6	13.8	14.8	18.2	17.0
30-34	15.9	16.7	16.8	17.2	17.2
35-39	18.2	20.7	17.4	15.7	17.1
40-44	17.4	16.4	15.9	13.0	14.8
45-49	15.0	14.6	14.7	10.3	11.7
50-54	13.0	11.2	12.3	8.2	9.9
Age difference between spouses					
Wife Older	26.0	28.8	24.8	12.0	13.8
Husband 0-2 years older	22.7	20.5	23.4	25.6	25.9
Husband 3-6 years older	26.3	22.0	25.0	31.5	29.9
Husband >6 years older	24.9	28.7	26.9	31.0	30.4
Household status					
Lodger	3.1	6.9	2.4	4.5	3.9
Head family	96.9	93.1	97.6	95.5	96.1
Migrant status					

	SWEDEN	ICELAND	NORWAY	USA	CANADA
Both migrants	13.9	-	32.0	35.1	18.2
Wife mig. & husband non-mig.	9.8	-	17.0	8.2	5.1
Wife non-mig. & husband mig.	10.9	-	13.8	13.3	8.5
Both non-migrants	65.3	-	37.2	43.4	68.2
Children>4 years in household					
No	29.6	32.7	32.0	36.7	32.9
Yes	70.4	67.3	68.1	63.3	67.1
Community characteristics:					
Female labour force participation					
Low(1st quartile)	22.0	23.9	20.8	11.4	29.4
Medium (2nd and 3rd quartiles)	45.4	58.1	63.3	39.5	42.7
High (4th quartile)	32.6	18.1	15.9	49.1	28.0
Teachers/100 children aged 7-14					
Low (1st quartile)	23.8	44.8	21.1	11.2	29.2
Medium (2nd and 3rd quartile)	56.3	30.9	42.4	63.9	47.3
High (4th quartile)	20.0	24.3	36.5	24.9	23.5
Proportion employed in agriculture					
Low (1st quartile)	51.4	29.1	46.9	53.7	25.1
Medium (2nd and 3rd quartiles)	35.8	51.6	36.8	33.8	41.5
High (4th quartile)	12.8	19.3	16.3	12.5	33.4
Community-level CWR					
Low (1st quartile)	22.9	15.0	15.3	35.1	24.8
Medium (2nd and 3rd quartile)	50.6	63.9	58.7	51.9	46.1
High (4th quartile)	26.5	21.0	25.9	13.1	29.1
Proportion migrants					
Low (1st quartile)	17.3	-	18.7	17.6	24.0
Medium (2nd and 3rd quartiles)	40.2	-	37.3	60.7	51.6
High (4th quartile)	42.5	-	44.0	21.7	24.3
Child-Woman Ratio by SES					
Elite	0.73	0.94	0.88	0.53	0.67
Skilled Workers and Foremen	0.87	0.84	0.97	0.65	0.79

	SWEDEN	ICELAND	NORWAY	USA	CANADA
Farmers	0.83	1.00	0.96	0.84	0.93
Lower Skilled Workers	0.97	0.84	0.99	0.71	0.84
Unskilled Workers	0.91	0.71	0.91	0.78	0.91
NA	0.74	0.97	0.53	0.49	0.73
Total	0.85	0.92	0.94	0.72	0.84
N	619 096	6 981	260 085	589 526	35 642
Geo-groups	2 531	294	595	2 818	208

Source: As for Table 1.

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Table 3

Socioeconomic status and number of children per woman (0-4). Elasticities from regression models.

A. Basic model (OLS)

	SWEDEN		ICELAND		NORWAY		USA		CANADA	
	e	**p**	**e**	**p**	**e**	**p**	**e**	**p**	**e**	**p**
Socioeconomic status										
Elite/upper middle class	ref.		ref.		ref.		ref.		ref.	
Skilled workers	0.137	0.000	-0.065	0.247	0.076	0.000	0.157	0.000	0.140	0.000
Farmers	0.230	0.000	0.202	0.000	0.201	0.000	0.478	0.000	0.358	0.000
Lower skilled workers	0.200	0.000	-0.048	0.259	0.140	0.000	0.186	0.000	0.151	0.000
Unskilled workers	0.163	0.000	-0.110	0.032	0.021	0.002	0.282	0.000	0.251	0.000
NA	0.058	0.000	0.144	0.002	-0.140	0.000	0.113	0.000	0.086	0.003
R^2	0.259		0.222		0.251		0.175		0.202	

Note: Model controls for age of woman. P-values are based on robust standard errors. Elasticities indicate the proportional change in number of children compared to the reference ategory.

Source: As for Table1.

B. Fixed effects model

	SWEDEN		ICELAND		NORWAY		USA		CANADA	
	e	**p**	**e**	**p**	**e**	**p**	**e**	**p**	**e**	**p**
Socioeconomic status										
Elite/upper middle class	ref.		ref.		ref.		ref.		ref.	
Skilled workers	0.111	0.000	-0.056	0.223	0.066	0.000	0.129	0.000	0.098	0.000
Farmers	0.097	0.000	0.048	0.313	0.090	0.000	0.333	0.000	0.232	0.000
Lower skilled workers	0.130	0.000	-0.010	0.806	0.079	0.000	0.145	0.000	0.103	0.000
Unskilled workers	0.103	0.000	-0.034	0.465	0.028	0.014	0.225	0.000	0.156	0.000
NA	0.036	0.000	0.095	0.049	-0.032	0.025	0.111	0.000	0.053	0.127
R^2 within	0.274		0.271		0.285		0.192		0.228	
R^2 between	0.173		0.247		0.319		0.428		0.289	
R^2 overall	0.270		0.266		0.282		0.202		0.228	

Note: Model controls for age of woman, age difference between spouses, presence of children over 4, Household status (head family or lodger), migration status (except Iceland). Fixed effects at lowest geographical level. P-values are based on robust standard errors. Elasticities indicate the proportional change in number of children compared to the reference category.

Source: As for Table1.

Table 4

Regression estimates (elasticities)of full model (OLS).

	SWEDEN		ICELAND		NORWAY		USA		CANADA	
	e	p	e	p	e	p	e	p	e	p
Socioeconomic status										
Elite/upper middle class	ref.		ref.		ref.		ref.		ref.	
Skilled workers	0.109	0.000	-0.056	0.300	0.064	0.000	0.132	0.000	0.100	0.000
Farmers	0.108	0.000	0.068	0.104	0.083	0.000	0.328	0.000	0.234	0.000
Lower skilled workers	0.122	0.000	-0.006	0.883	0.077	0.000	0.159	0.000	0.104	0.000
Unskilled workers	0.100	0.000	-0.038	0.435	0.033	0.000	0.236	0.000	0.156	0.000
NA	0.042	0.000	0.101	0.026	-0.031	0.013	0.122	0.000	0.047	0.102
Age of woman										
15-19	-0.567	0.000	-0.560	0.000	-0.517	0.000	-0.366	0.000	-0.666	0.000
20-24	-0.124	0.000	-0.131	0.019	-0.127	0.000	0.222	0.000	-0.035	0.159
25-29	0.139	0.000	0.086	0.057	0.109	0.000	0.286	0.000	0.195	0.000
30-34	ref.		ref.		ref.		ref.		ref.	
35-39	-0.256	0.000	-0.111	0.007	-0.226	0.000	-0.326	0.000	-0.340	0.000
40-44	-0.668	0.000	-0.551	0.000	-0.611	0.000	-0.732	0.000	-0.767	0.000
45-49	-1.279	0.000	-1.150	0.000	-1.194	0.000	-1.180	0.000	-1.288	0.000
50-54	-1.573	0.000	-1.361	0.000	-1.508	0.000	-1.353	0.000	-1.501	0.000
Age difference between spouses										
Wife older	0.048	0.000	0.045	0.148	0.012	0.014	0.021	0.000	0.016	0.369
Husband 0-2 older	ref.		ref.		ref.		ref.		ref.	
Husband 3-6 older	-0.022	0.000	0.010	0.779	-0.023	0.000	-0.009	0.021	-0.020	0.162
Husband>6 older	-0.093	0.000	-0.037	0.248	-0.100	0.000	-0.076	0.000	-0.078	0.000
Children>4 years in household										
No	-0.293	0.000	-0.216	0.000	-0.386	0.000	-0.383	0.000	-0.423	0.000
Yes	ref.		ref.		ref.		ref.		ref.	
Household status										
Head Family	ref.		ref.		ref.		ref.		ref.	
Lodger	-0.184	0.000	-0.766	0.000	-0.583	0.000	-0.439	0.000	-0.387	0.000
Woman employed										

	SWEDEN		ICELAND		NORWAY		USA		CANADA	
	e	**p**	**e**	**p**	**e**	**p**	**e**	**p**	**e**	**p**
No	ref.		ref.		ref.		ref.		ref.	
Yes	-0.170	0.000	-0.021	0.536	-0.143	0.000	-0.248	0.000	-0.154	0.000
Community characteristics:										
FLFP unmarried										
Low	0.016	0.000	-0.050	0.074	0.011	0.016	-0.001	0.872	0.020	0.149
Medium	ref.		ref.		ref.		ref.		ref.	
High	-0.046	0.000	-0.030	0.349	0.018	0.000	0.011	0.002	0.005	0.793
Teachers/100 Children 7-14										
Low	0.006	0.051	0.047	0.099	0.002	0.721	0.010	0.053	0.012	0.360
Medium	ref.		ref.		ref.		ref.		ref.	
High	-0.003	0.358	-0.029	0.327	-0.034	0.000	-0.014	0.000	0.015	0.261
Prop. Employed in agriculture										
Low	-0.028	0.000	-0.010	0.722	-0.032	0.000	0.011	0.007	0.055	0.009
Medium	ref.		ref.		ref.		ref.		ref.	
High	-0.011	0.006	0.035	0.281	-0.020	0.000	0.005	0.425	-0.012	0.370
Migrant Status										
Both migrants	-0.014	0.000			0.001	0.755	0.120	0.000	0.044	0.010
Wife mig. & husband non-mig.	0.011	0.006			0.017	0.001	-0.003	0.537	-0.023	0.340
Wife non-mig. & husband mig.	0.008	0.046			0.006	0.282	0.022	0.000	0.027	0.152
Both non-migrants	ref.				ref.		ref.		ref.	
Proportion migrants										
Low	0.025	0.000			0.015	0.002	0.044	0.000	0.087	0.000
Medium	ref.				ref.		ref.		ref.	
High	-0.045	0.000			-0.049	0.000	-0.075	0.000	-0.054	0.001
Child-woman ratio										
Low	-0.154	0.000	-0.245	0.000	-0.068	0.000	-0.176	0.000	-0.221	0.000
Medium	ref.		ref.		ref.		ref.		ref.	
High	0.138	0.000	0.291	0.000	0.103	0.000	0.275	0.000	0.290	0.000
R^2	0.285		0.291		0.290		0.218		0.261	

Note: P-values are based on robust standard errors. Elasticities indicate the proportional change in number of children compared to the reference category.

Source: As for Table 1.