Socioeconomic status and fertility: Insights from historical transitions in Europe and North America

Martin Dribe*, and Hilde Bras, Marco Breschi, Alain Gagnon, Danielle Gauvreau, Heidi Hanson, Thomas Maloney, Stanislao Mazzoni, Joseph Molitoris, Lucia Pozzi, Ken R. Smith, Hélène Vézina

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

Martin.Dribe@ekh.lu.se

Abstract

One of the major demographic changes during the past 200 years is the emergence of the two-child norm as part of the creation of the modern family. While we know a great deal about the timing of the fertility transition in different regions, we know much less about specific features and causes. The aim of this paper is to use longitudinal micro-level data for seven local populations in Europe and North America in the nineteenth and twentieth centuries to study the relationship between socioeconomic status and fertility before, during and after the transition. Using the same analytical model allows us not only to test hypotheses about the reversal of class differences, but also to address possible determinants of fertility decline more generally. More specifically we look at the development of socioeconomic differences in marital fertility and relate it to common theories on fertility behavior as adjustment and innovation processes. Our results do not provide strong support for the hypothesis of high fertility among the upper classes in pre-transitional society, but support the idea that they acted as forerunners in the transition by being early in reducing their fertility. Besides this regularity, the patterns of class differences in fertility varied a great deal between populations, pointing to the importance of local contextual factors.

Preliminary work, please do not cite.

Paper for the annual meeting of the Economic History Association, Washington, DC, September 20-22 2013. This work is part of the project "Towards the modern family. Socioeconomic stratification, family formation and fertility in a historical perspective", funded by the Swedish Research Council.

Introduction

Across the western world there were dramatic changes in family life around the turn of the twentieth century. Following sustained increase in human longevity, family size more than halved during the great fertility decline (see Coale and Watkins 1986). These changes during the demographic transition had a profound impact not only on the lives of ordinary people, but according to one theory also for the transition to modern (sustained) economic growth (Galor 2011). Be that as it may, it is clear that the demographic revolution of the nineteenth and early twentieth centuries were of similar importance to humanity as were the Neolithic and industrial revolutions. Despite this importance, as was pointed out in a recent survey by Timothy Guinnane (2011), we still lack a clear understanding of this process, and which were the important mechanisms behind this change. There are a number of theories focusing on the greater importance of education, women's relative wages and independence, mortality decline, new attitudes and norms, secularization, and so on, but the empirical picture is not at all as detailed (see, e.g., Hirschman 1994; Schultz 2001; Guinnane 2011 for reviews of theories explaining the fertility transition).

One of the issues of great relevance for understanding the fertility decline is the differences in fertility according to socioeconomic status, and how these differences evolved over the fertility transition. There appears to be a generally accepted view in the literature that higher social status was associated with high fertility in pre-transitional society but that this situation reversed during the transition, or even well before (Skirbekk 2008; Livi-Bacci 1986). This change has been explained by the higher social groups acting as forerunners in the decline (Livi-Bacci 1986; Haines 1989a, 1992) but it remains unclear whether the change happened because new incentives were affecting the elite groups first (adjustment) or if it had to do with a diffusion of new ideas first adopted in these high-status groups (innovation) (see Haines 1992). However, to a considerable extent these generalizations are based on rather thin empirical grounds. With some notable exceptions (e.g. Haines 1977, 1992, Skirbekk 2008) there are few studies examining socioeconomic differentials in fertility covering the entire transition in different contexts in order to identify common patterns. Moreover, there is very little empirical evidence using longitudinal micro-level data where the reproductive behaviour of families can be followed over time.

The aim of this paper is to study socioeconomic differentials in fertility in a comparative perspective using micro-level economic-demographic data for six communities/areas in Sweden, The Netherlands, Italy, the United States and Canada covering the period from early nineteenth century until the mid-twentieth century. Using these very rich data sources enables a careful analysis of the relationship between socioeconomic status and fertility, and how it evolved during

the demographic transition. In turn a better knowledge of these patterns can inform us about important determinants of the fertility transition. It is, however, beyond the scope of this paper to establish the causal pathways behind the great fertility transition, but more to present a comparative picture of class differences during the decline.

After presenting some background to socioeconomic fertility differentials the data and methods will be described followed by an account of the basic demographic patterns, the event-history analysis and finally the conclusions.

Background and theory

Previous research tends to support an interpretation that connects fertility decline with broad socioeconomic changes taking place in the late nineteenth and early twentieth century, following the transition from an agriculturally based economy to an industrial one (see Dribe 2009). This transition involved sustained mortality decline, increasing levels of urbanization, expansion of education and increased female market work. The question remains how these changes affected different socioeconomic groups?

Looking at the fertility decline in France, Germany, Britain, Norway and the United States using cross-sectional data mainly from censuses, Haines (1992) showed that the socioeconomic differentials, as measured by occupation, generally widened during the transition. Fertility decline in all these countries except France was led by the middle and upper classes, while the agrarian population was slower to change. The question is whether this pattern was the result of socioeconomic change first affecting the upper and middle classes and not until later hit the lower classes as well, or if it was part of an older pattern with innovation diffusion from upper to lower social strata.

According to Livi-Bacci (1986), European elite groups often acted as forerunners in the fertility transition, showing declining fertility quite a long time before the general decline in fertility (see also Bardet 1990; Perrenoud 1990). He also argued that at least partly the early fertility decline in these groups was connected to urban residence, but it remained uncertain whether it was urban life as such that created special preconditions for fertility in terms of socioeconomic or cultural environment, or if it was rather something more specific to the elite groups as such.

There is also evidence from other contexts pointing in the same direction (e.g. Schneider and Schneider 1996; Sogner, Randsborg and Fure 1984). In his study of socioeconomic fertility differentials in Britain during the fertility decline using the 1911 census, Szreter (1996) stressed the interplay between geography and social class in the decline. Fertility decline was not simply

diffused socially and geographically following a certain pattern. Instead, there were pronounced differences within different social groups regionally, having to do with differences in the perceived costs of child rearing. As conditions changed, new attitudes and values spread within these regional social groups by way of a changed discourse. This change in discourse, however, was in turn to a large extent determined by changing economic conditions. Overall, Szreter downplayed the importance of socioeconomic differentials in fertility during the transition, but this has recently been revalued using the same data by Barnes and Guinnane (2012), who argue that social class accounted for a large proportion (about 2/3) of the fertility variance between couples in the 1911 British census.

More recently the issue of fertility differentials by social class, or wealth, has also gained renewed attention by economic historians following the publication of Gregory Clark's *A Farewell to Alms* (2007; see also Guinnane 2011). Based on data from wills (and thus surviving children at the time of parental death) he showed that number of surviving children was higher among richer people in preindustrial England, but also that these differences diminished well before the fertility transition (see also Clark and Cummins 2009, Clark and Hamilton 2006) and similar findings have been made for France (Cummins 2013) as well as for England using occupational data from family reconstitutions (Boberg-Fazlic, Sharp, and Weisdorf 2011).

From a theoretical point of view, fertility decline is often viewed in the framework of innovation and adjustment (Carlsson 1966), where the first explains fertility decline as a result of new knowledge or attitudes to fertility control, while the latter sees the decline as a result of an adjustment of behavior to new circumstances and a greater motivation to limit fertility. In an alternative, but equally classic, formulation, Coale (1973, later developed by Lesthaeghe and Vanderhoeft 2001) identified three conditions for fertility decline, namely that people needed to be "ready, willing and able". These three conditions involve both adjustment and innovation.

The basic premise of this framework is that people in the past were not completely ready to limit family size even though they might have been both willing and able in the sense that they had economic and demographic reasons to limit family size as well as the necessary knowledge to do so. What was required was a change in attitudes making it socially acceptable to limit fertility within marriage (see Carlsson 1966; Cleland 2001; Cleland and Wilson 1987; Lesthaeghe 1980; Lesthaeghe and Surkyn 1988). In this process increased knowledge of contraceptive methods may also have played a part; even though most scholars seem to assume that knowledge of basic contraception through traditional methods were known to people, it remains uncertain to what extent they were used within marriage (McLaren 1990; Santow 1995; Van de Walle 2000; Van de Walle and Muhsam 1995). In any case, the distinction between readiness and ability is crucial. The

mere fact that people were able to limit fertility does not mean that they were ready to do so. For this to happen there had to be social acceptance to limit the number of children within marriage, and according to the innovation-diffusion paradigm this was largely not the case in pre-transitional society. It is more difficult to find out how these new attitudes came about and spread through society. In his theory of innovation-diffusion more generally, Rogers (1962) identified five groups in the diffusion process with strong links to socioeconomic status: innovators (highest SES), early adopters (high SES), early majority (average SES), late majority (below average SES), and laggards (lowest SES). Viewing deliberate family limitation within marriage as an innovation (e.g. Cleland 2001), we would then expect to find a clear gradient in the decline of marital fertility going from highest to lowest socioeconomic status. We would also expect that higher social groups would be more likely to formulate and adopt these new ideas as they were culturally more open and increasingly felt it important to distinguish themselves from the lower classes. Such a strategy of distinction in the middle class has been shown important for other aspects of family life, for instance in marriage patterns (Van de Putte 2007; see also Frykman and Löfgren 1987). The middle class and elite groups can also be expected to have been better able to acquire new knowledge about methods of birth control to the extent that these were not generally known before. What is not as clear, however, is how to explain the innovation in the first place, i.e. why the innovators suddenly decided to start to do things differently and limit their family size.

In the theoretical framework outlined by Easterlin and Crimmins (1985), both the demand and supply of children are important in explaining the high pre-transitional fertility despite the assumption that knowledge about birth control was available, as well as the decline in fertility once it started. 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 mortality in pre-transitional society (low supply) together with a high demand for children implied that demand exceeded supply. Following the mortality decline the supply of children increased which contributed to the decline in fertility (Galloway, Lee and Hammel 1998; Haines 1998; Reher 1999; Reher and Sanz-Gimeno 2007). However, declining mortality was only part of the explanation as fertility was reduced much more than mortality which implies that fertility decline also involved a reduced number of surviving children; in other words a decline in net fertility (see Doepke 2005).

This means that a changing demand for children was also important for the fertility decline (see Brown and Guinnane 2002; Crafts 1984; Dribe 2009; Galloway, Hammel, and Lee

1994; Mosk 1983; Schultz 1985). The demand for children can be defined as the number of children a couple would want if there were no costs to limit fertility, depending on family income and the cost of children in relation to other goods that are directly related to social status, economic conditions and occupational levels. Following industrialization and urbanization the motivation to have children changed, and this can be expected to have affected socioeconomic groups differently. On the one hand, higher consumption aspirations among high status groups would have increased opportunity costs of childbearing and therefore contributed to a reduced demand for children. On the other hand, since children could help out working in the fields or assisting in supplementary activities, from a relatively early age, economic benefits of children might also have been higher among low and middle class families in rural contexts (i.e. among farmers and agricultural laborers), implying a delayed response in terms of fertility decline in these groups.

In addition, to the extent that industrialization and urbanization increased the returns to education, demand for child quality would also have increased (Becker 1991). In turn, this would have led families to substitute quantity for quality, by having fewer children and investing more in each child. This quantity-quality trade-off has been viewed as an important explanation for the decline in fertility (see, e.g., Dribe 2009; Wahl 1992) as well as for the escape from the Malthusian trap and emergence of modern economic growth (e.g., Galor 2005, 2011; see also Becker et al. 2010; Guinnane 2011).

Empirical studies have also confirmed that smaller family sizes in the demographic transition became increasing connected to socioeconomic upward mobility for children (Van Bavel 2006, Van Bavel et al. 2011; Bras, Kok, and Mandemakers 2010). It could be expected that this change towards more investments in child quality would first be adopted by the higher status groups, partly because of a higher return to education in these occupations, and partly because of better knowledge and information about the new conditions emerging in these socioeconomic groups.

Data

We use data from six different communities in Europe and North America: Scania in southern Sweden, Stockholm, the capital of Sweden, a sample of birth cohorts in areas of the Netherlands, the town of Alghero on the island of Sardinia (Italy), a sample of the population of Utah in the United States, and the community of Saguenay in Quebec, Canada.

Scania, Sweden

Data come from five rural parishes in southern Sweden (Hög, Kävlinge, Sireköpinge, Halmstad, and Kågeröd) which were homogenous in terms of religion (see Bengtsson 2004; Bengtsson and Dribe forthcoming for a more detailed description). They had 3,900 inhabitants in 1830. By the end of 1939 that figure had increased to 6,300, which implies roughly the same rate of growth as in Sweden as a whole. The growth in the five parishes was, however, very unequally distributed, as 91 percent took place in Kävlinge. The selected parishes are compact in their geographical location, showing the variations that could occur in a society with regard to size, topography, and socioeconomic conditions.

The dataset used is based on local population registers in combination with church records, which include information on demographic events and migration for all members of households, and families within households. The vital events have also been checked against the birth and death registers to adjust for possible under-recording of events in the population registers. In this paper we use data from about 1815, when the population registers begin, to 1968 well after the fertility transition was completed. The data from the population registers have also been linked to poll-tax registers (*mantalslängder*) and income registers which provide yearly information on occupation. The resulting database contains all individuals born in the different parishes, or migrating into them. Instead of sampling any particular group (a birth cohort for example), each individual is followed from birth or time of arrival in the parish, to death or migration out of the parish.

Stockholm, Sweden

The data for this study come from the Roteman's archive, which contains all individuals who lived in Stockholm City between 1878 and 1926 (see Molitoris and Dribe forthcoming). The Roteman's Institution (*Rotemansinstitutionen*) was established in 1878 as a response to the growing burden of data collection placed on parish priests in Stockholm. On January 1, 1878, the city was divided into 16 districts (*rotar*), which often simply took on the parochial borders already existing within the city. Each of these districts was assigned one district administrator (*roteman*), who was responsible for registering individuals in the system and all births, deaths and migration (Geschwind and Fogelvik 2000). In 1926, the system was officially abandoned for the same reason it was created: rapid population growth.

The structure of the data is spell-based with information explaining how each spell began and ended. For example, it is known if a spell began with a birth and ended with out-migration. In the dataset there is information about occupation, birthdates, position of an

individual in the household (e.g. head, servant, lodger, etc.), place of birth, marital status, sex, and vaccination status. Information on marriage dates is not available, though married couples can be identified by their relation to the head of household. The data extracted for this study consist of all women aged 15 to 49 who lived in Stockholm during the period and all individuals with a connection to those women, including family members, household employees, and lodgers. In total, there were 3,733,842 observations with 970,940 unique individuals of which 579,014 were female.

During the period under observation the population of Stockholm increased from 136,000 to 502,000, amounting to an annual growth rate of 2.2 percent (compared to 0.6 percent for the country as a whole). Despite significant changes in the economy and city, Stockholm was still relatively poor during the late nineteenth century. The socioeconomic differences that developed within in the city during industrialization translated into differential demographic outcomes, such as higher infant mortality among the lower classes (Macassa et al. 2006). Breastfeeding in Stockholm appears not to have been widespread, and non-marital births were among the highest in the country in the nineteenth century (Brändström et al. 2002). Family formation and legal marriage were relatively unimportant, leading to a large number of unmarried individuals above 15 years old and an average household size of about 2.5 (Söderberg, Jonsson and Persson 1991: 112-113). The lack of formal marriages was increasingly replaced by informal cohabitation. As can be expected, socioeconomic status played a significant role in determining marriage partners. During the late nineteenth century, the unskilled and lowly educated were highly endogamous, while the middle class exhibited considerable exogamy. In the 1880s, for instance, more than half of all middle class men married upper class women (Matović, 1984: 237).

The Netherlands

We use data from the Historical Sample of the Netherlands (HSN, see Bras, forthcoming, for a more detailed discussion). The HSN contains information available in the Dutch civil and population registers of a 0.5 percent sample of all Dutch men and women (so called Research Persons) born between 1812 and 1922 (Mandemakers 2006). The most important source is the Dutch population register that was initiated in 1850. In it, information is available on date and place of birth, relation to the head of the household, sex, marital status, occupation, and religion for each individual in a household. Starting point of the first registers was the census of 1849, the returns of which were copied into the population register. All changes occurring in the household were mentioned in the register. New household members, arriving after the registration had started, were added to the list of individuals already recorded, and those moving out by death or

migration were deleted with reference to place and date of migration or date of death. This means that families and individuals can, in principle, be followed on a day-to-day basis for a long period. The decennial censuses were used to update the system.

For the purpose of this study, Research Persons and their spouses who had their reproductive careers between 1870 and 1940 in different municipalities of the Netherlands were selected. Given that the population registers were initiated in 1850, it was impossible to construct full maternity trajectories of women starting earlier than ca. 1865/1870. In addition, given that information on all persons (including children) living in the same household as the couple is available until 1940 only, we could examine maternity histories of women between age 15 and 50 only until 1940. In all, information on full maternity histories is available for 3,119 couples. Another important source from which data was derived were the marriage certificates. In a marriage record, information on occupations, ages, places of birth, and literacy of the bride and groom are included. Moreover, there is data on the presence (alive or dead) of the parents, their occupations, places of residence, ages and literacy. Marriage records were not available for all couples. We had full information for 1,827 couples (period 1870-1890 N=130; period 1890-1920 N=532; period 1920-1940 N=1165).

Alghero, Italy

Alghero is a coastal town in north-western Sardinia that, before national unification (1861), constituted, with the regions of Piedmont and Liguria, the Kingdom of Sardinia. In 1861 it had 8,831 inhabitants. It was a relatively isolated town due to large geographical distances and weak communications. The Sardinian economy was based on agriculture, sheep farming and mining. Farming was not intensive and was traditionally limited to olives, vines, fruits, cereals and legumes. Land use was organized according to a long standing semi-feudal land tenure system that was still prevalent in the last decades of the nineteenth century. Farmers endured especially low standards of living and were often obliged to supplement their modest earnings with additional activities such as sheep farming or handicrafts (Coda 1977). According to various lists of the indigent families kept in the local municipal historical archive, about 35-40 percent of the families in Alghero were classified as "poor". More than three-quarters of the Alghero population were almost completely illiterate, as was the case everywhere in Sardinia.

The demographic information in this study is based on civil records of birth, death and marriage which were introduced in the island in 1866, according to the rules of the newly unified Kingdom of Italy (see Breschi et al. forthcoming). Our analysis covers the years 1866-1935. We have combined the demographic information obtained from the civil status registers with the

data contained in the parish registers of baptisms, burials and marriages. In particular we analyze fertility behavior of Alghero women married between 1866 and 1905, and follow them until 1935. We selected marriages celebrated in Alghero between spouses both residing there, and whose entire reproductive history was observed. Finally, to control population mobility, the couples selected were included in the analysis until the date of the last event recorded for a component of the respective family. This gave a total number of 2,209 couples which made up 79 percent of all marriages that took place in Alghero between spouses who claimed to be both residents there; the remaining 21 percent of marriages (about 542 cases) was made up of couples who presumably migrate or were otherwise more mobile.

Utah, USA

Data come from the Utah Population Database (UPDB, see Maloney, Hanson and Smith, forthcoming). The core of the UPDB is information on over 185,000 three-generation families identified on "Family Group Sheets" from the archives at the Utah Family History Library. These genealogical records provide data on migrants to Utah and their Utah descendants for more than 1.6 million individuals born from the early 1800s to the mid-1970s. The full UPDB now contains data on nearly 7 million individuals due to longstanding and on-going efforts to add new sources of data and update records as they become available. Because these records include basic demographic information on parents and their children, fertility and mortality data are extensive with coverage up to the present. Importantly for our purposes, they allow us to follow individuals from several birth cohorts throughout the course of their own childbearing, rather than limiting us to a single cross-section or a limited window of observation.[1]

Information on occupation comes from death certificates which are linked to family history records. These death certificates begin in 1904, allowing us to identify the occupation of individuals who died in that year or later. We interpret the information on the death certificates as identifying an individual's "usual occupation" over the course of their work life.[2] We believe this measure of occupation to be a good indicator of socio-economic status in a way that may be superior to an occupation observed in a cross-section, such as a decennial Census. It does, though, omit any information on job change or on the variety of employments that might have

[1] More detail on the breadth and quality of each component data source is available on the UPDB website http://www.hci.utah.edu/groups/ppr

[2] Current instructions regarding the recording of occupations on death certificates emphasize the importance of reporting the "usual" or longest-held occupation of the decedent and specifically emphasize that "retired" or "unemployed" should not be entered (US Department of Health and Human Services 2012, p. 5-6). Only about one-third of one percent of records (198 records) that otherwise met our sample selection criteria had spouses' occupations coded as "retired." We are therefore confident that a usual occupation was reported even in cases in which the individual had stopped working.

been held at a point in time. This may have been especially relevant in the earlier years of the settlement of Utah, when church authorities established policies aimed at territorial self-sufficiency, which could have resulted in individuals being engaged in a variety of kinds of activity simultaneously (Bean, Mineau and Anderton 1990: 56-57).

To limit the number of confounding variables that might be at play, we restrict our sample to women who were born in Utah between 1850 and 1919. We also limit our sample to women who married once, remained married to that one spouse through age 50, and had at least one child. Finally, we exclude women for whom spouse's occupation is unknown, unreported, or insufficiently detailed to classify, and for a very small number of cases in which spouses were reported to be in the military. The number of women in each ten-year birth cohort in our data set, rising from 1,470 in the 1850s cohort to over 13,000 in the 1910s cohort.

Saguenay, Canada

We use data from the BALSAC database which contains all church and civil records for the Saguenay region in Quebec from the onset of colonization in the 1830's up to 1971, that is 432,000 births, 91,000 marriages, and 122,500 death records (BALSAC Project, 2012, see also Vézina, Gauvreau and Gagnon forthcoming). These records have been linked using family reconstitution methods and the resulting dataset carries information on 536,484 individuals.

We retrieved information on the reproductive history of all women married in the Saguenay region from the beginning of the settlement (first marriage recorded in 1842) up to 1971; only women's first marriages were selected (N=72,359). In 73 percent of these families, all children have their birth record in the region, while in 14 percent of them, at least one child is known only by a marriage or a death record, most likely due to temporary migration; the remaining 13 percent are childless families. For this study, and to avoid issues of temporary migration, we work with the first and third categories of families and retain those where the wife's birthdate is known, which provides information on the age of the woman at every event and at time of censoring. The final sample comprises 54,784 couples - of which 13 percent are childless - and 264,732 children.

In each family, the censoring date is defined as the date when the wife turns 50, if both spouses are still alive; or as the date of the first spouse's death when the death occurs before the wife reaches 50; or as December 31, 1971 when both spouses are alive at this time and the wife is under 50. Families are considered either "complete", if both spouses were alive when the wife turned 50, or "interrupted" if the marriage was broken before the wife reached the age of 50. In families where only one death was recorded, we hypothesized that the other spouse was either

still alive in 1971 or that he or she migrated after the death of the first spouse and died outside of the Saguenay region. When no death was recorded, spouses could either be still alive in 1971 or have left the region. Since our goal is to include as many couples as possible for the most recent decades in order to capture as much as possible of the transition process, we keep these families and consider them as complete or interrupted based on the wife's age at the end of observation in 1971. Before 1900, the death record of both spouses is known for nearly 90 percent of the couples. Between 1900 and 1940, this proportion decreases from 82 percent to 15 percent while couples with one known death record increases steadily (12 to 43 percent). The proportion of couples without death records also increases and represents more than 80 percent of couples for the last three periods.

Marriage records provide information about the husband's occupation and about whether the husband and the wife were able to sign. For each child, we have information about his/her birth date, sex, birth order and interval with the preceding and with the following birth. When available, we also extracted information about the child's date of death, the father's occupation at the birth of the child and whether or not the father signed the birth record.

To investigate the relationship between socioeconomic status (SES) and fertility, we use the occupational information mentioned in vital events. This information is available in the marriage record for 46 percent of the couples and in at least one birth record for 67 percent of families. Analyses are based on the modal occupation declared by the fathers at their children's baptism.

Methods

We used episode-structured data for these communities to estimate a set of identical event-history models. Depending on the nature of the data (continuous or discrete time) we used Cox proportional hazard models or complementary log-log regressions to get comparable estimates between the populations. Separate models were estimated for first births and higher-order births because first-birth risks are tightly connected to union formation, especially in pre-transitional and early transitional contexts. For first births the duration is time between marriage and first birth, or censoring due to death or migration. For higher-order births the duration is time since last birth. We control for age of the woman and area (differently defined in different contexts but typically some geographic unit), and in the higher-order birth models we also control for the life status of the previously born child (dead or alive). The main variables of interest are transition phase and socioeconomic status. Four phases were defined in each context:

P1: Pre-transition
P2: Early-transition
P3: Late transition
P4: Post transition

Naturally they correspond to somewhat different time periods in the different contexts (see table 1) but indicate similar phases of the demographic transition, and should therefore be broadly comparable. We do not have data covering all four periods in all the communities, but include the periods for which data are available.

Table 1 here

Socioeconomic status (SES) is measured by the occupation of the father. We have coded all occupations into HISCO (Van Leeuwen, Maas, and Miles 2002), and then classified them according to HISCLASS (Van Leeuven and Maas 2011), which is a 12-category classification scheme based on skill level, degree of supervision, whether manual or non-manual, and whether urban or rural. 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, 12) Unskilled farm workers. These 12 classes were grouped into five:

1. Higher occupations: (1+2+3+4+5)
2. Skilled workers (6+7)
3. Farmers (8)
4. Lower skilled workers (9+10)
5. Unskilled workers (11+12)

In the analysis we include interactions between transition phase and SES to get a better picture of how the socioeconomic differentials evolved over the transition, and how the fertility decline differed between socioeconomic groups. We present the results graphically based on the interaction models, but all model estimations are available in the appendix (including indications of their statistical significance). Needless to say, this is not a causal analysis but a kind of multivariate description using longitudinal data.

Basic patterns

In figure 1 age-specific marital fertility rates in the different population are pictured. Looking first at Scania, P1 shows a rather typical pre-transitional pattern with falling fertility by age in a more or less linear fashion, and with high levels of marital fertility (about 500 per thousand) in the age group 20-24. These high levels are explained by a close connection between marriage and start of childbearing in many pre-transitional populations with high rates of pre-marital pregnancies (see Dribe, Manfredini and Oris forthcoming). Total marital fertility in Scania in this phase was 8.2. In the early-transition phase the shape of the curve was similar but the level was somewhat lower. In the later phases fertility levels were much lower, and there was a decline in all age groups. In the final phase total marital fertility had declined to 3.1. Naturally the decline was largest in younger age groups measured in absolute terms, which is clearly visible in the figure, but in relative terms the decline was strongest in older age groups. For example, the fertility level in the late transition phase (P3) was about 40-50 percent of its pre-transitional level in ages over 30 but 75 percent in the lowest age group. Similarly, when comparing the post-transition levels they were about 10 percent of their pre-transition levels in ages over 40, and 40-50 percent in ages below 30.

Figure 1 here

Utah shows a slightly different pattern from that in Scania. In the pre-transitional phase there was not as big differences across different age groups below 45. In particular the fertility levels in the youngest age groups were lower, which might have been connected to a different marriage pattern and especially a weaker connection between marriage and start of childbearing, for example through less prevalence of pre-marital conceptions. Total marital fertility in pre-transitional Utah was, however, higher than in Scania (9.4). Over the transition, the levels declined considerably, but the overall shape of the curves remained similar. Total marital fertility was 7.3 in the early-transition phase and 5.4 in the late-transition phase. As was the case in Scania fertility declined more, in relative terms, among the older age groups, but all age groups joined the transition more or less from the start.

Turning to the Sardinian town of Alghero, the lack of a real fertility transition in the period under study is quite clear from the figure. There was not much change in overall fertility between the two periods, but as will be made clear later, there were some groups in the population starting their decline in the second period, and hence we have labeled it as early

transition despite the small impact on overall fertility. Total marital fertility was 7.8 in the first phase and 7.6 in the second.

Pre-transitional Saguenay resembles Scania the most in terms of levels, with marital fertility in the lowest age group approaching 500 per thousand. The shape is not as linear as in Scania, and in some ways resembles Utah more than Scania. There was pronounced decline in all age groups across the different transition phases, with the biggest relative change in the higher age groups. Total marital fertility declined from almost 9 in the pre-transition phase to about 4 in the late transition phase (making it more similar to the post-transition phase in Scania than the late transition phases in Scania or Utah).

Finally, looking at Stockholm the pattern in the early transition phase was similar to the others, but the overall level was somewhat lower (TMFR 6.4 compared to 7.2-7.7 in the other populations). There was a marked decline between the two phases, with the greatest reduction in relative terms in age groups 30-44.

A different way of looking at the transition is to study birth intervals. Table 2 shows mean intervals from marriage to first birth and between higher-order births across phases and populations. In the pre-transitional phase the first interval was shortest in Scania and the Netherlands, about 1 year, and slightly longer in Alghero and Utah. In all populations we see that time to first birth increased during the fertility transition. Similarly higher-order birth intervals got prolonged in the transition from about 2.5 years to about 3 years or more. The Netherlands showed somewhat shorter intervals throughout, but the increase was clear here as well. This shows that spacing of births was an important part of the fertility transition as has also been stressed in previous research (Anderson 1998; Bean, Mineau, and Anderton 1990; Crafts 1989; David and Sanderson 1986; Haines 1989b; Szreter 1996), even though we cannot completely rule out that failed stopping could have been part of the increase in the higher-order birth intervals.

Table 2 here

Event-history analysis

Turning now to the event-history analysis of birth intervals, the distributions of the main variables are shown in table 3. Clearly there were big differences between the populations both in terms of the social structure and the distribution of the sample across transition phases. The results from the regressions are presented in graphs indicating how the class differences evolved over time and how changes between phases differed across classes. All figures are based on interaction models and the difference is only which categories are set as comparison, or

reference, groups. First births and higher-order births are analyzed separately. No significance levels are indicated in the figures, but full estimations are available in appendix.

Table 3 here

Looking first at Scania, for which we have data for all four transition phases, figure 2 shows the class differences in the four periods with unskilled workers set as the reference. Clearly there were no dramatic changes in the pattern over time. Higher occupations had low first birth risks in all phases while the unskilled had high. Other groups changed positions somewhat, perhaps most clear for farmers who went from the group with the longest first intervals (lowest birth risk) in the pre-transition phase to the one with the shortest (highest birth risk) in the late-transition phase.

Figure 2 here

In figure 3 the class differences across populations are charted for each transition phase separately. In the first panel, which shows the pre-transition phase, the patterns are quite different across populations. In Utah and Alghero the unskilled had relatively long intervals (low birth risks), while they had short intervals in Scania and the Netherlands (high birth risks). In Saguenay and the Netherlands higher occupations had the longest intervals. Farmers stand out with short intervals in Utah and Alghero, and with long intervals in Scania, and also in the Netherlands. Hence, it is difficult to find a consistent class pattern in first-birth risks in the pre-transition phase, which most likely is connected to differences between populations in the degree to which entry into parenthood was immediately connected to marriage, through for example pre-nuptial pregnancies.

In the early-transition phase (P2) the higher-occupations group emerged with the longest first birth intervals (lowest birth risks) in all populations except Alghero, where it was very close to the longest. Apart from this there was not much difference between classes in most populations. Similarly in the late transition (P3) the long intervals of the higher occupations were clear in all population, even though the difference to the other groups were not always large. Taken together, it seems quite clear that although there were big differences across populations in the class differences in first-birth risks in all periods, higher occupations were always involved in fertility decline through prolonged first intervals.

Figure 3 here

Figure 4 shows changes in first birth risks over transition phases in the different populations. In Scania and Utah it is clear that first birth risks declined faster among higher occupations, even though differences were not very large. In both Alghero and the Netherlands first-birth risks for the elite group increased (shorter intervals) in the very early stages of the transition (between P1 and P2), while it then started to decline in the Netherlands to the late-transition period. In Saguenay all groups had a similar pattern, but the higher occupations were among the groups with the fastest change. Thus, it is difficult to find strong commonalities in the class differences in first birth risks, beyond the long intervals of the elite group, and in some populations also an early prolongation of first intervals in this group during the fertility decline.

Figure 4 here

We now turn to higher order births, which is of main interest when looking at fertility decline, as it was more a decline in number of births than a change in marriage and transition to parenthood (Coale and Watkins 1986). Figure 5 shows class differences in higher-order birth risks for Scania over all four transition phases, and figure 6 shows class differences across populations by transition phase. In the pre-transition phase (P1) the elite group had highest fertility in Scania while the unskilled had the lowest. This changed over the transition so that the elite had the lowest fertility level already early in the transition (P2), and were joined by the skilled workers and lower skilled workers in the subsequent period, while unskilled workers and farmers retained the highest levels. Even in the post-transition phase there was a large difference in marital fertility between the farmers and the unskilled workers, on the one hand, and the rest of the groups on the other.

Figure 5 and 6 here

Looking at the first panel of figure 6, it is quite clear that the Scanian pattern cannot be generalized to other contexts. In no other populations did the higher occupations stand out with high fertility in the pre-transition period. Thus, there is only very limited support for the idea that the elite groups always had high fertility before the fertility transition. In fact, only Scania conforms to this picture. In Utah and the Netherlands farmers had the highest fertility levels while class differences were small overall in both Alghero and Saguenay. It is of course possible

that elite fertility was higher further back in time, before our study period begins, and that an early fertility decline took place in this group leading to a convergence to majority levels. However, it is equally clear that the elite did not have lower fertility than other classes in the immediate pre-transitional period as sometimes suggested.

In the early-transition phase (P2) higher occupations showed the lowest marital fertility in all populations, except the Netherlands where the class differences were negligible. Clearly, this supports the idea that the elite were forerunners in the decline, and early adopters of family limitation. Finally, in the late-transition phase there was clear convergence to the higher occupations of all groups, except farmers and unskilled workers who had higher fertility in most populations.

In the Netherlands and Saguenay farmers had the highest fertility levels, with unskilled forming an in-between group. Thus, with the possible exception of the Netherlands, higher occupations emerged early in the transition as a low fertility group to which other groups converged. Farmers and unskilled workers appear as clear laggards in the process, and even in the post-transition period in Scania they had considerably higher fertility than other groups.

If we instead look at change over time (see figure 7), the early decline among the higher occupations stand out in an even clearer way, especially in Scania and in Alghero, but also in Utah and Saguenay they belonged among the early movers, even though class differences were not as large in these populations. The Netherlands formed a dramatic exception where marital fertility in the elite group was slowest to change, while farmers acted as forerunners. Also in Stockholm the decline in the elite group seemed smaller than for the rest which is in line with an earlier view that the rich had higher fertility than other groups in Stockholm immediately after the transition (Edin and Hutchinson 1935).

Figure 7 here

Concluding discussion

The findings of our analysis can be easily summarized. We found substantial variety in the class patterns of fertility in the different populations of Europe and America that we studied. This seems to contradict the generalizations often made in the literature. The most consistent patterns we found for higher-order births, while for first births the heterogeneity between populations was even larger. This is also what could be expected as entry into parenthood was as much related to marriage and setting up a household, as with fertility. It is also a well-known fact from previous

research of the great fertility decline that it was mainly a reduction in marital fertility as more and more people started to reduce family size, rather than a bi-product of changing marriage patterns. This also makes higher-order fertility of greater interest and relevance when studying factors related to the fertility transition.

Nonetheless, we saw that prolonged intervals between marriage and first birth were also a notable aspect of the decline in most of our populations studied. Similarly, longer inter-birth intervals were crucial in the transition and it points to spacing of births as important in the transition in addition to parity-specific stopping which has always been the main focus in the literature.

Turing to class differences, which was the main focus of our analysis, there was only very limited support for the hypothesis that the more well-to-do had higher fertility before the fertility transition. In fact, only in one of our studied populations, Scania, could we find this pattern. So based on the evidence we have from these different contexts the generalization of higher reproduction in the upper classes could not be supported and neither could the claim of low fertility in this group before the transition. Instead, farmers had high fertility in some contexts and workers in others. It seems as if class differences in fertility in pre-transitional society were highly dependent on local contexts and conditions for childbearing.

We found much more support for the idea that the upper classes acted as forerunners in the transition once it got under way, even though it was not the case everywhere (the Netherlands was the most notable exception). Overall, the upper classes were first to start to reduce their fertility, especially when looking at higher-order births, but sometimes also when it came to increasing intervals between marriage and first birth. In some cases the differences in timing of the decline was not that large between classes, while in other cases they were quite prominent, but in all cases but one the upper classes were among the first to change behavior. Hence, the widening of class differences in the transition, as identified in previous studies, was not a universal phenomenon. As the transition progressed, more groups joined the transition leading to at least some convergence between groups. However, in most cases farmers and unskilled workers retained their relatively high fertility levels also late in the transition.

Looking at Scania, where we have data for all four transition phases, this pattern was also very clear. The higher occupations were forerunners in the process to declining higher-order births risks, followed by all other groups in the subsequent period. However, due to different starting points and different paces in the decline, farmers and unskilled workers had much higher fertility also in the post-transitional phase (based on higher-order births) than the other groups (a difference of about 30 percent).

It is difficult to fully link these results to the major theoretical explanations previously discussed. Clearly the higher fertility of farmers often observed made good economic sense in a society where manual labor at the farm was important and where productive and reproductive work was localized close to each other. It is not as clear why unskilled workers had more children once they got the chance to marry, but as already mentioned the rather big differences in class patterns across populations indicate a large role played by local contextual factors in explaining these patterns.

The early fertility decline of the upper classes seems much more general but is also difficult to reconcile with several of the explanations put forward in the literature. It seems highly unlikely that it could be explained by increased labor force participation of married women, and thus higher opportunity costs of children, as women in these groups rarely worked for pay, and we have in any case no indication of a change in this variable for the women of this group. Similarly, it appears unreasonable that it could be explained by declining benefits of children stemming from either less labor input or increased intergenerational transfers through market or state. Children of the elite did not work in factories or as farm servants, and the transfers from the state did not begin until later, and was then of most importance for the loving standards of the lower classes. Also in terms of the quantity-quality trade-off we cannot expect the elite to have been most strongly affected because of their greater wealth and possibility of investing in their children's education without having to limit fertility. Moreover, in some of our study contexts it is questionable how importance educational investments were in this period (see Bengtsson and Dribe forthcoming; Molitoris and Dribe forthcoming).

There might have been some effect of an earlier decline in infant- and child mortality in the elite group, but it seems far too small to account for the entire fertility decline and, at least in the case of Scania, the mortality development of the elite did not differ from that of the working classes (Bengtsson and Dribe forthcoming). Another possible factor, which has been discussed in relation to declining fertility of the elite in other contexts, is changes in inheritance laws affecting the possibilities for the elite to transfer enough resources to their children in order to safeguard their social standing (e.g. Bardet 1990; Perrenoud 1990). As far as we know there were no such changes in inheritance laws affecting all our populations at the time of the fertility transition, and we have no evidence of other societal changes in this period which would have made social reproduction among the elite more difficult, and which could have provided new incentives to limit fertility.

The innovation-diffusion theory is clearly consistent with an early decline among the upper classes. Higher social status is usually associated with early adoption of new behavior, and

the almost universal pattern of early decline among the upper classes is obviously in line with this idea. Aside from this early adoption of family limitation in the elite group, however, there was no consistent socioeconomic gradient in the decline as could be expected from an innovation-diffusion perspective where the innovation spread from early adopters (high SES) to early majority (middle class) and later to the laggards (low SES). Moreover, the fact that an empirical pattern is in line with predictions of a theory does of course not prove the theory right. We do not know a great deal about how the new fertility behavior spread in these societies and which factors explained the start of the process.

Even though the focus has been on socioeconomic differentials, what was quite striking in all our contexts was the high degree of simultaneity in the decline. There were important differences between classes, but all classes took part in the transition. The clearly shows that the changes happening in society at this point in history affected all groups in society, albeit with some forerunners and some laggards.

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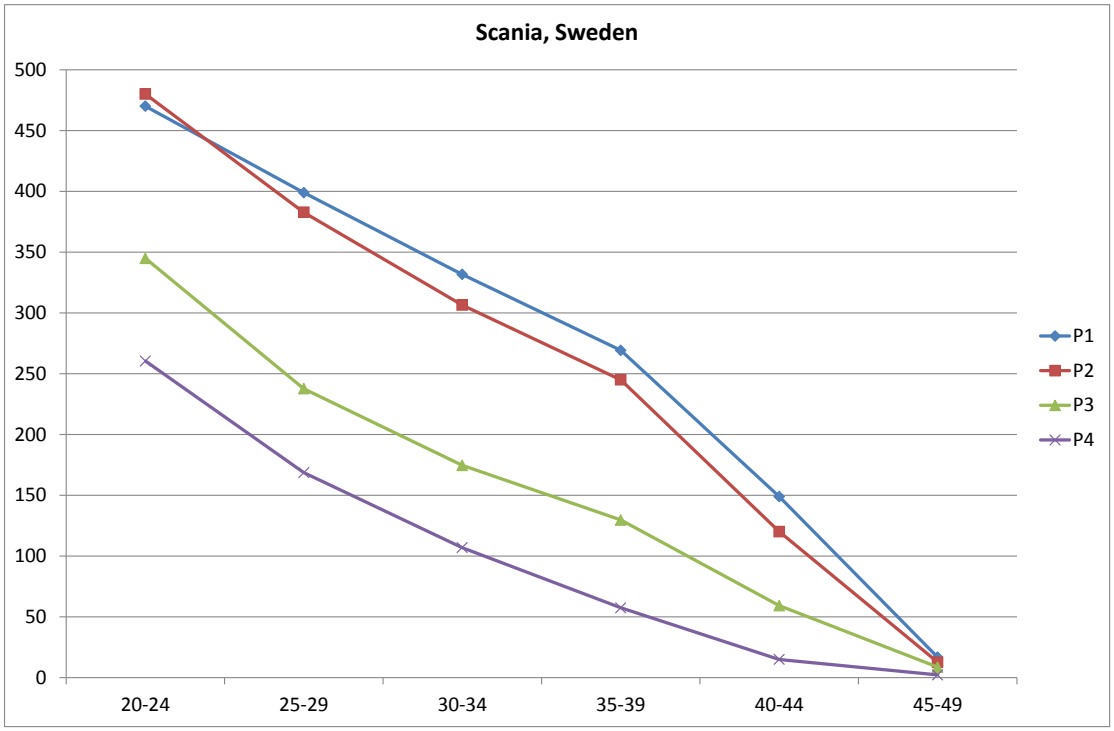
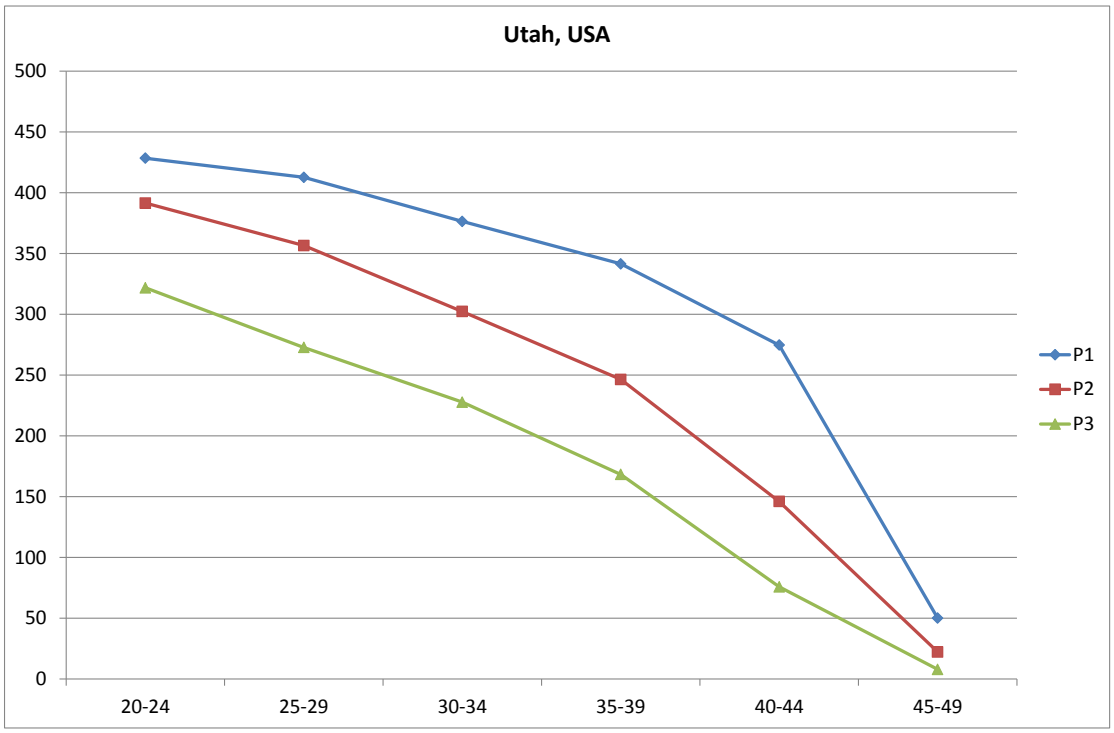
Table 1. Time periods corresponding to different transition phases in the different populations.

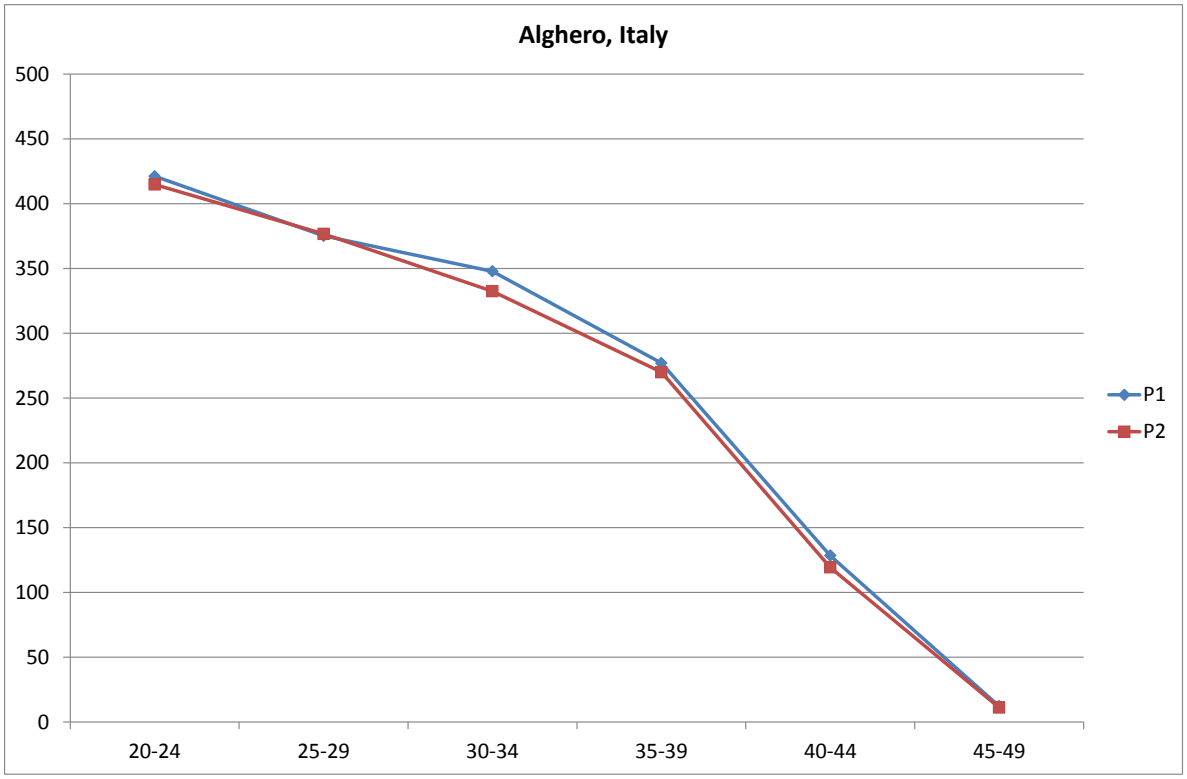
	P1 Pre-transition	**P2 Early transition**	**P3 Late transition**	**P4 Post-transition**
Scania, Sweden	1815-1879	1880-1909	1910-1934	1935-1968
Utah, USA	1850-1869	1870-1899	1900-1919	NA
Alghero, Italy	1866-1895	1896-1905	NA	NA
Stockholm, Sweden	NA	1878-1909	1910-1926	NA
The Netherlands	1870-1889	1890-1919	1920-1940	NA
Saguenay, Canada	1842-1929	1930-1959	1960-1971	NA

Note: For Utah and Alghero transition phases refer to marriage cohorts.

Figure 1. Age-specific marital fertility rates by transition phase in the different communities.



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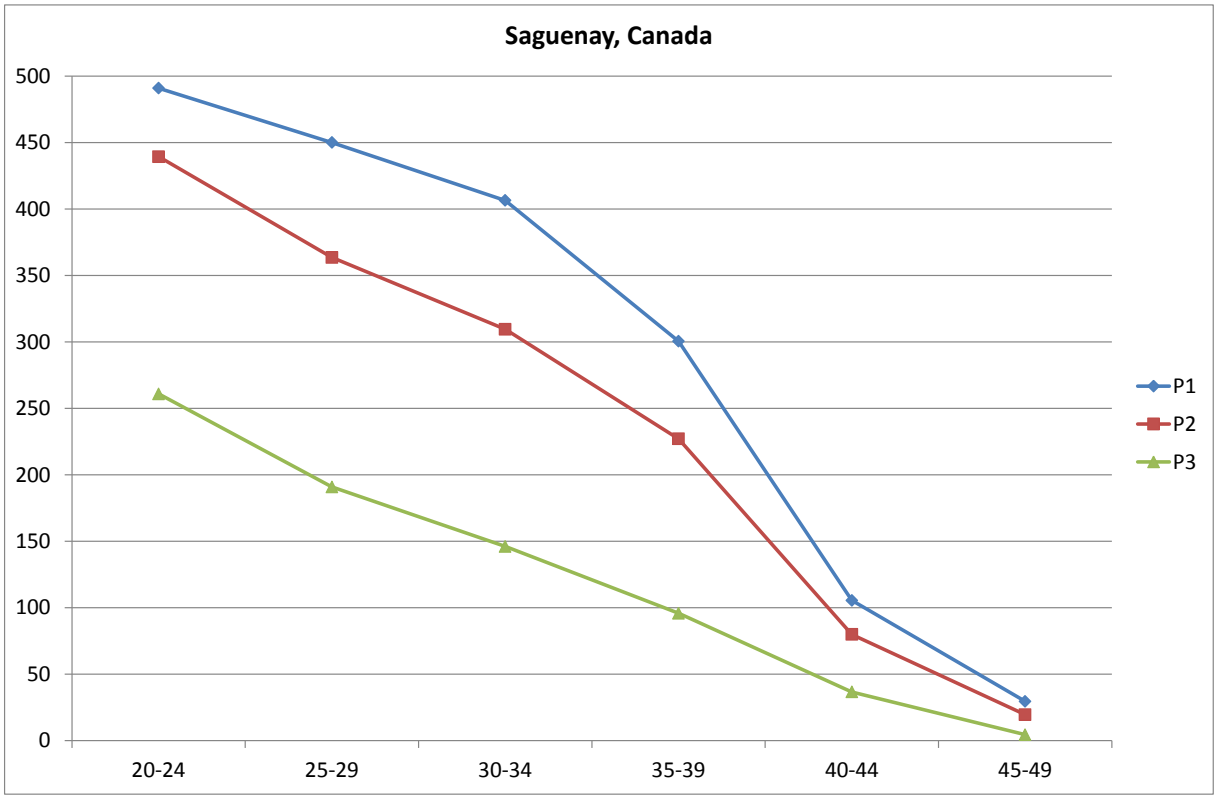
P2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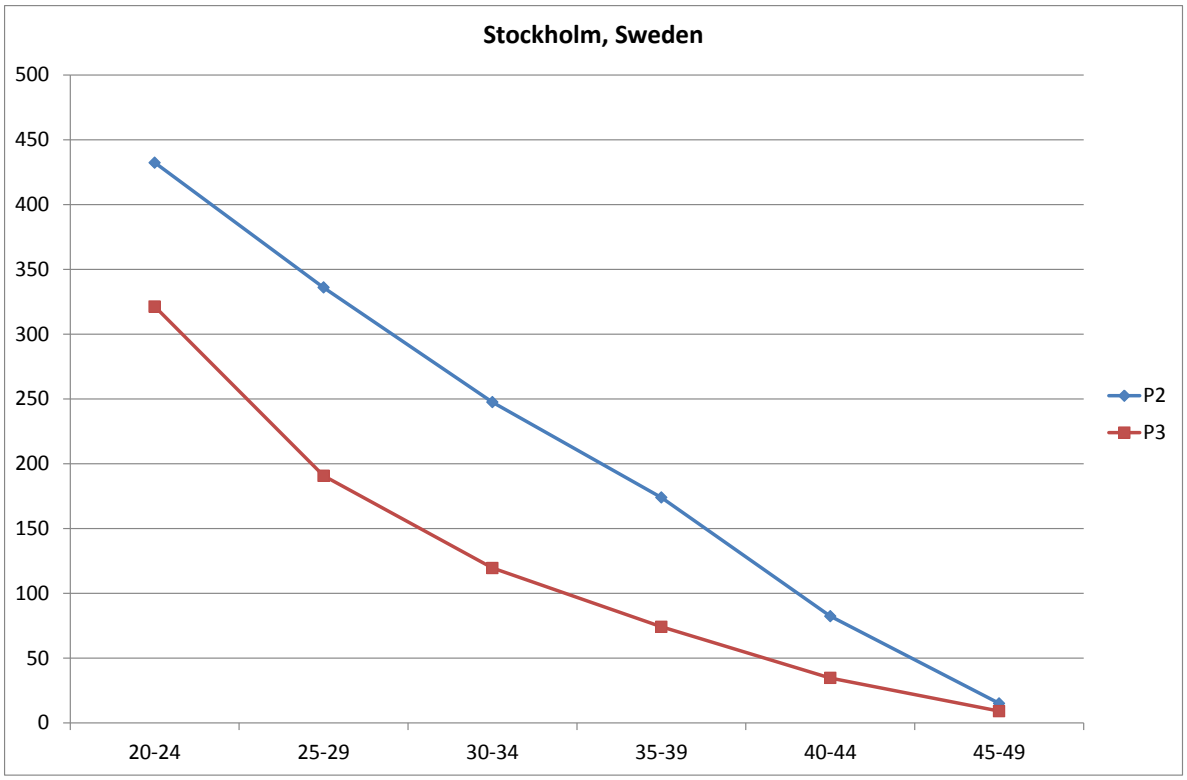
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40-44
45-49
P2
P3

Table 2. Mean birth intervals (years) in the different communities.

A. Marriage to first birth

	Scania	**Utah**	**Alghero**	**NL**
P1	1.06	1.43	1.34	0.97
P2	1.18	1.56	1.45	1.00
P3	1.34	2.06		1.30
P4	2.24			

B. Interbirth intervals

	Scania	**Utah**	**Alghero**	**Stockholm**	**NL**
P1	2.69	2.51	2.47		1.93
P2	2.60	2.81	2.45	2.43	2.05
P3	3.05	3.48		2.87	2.26
P4	3.86				

Table 3. Distribution of main covariates (%) used in regressions.

	Scania, Sweden		Utah, USA		Alghero, Italy		Stockholm, Swe		The Netherlands		Saguenay, Canada	
	FB	HOB	FB	HOB	FB	HOB	FB	HOB	FB	HOB	FB	HOB
SES							NA					
Higher occupations	15.5	14.7	23.1	19.7	6.4	4.4		12.4	20.2	11.2	13.4	10.1
Skilled workers	17.7	15.6	12.2	11.5	10.6	10.1		15.6	20.5	12.6	9.7	9.5
Farmers	19.9	24.8	23.8	30.1	45.7	49.6		NA	7.9	6.2	23.1	31.3
Lower skilled workers	29.0	27.2	8.4	7.6	15.0	12.8		11.9	16.1	10.0	8.6	6.1
Unskilled workers	15.3	15.9	4.2	4.5	22.2	23.1		25.1	35.3	56.7	18.1	26.1
NA	2.6	1.8	28.3	26.7	0.0	0.0		35.0	7.4	3.3	27.1	17.0
Transition phase												
P1	27.1	37.6	12.0	18.6	74.3	74.1			6.7	6.1	22.3	27.7
P2	13.6	19.0	46.0	48.9	25.7	25.9		71.7	41.0	44.1	26.9	48.9
P3	16.0	16.6	42.0	32.6	NA	NA		28.3	52.3	49.8	50.9	23.4
P4	43.3	26.7	NA	NA	NA	NA		NA	NA	NA	NA	NA
Time at risk (person years)	4814	55473	140622	2026222	4647	37481		1125922	2321	16941	125739	729176
Births	2000	9569	80138	319079	1955	9607		171243	1942	7662	43852	259649

Note: Models also control for age of woman, area (when relevant) and LDS status in the case of Utah. Higher order models also control for life status of previous child. For Utah and Alghero transition phase is based on marriage cohorts.

Figure 2. SES differences in first birth risks by transition phase. Net effects (relative risks) from interaction model Period*SES. Scania.

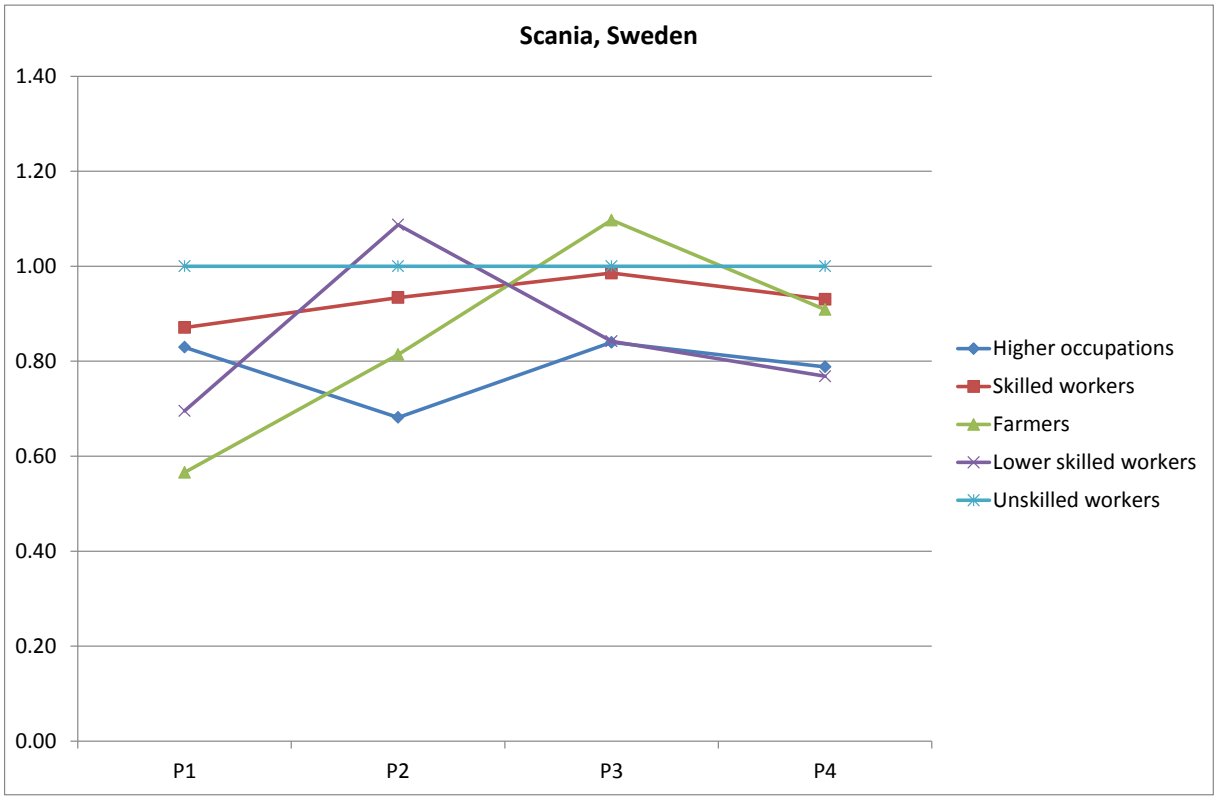
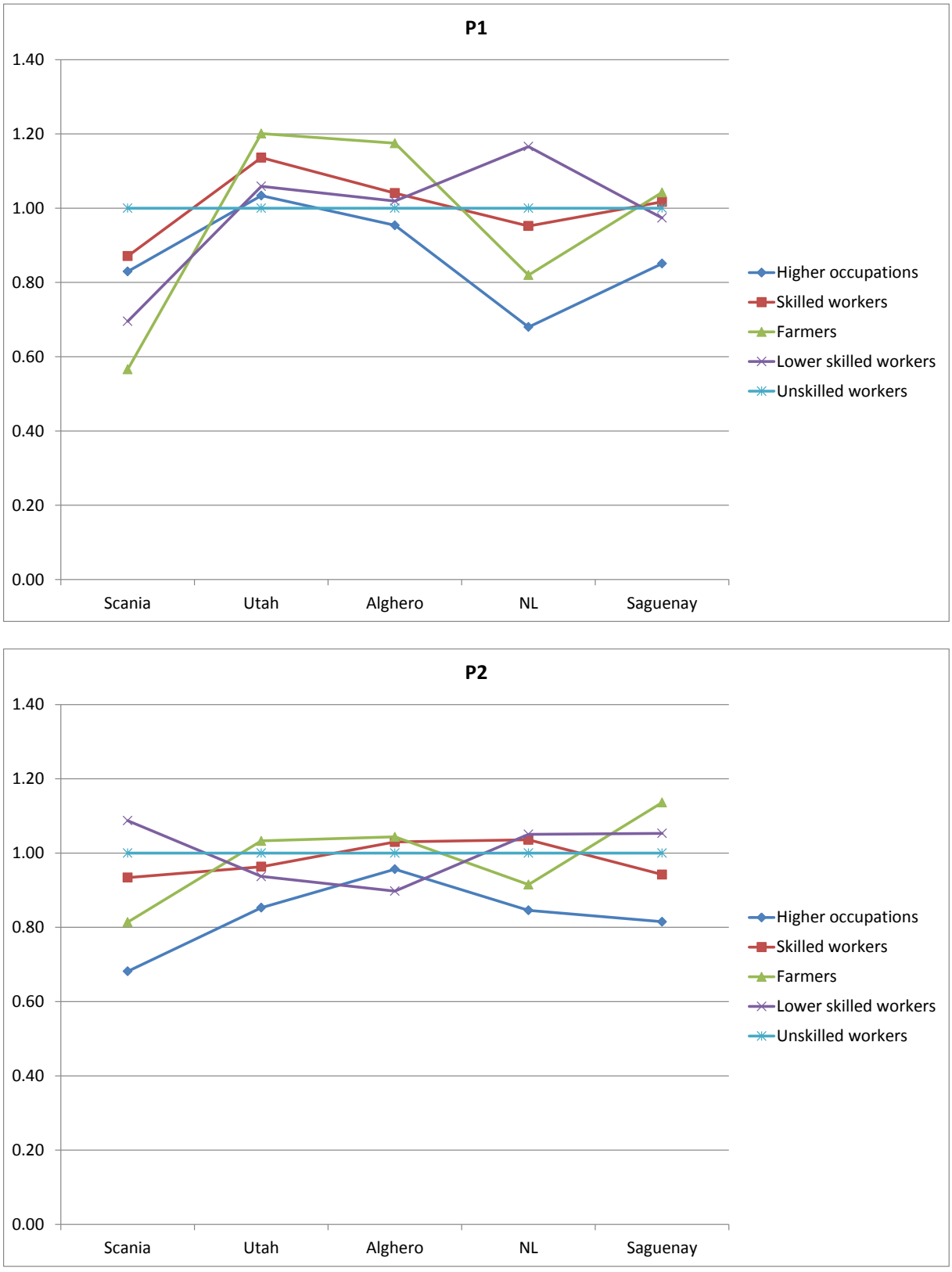


Figure 3. SES differences in first birth risks. Net effects (relative risks) from interaction model Period*SES.



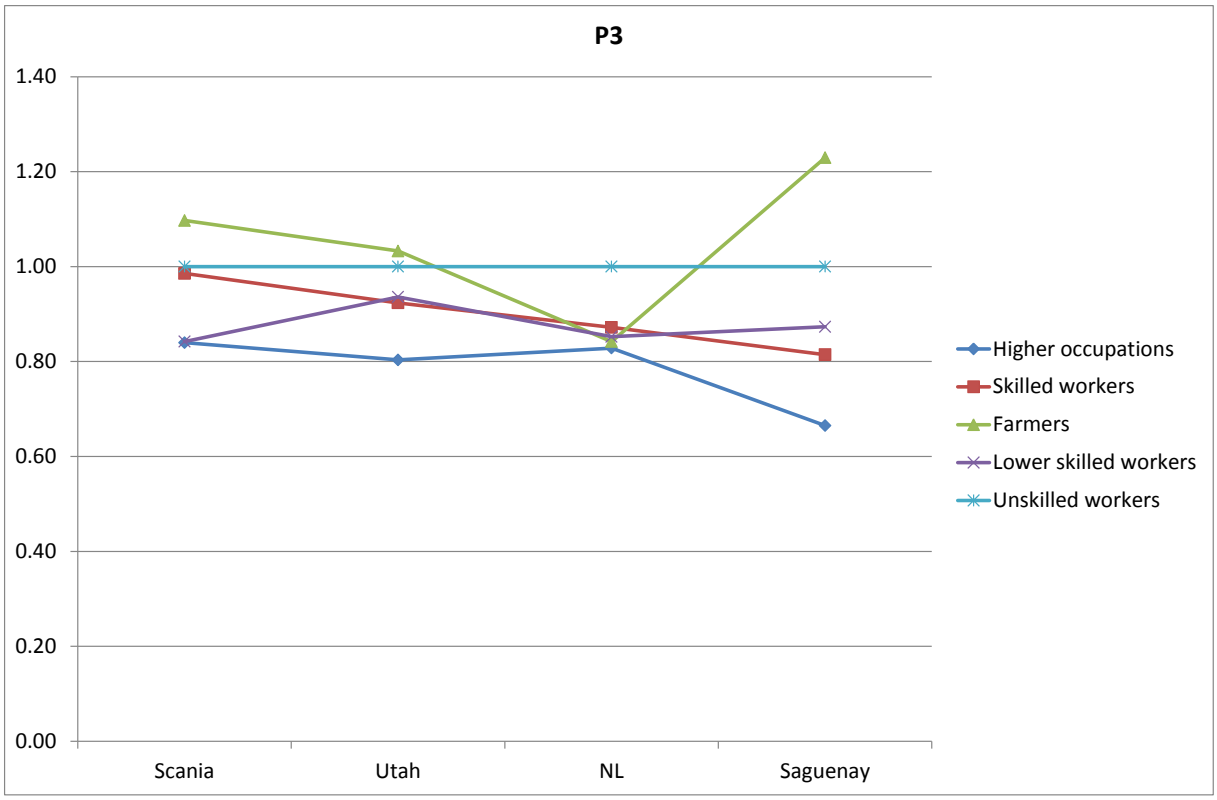
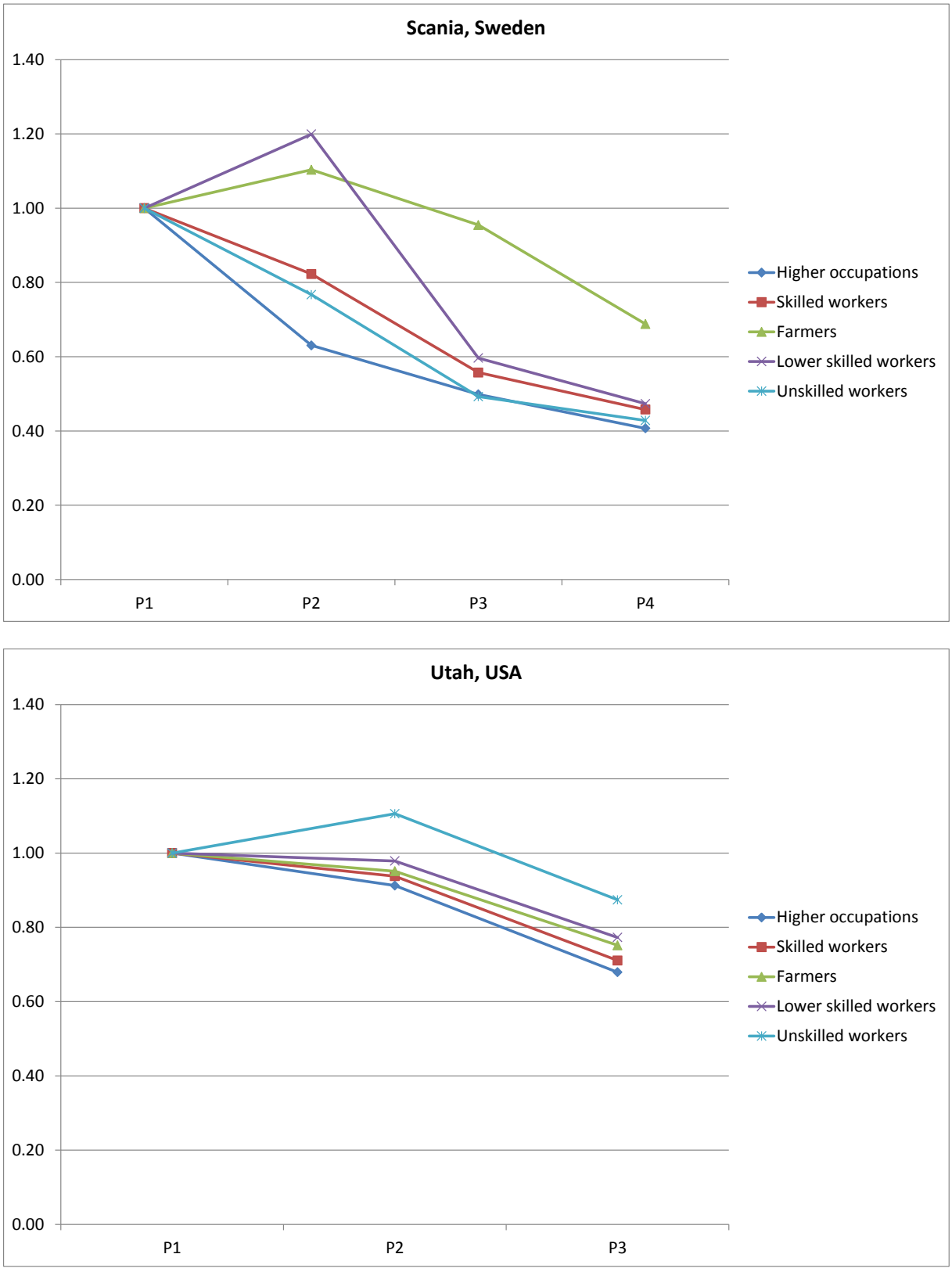
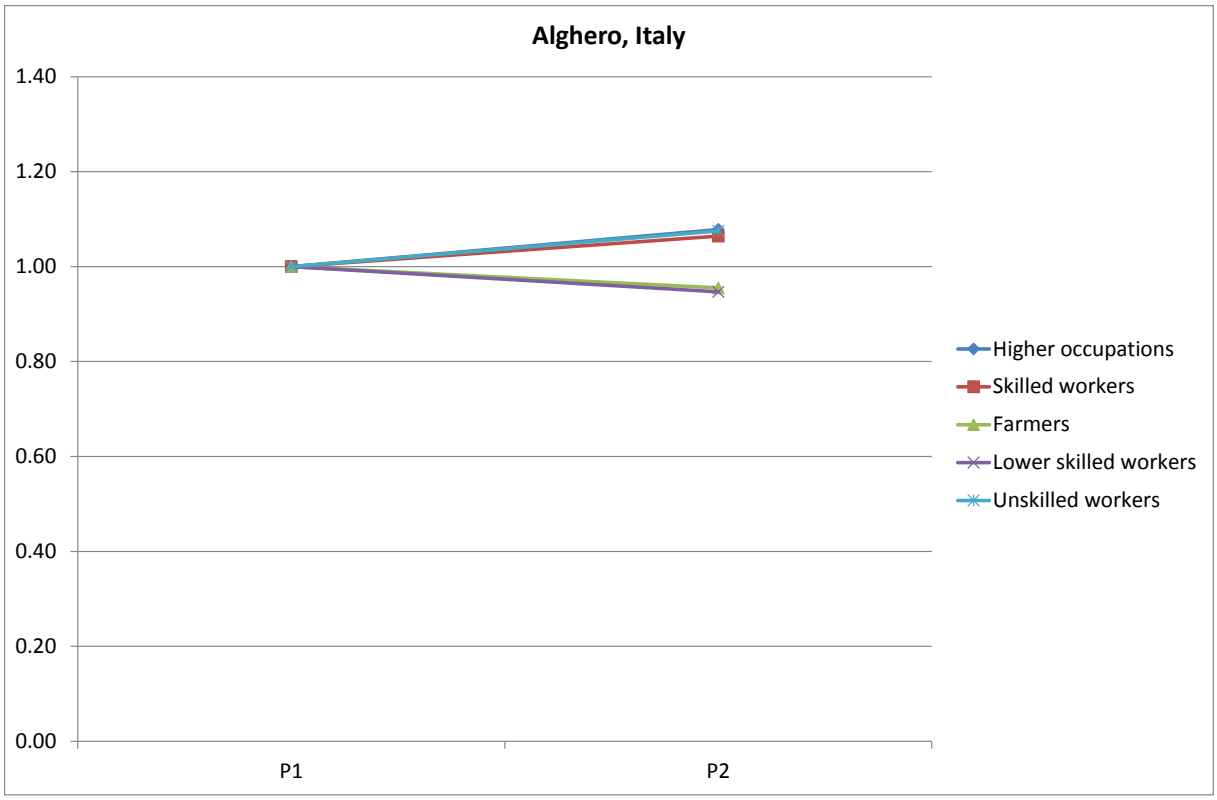
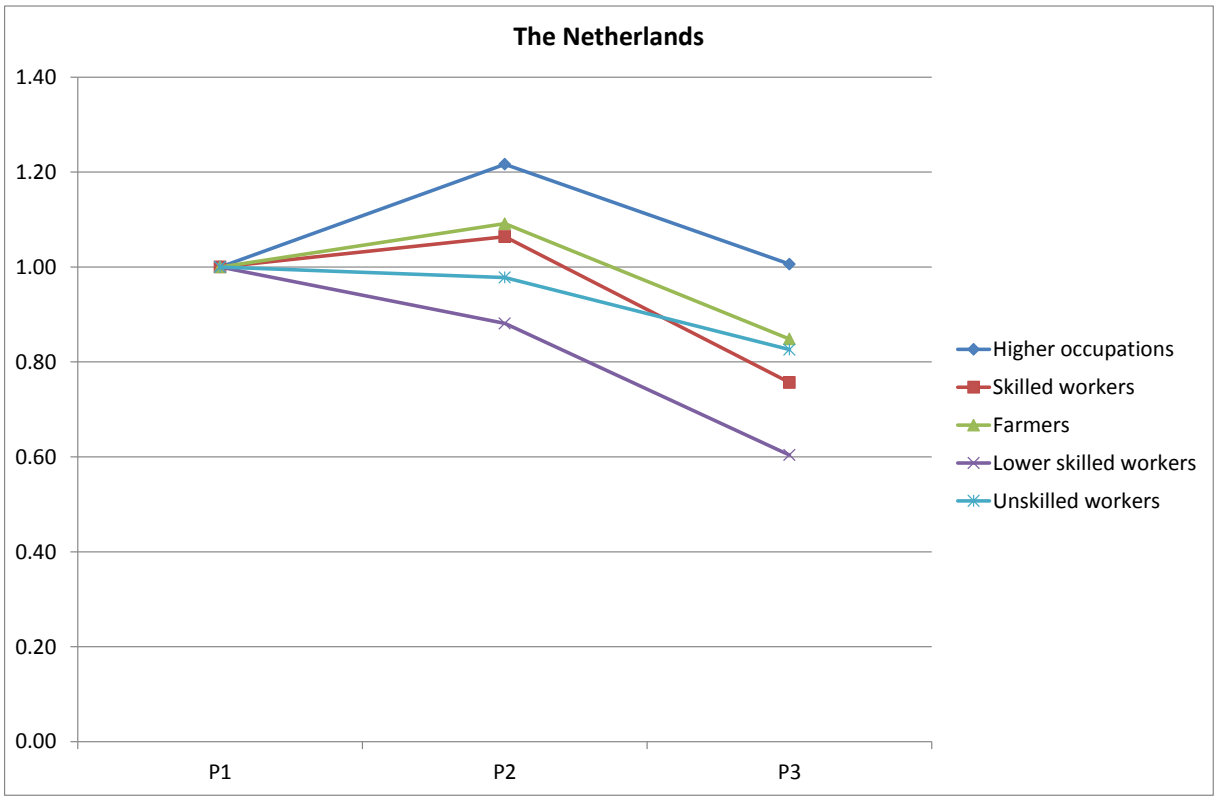

P3
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
Scania
Utah
NL
Saguenay
Higher occupations
Skilled workers
Farmers
Lower skilled workers
Unskilled workers

Figure 4. Period effects on first birth risks. Net effects (relative risks) from interaction models (period*SES).




Alghero, Italy
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
P1
P2
Higher occupations
Skilled workers
Farmers
Lower skilled workers
Unskilled workers


The Netherlands
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
P1
P2
P3
Higher occupations
Skilled workers
Farmers
Lower skilled workers
Unskilled workers

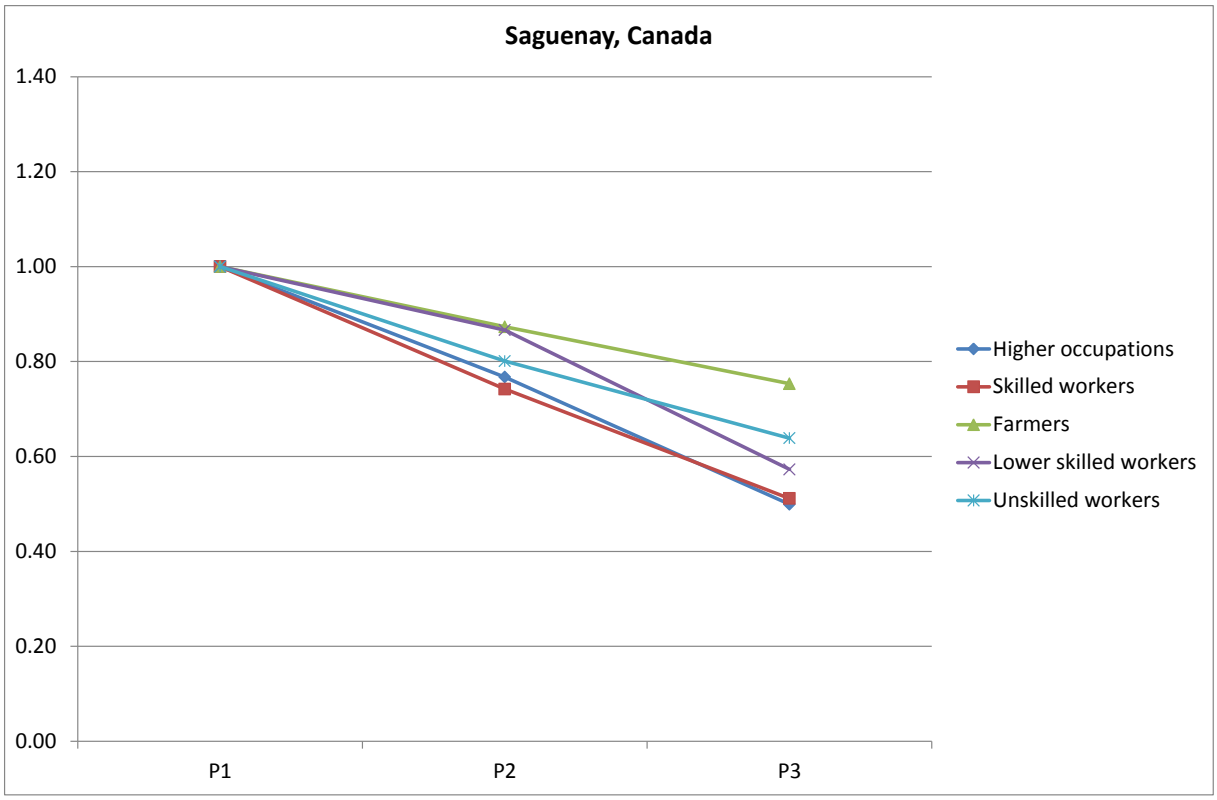

Saguenay, Canada
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
P1
P2
P3
Higher occupations
Skilled workers
Farmers
Lower skilled workers
Unskilled workers

Figure 5. SES differences in higher order birth risks by transition phase. Net effects (relative risks) from interaction model Period*SES. Scania.

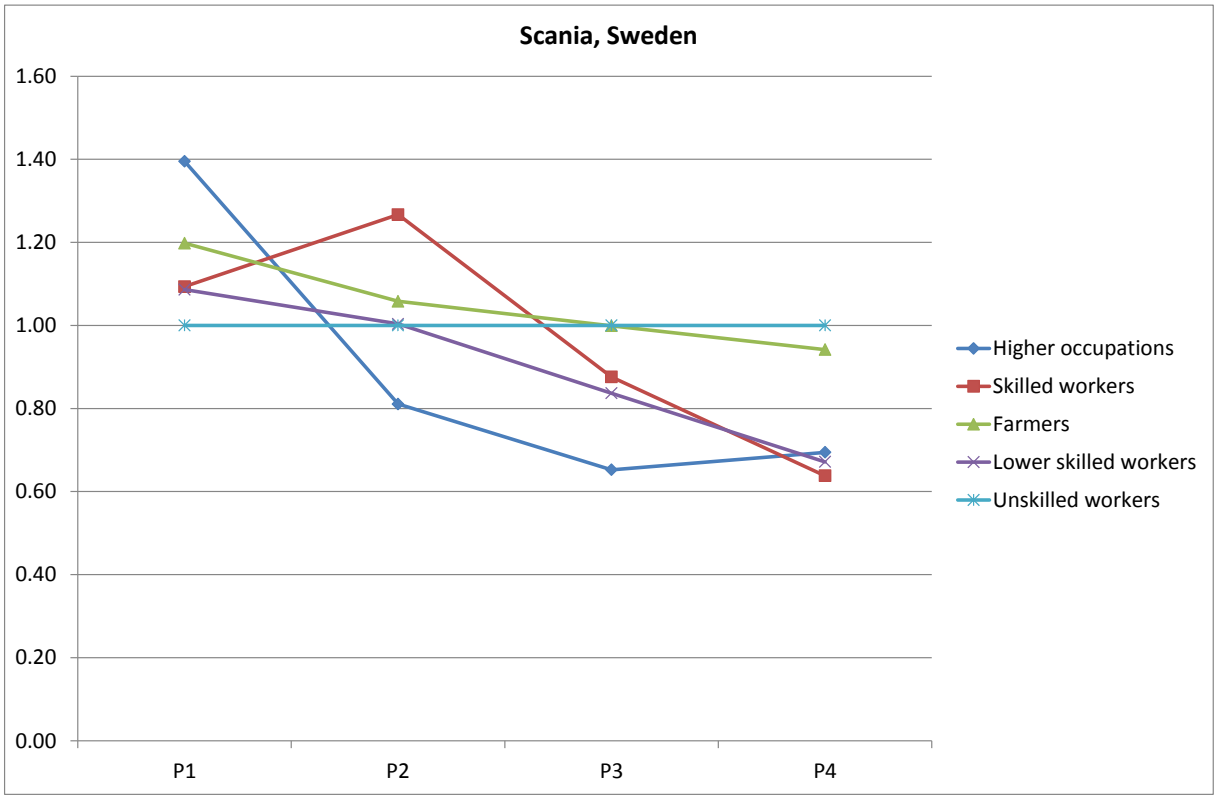
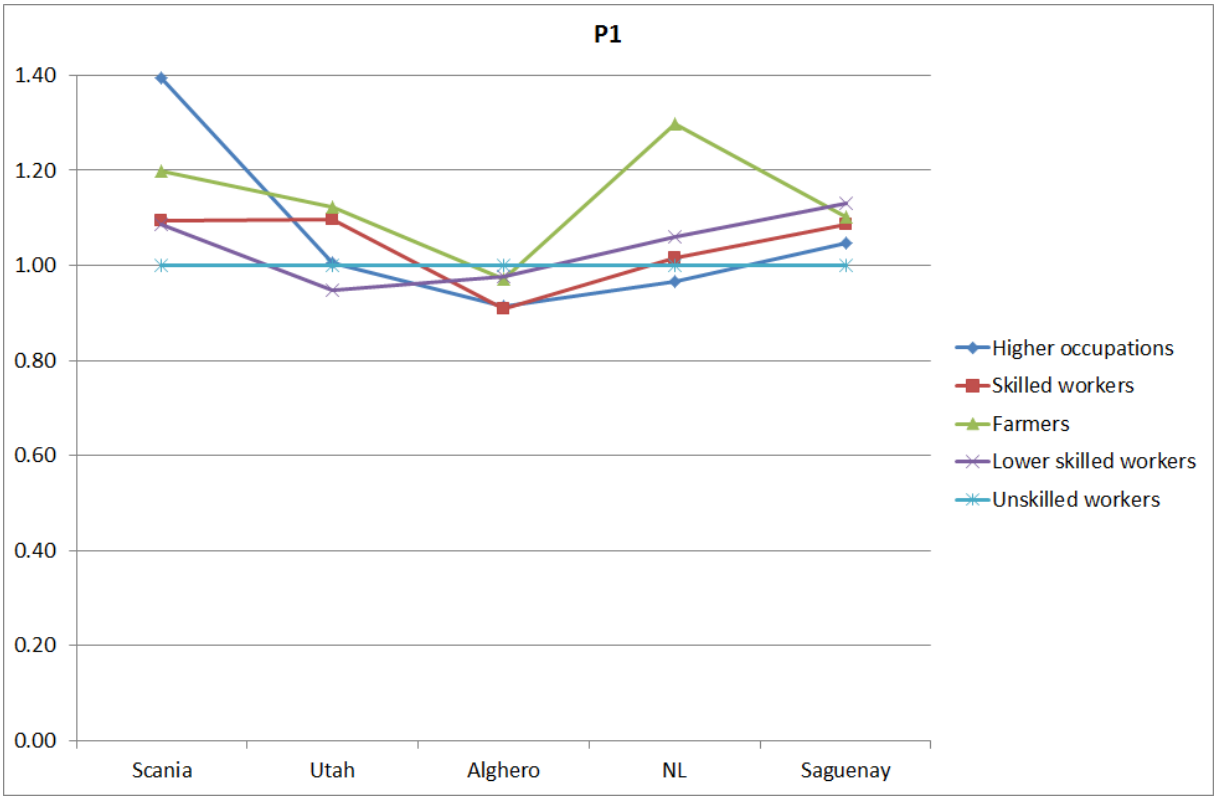
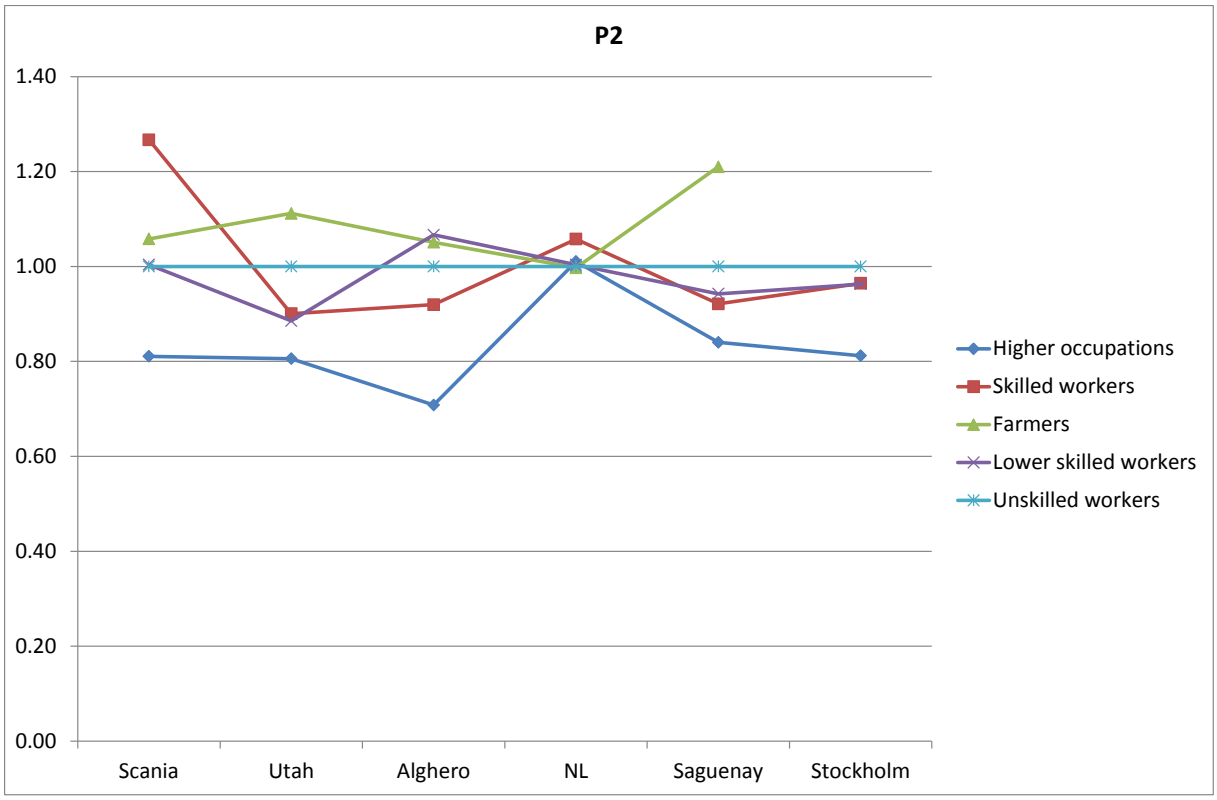


Figure 6. SES differences in higher-order birth risks. Net effects (relative risks) from interaction model (Period*SES).





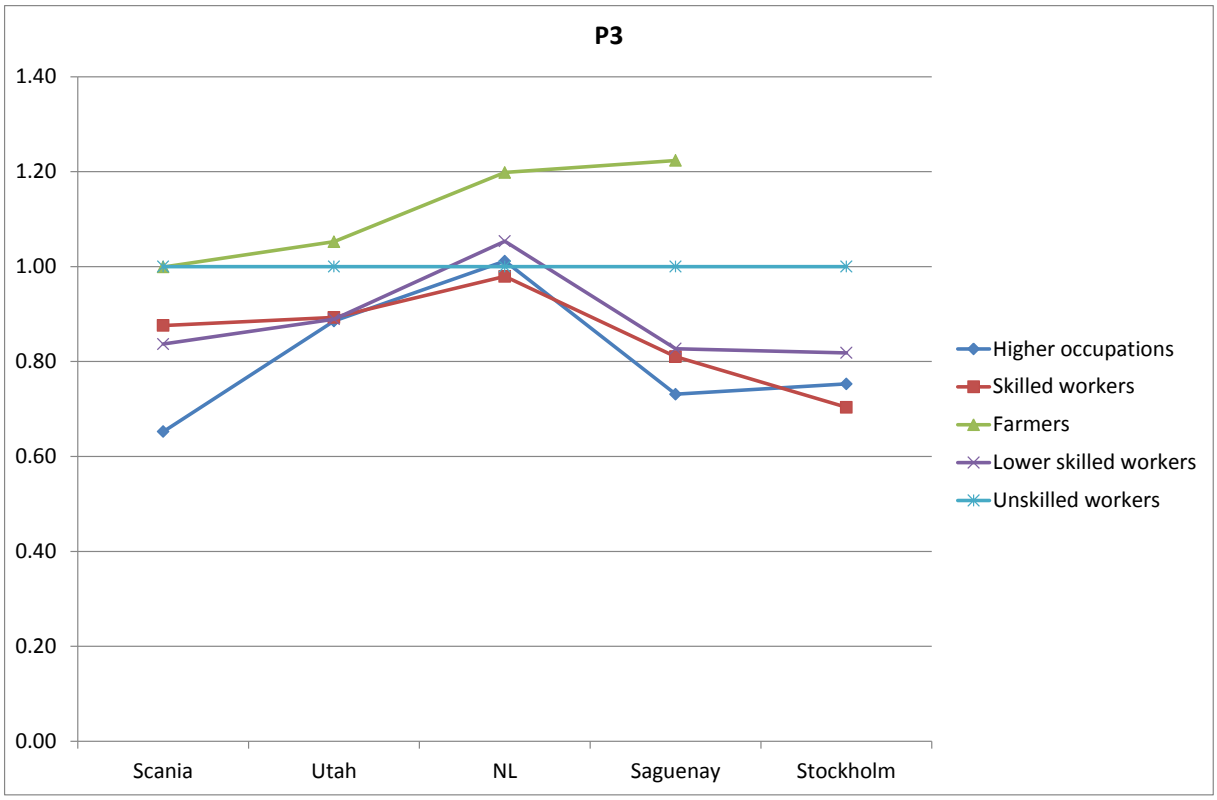
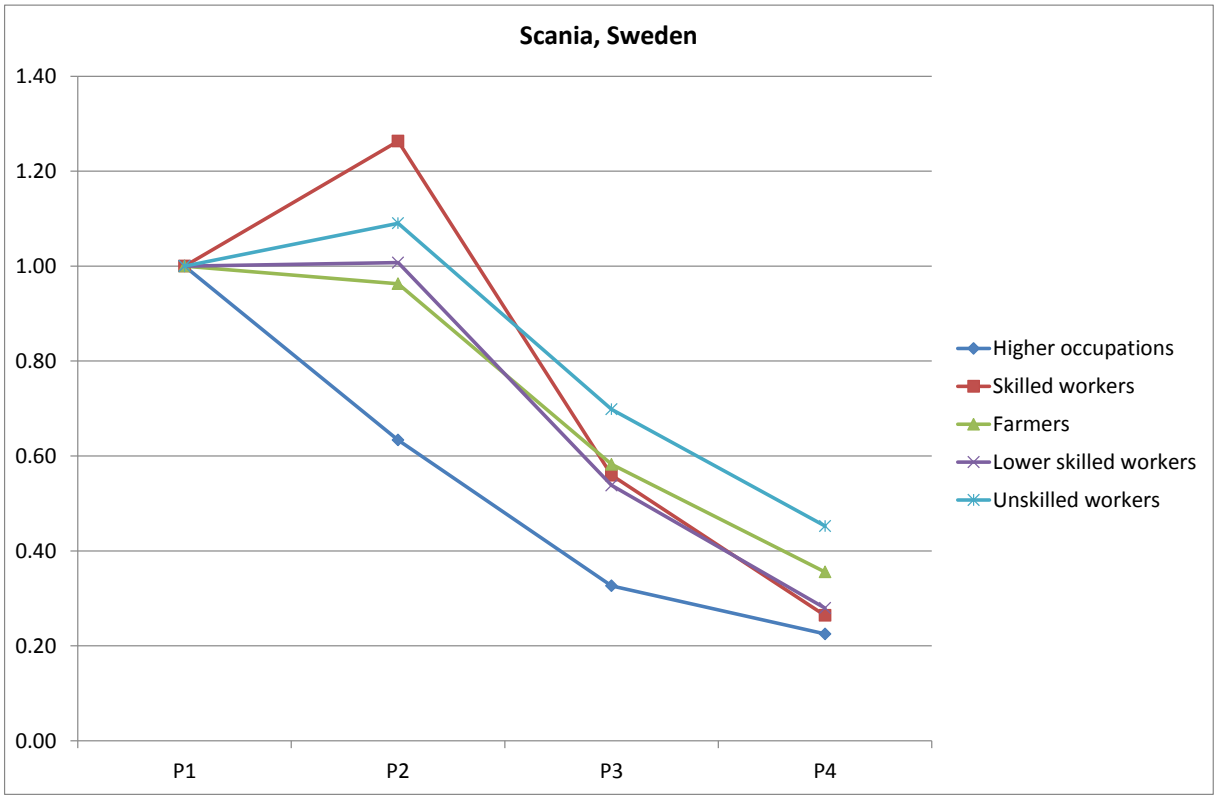
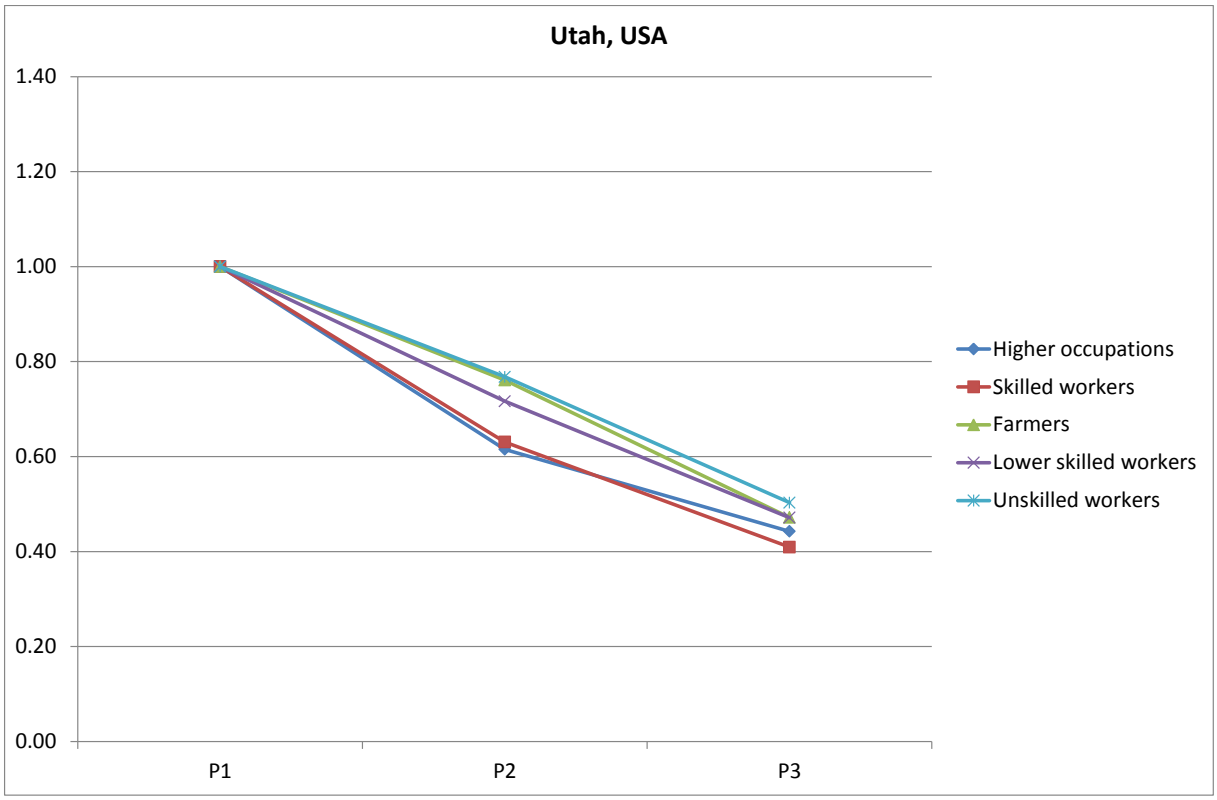
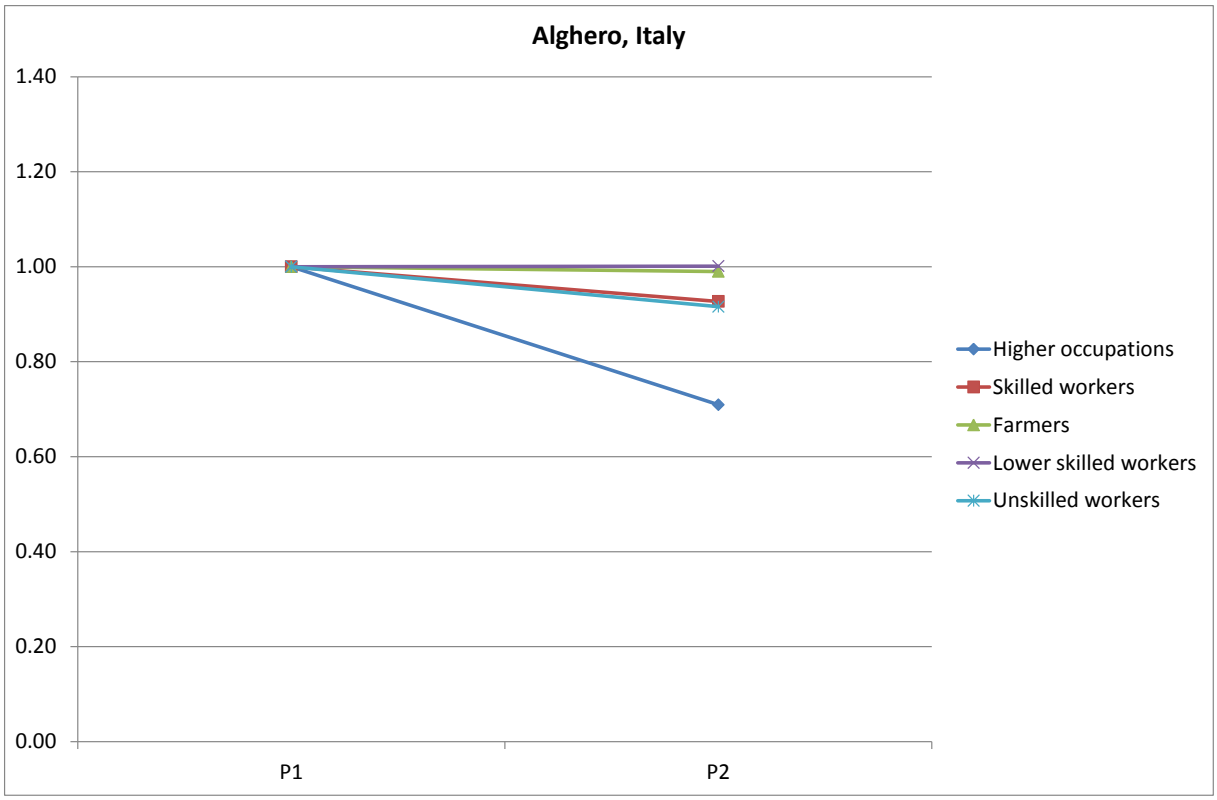
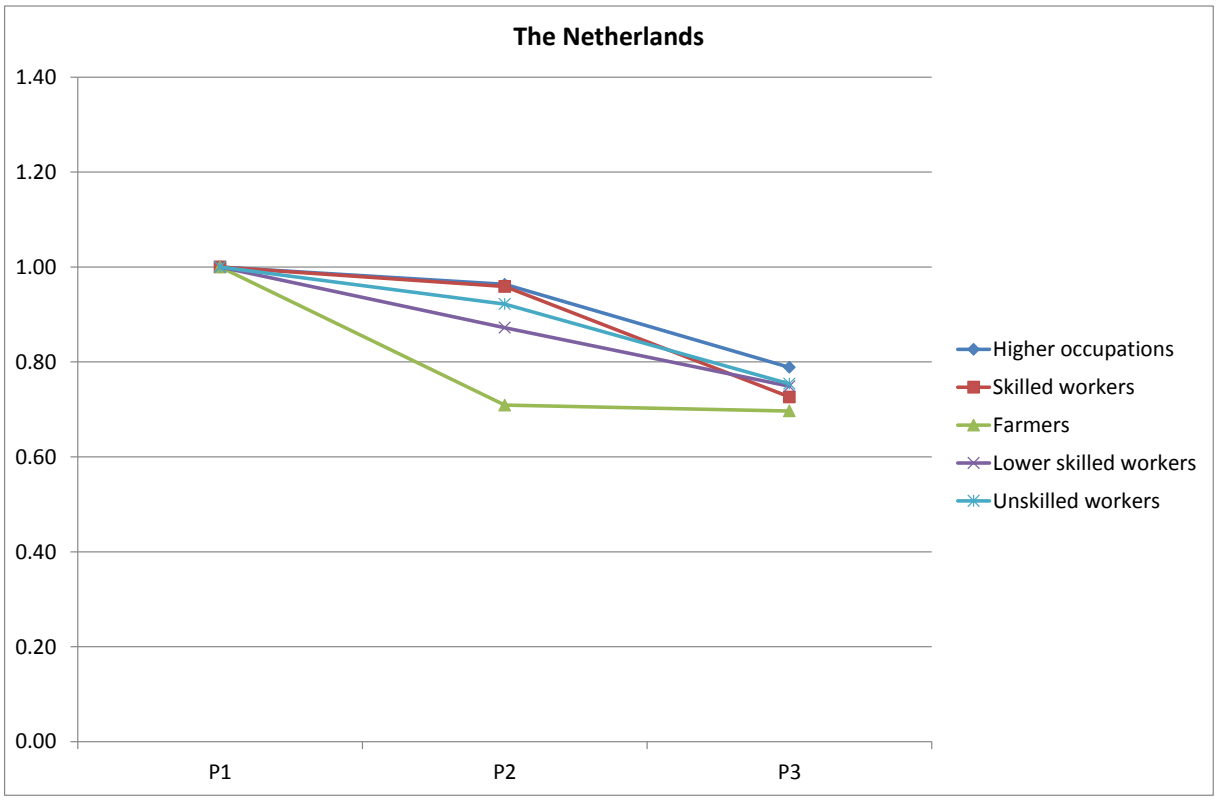

P3
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
Scania
Utah
NL
Saguenay
Stockholm
Higher occupations
Skilled workers
Farmers
Lower skilled workers
Unskilled workers

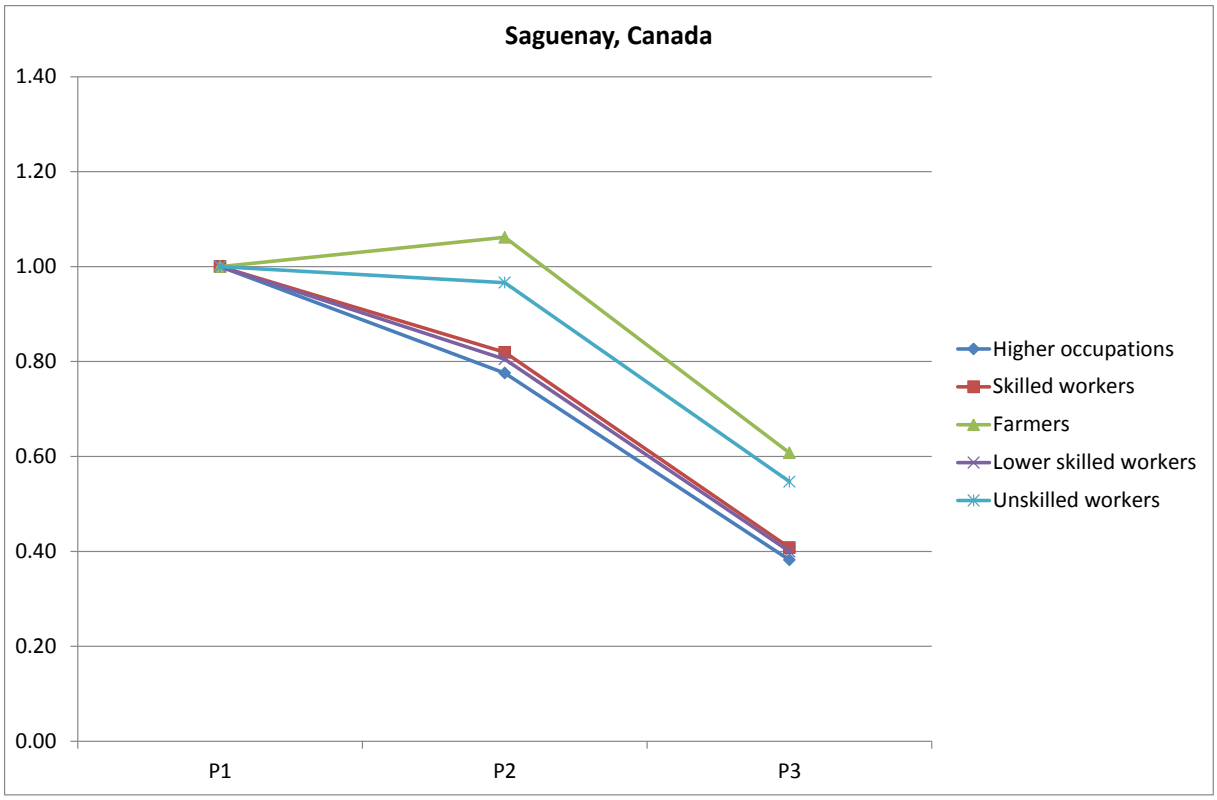
Figure 7. Period effects on higher-order birth risks. Net effects (relative risks) from interaction models (period*SES).

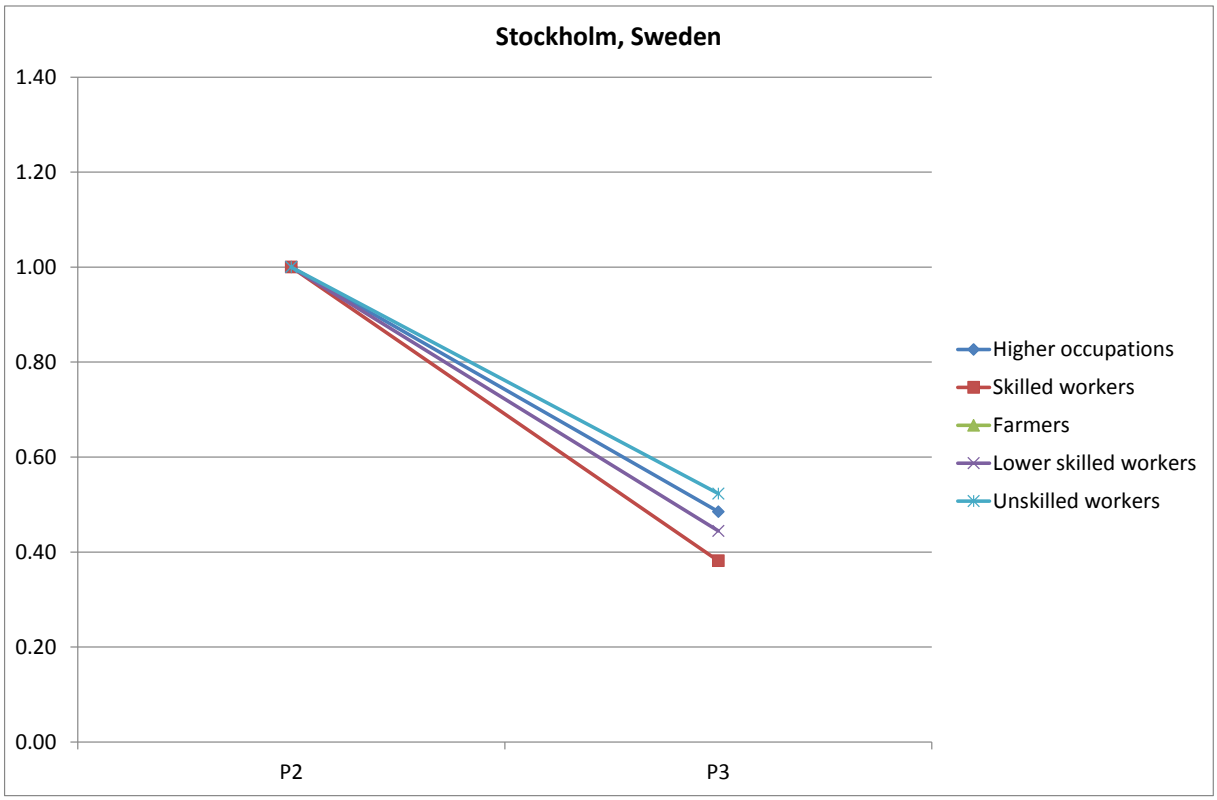





Alghero, Italy
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
P1
P2
Higher occupations
Skilled workers
Farmers
Lower skilled workers
Unskilled workers


The Netherlands
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
P1
P2
P3
Higher occupations
Skilled workers
Farmers
Lower skilled workers
Unskilled workers


Saguenay, Canada
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
P1
P2
P3
Higher occupations
Skilled workers
Farmers
Lower skilled workers
Unskilled workers


Stockholm, Sweden
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
P2
P3
Higher occupations
Skilled workers
Farmers
Lower skilled workers
Unskilled workers

Appendix

Table A1. Event history estimates of first births.

A. Scania, Sweden

	M1		M2		M3		M4	
	HR	p	HR	p	HR	p	HR	p
SES								
Higher occupations	0.62	0.000	0.61	0.000	0.76	0.001	0.83	0.200
Skilled workers	0.79	0.001	0.74	0.000	0.90	0.149	0.87	0.280
Farmers	0.81	0.002	0.79	0.001	0.71	0.000	0.57	0.000
Lower skilled workers	0.74	0.000	0.71	0.000	0.79	0.000	0.70	0.000
Unskilled workers	1.00	ref	1.00	ref	1.00	ref	1.00	ref
NA	0.93	0.567	0.88	0.293	0.87	0.279	0.73	0.314
Age at marriage								
15-24			1.00	ref	1.00	ref	1.00	ref
25-29			0.87	0.006	0.80	0.000	0.80	0.000
30-34			0.69	0.000	0.61	0.000	0.59	0.000
35-39			0.39	0.000	0.33	0.000	0.32	0.000
40-49			0.10	0.000	0.08	0.000	0.08	0.000
Period								
P1 (1815-1879)					1.00	ref	1.00	ref
P2 (1880-1909)					0.94	0.375	0.77	0.054
P3 (1910-1934)					0.63	0.000	0.49	0.000
P4 (1935-1968)					0.50	0.000	0.43	0.000
Parish								
Hog					1.03	0.740	1.01	0.920
Kavlinge					1.00	ref	1.00	ref
Halmstad					1.21	0.020	1.17	0.061
Sirekopinge					1.10	0.182	1.06	0.397
Kagerod					1.22	0.001	1.18	0.009
Interactions								
Higher*P2							0.82	0.439
Higher*P3							1.01	0.962
Higher*P4							0.95	0.809
Skilled*P2							1.07	0.743
Skilled*P3							1.13	0.625
Skilled*P4							1.07	0.729
Farmers*P2							1.44	0.064
Farmers*P3							1.94	0.001
Farmers*P4							1.61	0.020
LowSkill*P2							1.56	0.016
LowSkill*P3							1.21	0.361
LowSkill*P4							1.10	0.558
NA*P2							1.35	0.405
NA*P3							1.38	0.457
NA*P4							1.24	0.644

Time at risk	4814	4814	4814	4814
Births	2000	2000	2000	2000
Women	2703	2703	2703	2703
Log likelihood	-13958	-13795	-13696	-13683
LR chi2(31)	41	368	566	591
Prob > chi2	0.0000	0.0000	0.0000	0.0000

B. Utah, USA

	M1		M2		M3		M4	
	HR	p	HR	p	HR	p	HR	p
SES								
Higher occupations	0.802	0.000	0.816	0.000	0.847	0.000	1.034	0.608
Skilled workers	0.919	0.000	0.921	0.000	0.964	0.063	1.136	0.073
Farmers	1.116	0.000	1.116	0.000	1.041	0.036	1.201	0.002
Lower skilled workers	0.912	0.000	0.912	0.000	0.956	0.035	1.059	0.467
Unskilled workers	1.000	REF	1.000	REF	1.000	REF	1.000	REF
NA	0.885	0.000	0.889	0.000	0.890	0.000	1.074	0.243
Age at marriage								
15-24			1.000	REF	1.000	REF	1.000	REF
25-29			0.843	0.000	0.845	0.000	0.846	0.000
30-34			0.842	0.000	0.834	0.000	0.835	0.000
35-39			0.853	0.000	0.841	0.000	0.841	0.000
40-44			1.091	0.127	1.073	0.220	1.071	0.229
45-49			1.170	0.334	1.214	0.231	1.219	0.222
Period								
P1 (Coh 1850-1869)					1.000	REF	1.000	REF
P2 (Coh 1870-1899)					0.946	0.000	1.106	0.108
P3 (Coh 1900-1919)					0.712	0.000	0.874	0.036
Mother Born on Wasatch Front					0.963	0.000	0.965	0.000
LDS Status								
Active LDS					1.098	0.000	1.097	0.000
Inactive LDS					1.000	REF	1.000	REF
Non-Lds					0.875	0.000	0.873	0.000
Interactions								
Higher*BC2							0.825	0.007
Higher*BC3							0.777	0.000
Skilled*BC2							0.848	0.031
Skilled*BC3							0.813	0.007
Farmers*BC2							0.860	0.022
Farmers*BC3							0.860	0.026
LowSkill*BC2							0.885	0.150
LowSkill*BC3							0.884	0.148
NA*BC2							0.844	0.010
NA*BC3							0.772	0.000
Time at risk	140622		140622		140622		140622	
Births	80138		80138		80138		80138	
Women	80138		80138		80138		80138	
Log likelihood	-824320		-824118		-823078		-823060	
LR chi2	1079		1484		3563		3600	
Prob > chi2	0.0000		0.0000		0.0000		0.0000	

C. Alghero, Italy

	M1		M2		M3		M4	
	HR	p	HR	p	HR	p	HR	p
SES								
Higher occupations	0.83	0.13	0.95	0.70	0.95	0.70	0.95	0.74
Skilled workers	1.02	0.80	1.03	0.71	1.03	0.71	1.04	0.69
Farmers	1.13	0.03	1.14	0.03	1.14	0.03	1.17	0.02
Lower skilled workers	0.99	0.92	0.98	0.80	0.98	0.80	1.02	0.84
Unskilled workers	1.00	ref	1.00	ref	1.00	ref	1.00	ref
Age at marriage								
15-24			1.00	ref	1.00	ref	1.00	ref
25-29			1.00	0.94	1.00	0.95	0.99	0.93
30-34			0.83	0.06	0.83	0.06	0.83	0.06
35-39			0.64	0.00	0.64	0.00	0.64	0.00
40-49			0.14	0.00	0.14	0.00	0.14	0.00
Transition phase								
P1 (coh 1866-1895)					1.00	ref	1.00	ref
P2 (coh 1896-1905)					1.00	0.93	1.08	0.50
Interactions								
Higher*C2							1.00	0.99
Skilled*C2							0.99	0.96
Farmers*C2							0.89	0.37
LowSkill*C2							0.88	0.46
Time at risk	4647		4647		4647		4647	
Births	1955		1955		1955		1955	
Women	2104		2104		2104		2104	
Log likelihood	-13333		-13268		-13268		-13268	
LR chi2	12		141		141		142	
Prob > chi2	0.0160		0.0000		0.0000		0.0000	

D. The Netherlands

	M1		M2		M3		M4	
	HR	p	HR	p	HR	p	HR	p
SES								
Higher occupations	0.69	0.000	0.79	0.000	0.83	0.004	0.68	0.129
Skilled workers	0.80	0.000	0.88	0.051	0.94	0.375	0.95	0.845
Farmers	0.78	0.006	0.87	0.116	0.88	0.154	0.82	0.557
Lower skilled workers	0.82	0.005	0.87	0.051	0.94	0.381	1.17	0.586
Unskilled workers	1.00	ref	1.00	ref	1.00	ref	1.00	ref
NA	0.83	0.410	0.94	0.461	0.98	0.814	0.97	0.926
Age at marriage								
15-24 (ref)			1.00	ref	1.00	ref	1.00	ref
25-29			0.52	0.000	0.53	0.000	0.53	0.000
30-34			0.42	0.000	0.42	0.000	0.42	0.000
35-39			0.33	0.000	0.35	0.000	0.35	0.000
40-49			0.25	0.001	0.25	0.001	0.25	0.001
Period								
P1 (1870-1889) (ref)					1.00	ref	1.00	ref
P2 (1890-1919)					1.03	0.751	0.98	0.894
P3 (1920-1940)					0.81	0.024	0.83	0.246
Municipality								
Rural (ref)					1.00	ref	1.00	ref
Urban					0.91	0.081	0.83	0.246
Interactions								
Higher*P2							1.24	0.430
Higher*P3							1.22	0.473
Skilled*P2							1.09	0.755
Skilled*P3							0.92	0.743
Farmers*P2							1.12	0.767
Farmers*P3							1.03	0.942
LowSkill*P2							0.90	0.730
LowSkill*P3							0.73	0.291
NA*P2							0.98	0.952
NA*P3							1.04	0.929
Time at risk	2321		2321		2321		2321	
Births	2010		2010		1942		1942	
Women	2010		2010		1942		1942	
Log likelihood	-13360		-13232		-12703		-12700	
LR chi2(31)	34		306		325		331	
Prob > chi2	0.0000		0.0000		0.0000		0.0000	

E. Saguenay, Canada

	M1		M2		M3	
	HR	p	HR	p	HR	p
SES						
Higher occupations	0.680	0.000	0.731	0.000	0.851	0.000
Skilled workers	0.870	0.000	0.898	0.000	1.017	0.663
Farmers	1.138	0.000	1.085	0.000	1.042	0.117
Lower skilled workers	0.938	0.001	0.952	0.008	0.974	0.584
Unskilled workers	1.000	ref	1.000	ref	1.000	ref
NA	0.357	0.000	0.388	0.000	0.319	0.000
Age at marriage						
15-24			1.000	ref	1.000	ref
25-29			0.380	0.000	0.376	0.000
30-34			0.006	0.000	0.006	0.000
35-39			1.100	0.000	1.015	0.606
40-44			0.828	0.000	0.853	0.000
45-49			0.969	0.041	0.964	0.016
Period						
P1 (1840-1929)			1.000	ref	1.000	ref
P2 (1930-1959)			0.802	0.000	0.801	0.000
P3 (1960-1971)			0.641	0.000	0.639	0.000
Size of locality						
<1000			1.000	ref	1.000	ref
1000-5000			0.969	0.041	0.964	0.016
>5000			0.974	0.104	0.977	0.158
Interactions						
Higher*P2					0.958	0.433
Higher*P3					0.782	0.000
Skilled*P2					0.926	0.126
Skilled*P3					0.801	0.000
Farmers*P2					1.090	0.015
Farmers*P3					1.179	0.000
LowSkill*P2					1.082	0.170
LowSkill*P3					0.897	0.051
NA*P2					1.443	0.000
NA*P3					1.139	0.021
Time at risk	125739		125739		125739	
Births	43852		43852		43852	
Women	57403		57403		57403	
Log likelihood	-447424		-446191		-446104	
LR chi2	7975		10441		10615	
Prob > chi2	0.000		0.000		0.000	

Table A2. Event history estimates of higher-order births.

A. Scania, Sweden

	M1		M2		M3		M4	
	HR	p	HR	p	HR	p	HR	p
SES								
Higher occupations	0.70	0.000	0.66	0.000	0.96	0.283	1.40	0.000
Skilled workers	0.78	0.000	0.75	0.000	1.04	0.279	1.09	0.138
Farmers	1.06	0.044	1.12	0.000	1.10	0.002	1.20	0.000
Lower skilled workers	0.85	0.000	0.86	0.000	0.98	0.552	1.09	0.058
Unskilled workers	1.00	ref	1.00	ref	1.00	ref	1.00	ref
NA	0.87	0.090	0.83	0.023	0.84	0.033	0.71	0.056
Age of woman								
15-24			1.00	ref	1.00	ref	1.00	ref
25-29			0.88	0.003	0.78	0.000	0.78	0.000
30-34			0.79	0.000	0.62	0.000	0.62	0.000
35-39			0.67	0.000	0.48	0.000	0.48	0.000
40-44			0.40	0.000	0.24	0.000	0.24	0.000
45-49			0.07	0.000	0.04	0.000	0.04	0.000
Period								
P1 (1815-1879)					1.00	ref	1.00	ref
P2 (1880-1909)					1.01	0.671	1.09	0.168
P3 (1910-1934)					0.56	0.000	0.70	0.000
P4 (1935-1968)					0.31	0.000	0.45	0.000
Parish								
Hog					1.00	0.939	0.98	0.639
Kavlinge					1.00	ref	1.00	ref
Halmstad					1.30	0.000	1.28	0.000
Sirekopinge					1.35	0.000	1.33	0.000
Kagerod					1.35	0.000	1.34	0.000
Life status of prev. child								
Alive					1.00	ref	1.00	ref
Dead					2.07	0.000	2.07	0.000
Interactions								
Higher*P2							0.58	0.000
Higher*P3							0.47	0.000
Higher*P4							0.50	0.000
Skilled*P2							1.16	0.113
Skilled*P3							0.80	0.048
Skilled*P4							0.58	0.000
Farmers*P2							0.88	0.123
Farmers*P3							0.83	0.050
Farmers*P4							0.79	0.029
LowSkill*P2							0.92	0.324
LowSkill*P3							0.77	0.007
LowSkill*P4							0.62	0.000

NA*P2				1.21	0.373
NA*P3				1.34	0.317
NA*P4				1.07	0.822
Time at risk	55472.7	55472.7	55472.7	55472.7	
Births	9569	9569	9569	9569	
Women	16505	16505	16505	16505	
Log likelihood	-85180	-84281	-82941	-82885	
LR chi2(31)	197	1996	4676	4788	
Prob > chi2	0.0000	0.0000	0.0000	0.0000	

B. Utah, USA

	M1		M2		M3		M4	
	HR	p	HR	p	HR	p	HR	p
SES								
Higher occupations	0.808	0.000	0.815	0.000	0.865	0.000	1.006	0.859
Skilled workers	0.878	0.000	0.853	0.000	0.920	0.000	1.097	0.015
Farmers	1.141	0.000	1.235	0.000	1.088	0.000	1.122	0.000
Lower skilled workers	0.860	0.000	0.823	0.000	0.899	0.000	0.949	0.229
Unskilled workers	1.000	REF	1.000	REF	1.000	REF	1.000	REF
NA	1.029	0.003	1.019	0.129	0.969	0.011	1.072	0.030
Age at marriage								
15-24	1.000	REF	1.000	REF	1.000	REF	1.000	REF
25-29			0.715	0.000	0.707	0.000	0.707	0.000
30-34			0.566	0.000	0.547	0.000	0.547	0.000
35-39			0.434	0.000	0.406	0.000	0.405	0.000
40-44			0.231	0.000	0.204	0.000	0.204	0.000
45-49			0.040	0.000	0.032	0.000	0.032	0.000
Period								
BC1 (1850-1869)					1.000	REF	1.000	REF
BC2 (1870-1899)					0.709	0.000	0.768	0.000
BC3 (1900-1919)					0.446	0.000	0.503	0.000
Mother Born on Wasatch Front					0.960	0.000	0.961	0.000
LDS Status								
Active LDS					1.233	0.000	1.230	0.000
Inactive LDS					1.000	REF	1.000	REF
Non-Lds					0.938	0.000	0.936	0.000
Interactions								
Higher*BC2							0.801	0.000
Higher*BC3							0.880	0.002
Skilled*BC2							0.821	0.000
Skilled*BC3							0.814	0.000
Farmers*BC2							0.991	0.802
Farmers*BC3							0.938	0.101
LowSkill*BC2							0.933	0.146
LowSkill*BC3							0.937	0.181
NA*BC2							0.915	0.014
NA*BC3							0.831	0.000
Time at risk	2026223		2026223		2026223		2026223	
Births	319 079		319 079		319 079		319 079	
Censored Spells	78341		78341		78341		78341	
Women	82918		82918		82918		82918	
Log likelihood	-3909350		-3869939		-3856620		-3856385	
LR chi2	5177.87		51047.45		66493.71		66854.46	
Prob > chi2	0.000		0.000		0.000		0.000	

C. Alghero, Italy

	M1		M2		M3		M4	
	HR	p	HR	p	HR	p	HR	p
SES								
Higher occupations	0.744	0.000	0.816	0.001	0.853	0.007	0.914	0.190
Skilled workers	0.935	0.086	0.935	0.085	0.913	0.020	0.909	0.033
Farmers	0.986	0.584	0.994	0.820	0.991	0.732	0.972	0.344
Lower skilled workers	0.972	0.429	0.989	0.763	1.001	0.973	0.976	0.564
Unskilled workers	1.000	ref	1.000	ref	1.000	ref	1.000	ref
NA	-	-	-	-	-	-	-	-
Age of woman								
15-24			1.000	ref	1.000	ref	1.000	ref
25-29			0.953	0.165	0.940	0.071	0.941	0.075
30-34			0.928	0.060	0.902	0.010	0.903	0.010
35-39			0.796	0.000	0.765	0.000	0.766	0.000
40-44			0.419	0.000	0.387	0.000	0.388	0.000
45-49			0.053	0.000	0.047	0.000	0.047	0.000
Cohort								
C1 (1866-1895)					1.000	ref	1.000	ref
C2 (1896-1905)					0.956	0.059	0.916	0.072
Life status of prev. child								
Alive					1.000	ref	1.000	ref
Dead					2.090	0.000	2.089	0.000
Interactions								
Higher*C2							0.774	0.063
Skilled*C2							1.012	0.899
Farmers*C2							1.081	0.190
LowSkill*C2							1.093	0.255
Time at risk	37481		37481		37481		37481	
Births	9607		9607		9607		9607	
Women	1949		1949		1949		1949	
Log likelihood	-70482		-70004		-69513		-69509	
LR chi2	30		986		1969		1977	
Prob > chi2	0.0000		0.0000		0.0000		0.0000	

D. The Netherlands

	M1		M2		M3		M4	
	HR	p	HR	p	HR	p	HR	p
SES								
Higher occupations	0.96	0.217	0.99	0.804	1.02	0.587	0.97	0.831
Skilled workers	1.00	0.984	1.00	0.902	1.02	0.526	1.02	0.914
Farmers	1.13	0.014	1.15	0.004	1.13	0.016	1.30	0.178
Lower skilled workers	1.00	0.974	0.99	0.739	1.03	0.494	1.06	0.713
Unskilled workers	1.00	ref	1.00	ref	1.00	ref	1.00	ref
NA	0.91	0.137	0.87	0.029	0.91	0.141	1.05	0.832
Age of woman								
15-24			1.00	ref	1.00	ref	1.00	ref
25-29			1.98	0.000	0.70	0.000	0.83	0.000
30-34			1.39	0.000	0.57	0.000	0.68	0.000
35-39			1.11	0.129	0.53	0.000	0.64	0.000
40-44			1.05	0.498	0.46	0.000	0.55	0.000
45-49			0.91	0.254	0.36	0.000	0.43	0.000
Period								
P1 (1870-1889) (ref)					1.00	ref	1.00	ref
P2 (1890-1919)					0.92	0.094	0.92	0.214
P3 (1920-1940)					0.76	0.000	0.75	0.000
Municipality								
Rural					1.00	ref	1.00	ref
Urban					0.91	0.000	0.92	0.000
Life status of prev. child								
Alive					1.00	ref	1.00	ref
Dead					1.17	0.001	1.16	0.002
Interactions								
Higher*P2							1.05	0.795
Higher*P3							1.05	0.786
Skilled*P2							1.04	0.811
Skilled*P3							0.96	0.817
Farmers*P2							0.77	0.207
Farmers*P3							0.92	0.699
LowSkill*P2							0.95	0.746
LowSkill*P3							0.99	0.968
NA*P2							0.82	0.394
NA*P3							0.89	0.618
Time at risk	16941		16941		16941		16941	
Births	7906		7906		7662		7662	
Women	2351		2351		2351		2351	
Log likelihood	-63383		-63215		-60969		-61011	
LR chi2(31)	11		349		443		361	
Prob > chi2	0.0530		0.0000		0.0000		0.0000	

E. Saguenay, Canada

	M1		M2		M3	
	HR	p	HR	p	HR	p
SES						
Higher occupations	0.72	0.000	0.84	0.000	1.05	0.023
Skilled workers	0.88	0.000	0.93	0.000	1.09	0.000
Farmers	1.24	0.000	1.14	0.000	1.10	0.000
Lower skilled workers	0.82	0.000	0.92	0.000	1.13	0.000
Unskilled workers	1.00	ref	1.00	ref	1.00	ref
NA	0.98	0.002	0.95	0.000	1.10	0.000
Age of woman						
15-24			1.00	ref	1.00	ref
25-29			0.79	0.000	0.79	0.000
30-34			0.65	0.000	0.65	0.000
35-39			0.47	0.000	0.46	0.000
40-44			0.17	0.000	0.17	0.000
45-49			0.04	0.000	0.04	0.000
Period						
P1 (1840-1929)			1.00	ref	1.00	ref
P2 (1930-1959)			0.974	0.000	0.97	0.002
P3 (1960-1971)			0.515	0.000	0.55	0.000
Size of locality						
<1000			1.00	ref	1.00	ref
1000-5000			0.994	0.361	0.99	0.232
>5000			0.857	0.000	0.87	0.000
Life status of prev, child						
Alive			2.129	0.000	2.12	0.000
Dead			1.00	ref	1.00	ref
Interactions						
Higher*P2					0.80	0.000
Higher*P3					0.70	0.000
Skilled*P2					0.85	0.000
Skilled*P3					0.75	0.000
Farmers*P2					1.10	0.000
Farmers*P3					1.11	0.000
LowSkill*P2					0.83	0.000
LowSkill*P3					0.73	0.000
NA*P2					0.86	0.000
NA*P3					0.81	0.000
Time at risk	729176		729176		729176	
Births	259649		259649		259649	
Women	47549		47549		47549	
Log likelihood	-2496512		-2467766		-2467433	
LR chi2	6286		63778		64445	
Prob > chi2	0.000		0.000		0.000	

F. Stockholm, Sweden

	M1		M2		M3		M4	
	HR	p	HR	p	HR	p	HR	p
SES								
Higher Occupations	0.72	0.000	0.72	0.000	0.80	0.000	0.81	0.000
Skilled Workers	0.84	0.000	0.88	0.000	0.90	0.000	0.96	0.000
Lower Skilled Workers	0.90	0.000	0.92	0.000	0.93	0.000	0.96	0.000
Unskilled Workers	1.00	ref	1.00	ref	1.00	ref	1.00	ref
Missing	1.66	0.000	1.62	0.000	1.52	0.000	1.49	0.000
Age of woman								
15-24			1.00	ref	1.00	ref	1.00	ref
25-29			0.97	0.000	0.94	0.000	0.94	0.000
30-34			0.90	0.000	0.84	0.000	0.84	0.000
35-39			0.78	0.000	0.71	0.000	0.71	0.000
40-44			0.49	0.000	0.42	0.000	0.42	0.000
45-49			0.13	0.000	0.11	0.000	0.11	0.000
Period								
P2 (1878-1909)					1.00	ref	1.00	ref
P3 (1910-1926)					0.50	0.000	0.52	0.000
Parish								
Gamla Stan					1.00	ref	1.00	ref
Norrmalm					0.94	0.000	0.94	0.000
Kungsholmen					1.17	0.000	1.17	0.000
Östermalm					1.11	0.000	1.10	0.000
Södermalm East					1.27	0.000	1.27	0.000
Södermalm West					1.22	0.000	1.22	0.000
Brännkyrka					1.48	0.000	1.48	0.000
Life status of prev. child								
Alive					1.00	ref	1.00	ref
Dead					1.07	0.000	1.07	0.000
Interactions								
Higher*P3							0.93	0.000
Skilled*P3							0.73	0.000
LowSkill*P3							0.85	0.000
NA*P3							1.08	0.000
Time at risk	1165789		1160822		1125922		1125922	
Births	184988		184297		171243		171243	
Women	317590		317017		303667		303667	
Log likelihood	-221235		-2204096		-2035155		-2034864	
LR chi2	18076		35192		46636		47219	
Prob > chi2	0.0000		0.0000		0.0000		0.0000	