

**STRUCTURE AND BEHAVIOR
IN TRANSITION.
DEMOGRAPHIC REPRODUCTION
IN 19TH CENTURY GENEVA**



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Structure and behavior in transition. Demographic reproduction in 19th century Geneva

The study of historical fertility change has a long tradition in population sciences. Since the onset of the first decline in marital fertility at the end of the 19th century in Western Europe and North America, an impressive amount of research has been published on both the process and the causes of this fundamental social change. To this day, however, population science in general and population history in particular have suffered from an incomplete dialogue between macro and micro approaches (Billari 2006). When studying fertility transitions, demographers, historians and economists alike have unilaterally privileged approaches either focusing on change in population structure and aggregate indexes or concentrating on change in behavioral patterns. The main objective of my study (Schumacher 2010) was precisely to overcome this micro-macro gap in the analysis of reproductive change. In the following pages, I will elucidate this cleavage between macro- and micro-approaches, explain my integrative research design and discuss conclusions of my work.

The micro-macro gap in the study of demographic change

The genesis of historical demography is closely related to Louis Henry's work on natural fertility (Henry 1961 ; Henry 1967). Aiming at understanding pre-transitional fertility behavior, Henry has shown how individual records of parish registers can be used to reconstitute birth histories that in turn can be used for longitudinal fertility analysis. Hundreds of local family reconstitution studies following Henry's manual have been published in the 1970's and early 1980's (Rosental 2003). Applying mainly to pre-transitional small-scale populations, these micro-demographic studies have shown that before the first demographic transition, overall levels of fertility were controlled through the limited access to marriage and birth spacing (as a result of intense breastfeeding), whereas after the transition family limitation was mainly accomplished by birth stopping through contraception and abortion (Bongaarts and Potter 1983). In the light of these micro-demographic studies, the first decline in fertility appears as a transition from moderate to low levels of reproduction resulting from a shift from non-

parity related fertility control to parity dependent family limitation (Coale 1986). Family reconstitution data have often been criticized for not being representative. Indeed, Henry's technique has been designed for the analysis of sedentary populations and explicitly excludes censored or truncated birth histories. As a consequence, our knowledge of pre-transitional fertility behavior essentially builds on the non-migrating populations. The focus on locally stable families explains historians' reluctance to urban populations of the 19th century.

Changes in reproduction during the second half of the 19th century have mainly been studied in a macro-demographic perspective. The European Fertility Project initiated by Coale and his colleagues from the Princeton Office of Population Research was at the very center of population history in the 1970's and the 1980's. Coale and Treadway (1986) have shown how to compute indirect measures of fertility using census data and vital statistics. Computing these fertility indexes at various spatial levels, the Princeton demographers have studied fertility transitions in 19 European countries and published a dozen of country reports and comparative articles (Coale and Watkins 1986). Their analyses have shown considerable interregional differences in the pre-transitional fertility levels from which the decline started as well as differences in the timing and the speed of the fertility decline. The European Fertility Project and similar subsequent macro-demographic studies have undoubtedly contributed to a better understanding of the fertility transition at the end of the 19th century. As its indexes have not been designed for the analysis of reproductive behavior, the Princeton project has privileged the study of the decline's onset and contributed to the formulation of the diffusion hypothesis. However, the process of decline has been largely neglected.

The micro-macro gap in the study of fertility transitions is not less perceptible among the different frameworks put forward to interpret these changes. Most frameworks explain the decline of fertility either by social forces or by individual agency (Huinink 2000 ; de Bruijn 1999). In the narrative of the classic demographic transition theory (Notestein 1945), the decreases of mortality and fertility are seen as lagged responses to economic and social modernization, whereas in the systemic frameworks (Davis 1963 ; Livi Bacci 1999) the decline of fertility is one of the possible answers to the decrease of mortality. Designed

in the perspective of the classic transition theory, the European Fertility Project has questioned the link between modernization and fertility decline and hypothesized an innovation-diffusion dimension of the reproductive revolution (Coale 1973 ; Knodel and van de Walle 1979). Ideational frameworks such as Caldwell's theory of intergenerational wealth flow (1982) stating that mass education brought about emotional nuclearization of the family, or Lesthaeghe's (1983) work on secularization as the bottleneck condition for fertility decline have further developed the idea of the diffusion of family limitation.

Economists have first translated the macro-sociological link between modernization and reproduction into agent-based frameworks of demographic decision making. Leibenstein's (1974) work on the demand for children has focused on income effects on children's costs and utilities, whereas exponents of The New Home Economics have stated an increase in the quality of children (Becker 1981) and in children's opportunity costs, leading couples to opt for smaller family sizes. Easterlin's (1975) supply-demand framework is a much more integrative model explaining individuals' motivation to reduce fertility as an interplay between children's demand (in the sense of Leibenstein), supply (mortality) and the costs involved with fertility control. Social psychologists have further developed on children's utilities (Hoffman and Hoffman 1973 ; Nauck 2001) and explained parents' decision to have less offspring by a transition from economic-utilitarian to psychological-affective values of children.

The example of 19th century Geneva perfectly demonstrates the need for an integrative multilevel analytic framework in order to explain demographic change. The city of Geneva has been known for an early fertility decline that spread from the upper classes to the middle and lower classes in the second half of the 18th century (Perrenoud 1990). At the beginning of the 19th century fertility reached a level observed more than a century later at the Swiss national level. Between the 1820's and the 1880's fertility remained at a low but transitional level and even increased slightly in the second half of the century. During this transitional period, Geneva experienced a manifold transformation affecting individuals' logic of situation and selection. Immigration from French-speaking and German-speaking Switzerland, from Savoy and France, Southern Germany and Northern Italy reshaped the popula-

tion's ethnic, religious and social structure. The deconstruction of the medieval city walls in 1850 opened the way for an urban agglomeration, while the economy experienced the transition from proto-industry to light industry and services. Last but not least, the liberal party's election to government in the 1840's accelerated institutional modernization.

An integrative multilevel analytic framework and its implementation

In order to understand demographic reproduction in this transitional setting, I applied an integrative multilevel framework inspired by recent life course research. The life course can be conceptualized as a multilevel, auto-referential and multidimensional process (Huinink 2000). Reproductive life courses are multilevel processes insofar as demographic behavior depends on the specific socio-spatial context characterized by historically shaped conditions and institutions on the one hand and on the behavior of significant others on the other hand. Life courses are auto-referential processes insofar as individuals behave according to the experiences and resources (be they material, social or cultural) they accumulated during their lifetime. Finally, life courses are multi-dimensional processes insofar as different parallel careers interact with each other. The implementation of this multilevel framework implied the thorough study of 1) the agents' logic of situation, i.e. the social, demographic and institutional context, 2) parent's logic of selection, i.e. their dynamic auto-referential and multi-dimensional demographic decision making, and 3) the dependency of reproductive behavior on the social context.

The first empirical part of my study presents the broader context of 19th century Geneva and analyzes the long-term evolution of mortality and fertility in a macro-demographic perspective. Analyses in this part are based on census data (the cantonal censuses from 1802 to 1843 and the Swiss Federal censuses from 1860 to 1920), vital statistics (data published by 19th century scholars and by the local authorities, and the Swiss vital statistics from 1867 to 1920), official documents of the local administration as well as historical testimonies.

In the 19th century, Geneva's socio-demographic structure was impor-

tantly influenced by immigration. Local citizens lost their majority in the 1850's, while the proportion of Protestants diminished gradually from almost 90 % in 1800 to 51 % in 1900. In spite of xenophobic and anti-catholic voices in the population, immigrants and Catholics spread regularly over the City. On the labor market, however, a certain degree of ethnic segregation could be observed. The institutional setting and its evolution during the 19th century enhanced demographic change. In a context of religious heterogeneity in which the once powerful Protestant Church lost much of its influence, the process of secularization was close to accomplishment. Formal education was widespread since the beginning of the century and became compulsory in 1872. Social welfare (reducing children's security utility in the sense of Leibenstein) finally went through the first steps of modernization after the liberal party's election to government.

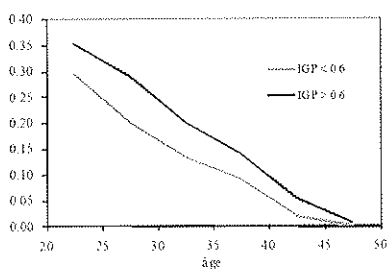
The macro-demographic analysis has shown transitional levels of mortality and fertility. Life expectancy (calculated from period life tables) rose approximately from 39 years in 1816 to 46 years in 1900, with a higher increase among females. The gain in average survival can almost entirely be explained by the decline in infant and childhood mortality. Infant mortality (from 0 to 11 months) decreased substantially during the first two decades of the 19th century, whereas early childhood mortality (from 1 to 4 years) fell already in the late 18th century when the regular 4 to 5 years smallpox cycles came to an end. In the 1860's, both infant and childhood mortality rates rose temporarily before entering into a second phase of decline at the end of the century. After a first general decline between 1770 and 1815, fertility remained at a transitional level before rising temporarily around the mid-century. A second phase of fertility decline started after 1880 and ended in the inter-war period when the fertility transition was accomplished. The confrontation of measures of mortality, fertility and nuptiality highlights a change in the demographic system at the turn of the 19th century. At this very moment, reproduction rates fell definitely below the replacement level of generations. Most importantly, short-term interactions between demographic variables changed at the same time. Effective during the 17th and 18th centuries, the Malthusian preventive and positive checks definitely disappeared in the 19th century.

The second empirical part of my study focuses on reproductive behavior

in 19th century Geneva and analyzes interactions between structure and agency. Statistical analyses are based on two representative samples of 2200 couples married in the city of Geneva between 1800 and 1880 and 1100 married couples immigrated to Geneva between 1845 and 1880, whose family life courses have been reconstituted using individual civil records (birth, marriage and death certificates), records of immigration permits, censuses and yearbooks.

The micro-demographic analyses have shown that cohort fertility remained relatively stable throughout the 19th century. The temporary increase in period fertility in the 1850's can be explained by a timing effect due in part to the spatial expansion of the city. Rate models of fertility by age and duration of marriage show a substantial though slightly decreasing degree of family limitation across the successive marriage cohorts. Absolute levels of fertility have been found higher among non natives, whereas levels of fertility control were lower among immigrants, although to a lesser extent than expected. Social structure had a much more important impact on reproductive behavior than geographic origin. Families of the elite had a substantially lower fertility and limited the number of offspring more consequently than skilled and unskilled workers. Lower infant and childhood mortality doubtlessly contributed to the elite's specific behavior. Children born to upper class families had a 87 % chance to survive their first five years of life, against 77 % among children born to working class families. Survival models applied to more than 6600 births confirm the temporary increase in infant mortality between 1860 and 1875 and show that this rise was mainly due to higher post-neonatal mortality among larger families who did not space their births.

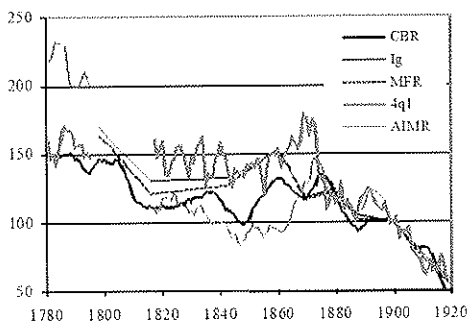
Figure 1. Immigrants' age-specific fertility rate by level of marital fertility in province of origin. Geneva, 1845-1900.



From the combined consideration of demographic structure and agency, it becomes clear that the particular decline trajectory of Genevan fertility was a result of multilevel, auto-referential and multi-dimensional effects in 19th century family life courses. First of all, immigration from pre-transitional regions affected overall levels of fertility. Multilevel rate analyses show indeed that grooms born in high fertility provinces had a higher-than-average fertility during their reproductive life span in Geneva. Figure 1 shows that age-specific fertility rates were substantially higher among immigrants originating from provinces with Coales' index of marital fertility I_g higher than 0.6. The same socialization effect could be found among non natives who got married in Geneva. This also means that immigrants' adaptation to local demographic behavior was less a matter of having been confronted with particular parity-related forms of fertility control, than of having known any form of family limitation (i.e. birth spacing).

Probably even more than by the socialization effects, it is by the multiple interactions between fertility and infant and childhood mortality that one can explain the particular shape of Geneva's demographic transition. Macro-analysis has shown an almost perfect parallelism between various measures of fertility on the one hand and measures of childhood mortality on the other hand. Figure 2 gives the indexed evolution of the crude birth rate (CBR), Coale's index of marital fertility (I_g), the marital fertility rate (MFR), the probability of dying between ages 1 and 4 ($4q_1$) and the adjusted infant mortality rate (AIMR). The figure shows an obvious connection between fertility and mortality, and especially between marital fertility and early childhood mortality. The micro-analyses of reproductive life courses have shown that this connection was the result of three different effects. The 1) lactation effect increased fertility through the accelerated ovulation following the death of a breastfed infant among families practicing birth spacing, while the 2) replacement effect had a positive impact on fertility through the explicit replacement of deceased children among families practicing parity-related family limitation. Combined time-series and life-event analyses have finally shown a certain 3) hoarding effect (net of lactation and replacement effects), indicating shortened birth intervals after short-term increases in early childhood mortality.

Figure 2. Natality, fertility and early childhood mortality in Geneva 1780-1920
(Indexes, 1900 = 100)



To conclude, this study shows that the process of the reproductive transition cannot be fully understood in its whole complexity without using an integrative analytic framework combining macro- and micro-demographic concepts and analyses. Making use of aggregate and individual data sources, this study investigates the transition of the demographic and social structure, analyzes the transition of families' reproductive behavior, and finally demonstrates how macro- and micro transitions are interconnected.

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