

Population dynamics in historical Roman Italy: the impact of warfare

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Abstract

Historians of the late Roman Republic (3rd -1st centuries BCE) debate intensely over the nature of demographic developments during this period. Two opposing stances with widely divergent historical implications are being defended. One camp, the ‘low counters’ holds that Roman Italy paid a heavy toll for its military and political expansion into an Empire and experienced continued population decline. The other, the ‘high counters’ by contrast hold that the Italian population grew pronouncedly. Both base their arguments on census totals and archaeological traces of habitation that leave room for widely divergent interpretations. At the same time, available evidence on a number of demographic parameters – life expectancy, marriage ages and excess mortality rates – is not integrated into this debate. In this paper, we employ a micro-simulation model, SOCSIM, to integrate both sets of evidence. By doing so, we make explicit which assumptions underlie the opposing viewpoints on population dynamics in historical Roman Italy. This allows us to evaluate the respective plausibility of each of these scenarios, as it will become evident how well these required assumptions match the range of historically attested demographic parameters for the Roman world. Sophisticated demographic techniques can thus provide significant advances in a fundamental historical debate.

1. Background and research questions

Questions regarding population size, population trends and demographic structures are fundamental for our understanding of Roman Republican history (3rd-1st centuries BCE, Italy). How we ought to judge what voting rights meant in the Republic, how the performance of the Roman economy compared to that of later pre-industrial counterparts and what impact it had on the living standards of individuals, how the course of Roman history might have been affected by the availability of military manpower and the resilience of free labourers - these and similar questions cannot be answered without at least an approximate idea of population dynamics (cf. Scheidel 2008). It does not come as too much of a surprise then that recent years have witnessed a revival of intense debate on the demographic background against which political and social developments during the period between the Hannibalic Wars and the reign of the first emperor Augustus took place.

Interestingly, this debate is characterized by a scholarly split between two extremes that rest on two different interpretations of the main historical evidence, the census totals. The first of these, the so-called ‘low count’, implies a population of ca. 6 mln around the year 1 CE, following almost two centuries of slow population decline. The second, by contrast, holds that the population of Italy rather constituted of about 16 mln inhabitants, and experienced rapid population increase (notably Lo Cascio 1994). These two different stances coincide with different ‘worldviews’ on the history of the Roman Republic. In recent years, scholarship has increasingly recognized that population dynamics may well have run along different pathways than these extremes would suggest, and alternative scenarios of more moderate growth have been proposed (De Ligt 2004 and Hin 2008 and 2013). Currently, these demographic scenarios are based on the historical evidence of the multi-interpretable Republican and Augustan census totals, and on trends in traces of habitation that the archaeological survey evidence suggests (e.g. Launaro 2011; De Ligt 2012). Alongside this evidence, however, different types of datasets also yield information on proximate determinants of demographic trends, such as marriage rates, life expectancy and fertility levels, and excess mortality levels during main episodes of warfare, such as the Second Punic War. While all of these data

necessarily have their limitations, they do offer us the opportunity to test how (in)compatible this evidence is with the different scenarios of population development defended by ancient historians by performing demographic simulations. These could yield significant insights on the relative plausibility of the various proposed scenarios, and hence be highly valuable to the scholarly debate. In this paper, we will perform such a simulation.

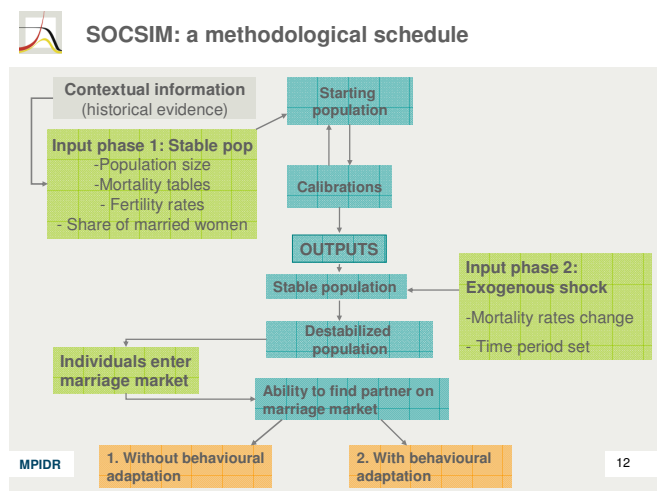
2. Data and methods

This paper employs SOCSIM, a micro-simulation model developed at the University of California, Berkeley. This paper draws on several published articles discussing key characteristics of Roman demographic life that can serve as input parameters for SOCSIM.

A general mortality profile can be derived from the census records from Roman Egypt (Bagnall and Frier 2006² and Scheidel 2001), from data on the elites in Italy itself (Scheidel 1999), and from Ulpian's Life Table (Frier 1982; Woods 2007), which all fall within a limited range of life expectancies of between 20 and 30 at birth. Inscriptional evidence furthermore yields insights in marriage ages (Lelis *et al.* 2003; Scheidel in press). Fertility parameters are based on the notion that Roman society was characterized by natural fertility (Caldwell 2004) and, in the starting model, that birth intervals in Italy were similar to those observed in the Roman province of Egypt (Bagnall and Frier 2006²). Starting from these assumptions, we create a stable population model. Subsequently, this base population can be subjected to time-varying assumptions, which allow us to model the impact of historical excess war mortality that was especially heavy during the Second Punic War. The extent of this impact is approximately know to us in absolute numerical terms through Livy and Polybius' accounts of war losses among Roman soldiers, the reliability of which is discussed extensively in Brunt 1987² and Rosenstein 2004.

Our methodological approach to testing the plausibility of the opposing population scenarios defended in the scholarly debate is to create plausibility ranges by rerunning the model various times. Each time, we will set demographic parameters at different levels that fall within the range of historically attested or defended values for mortality, war mortality, ages of marriage and fertility schedules. We will, for example, test the macro-demographic implications of different reactions of the marriage market to changes in the sex ratio resulting from warfare: one in which marriage ages are kept constant, and one in which they are highly flexible to maximize the continuation of high fertility. Figure 1 below gives a summarizing schematic overview of the methodological operations of SOCSIM.

Fig. 1 Schematic depiction of interactions and phases in SOCSIM modeling

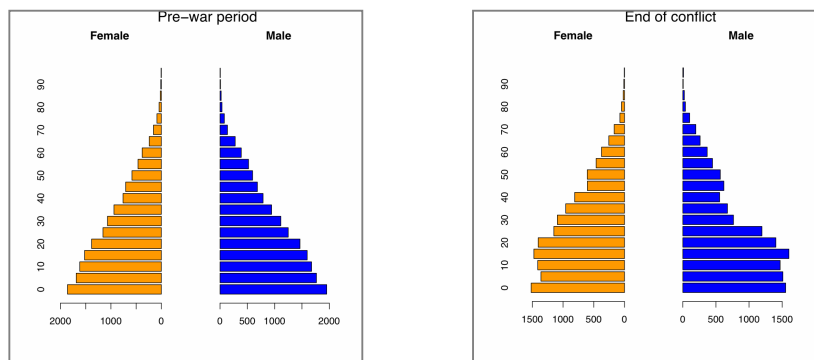


By running the model with sets of ‘minimizing assumptions’ that would theoretically best the low count model and ‘maximizing’ assumptions that would theoretically best fit the high count model we will gain insight in the plausibility of scenarios. SOCSIM modeling will thus allow us to make explicit which assumptions are required by the diverse scenarios, and how these assumptions tally with our historical evidence.

3. Preliminary results

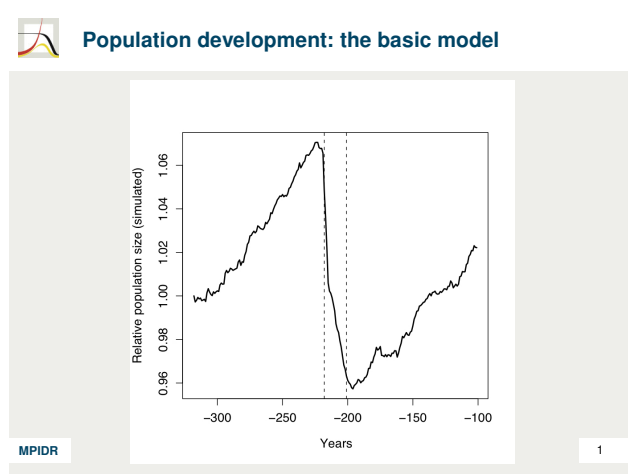
Currently, we have set up our base parameters and completed the calibrations required to create a stable base population. A first run to simulate the impact of the Second Punic War excess mortality has also been performed. As Fig. 2 below shows, the Second Punic War had a significant impact on population composition. We also find that the changes in sex ratio would coincide with a sharp temporary increase in the share of women unable to find a marriage partners, which rose to nearly 40% among the cohorts of women most heavily affected. TFR nearly halved for this cohort, dropping from 4.6 to 2.6.

Fig.2 Population pyramid Roman citizens, before (left) and at the end of the Second Punic War (right)



Concurrently, we see a quite pronounced impact of the Hannibalic War on the population size of Italy: whereas under the ‘standard’ assumptions, population starts to grow again following the end of the shock mortality, population size takes a remarkably long time to recover (see Fig. 3).

Fig. 3 Population development after the Second Punic War: the basic model



While the current output figure does not display the entire period up to the reign of Augustus, the trend for the period between 200 and 100 BCE suggests that under the current assumptions, the population of Italy would barely have been back to the levels prior to the War by the reign of Augustus. These preliminary results suggest that the extremely high population size assumptions of the high count scenario might well require demographic input parameters on mortality and fertility that fall beyond the scope of the defensible. It also raises questions with regard to the extremely pessimistic standpoint of continuous population decline defended by the 'low count'. We expect to find that scenarios of moderate population growth will best fit the historical evidence on the demographic characteristics of the Roman population.

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