Period and Cohort Measures of Migration

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Migration is only rarely analyzed from a population perspective, unlike the two other main demographic processes, fertility and mortality. Individual and regional studies of migration are common-place but it is less common to use population based measures of migration propensities, in particular those constructed using longitudinal cohort data. In this study I will use such a population focused approach, and demonstrate the usefulness of the rarely used total migration rate to estimate life course mobility by both period and cohort measures. I will look at migration on several different scales, ranging from any change of residence, to intermediate internal migration, and international migration rates, using Swedish administrative register data.

There has been a long awareness of the usefulness of a cohort perspective on migration (Taeuber 1966), and in demography in general (Hobcraft, Menken and Preston 1985; Ryder 1965). Theories of migration have simultaneously stressed the importance of viewing migration as a life course process (e.g. Bailey 2008; Kley 2011; Mulder 1993b; Rossi 1980). Despite this, migration is almost universally analyzed with period data, and period measures. This is in great contrast to the widespread use of cohort measures in fertility and mortality research. Period perspectives, unlike a cohort perspective, do not directly correspond to the actual life courses of individuals. Instead they are a compound of the experience of different cohorts, and it is thus a high risk that period effects can bias measures of the actual life course experienced. Event history analyses of migration microdata, common in contemporary research use longitudinal data on actual cohorts, but this perspective is only rarely applied to a population level view of migration (Kolk 2014).

Previous perspectives on migration over the life course

Migration researchers and demographers have been interested in measures of migration propensity over the life course for a long time. The age patterns of internal migration are well understood (Mulder 1993a; Mulder 2007; Rogers 1988; Rogers, Raquillet and Castro 1978), as they are very important for understanding internal migration between different areas in developed countries. That migration pattern changes over the life course, and the implications for family formation, housing careers, and other sociodemographic variables, are also central in much theorizing on migration (Dieleman and Everaers 1994; Kulu and Milewski 2007; Mulder 1993b; Mulder and Hooimeijer 1999; Rossi 1980).

Starting in the 1960s migration researchers began using life table techniques to study migration propensities over the life course (Long 1992; Long 1973; Wilber 1963), similar to the approach in this manuscript. Much like demographers use period data to create an estimate of life expectancy or fertility levels from a virtual cohort, researchers calculated expected number of migration events over the life course. This approach can be used with both cross-sectional data with individuals at different ages from a single area or from representative survey data, much like mortality and fertility measures. If some information on previous migration patterns are available, it is also possible to calculate migration histories (Kulu, Malmberg and Lundholm 2014). Researchers have also developed various methods to infer age

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specific migration rates, and thus total number of migrations, from sources with incomplete or noisy data (e.g. Rogers and Rajbhandary 1997). This approach has however, to my knowledge, not been applied to calculate cohort measures using life table techniques. An valuable contribution, which partially answers similar questions is the use of age-period-cohort measures to migration (Mulder 1993a). This gives insights into differences between period and cohort trends but does not calculate the actual experience for cohorts, and is less easily interpretable as a descriptive measure.

Researchers have also not typically studied complete populations when examining migration, in sharp contrast to other demographic issues. Unusual exceptions are research which applies modern register data (Kulu et al. 2014; Lundholm 2007), an approach also taken in this study. The consequence of such a lack of population level period data in migration research is that several standard demographic techniques used in fertility and mortality research are not commonly used. This has undoubtedly limited our knowledge of migration patterns. The use of cross-sectional data makes it impossible to follow actual individuals over time, as any measure is a compound of different individuals. This is particular a problem as it makes it impossible to study migration propensities based on previous experiences (compare parity in fertility research). Advantages of an order specific approach, with both period and cohort data will be shown in this manuscript.

Population level measures of migration

Below I show the usefulness of a cohort perspective on migration, and the advantages of viewing migration through the lens of demographic period and cohort fertility measures. The number of migration events over the life course can be seen as a direct analog to both the Total Fertility Rate (TFR), and the Cohort Fertility Rate (CFR). It is calculated by summing up age specific rates for a given age range. This measure has been given several different names, including migration expectancy (e.g. Long 1973; Wilber 1963), General Migration Rate (e.g. Rogers and Rajbhandary 1997), and total migration rate (e.g. Gödri and Spéder 2010). I will refer to the period measure as total migration rate (Period TMigR) and the cohort measure as the Cohort Migration Rate (Cohort TMigR), analogous to fertility measures. I will use the notation below.

$$(1)\ {}_nm_x = \frac{{}^nM_x}{{}_nP_x} \qquad (2)\ \mathrm{TMigR} = \mathrm{n}\sum_x {}_nm_x \qquad (3)\ {}_{40}\mathrm{TMigR}_{20} = \mathrm{n}\sum_{x=20}^{40} {}_nm_x$$

Where: x=age, M=number of migrations, m=migration rate, P=population, n=age interval (in this manuscript 1). Cohort TMigR is calculated in a similar way, with the difference that the sum of age-specific rates for a cohort is used, instead of rates for different groups at a single time point.

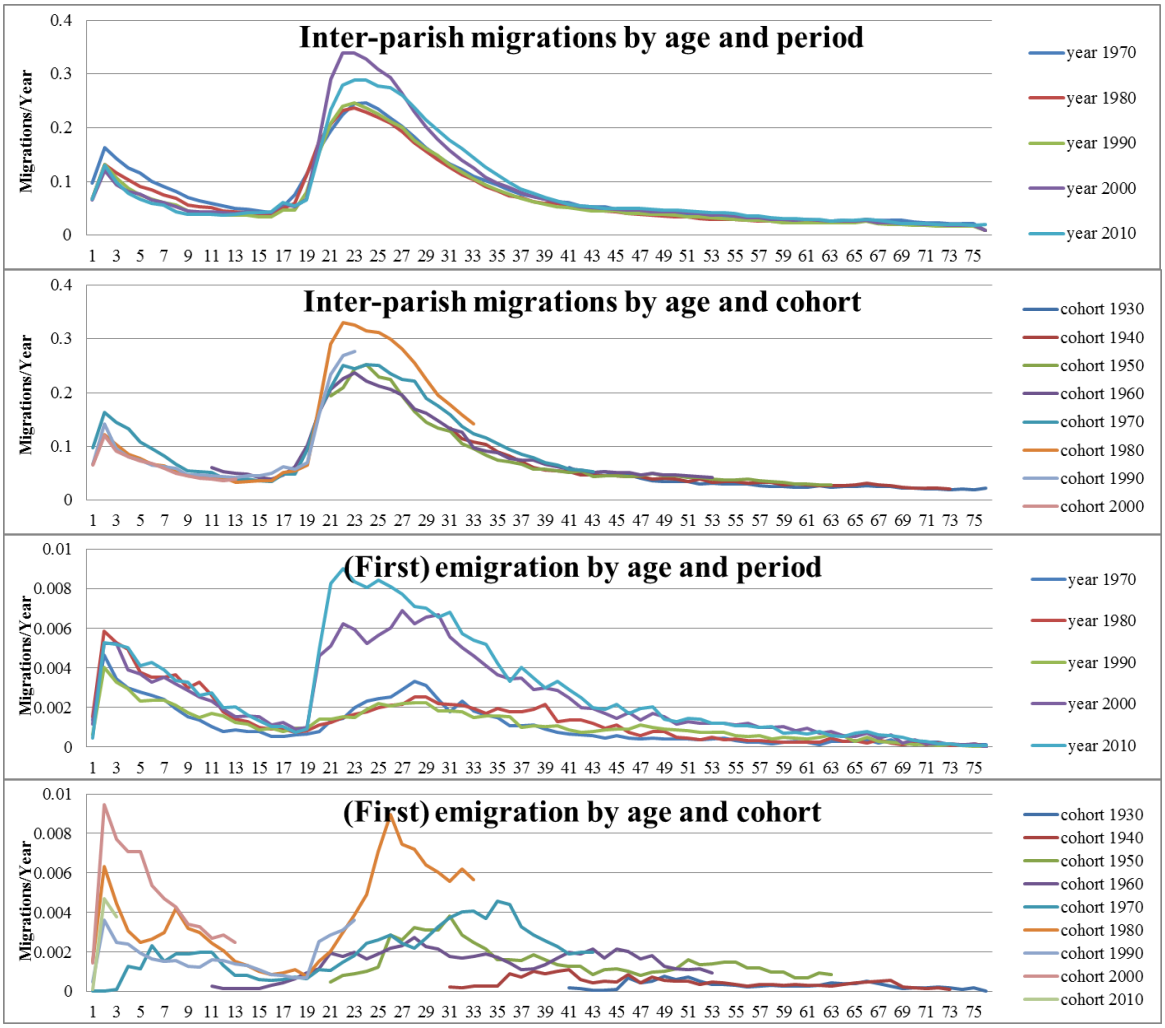
This notation highlights the similarity with period measures, something which will be even more apparent when one introduces order specific migration rates (similar to parity in fertility analysis). The notation also allows simple differentiation among different age intervals, something which is extra important in migration analysis as migration in childhood is not "self-generated". The measure is sensitive to the way a "migration event" is defined, as migration is a sociological event with a less clear physiologically binary interpretation than mortality and fertility.

In this manuscript I apply data from Swedish administrative registers from the years 1968-2012 to these kind of analyses. I will present some preliminary results using this approach where migration is defined as

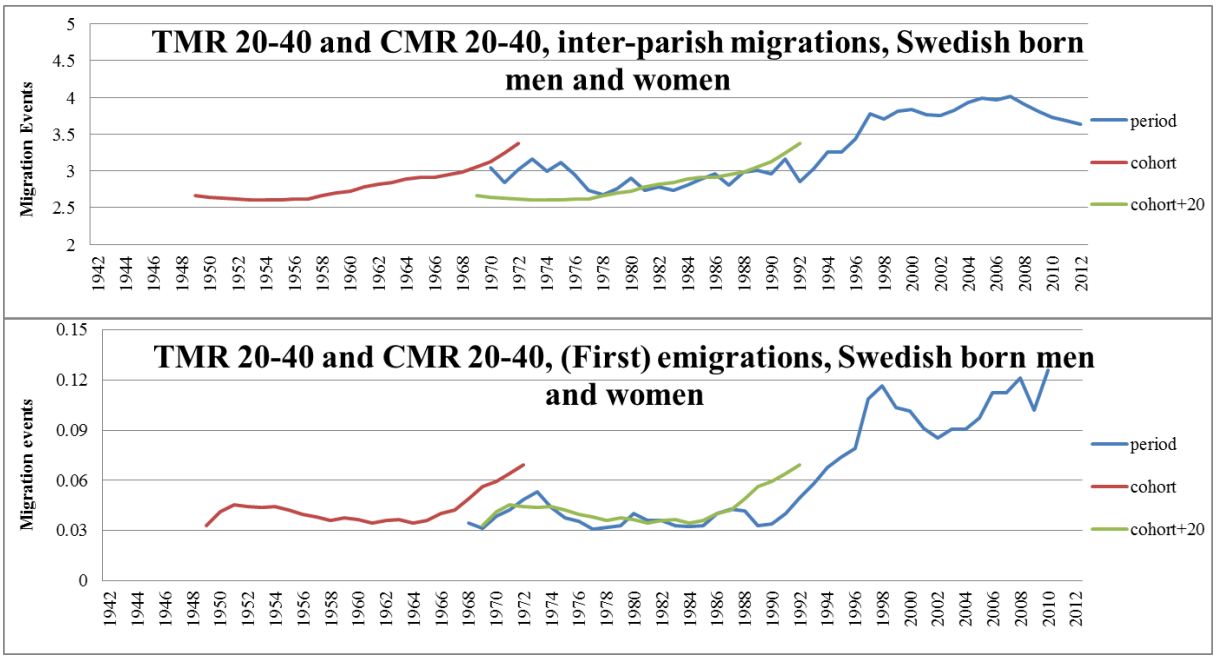
any inter-parish migration event, and as the first emigration. In further analysis I will use geographic information in Swedish administrative register to explore a further range of migration measures. I will also calculate migration rates by migration order for different migration thresholds. This will be similar to fertility tables used with parity specific data and will give valuable insights into different propensities and age patterns at migration at local, inter-regional, and the international level.

Results

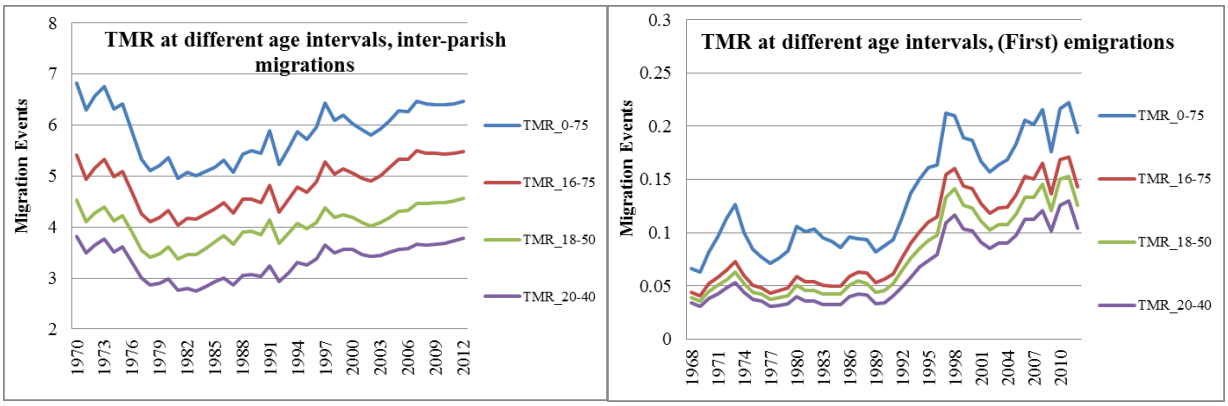
In this section, I will present some preliminary results which will highlight the opportunities of this approach. In Figure 1 I show some early results applying period and fertility data to calculate the total migration rate. I will first show the age specific pattern by period and by cohort for cross-parish migrations, and international migration from 1961 to 2012. The results show that measured at the inter-parish level, there has been a slight increase in internal mobility in Sweden over time, and that there has been continuity in age patterns but some increased concentration in early adulthood. An interesting finding is the very strong period change in emigration, visible when comparing period and cohort age rates. In future analysis I will complement this data on age rates with both order specific information and data on migration using different thresholds.



In figure 2 I present some preliminary comparisons between period and cohort total migration rates between ages 20 and 40 for inter-parish migrations and emigrations. One observation is that cohort rates show less variation over time than period measures, similar to cohort measures of mortality and fertility. Some of the dramatic cohort age patterns are not yet visible in this measure which requires data until age 40.



Finally, in Figure 3 I show some brief comparisons between total migration rates at different age intervals using period data.



Conclusions

The total migration rate is a useful contribution to the toolbox of a migration researcher. In further versions of this manuscript I will give additional results which will highlight the many advantages of such measures.

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