Estimates of the Contribution of Rising Educational Participation to Partnership Postponement: a Model-Based Decomposition for the UK, France and Belgium

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Abstract

Postponement of partnership is a major recent trend in Europe and other developed countries that has contributed to low period fertility since the early 1970s. Recent findings suggest that delayed childbearing is closely linked to educational participation and initial estimates suggest that rising enrolment may explain up to 80 per cent of the rise in mean ages at first birth in some countries by raising the average age at completing education. However, the associated issue of the role of education on partnership has not been studied in detail. Using generalized additive models (GAM), this paper analyses variation in first partnership rates by age at leaving education and duration since leaving education in Britain, France and Belgium between 1970 and 2000. Subsequently, based on fitted rates, direct and indirect standardization by age at leaving education and duration since leaving education are used to decompose variation of first partnership by age in terms of composition effects and rate effects in the countries considered.

Introduction

The postponement of forming partnerships in recent decades has been a major demographic factor in Europe. This is important in its own right as a major emerging trend, but also has implications for levels of fertility given the strong association between being in a partnership and fertility (although the proportion of births outside marriage has increased substantially, these largely occur within cohabiting unions).

A number of explanations for these trends have been advanced, including ideational change associated with the Second Demographic Transition (Lesthaeghe, van de Kaa etc.). Changing educational levels have been advanced as a component of explanation for recent trends in both fertility and partnership. However, these analyses are usually based on level of educational qualifications rather than participation in education as such. In part, this is may be due to the fact that there are few long run reliable series of participation in education, in particular, those also containing age at leaving full-time education together with demographic events.

In this paper, we draw on data from three countries, United Kingdom, France and Belgium, that have high quality data stretching back to at least the 1970s on age leaving education, together with information on events including first birth, first marriage, and, for our particular interest, age at first sexual partnership.

The data sources are described in detail in the data section.

Historically, emphasis has been given on the role of factors associated with the ability of a young person to form a partnership in Europe, particularly the North-western European pattern associated with John Hajnal. Since participation in full-time education is incompatible with full-time employment, which has underpinned the ability to form an independent household (and partnership), educational participation is likely to impact on levels of partnership. However, it is not the only possible factor and in this paper we consider in detail the relationship of changing patterns of educational participation with changing ages at first partnership.

Figure 1 shows the mean age at first partnership and exiting education for the three countries (values for Terminal Educational Age (TEA) in Belgium are on slightly different basis from the others at present but this will be amended shortly).

Figure 1.

The patterns are similar; in particular, trends for United Kingdom and France over the period 1970 to 2000 are almost identical for age of first partnership. However, educational participation is very different, with much higher levels being observed in France than in the other countries.

While attention has been given to variables such as ideational change and economic independence as factors determining when a relationship starts, little attention has been given to the role of partnership within education in itself. Figure 2 therefore shows patterns of first partnership formation according to whether the woman was or was not in full-time education. In all countries, the proportion of partnerships starting within education has been increasing, although the levels in the United Kingdom and Belgium are lower than those in France. In addition, the rises in the United Kingdom and Belgium are considerably less than in France, where recently about one quarter of first partnerships occur while the woman is in full-time education.

Figure 2.

The overall age at first partnership is a weighted average of ages of partnerships that commence within and after full-time education. Figure 3, therefore, shows mean age at first partnership broken down by education status. In United Kingdom and Belgium, the effect of partnership within education is small reflecting its small contribution to overall number of first partnerships. However, in France this has an increasing impact on the overall mean age at first partnership.

Figure 3.

We consider how far the substantial increase in the proportion of partnerships formed within education in France can be explained largely by the increase in educational participation over this period; that is whether the numbers are determined largely by changes in the propensity to form a partnership while in education or due to increases in the proportions of women in education at risk of doing so. We address this by using decomposition methods, mainly standardisation in this application, although we discuss alternative approaches.

These figures suggest that there is generally parallel relationship between age at leaving full-time education and age at partnership during the latter part of the twentieth century, although this

appears to be weakening as the gap between ages of finishing education and forming first partnership is shrinking in the latest period.

The causes of what is often described as "postponement" have been much discussed but hitherto little documented. Recent findings indicate that the growth in educational participation is associated with the trend to delayed childbearing (Neels & De Wachter 2010; Ní Bhrolcháin & Beaujouan 2012). Initial estimates suggest that rising enrolment may explain up to 80 per cent of the increase in mean ages at first birth in some countries (Ni Bhrolchain & Beaujouan 2012), but similar attention has not been given to the role of education on partnership.. Building on this earlier work, this paper aims to adopt a modelling approach (i) to gauge the empirical relevance of several dimensions of personal time - age, age at leaving education and duration since leaving education – in accounting for variation of first partnership rates at the individual level and (ii) using the results of the micro level models, to quantify more precisely the contribution of the increasing mean age at completing education to the upward trend in the age at first partnership. We address two research questions, as follows:

1) Of the several dimensions of personal time – age, age at leaving education and duration since leaving education – which dimension or combination of dimensions is most relevant to capturing variation in first partnership rates since 1970 in the countries considered, at the individual level?

2) What is the contribution of changing patterns of enrolment – that is the change over time in the proportion of women enrolled at each age a, and the changing composition in terms of years u since leaving education – in accounting for the changing mean age at first partnership.

Data & Methods

The analyses use large-scale survey and census data for Britain, France and Belgium. For Britain, we used two sources: (a) a pooled series of General Household Survey (GHS) rounds from 2000 to 2009, a subset of a larger time-series data file of GHS surveys from 1979 to 2009, and (b) the Understanding Society survey, the first round of a prospective longitudinal study linked with the British Household Panel Survey. Both surveys collected fertility histories together with information on the age at which respondents completed their education. Data from the two sources have been combined, and validated against rates derived from the national vital statistical system and national statistics on educational participation. For further details of the GHS as a source, see Ni Bhrolchain et al (2011) and Ni Bhrolchain and Beaujouan (2012). For France, we used the Family History Survey (FHS) linked with the French census of 1999 (Cassan et al. 2000). This large scale survey collected detailed fertility and partnership histories and information on the age at completing education.

Finally, for Belgium we used data from the 2001 census that provides information on age last attended education, as well as partnership histories for all women aged 14 and older (Deboosere & Willaert 2004). Validation against vital registration has shown that period and cohort indicators estimated retrospectively from the 2001 census agree well with national statistics on period fertility trends between 1960 and 2000, as with independent estimates of cohort fertility patterns for women born after 1930 (Gadeyne et al. forthcoming).

We use generalized additive models (GAMs) to answer the first research question (Wood 2006). In summary, the GAM-approach applies lower-order spline functions to the marginal and/or joint distributions of age, period, age at leaving education and duration since leaving education to fit variation in first birth hazards between 1970 and 1999 in the countries considered (we also look at the early 2000s for UK). Summary statistics - adjusted R^2 and percentage of deviance explained – are a guide to how well variation in first birth rates is captured by smoothing marginal and joint distributions of one or several dimensions. Comparing the fit across models provides an indication, for present purposes, of the empirical relevance of the difference dimensions of time considered. All models are estimated using the mgcv-package in R.

Our investigation is in two parts

1) we first examine micro-level models to evaluate which one or combination of personal time dimensions—age, age at leaving education, duration since leaving education-- best represents variation in first partnership rates at the individual level.

2) We then employ direct and indirect standardization by age at leaving education and duration since leaving education to distinguish between i) the statistical effect of change in the distribution of the age at leaving education *(compositional effect)*, and ii) the contribution of change in the schedules of first partnership rates by age at and duration since leaving education *(rate effect)* to change over time in the mean age at first partnership and in the variance of age-specific first birth schedules (research question 2).

In taking account of changing patterns of enrolment/school leaving by age, the age-specific first partnership rate at each age *a* can be decomposed into an age-specific rate for women enrolled in education *(inedu)*, and age-duration-specific rates for women who have left education *(leftedu)*. Considering two time periods t_1 and *t2*, the age specific first partnership rate in each period can be expressed as follows:

period 1: $\quad _{t_1}f^a_{Total} = {_{t_1}}f^a_{inedu}{_{t_1}}w^a_{inedu} + {_{t_1}}f^a_{leftedu}{_{t_1}}w^a_{leftedu}$

period 2: $\quad _{t_2}f^a_{Total} = {_{t_2}}f^a_{inedu}{_{t_2}}w^a_{inedu} + {_{t_2}}f^a_{leftedu}{_{t_2}}w^a_{leftedu}$

where $\quad _{t}f^a_{leftedu} = \sum_{j=0}^{35} f^a_j u^a_j$

and where a= age, index *j* reflects duration since leaving school *(sinceleft)*[1]. Apart from distinguishing two types of rates, two sets of weights are relevant for the standardization: i) the proportion of women in education at each age *a*, and ii) the distribution of women aged *a* by duration since completing education. Direct and indirect standardization of age schedules by age at leaving education and duration since leaving education is then carried out as follows:

i) the *indirect standardization* approach involves keeping constant the age-specific rates (for women in education) and age-duration-specific rates (for women who have left education) and applying these rates to the populations actually observed at different time points that vary at each age *a* in terms of the proportion of women still enrolled in education and the distribution of duration since leaving education for women who have left education.

ii) The *direct standardization* approach involves keeping constant at each age *a* the population composition in terms of proportions enrolled in education and the distribution since leaving education for women no longer in education, while allowing age-specific (for those in education) and age-duration-specific rates (for those who have left) to vary from one period to the next.

Conclusions

Our point of departure in this work is the analysis by Ni Bhrolcháin and Beaujouan (2012) highlighting the importance of duration since leaving education for structuring first birth rates in Britain and France, and also providing initial estimates of the role of increasing educational participation in contributing to delayed childbearing in Britain and France. We take that work forward by investigating the related question of how far changing educational participation is an important factor in the recent rise in age at partnership. We employ generalized additive models in our analyses of first partnership rates in Britain, France and Belgium since 1970. We generalize the suggestion of Ni Bhrolchain and Beaujouan (2012) that duration since leaving education is the more relevant single dimension of time to explain variation in recent family formation rates, showing a better fit to the

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[1] The index j runs from values 0 to 35, assuming that women do not leave school before age 15 and can age-specific rates are calculated up to age 50 (at which point j attains its maximum value of 35).

data in all three countries than do models based on age. We therefore find that a standard multistate model, which contains only onetime dimension is unable to capture the complexity of recent trends. These results suggest that the changing distribution of mean age leaving education, in tandem with first partnership schedules by duration since leaving education provide a relevant and coherent framework that can also explain period variation in first partnership rates. However, the increasing proportion of first partnerships occurring within education will also need to be given more attention than in the past.

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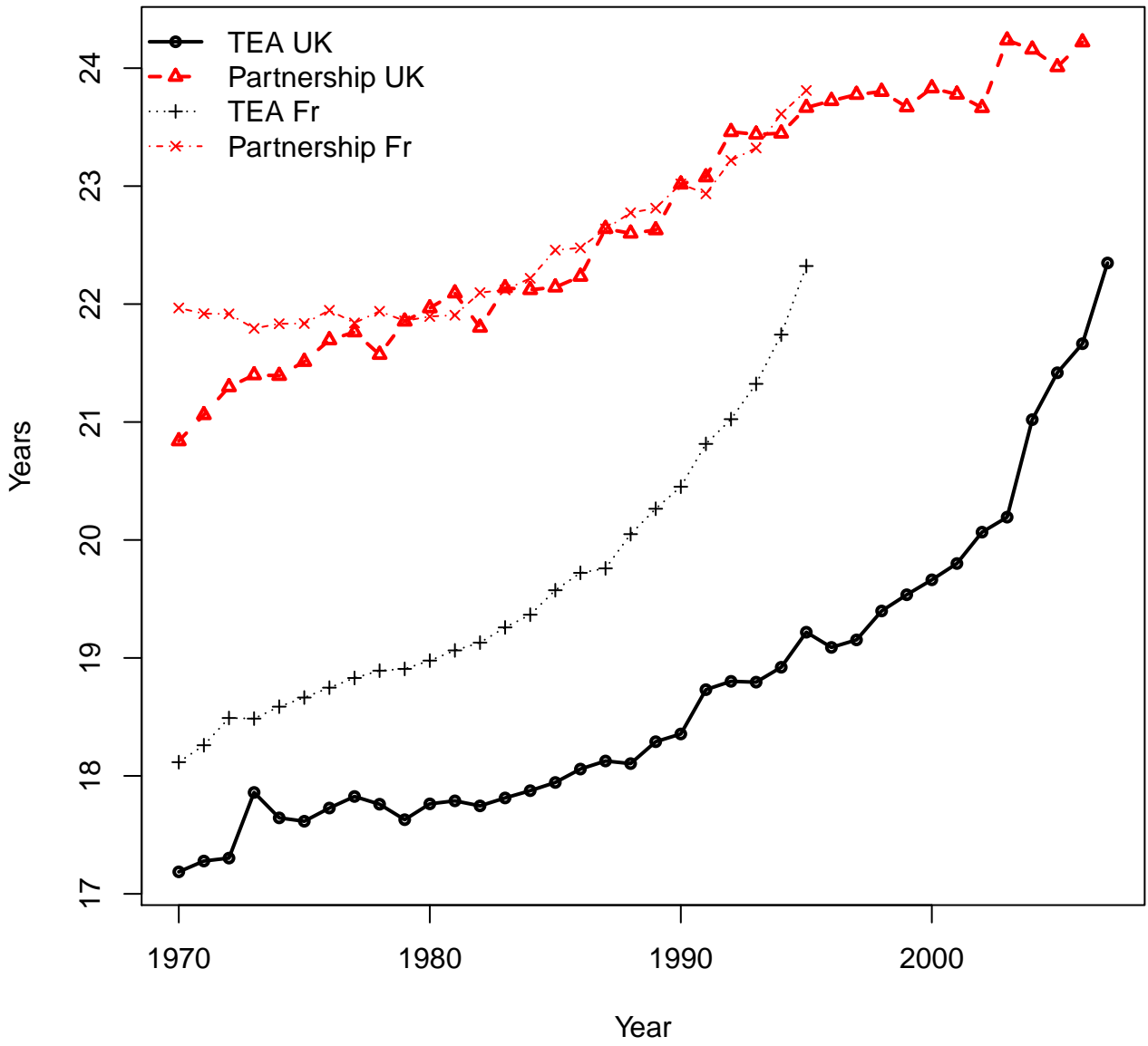**Figure 1. Mean age of first event; France & UK**

Figure 2. Proportion First Partnerships starting in Education
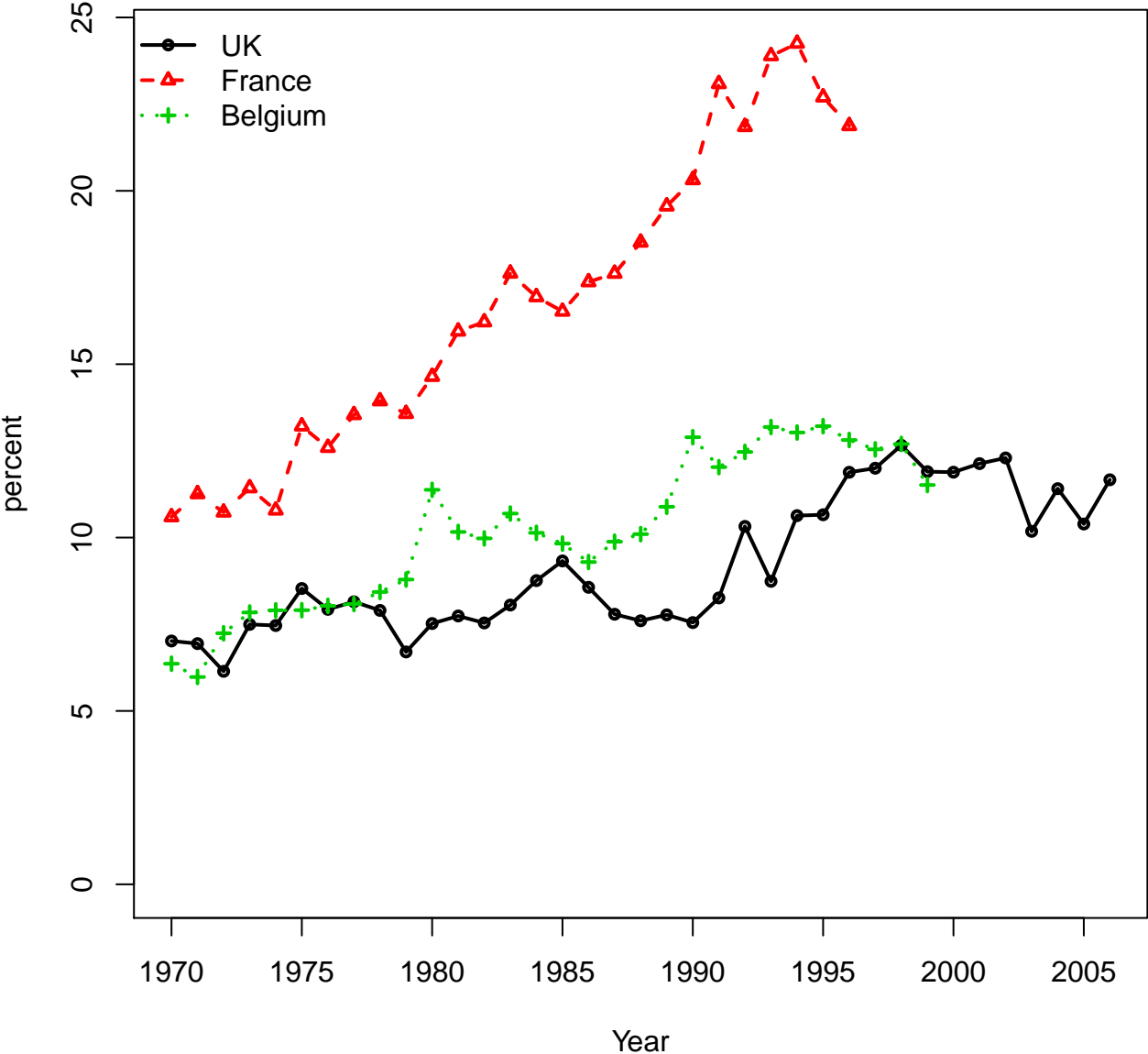
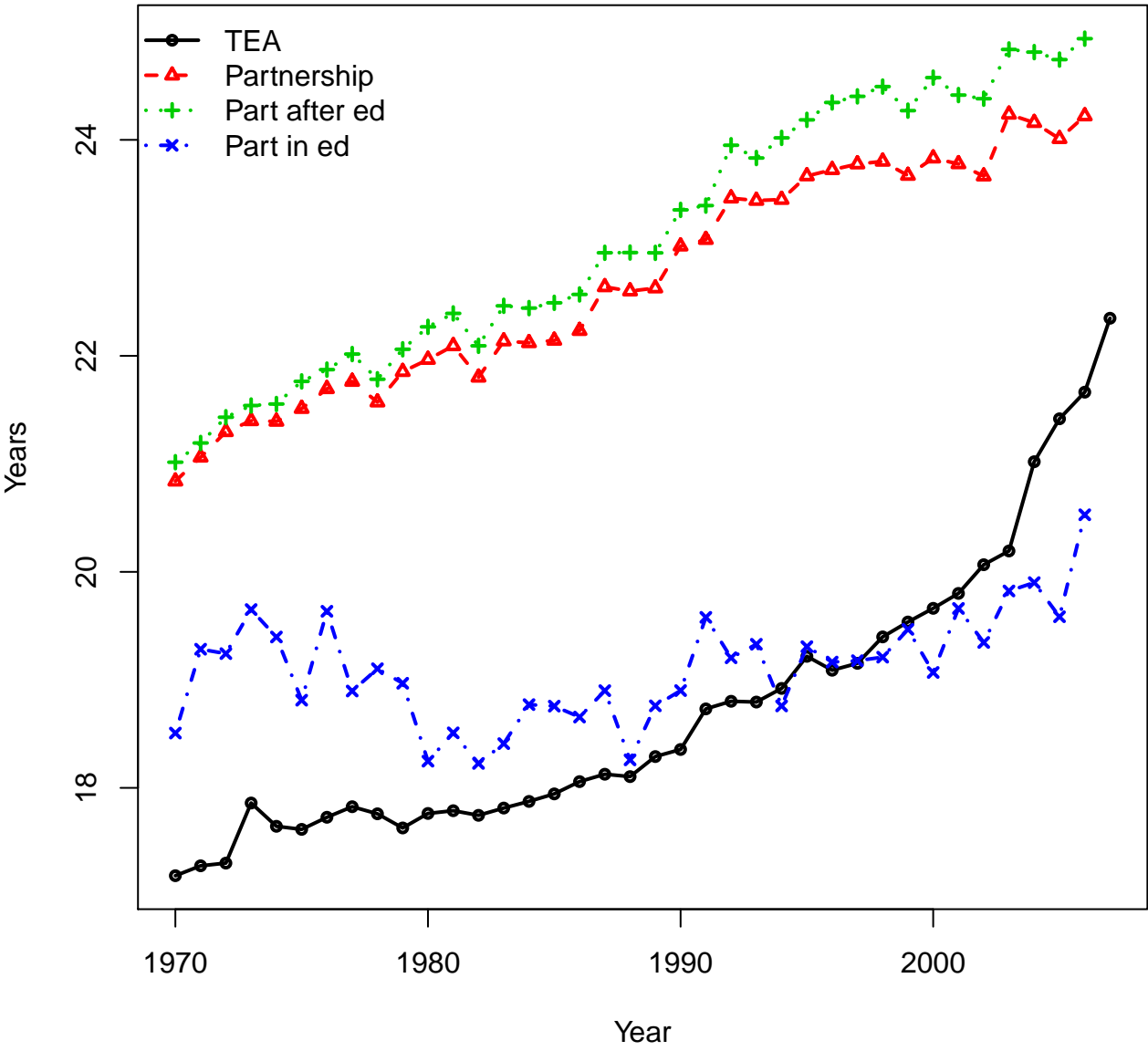**Figure 3a. Mean age of first event; UK**
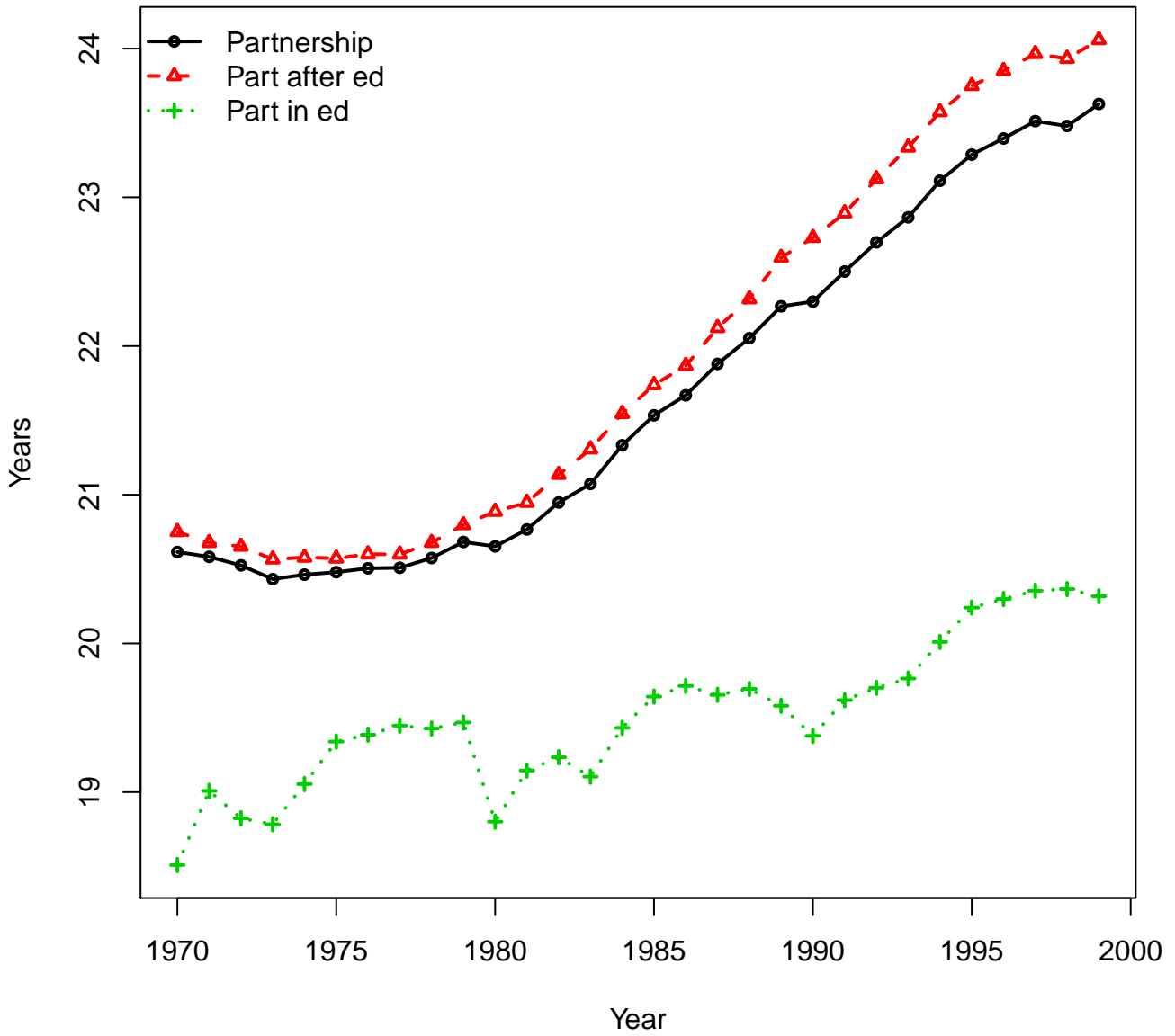
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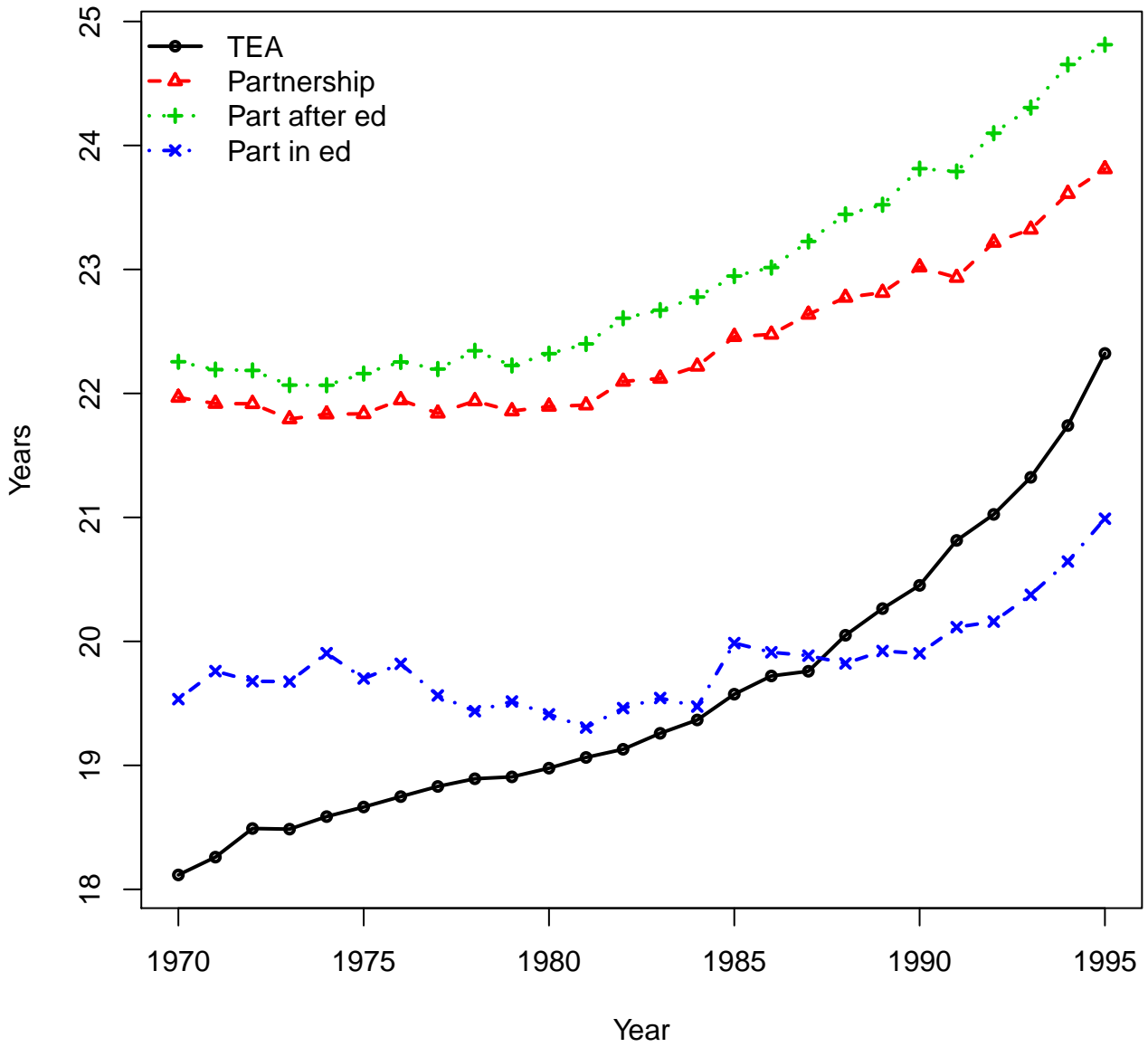
Figure 3b. Mean age of first event; France

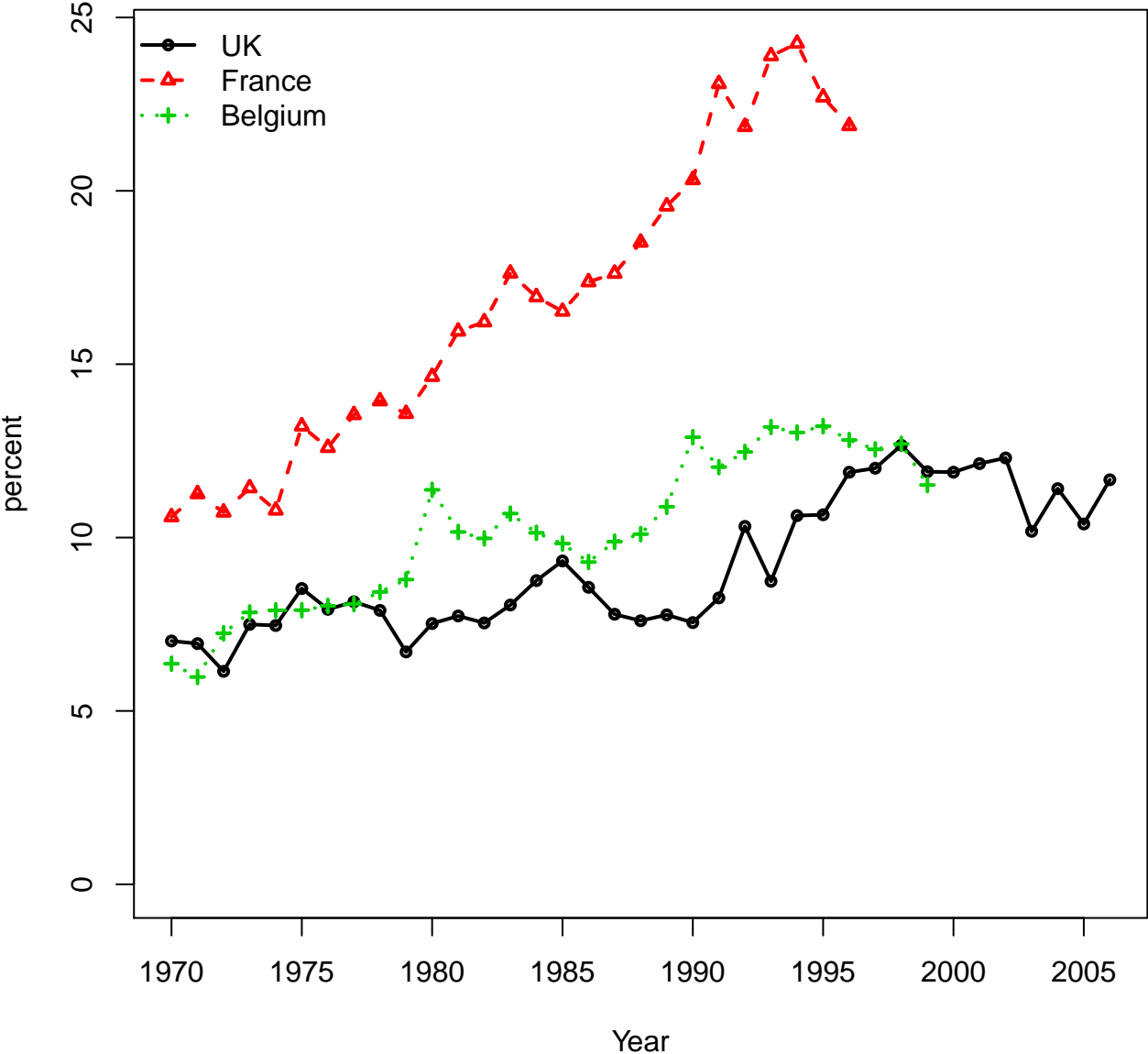**Figure 2. Proportion First Partnerships starting in Education**

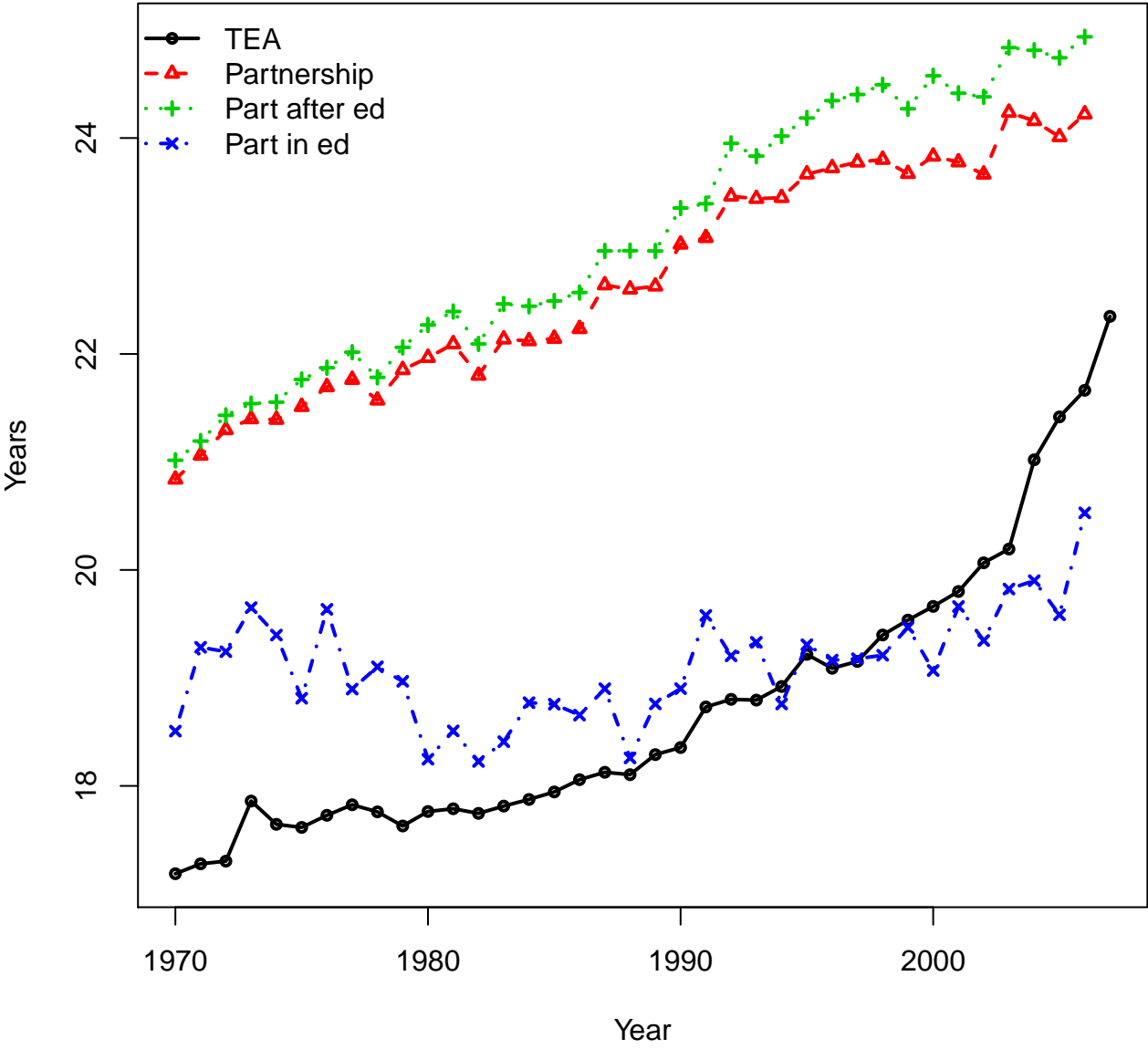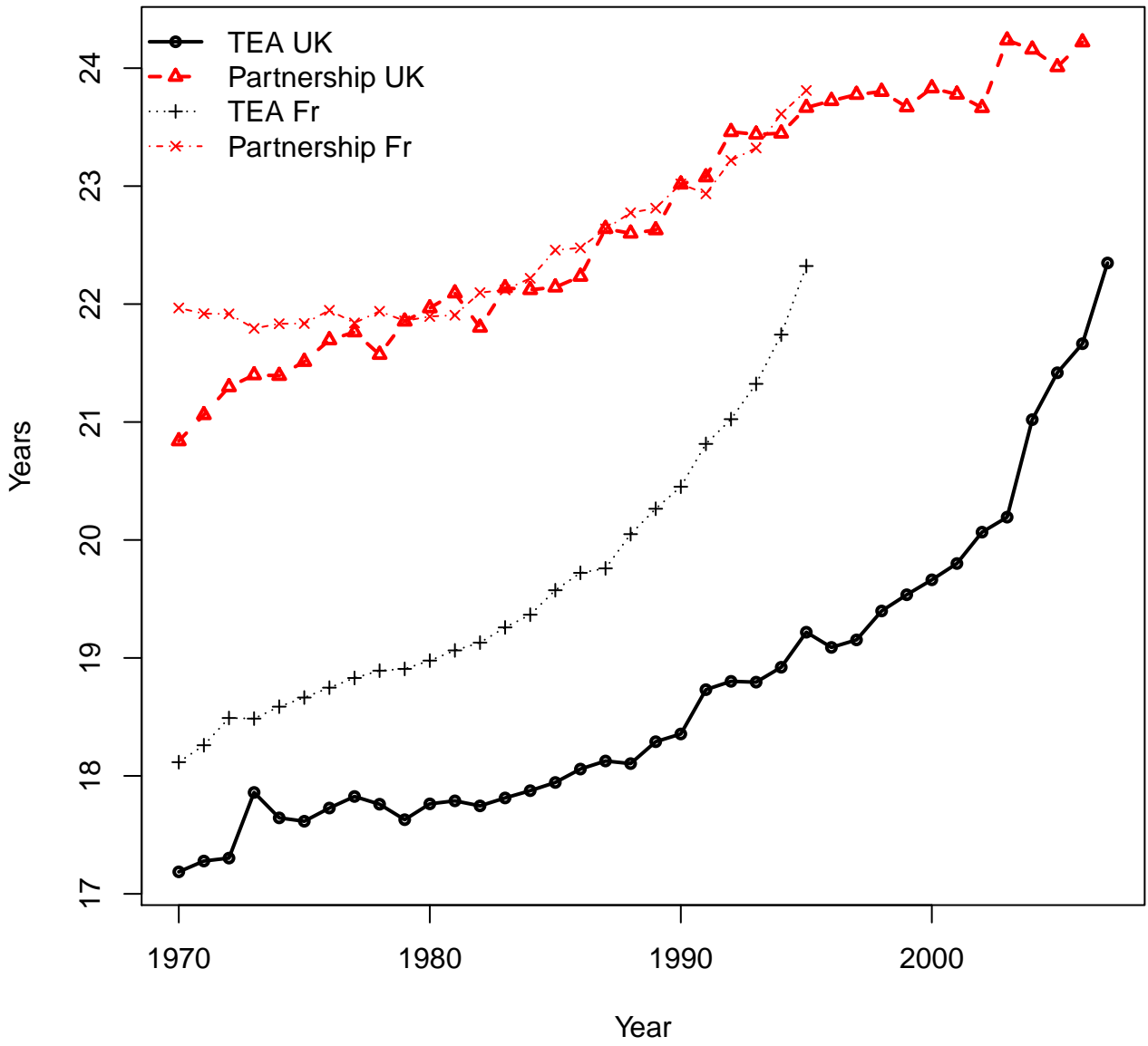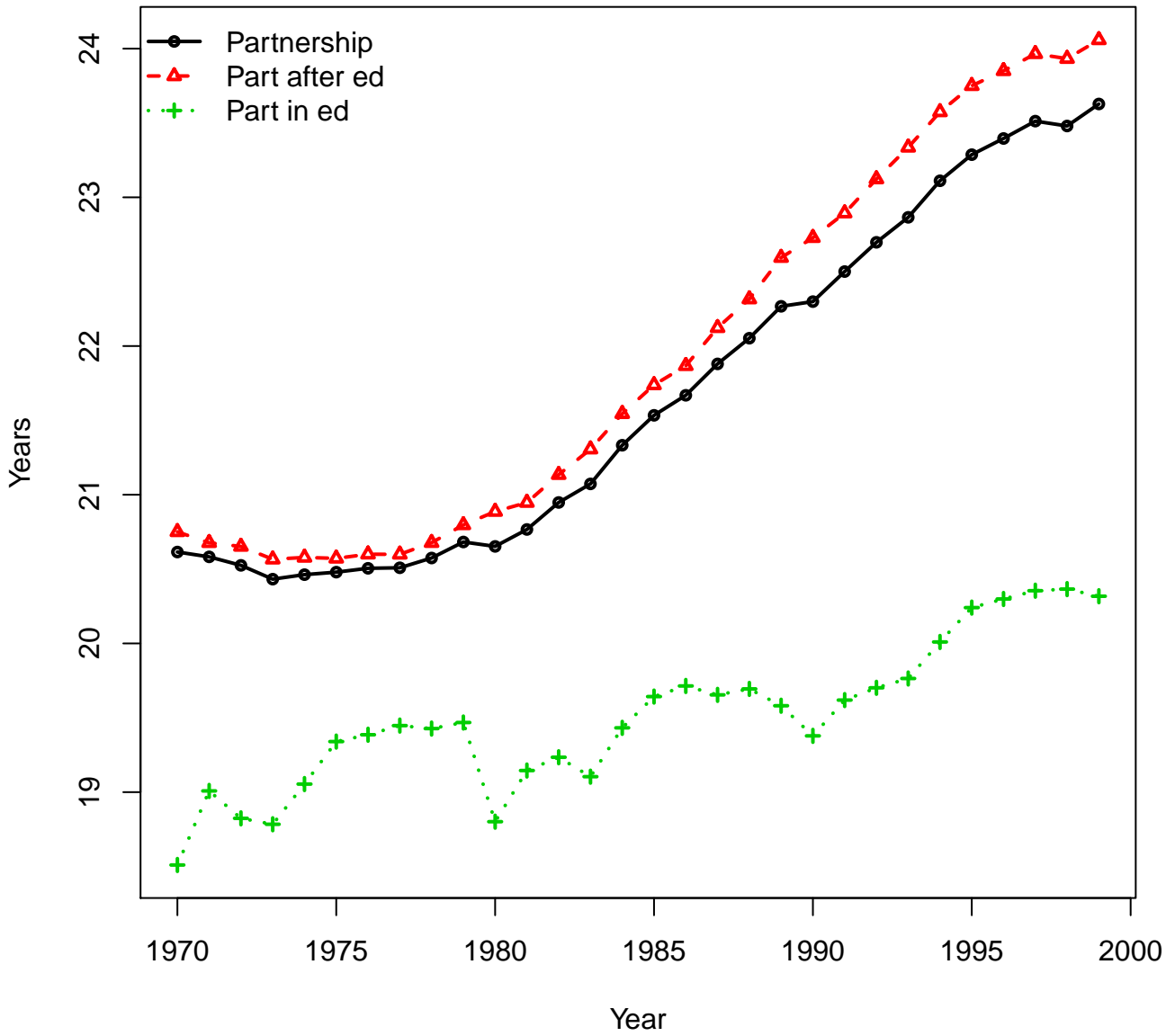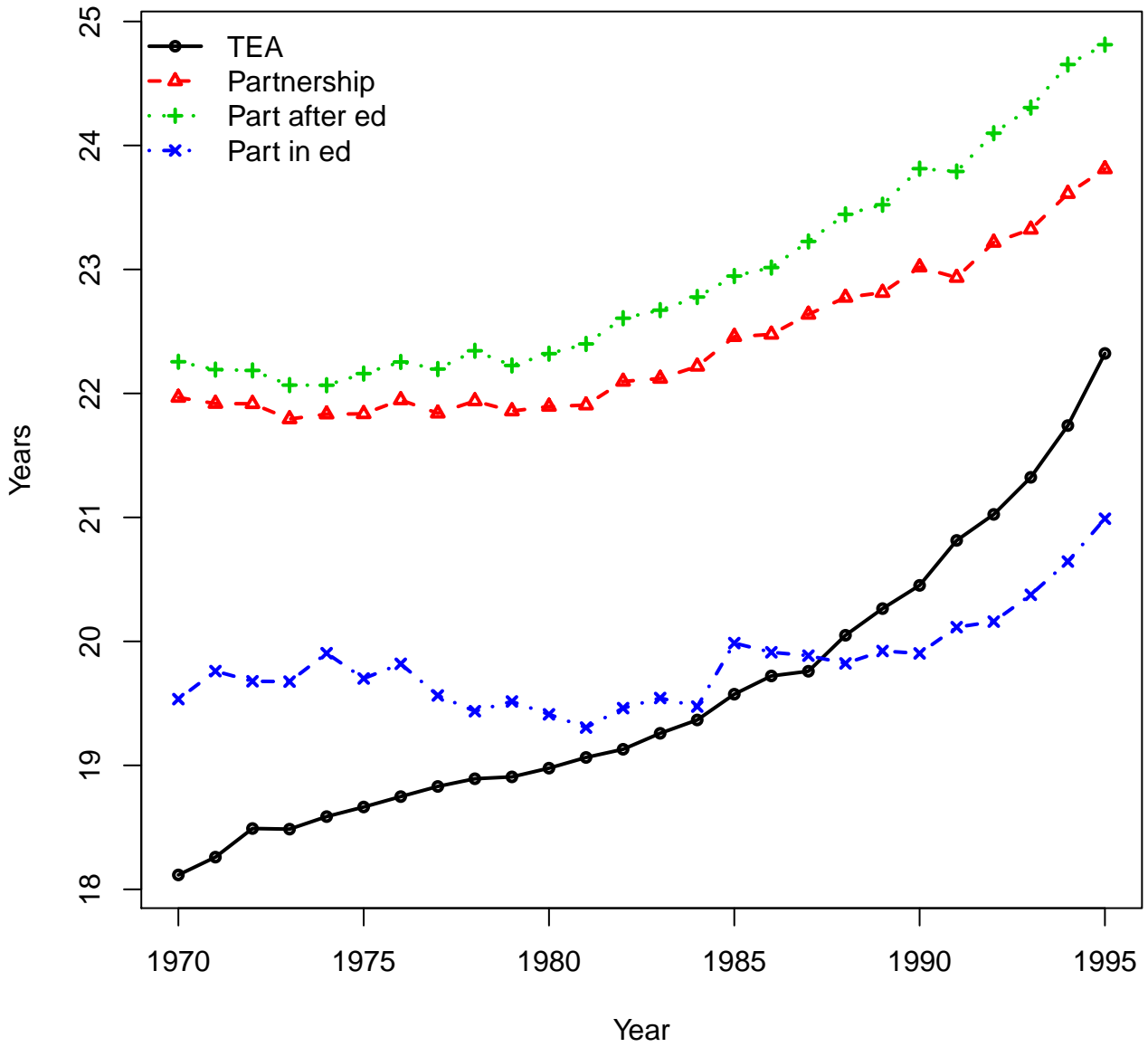**Figure 3a. Mean age of first event; UK**

Figure 1. Mean age of first event; France & UK

Figure 3c. Mean age of first partnership; Belgium

Figure 3b. Mean age of first event; France

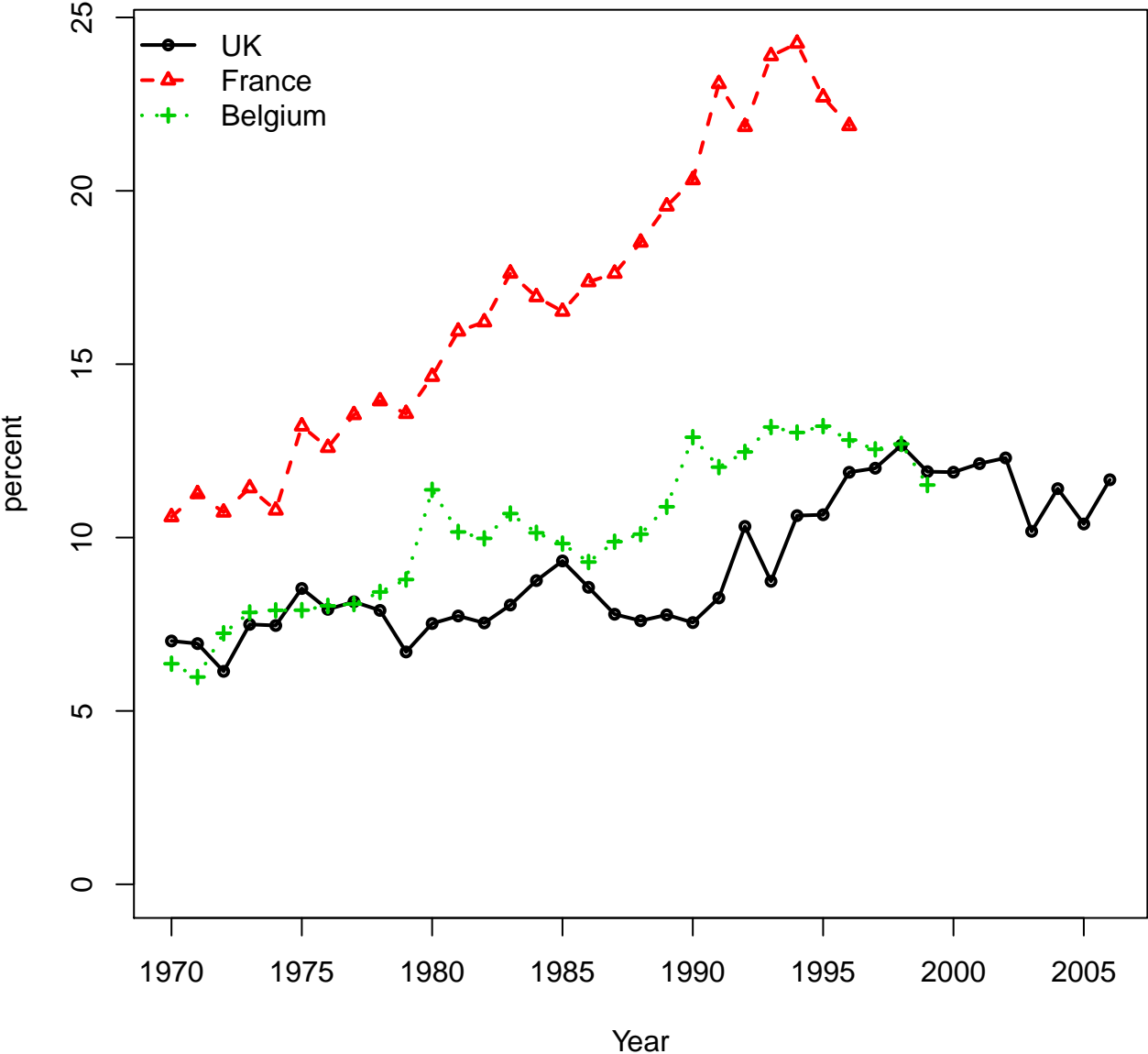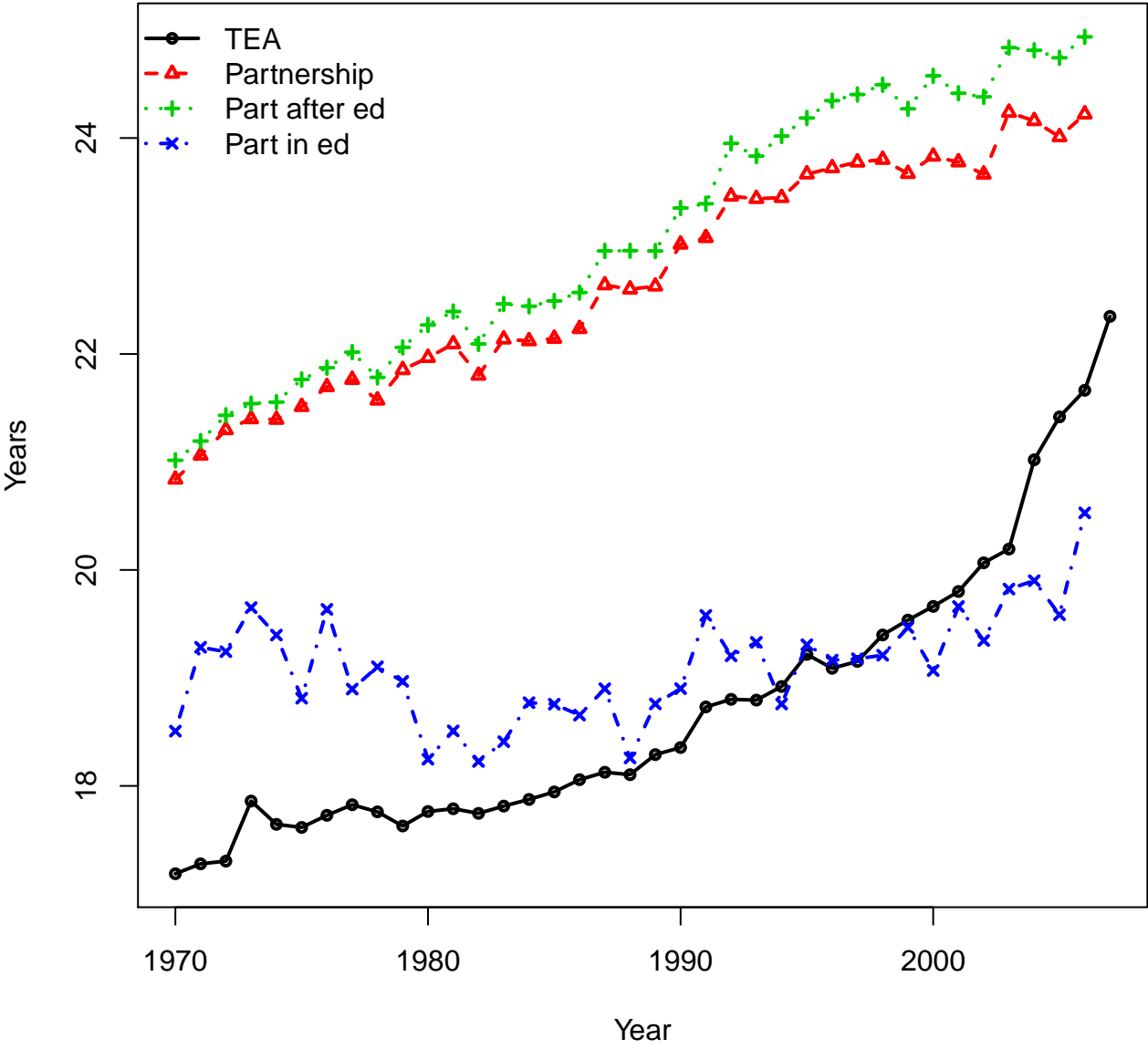# Figure 2. Proportion First Partnerships starting in Education

Figure 3a. Mean age of first event; UK

Figure 1. Mean age of first event; France & UK

- TEA UK
- Partnership UK
- TEA Fr
- Partnership Fr

Years

Year