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EL ROL DE LOS ESTUDIOS DE POBLACIÓN TRAS LA PANDEMIA DE COVID-19 Y EL DESAFÍO DE LA IGUALDAD EN AMÉRICA LATINA Y EL CARIBE

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Educational expansion and trends over time in the age-gap between partners

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Abstract

Women's participation in tertiary education has been increasing since the second half of the 20th century and, in many countries, since the 1990s, tertiary-educated women in their reproductive ages outnumber tertiary-educated men. This structural change had consequences for union formation behavior. The expansion of women's educational attainment has challenged the persistence of conventional union patterns, in which women tend to mate with men who have higher social status (social hypergamy, from the woman's viewpoint) and older age (age hypergamy). In this paper, we examine the interaction between changes in educational assortative mating and age-difference between partners over time. We used IPUMS harmonized census microdata of four countries (Brazil, France, Panama, and United States), which have available data since the 1960s. We found that expansion of education is favorable to increasing age homogamy over time, especially for the higher educated. Educational hypergamy and age hypergamy, however, have become less compatible over time. As a consequence, educationally hypergamous unions have become more heterogeneous in terms of the age-difference between partners, contrary to the overall trends for other couples.

1. Introduction

Educational expansion is a major social development, taking place worldwide from the second half of the twentieth century (Schofer and Meyer, 2005). During the last decades of this century, women's participation in tertiary education has been remarkably increasing, and in many countries of the world, now tertiary-educated women in their reproductive ages outnumber tertiary-educated men (Esteve et al., 2012; Esteve et al., 2017). This structural change had consequences for family behavior, for union formation in general and educational assortative mating in particular (Van Bavel, 2012; Van Bavel et al., 2018).

Mating patterns are not random, but highly structured by opportunities and limited by preferences, these largely shaped by social norms. . Conventionally, marriage practices have been characterized by the supremacy of the husband over the wife. This supremacy could be entailed by differences in terms of social status (education, occupation, income, wealth) or age difference, Hypergamy, where the man has a higher social status than the woman, is often tied up to age hypergamy, i.e., the man is older than the woman. Age hypergamy, diffused all over the world, can be regarded as by-product of the cultural norm of hypergamy (Ni Bhrolchain, 2006). Accordingly, scholars associate mating patterns in several dimensions (e.g., age, education, income, etc.) as indicators of the dynamic in gender equality for a society (Bozon, 1991; Kolk 2015; Trimarchi, 2019). In societies with a rigid gender role specialization, people are expected to balance unequal traits through marriage (Becker 1974).

However, the expansion of women's educational attainment, which is also considered an advancement towards more equality between genders and consequently more flexible partnerships in terms of gender specialization, has challenged the persistence of conventional union patterns. Nowadays, educational homogamy is still the most frequent result of mating, both in ascribed and achieved attributes, and at the same time, in many European and non-European contexts, hypogamous unions, i.e., the woman more educated than the man, have been increasing relative to educationally hypergamous couples.

While numerous studies have addressed the role of women's educational expansion for changes in educational assortative mating (Esteve et al. 2012; Grow and Van Bavel 2015; De Hauw et al., 2017), changes in trends of the age-gap between partners have remained relatively unexplored. Studying these trends has an increasing scholarly interest, due to its links with the evolution of power-dynamics between genders, at individual and societal level (Van Bavel, 2012; Kolk, 2015).

In this paper, we aim to fill this gap, asking to what extent changes in educational assortative mating are associated with changes in the age-difference between partners. Our contribution is twofold. First, we consider trends in age and educational assortative mating over five decades in four countries of different regions (Brazil, France, Panama and United States), to check whether similar changes exist across different contexts within Europe and the Americas. Second, we describe trends of the age difference across educationally heterogamous and homogamous couples. In the case of homogamous couples, we take into account differences related to the absolute level of education.

2. Trends in mating patterns

Mating patterns have several consequences for the reproduction of social inequalities at the macro level, and for family behavior at the micro level (Schwartz & Han 2014). Scholars have extensively explored the process of partner's search, including its timing and determinants (Oppenheimer, 1988; Mare, 1991; Sassler 2010), and long-term explanations for changes in mating patterns -i.e., modernization, assimilation (Schwartz 2013). Our study situates in the latter strand of research, focusing on changes over time in the association between age and educational assortative mating Age and education represents two important aspects of the mate selection process for both theoretical and methodological reasons.

From a theoretical perspective, both variables are proxy for desired characteristics in a partner. Age is proxy for physical attractiveness and youth, aspects that have been traditionally highly valued by men, more than women, when selecting a partner (Buss et al. 1990; 2001). Moreover, age may be indicative of long-term earnings potential: at younger ages it is more difficult to evaluate the future economic prospects of a potential partner. Normally, the economic situation of young people is more uncertain, and it becomes easier to *evaluate* once individuals leave formal education (Oppenheimer 1988). Education has both a cultural and economic value. On the one hand, higher education is synonym of higher social status and greater availability of cultural resources (Bourdieu 1986). On the other hand, it is widely considered a reliable indicator of good financial resources (Becker 1985).

The focus on age and education has also several empirical advantages in the study of mate selection processes. Differently from other partners' characteristics (e.g., income, occupation), age does not vary due to the union experience itself, and the age difference between partners remains constant over the life course of the couple. Partners' education, instead, may change after the couple is formed but this is less likely to happen with increasing age of the partners. Overall, from an empirical perspective, by using both age and education we are less likely to incur in endogeneity issues, which are often a limitation of mating selection studies.

2.1. Educational expansion and educational assortative mating

The way married and unmarried couples are sorted out is the byproduct of both male and female mating preferences, in combination with the distribution of characteristics in the mating market. People who mate homogamously in terms of education mostly come from the same social background and followed similar educational paths or attended the same religious community (Kalmijn 1991; Blossfeld and Timm 2003). In economic literature, positive assortative mating regarding education would imply an accumulation of advantages or disadvantages endowed in the level of education (Becker 1991). One way to enhance its own social status is by partnering with someone with higher social status. The degree to which this is possible depends on the level of social openness, stratification, and mobility in a society: more stratified societies offer fewer opportunities to the more disadvantaged to improve their social status (Blossfeld 2009).

Homogamy in education is the most typical mating pattern across countries and indicates the level of accumulation of resources within the couple. The distribution of heterogamous couples, which are less typical, has been changing in the last few decades due to changes in education-specific mating markets. The

reversal of gender inequality in tertiary education contributed to an increase of couples where the woman is more educated than her partner (Esteve et al. 2012; Ganguli et al. 2014; Grow and Van Bavel 2015; De Hauw et al. 2017).

Partnering among the highly educated has different implications than partnering among the less educated. On one hand, committed relationships formed by the more educated may be characterized by a longer search for a suitable partner; more years spent accumulating human capital can re-define what is considered an ideal partner (Oppenheimer, 1988). Moreover, depending on the context, the educational level may entail different outcomes in terms of union formation for men and women. While education has been often positively associated with men's union formation (Oppenheimer 2003; Kalmijn 2011; Trimarchi and Van Bavel 2017), this positive association holds true for women only in recent periods.

In the early 2000s, low educated women in European countries seem to face more difficulties in forming unions relatively to their highly educated counterparts (Toulemon 2014; Bouchet-Valat 2015), De Hauw et al. 2017). Similarly, in the United States, women's educational gradient in marriage has been changing over six decades, from negative to positive (Sweeney, 2002). College educated women, by the 2000s, were found more likely to be married, either because they had a more stable marriage, or , because, in case of divorce or widowhood, they were more likely to remarry (Torr, 2011).

However, in Latin America, the highly educated are still more likely to remain single, and this pattern is stronger for women (Ganguli et al. 2014). Besides, when they marry, Latin American women are more likely to "marry down" in terms of education than women from other countries in the world (Ganguli et al 2010). As a result, homogamy levels remain lower in Latin America than in the United States or Europe, where they have been increasing at both ends of the education distribution or remained constant (Ganguli et al. 2014; Greenwood et al. 2014; Schwartz & Mare 2005; Blossfeld & Timm 2003).

In any case, it is important to notice that changes in the level of homogamy and heterogamy may be due to the different ways of defining and grouping educational levels (see for examples the arguments in Gihleb & Lang 2016; Eika, Mogstad & Zafar 2019). This is a direct consequence of the fact that educational distributions of men and women are not constant over time and across countries. As a solution to comparability issues of educational distribution across countries and over time, it is well accepted to use the standard classification of education developed by UNESCO, i.e., the International Standard Classification of Education (ISCED)., This is the approach followed in this paper, and more details are given in section 3 on data and methods

2.2. Age difference between partners and education

The study of educational assortative mating is inherently linked to other individual traits, as age, which closely interacts with education. Research on mating preferences has shown that age and education are among the main attributes that can make people more or less desirable (Buss et al., 1990). Thus, individuals match assortatively on age, too. In general, men tend to be few years older than the woman, but trends may vary according to sex and context (Ni Bhrolchain, 1992). That is to say that the age difference between partners does not vary symmetrically for the two sexes. Men and women of a certain age are exposed to a

different structure of mating markets, contributing to the asymmetry of the age difference distribution over time. Moreover, with the diffusion of union disruptions, gender differences in re-partnering behaviors at a certain age also contribute to the asymmetry of the age difference distribution for the two sexes (Ni Bhrolchain, 1992).

Age differences between partners have been linked to power dynamics between sexes. Higher gender equality, within both the couple and society, is expected to be associated with lower age-differences (Bozon, 1991; Trimarchi 2019). Age hypergamy has been linked to limited opportunities for women, inequality and patriarchy. The younger partner is considered the weaker within the relationship in terms of bargaining power due to fewer socio-economic resources and less life experience (Kolk, 2015).

In general, educational homogamy, which is the most widespread union pattern, implies higher levels of age homogamy, especially at high levels of education (Blossfeld, 2009). Highly educated couples meet more often at school or universities, whereas the lower educated leave school earlier, which implies exposure to more age-heterogeneous social networks. However, less educated individuals tend to be less mobile relatively to their highly educated counterpart, and their unions tend to be homogamous in terms of place of residence or place of birth.

Expansion of education may be favorable to increasing age homogamy over time, especially for the highly educated, while increasing divorce and separation risks, may act in the opposite direction. Educational expansion implies a decrease in the proportion of people with low level of educational attainment, which may make it more difficult to find an educationally homogamous partner of similar age. Thus educational homogamy for the less educated is not compatible with age homogamy. Similarly, educational hypergamy, which was the most common mating among the heterogamous till the 1990s, is not compatible with the recent reversal of the gender inequality in education.

2.3. Opportunities, preferences, and the structural-constraint hypothesis

Assortative mating patterns arise from structural constraints linked to the availability and suitability of partners, which, in turn, depend on individuals' preferences and each individual's explicit or implicit evaluation of his/her position within the mating market. Still, it is rarely feasible to estimate the net effects of preferences versus opportunities, considering the current availability of data and the complications derived by feedback loops between both dimensions (Schwartz 2013). All the more that we do not observe explicit preferences (by the partners, their families or peers or any person or group involved in the mating process) but only the result, i.e., couples with (some) characteristics of the partners, and people not living as a couple

During the golden age of marriage during the baby boom in Europe, hypergamy was related to less educated men (mostly farmers, workers and immigrants) remaining single, as well as most educated women. Highly educated women, when they were working and gaining their own income, could afford living by their own (or end a non-satisfactory union). Social norms against hypogamy were also explicit, be it among men or women. With educational expansion, younger generations are more likely to be highly educated, creating a tension between age hypergamy and educational hypergamy. This tension can be solved by

differential propension to enter a union, or changing preferences: the trend of declining proportion of less educated women living as a couple, observed in a very large number of countries, is a consequence of these changing preferences (Esteve et al., 2017)

In this paper, we keep a couple perspective. In order to explain evolving trends in age homogamy, we focus on the constraints that individuals face due to an increase of highly educated women on the mating market. This approach does not dismiss human agency, but it acknowledges that individuals operate within a structure. In fact, constraints make people update their preferences, based on their experience in a certain mating market. Assortative mating patterns can even change without a change in preferences.

As Gihleb and Lang (2016) showed, educational expansion has widened the scope for homogamous couples, and the education distributions of men and women had become more similar, increasing homogamy without the need for a change in preferences. In line with this approach, and resulting from the trends described above, low educated individuals tend to form unions characterized by a wider age difference between partners. This is due to structural-constraints, i.e., lack of potential mates - according to traditional conventional mating patterns. Alternatively, low educated risk remaining single.

In sum, we expect that *the distribution of the age difference among low educated homogamous couples and hypergamous couples will be more heterogeneous over time, due to the lack of potential mates*. If this is the case, we expect that this heterogeneity is mostly driven by an increasing proportion of couples with large age difference among the low educated homogamous couples and the educationally hypergamous couples. These couples are more likely to hold gender traditional values, thus it is likely that the change in the distribution of the age difference is driven by an increase of age-hypergamous rather than age-hypogamous couples. With regard to the more educated, educational expansion should favor an increase of age and educational homogamy over time, which could still be counterbalanced by the diffusion of unions' disruption.

Contextual expectations

To test these expectations we have considered four different contexts: Brazil, Panama, France and the United States. We chose countries with available and comparable data from 1960 till the first decade of 2000, since it allows us to examine long-term trends in age and educational mating patterns. All countries considered have been facing similar trends regarding the development of education and changes in family behaviors.

Family demographic trends occurring in these countries include the postponement of fertility, increasing divorce rates and the diffusion of non-marital family behaviors; trends that can be synthesize under the expression of *second demographic transition* (Van de Kaa 1987; Lesthaeghe 2010). In the 1960s, our starting observational period, these countries differed both in their level of educational expansion and their stage of second demographic transition.

For the two Latin American countries, from the 1960s onwards, educational expansion especially consisted in guaranteeing the completion of primary education levels, which granted access to secondary education. In France and United States, instead, educational expansion mostly concerned the completion of secondary level, which grants access to tertiary education. Similarly, France and United States were far more advanced in their second demographic transition relatively to the Latin American countries.

Independently on the level of education, the reversal of gender equality in education, occurred in all four countries. As a result, we expect to find similar patterns regarding the changes in the distribution of the age difference among the less educated homogamous couples and the educationally hypergamous couples. However, the increase in age and educational homogamy will mostly concern France and United States, where educational expansion implied a substantial extension of the time that individuals spent in education.

3. Data and methods

Data source

We use the harmonized census data samples from the Integrated Public Use Microdata Series (IPUMS) international database of Brazil (1960-2010), France (1962-2011), Panama (1960-2010) and United States (1960-2015). The advantage of using census data is to emphasize the diachronic dimension of the changes across countries in educational assortative mating and age homogamy. Given our research question, we focus on couples as the unit of analysis. Our sample consists of couples where at least one partner is aged 30-39 years old. In France, all unions are formal marriages, in Brazil 19% are consensual unions, while in Panama consensual unions reach almost 54%. In United States there is no distinction between formal marriages and consensual unions. Our analytical sample totaled of about 21 million couples.

Since census data do not provide union histories of each partner, our data universe presents some limitations. First, we do not have information on union duration, and we describe the set of current unions at census, not recently formed unions. However, we use an age criterion for selecting the universe of couples so we can infer that partners in our sample have been together for around 10 years (maximum 20 years), under the assumption that almost no union is formed before age 20. Thus, by selecting couples formed by young adults, implying an age criterion, we are more likely to select *recent unions*. Second, we do not have information on the couple biography or on immigration history of the respondents. Conventionally, assortative mating studies restrict the universe of couples to newlyweds (e.g., Qian 2016), but we do not have this information. We study current unions of young adults: the most fragile unions are less likely to be observed at census. This may represent an important limitation especially for the 1960-1990 period in France and United States, since educationally hypogamous unions had higher dissolution rates than other types of unions. However, it seems that this is not the case for unions formed from the 1990s onwards (Schwart & Han 2014).

Variables and measures

Our main variable of interest is the difference in years between male and female ages. It is positive when the man is older than the women, and negative in the opposite situation. We also use a categorical variable for the age difference between partners. It is operationalized in four categories: age difference is 0 or ±1 (considered as age homogamy); the woman is older than the man; the man is 2 to 5 years older than the woman; the man is 6 years (or more) older than the woman. We have chosen this operationalization to create balanced categories of the age difference. Since in all countries most couples are age-hypergamous, this kind of categorization allows us to distinguish between age-hypergamous couples with small or large age

differences. Age hypogamous couples are generally uncommon and for each combination of year and country, there is no enough variation to distinguish between couples with small or large age differences.

The educational pairing variable is defined as the combination of both partners' levels of educational attainment. We used the IPUMS harmonized educational attainment variable for each spouse, which is coded into four categories: less than primary (individuals with no education or incomplete primary level); primary (individuals with at least four years of primary school completed); secondary (upper-secondary or post-secondary education completed); university (those who obtained a university degree). This coding derives from the ISCED 1997 scheme developed by UNESCO. We have kept four educational levels to properly account for the fact that the countries considered are at different stages in the educational expansion process. Next, we used a six-level compound measure, which compares partners' educational levels: couples where men and women have the same educational attainment, i.e., homogamous couples ((1) "both less than primary", (2) "both primary", (3) "both secondary", (4) "both tertiary"); (5) hypergamous couples in which the man has a higher attainment than the woman; and (6) hypogamous couples in which the woman has a higher attainment than the man. We do not account for more detailed combinations regarding the heterogamous unions because cell numbers would become too small to detect trends reliably.

In order to measure the strength of homogamy, loglinear models allow comparing the observed structure to a reference, most often the null hypothesis of random pairing. Our aim is not to disentangle structural changes and net preferences in homogamy (see e.g. Esteve et al (2017) for educational homogamy, or Qian (2016) for a comprehensive loglinear model on homogamy and Bouchet-Valat (2014) for a comparison with alternative methods), and we focus on observed distributions of education and age gaps between partners, as well as their trends in different countries. Nevertheless, we use loglinear models to measure the association between educational pairing and age gap between partners, comparing the observed structure, for each country and year, to a base situation where age homogamy and education homogamy would be two unrelated behaviors. This allows identifying how the two dimensions of age and education are related in the pairing process.

4. Main results. Limited changes in age homogamy, dramatic changes in educational structure and pairing

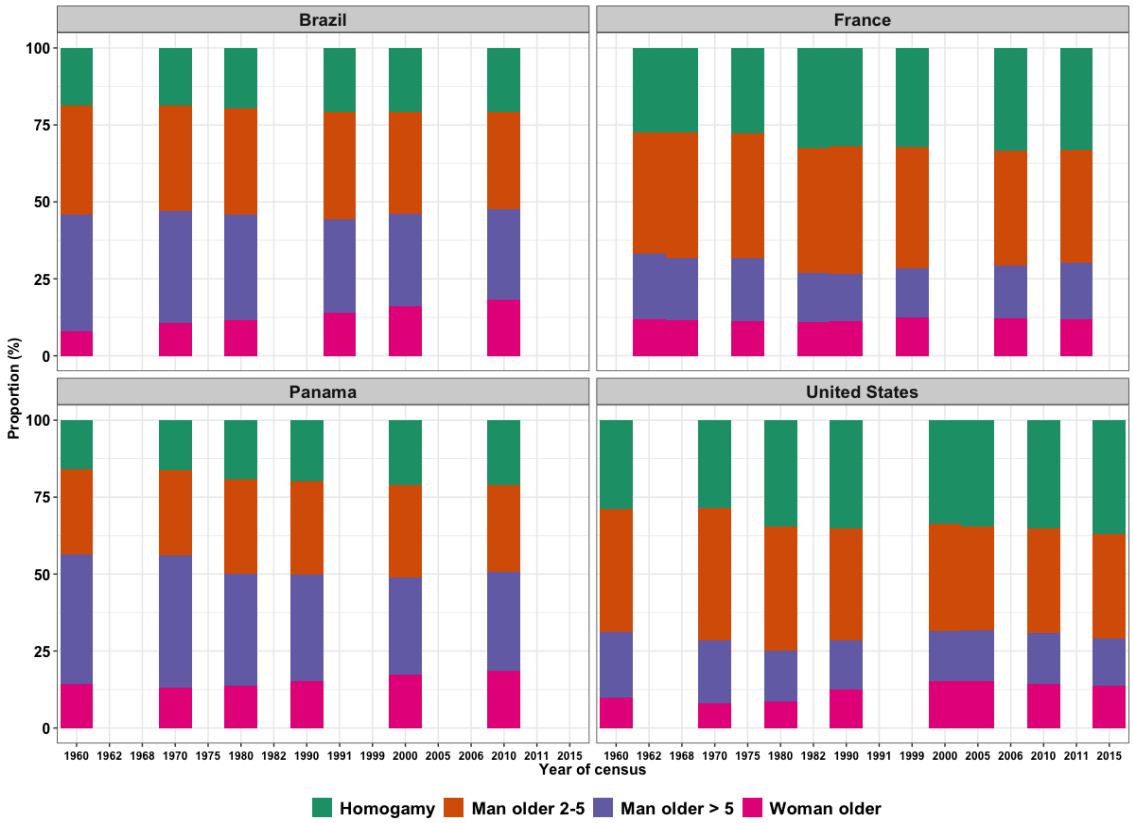
In this section we report the trends in age and educational assortative mating which took place from the 1960s to 2010 (or later, depending on the country). Our focus is especially on the age difference between partners, relative to the changes in educational assortative mating.

Figure 1 shows changes over time of the distribution of couples according to each category of the age difference. In all countries and years, couples where the man is older than the woman represent the majority of couples. Still, over time, the share of age homogamous couples, i.e., where partners have the same age or only a one-year difference, tends to increase everywhere. The proportion of age hypogamous couples, where the woman is two or more years older than the man, has been increasing too in all countries but in France. Moreover, in Brazil and Panama age hypogamy has increased almost reaching 20% in 2010, whereas in France and United States age hypogamy has remained well below 15% for all the period considered.

Figure 2 shows the proportion of couples by educational pairings over time. Two main trends are common to all countries. First, because of educational expansion, over time, there are fewer and fewer homogamous couples where both partners did not obtain primary education. Second, in line with previous findings, educational hypogamous couples where the woman has more education than the man, have been increasing, and in the 2000s, the proportion of hypogamous couples is higher than the proportion of hypergamous couples.

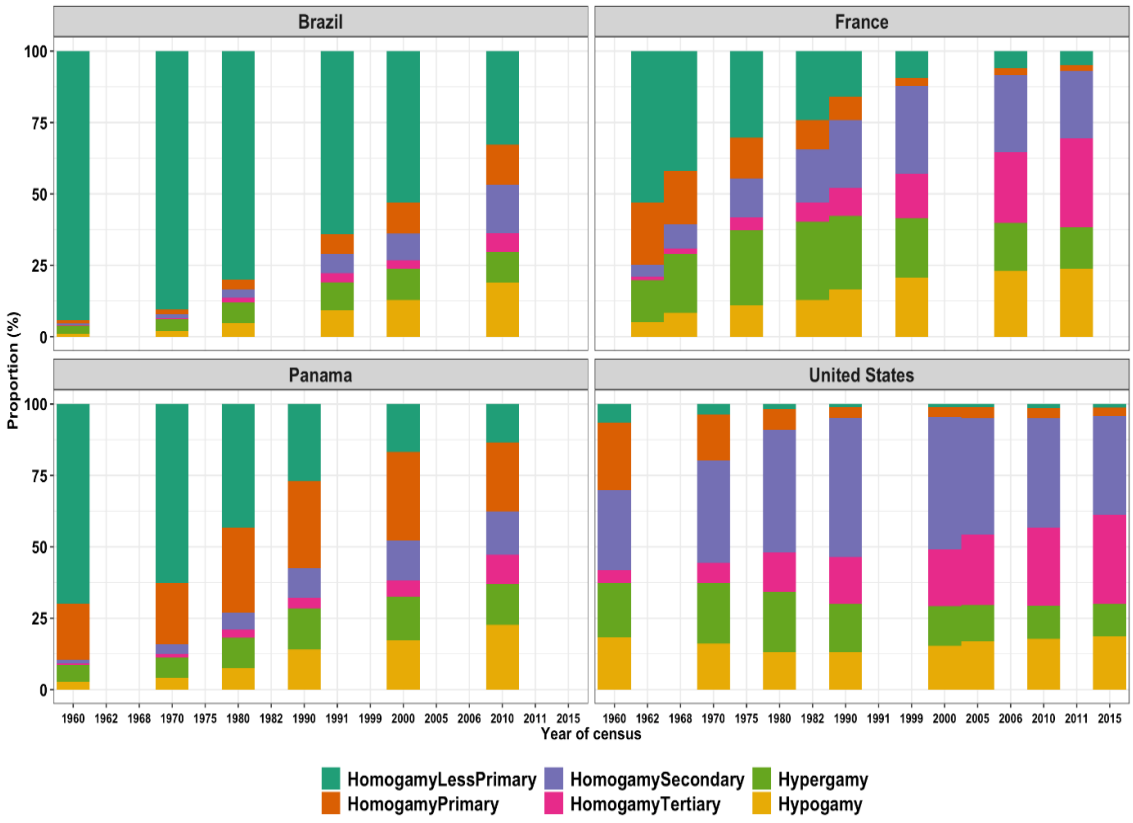
Changes across homogamous couples are specific by pair of countries. In Brazil and Panama, the proportion of couples where both partners did not reach primary education tends to decrease over time, while the rest of homogamous couples maintains an increasing trend. In France and United States, instead, the proportion of all homogamous couples with less than secondary education has a decreasing trend, in favor of secondary and tertiary educated homogamous couples.

Figure 1. Changes in age homogamy and age heterogamy (1960-2015), four countries.



Source: own elaborations on IPUMSi data

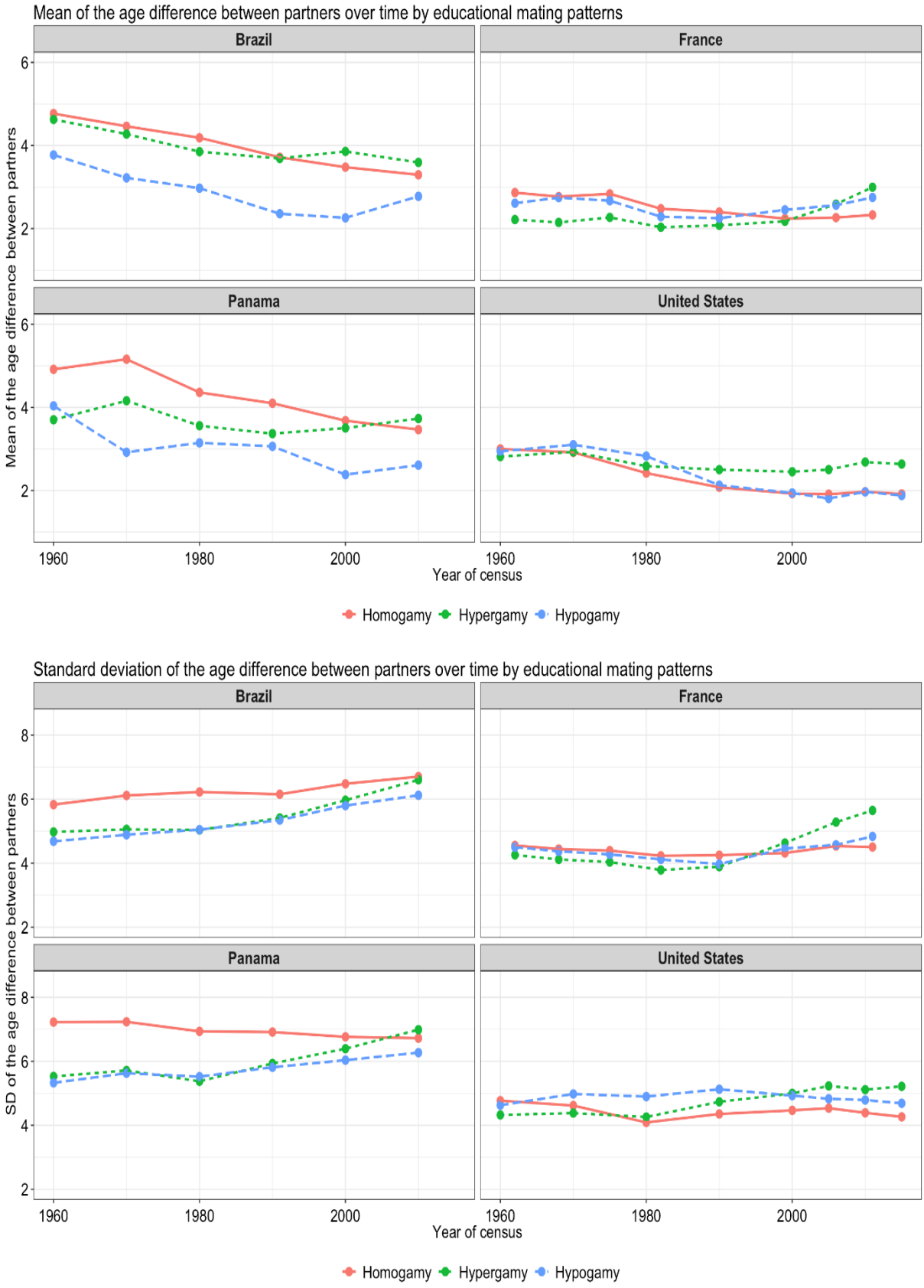
Figure 2. Changes in educational assortative mating (1960-2015), four countries.



Source: own elaborations on IPUMSi data

The following graphs (Figures 3-5) show a broader picture of assortative mating patterns among our couple universe, by considering the interaction between partners' age and education. First, we report on the distribution of partners' age difference across educational mating patterns, focusing on trends in the mean and standard deviation of the age difference. Second, for each educational mating pattern, we plot the proportion of couples according to their age difference measured using the categorical variable. Finally, loglinear models allows specifying whether the associations between age and educational homogamic patterns and their time trends in the observed countries may be considered as a direct consequence of education expansion.

Figure 3 Mean and standard deviation of the age difference across educational mating patterns (1960-2015), four countries.



Source: own elaborations on IPUMSi data

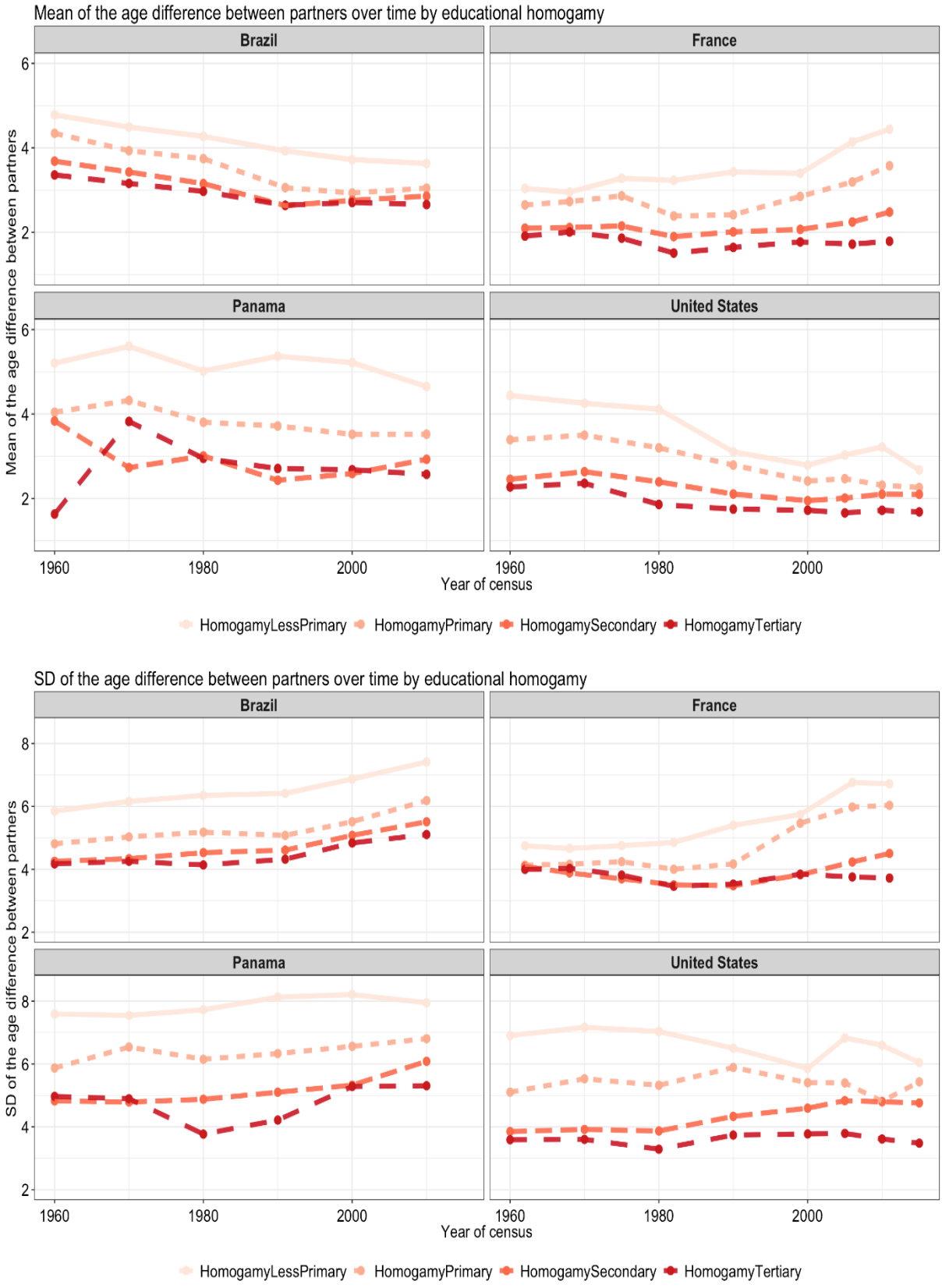
Figure 3 displays mean and standard deviation of the age difference between partners by educational mating patterns. In all countries, the mean age difference has been decreasing among the homogamous

couples, which could be interpreted as an outcome of educational expansion, in general, and women educational expansion, in particular. Another common trend to all countries is that towards the 1990s, the mean age difference among the hypergamous couples tends to increase. There is also an increasing trend in the variation of age differences across hypergamous couples, and only to a lesser extent among hypogamous couples. These patterns are in line with the structural constraint hypothesis above mentioned. Due to educational expansion, over time, it is more difficult to form an educational hypergamous union, where partners have similar ages. The magnitude of these trends, however, depends on the country. In general, mean and standard deviations of the age differences are larger in Brazil and Panama than in France and United States.

Figure 4 focuses on homogamous couples only, and it displays mean and standard deviation of the age difference by level of education of the couple. Expectedly, less educated homogamous couples present higher magnitude in the mean and standard deviation of the age difference relatively to the more educated couples in all countries. It is more problematic to identify other general trends though.. While we would expect similar behaviors between educationally hypergamous and homogamous couples where both partners did not finish primary education, as argued by the structural constraint hypothesis, this does not hold in all countries.

Increasing trends in the mean and standard deviation of the age difference of homogamous couples with less than secondary education are observed mostly in France. In Brazil, a decreasing trend in the mean age difference is associated with an increasing trend in the heterogeneity of the age difference, common to all type of homogamous couples. From the 1970s, in Panama and United States, we observe a decreasing trend in the mean age difference among couples with less than secondary education. Overall in France, Brazil and Panama, the mean age difference is increasing for each educational homogamous category but declining for educationally homogamous couples as a whole, due to educational expansion: homogamous couples are more and more educated, and the mean age gap is lower among the more educated.

Figure 4 Mean and standard deviation of the age difference by level of education of the partners, homogamous couples only (1960-2015), four countries.



Source: own elaborations on IPUMSi data

We now investigate whether changes in the mean age difference derive from changes in the proportion of couples where the man is older (age hypergamy), or where the woman is older (age hypogamy). In Figure

5, for each educational pairing, we show the proportion of couples by their *categorized* age difference. Each class of age difference is presented on one graph, and each curve plots the trends in the distribution of one educational group. In Brazil and Panama, with some variation across educational pairings and periods, around 60% -70% of the couples are age hypergamous, where the man is at least two years older than the woman (age gap categories 2-5 and >5). In France and United States, across all educational pairings, the majority of couples are age homogamous and age hypergamous, where the man is maximum five years older than the woman. Age homogamy tends to increase in these countries, especially among the educationally homogamous couples. In France, the increasing mean age difference for the educationally hypergamous couples since the 1990s, observed in Figure 3, is driven by a 10% increase in the share of couples where the man is more than five years older than the woman. In Panama, this trend is accompanied by a 5% increase in age hypergamous couples (man six or more years older than the woman) and also a slight increase in the share of age hypogamous couples.

Brazil and United States have witnessed an increasing trend of age hypogamous couples, among both the educational hypergamous and hypogamous couples. Interestingly, in all countries but in France, across educational hypogamous couples there has been a substantial increase in the share of age-hypogamous couples over time. Women in this kind of couple represent the partner with higher bargaining power, which stems from having a higher level of education in combination with being the older partner. In France, on the contrary, age hypogamy is not increasing, and it is less frequent among educational hypogamic couples than among educational hypergamic couples.

Figure 5 Proportion of couples by category of the age difference across educational pairings (1960-2015).

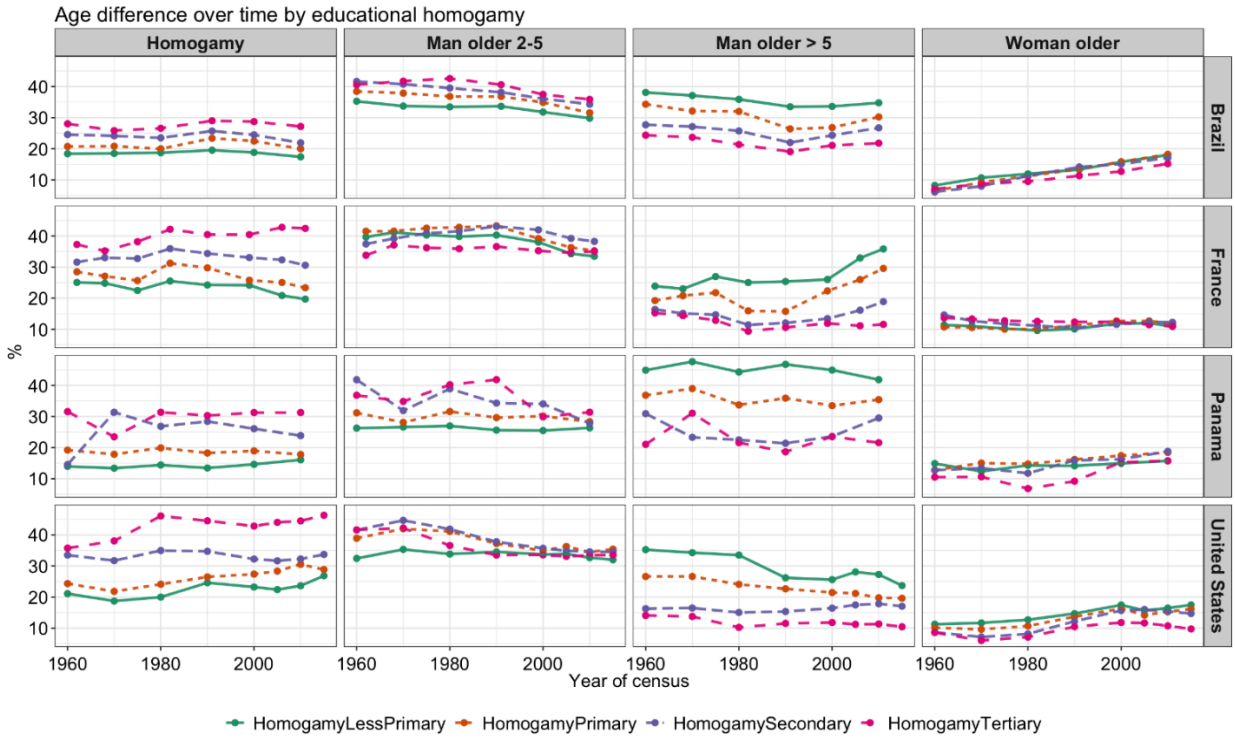
Source: own elaborations on IPUMSi data

Among homogamous couples, age homogamy increases in all countries, while the proportion of age homogamous couples decreases among educational hyper- or hypogamous couples in Brazil, France and Panama. In the USA, all categories of couples become more age homogamous, but the increase is larger among educational homogamous couples, like in the other countries. Age and educational homogamy are thus more land more related. Figure 6 zooms on patterns for only educationally homogamous couples. Remarkably, in Brazil, the decreasing trend in the mean age difference across educationally homogamous couples, jointly with the increase in the standard deviation, is exceptionally driven by an increase in age-hypogamous couples. This trend is uncommon to the other contexts, where the increase in age hypogamous couples is much less pronounced.

In all countries the lower mean and standard deviation on age difference among highly educated couples is due to a larger share of age homogamous couples, and a lower share of couples where the man is more than five year older than the woman, while differences in the proportions on couples where the woman is solder is much less contrasted (as well as the "median" category where then man in 3-5 year older).

As far as age difference between partners is concerned, educational homogamous couples are much more diverse than they are different from hypergamous or hypogamous couples: the higher the level of education, the higher the proportion of homogamous couples.

Figure 6. Proportion of couples by category of the age difference across educational homogamous couples by level of education (1960-2015).



Source: own elaborations on IPUMSi data

The loglinear models (see appendix) allow comparing the strength of the association between educational pairing and age difference between partners and their time trends in the four countries. They present the same results than Figures 5 and 6, but as log-odds instead of proportions. The sum of the log-odds is equal

to zero, for each educational pairing in each country each year. All points would be at zero if the distributions by educational pairing and age difference were statistically independent. The association appears weaker in Brazil than in the other countries, mostly among educational homogamous couples, where the increase of age homogamy and the decrease in large age hypergamy (the man more than 5 year older than the woman) with educational level are twice less important than in the other countries. Another specificity of Brazil is the fact that both educational and age hypogamy and educational and age hypogamy are strongly related. These associations are weaker and less stable in Panama and the USA, and reversed in France before 2000. Among educational homogamous couples, age hypogamy is less frequent for highly educated couples in all countries but France. The contrasts are not very large but France appears an outlier in the association between age homogamy and age difference.

5. Discussion

Educational expansion notably impacted educational assortative mating patterns. In particular, the reversal of gender inequality in education occurring in the last decade of the 20th century has contributed to an increasing share of educational hypogamous couples relatively to the hypergamous. Since educational and age assortative mating are inherently linked, we aimed to provide descriptive evidence about changes in the mean age difference between partners over five decades in four different contexts. The numerous studies on educational assortative mating have disregarded the links with the age difference between partners, which highlights another aspect of gender equality within the couple and in society at large.

Our descriptive results, derived from harmonized census data, show that the mean age difference for educational hypergamous unions increased over time relatively to other type of educational pairing. This holds in every context considered. In France this is linked mainly to an increase in the share of couples where the man is five or more years older than the woman, while in the other countries there is also an increase of unions where the woman is older than the man.

In sum, while everywhere the norm of educational hypergamy is losing ground, women can still hold to this mating strategy by searching for higher educated men than themselves among the older cohorts. Men may have the same strategy, searching for lower educated women than themselves among the older cohorts. A striking result is the large gradient in age homogamy with level of education: the increase in age homogamy is largely due to the fact that highly educated couples are much more often also age homogamous, and less often age hypergamous with the man more than 5 year older than the woman, compared to less educated couples. This is a direct consequence of the increase in the share of couples who met at school or university, even if union disruptions and second unions are frequent (Bouchet-Valat & Grobon, 2019). Country differences could be linked to mechanisms depending on divorce and re-partnering dynamics by educational pairing, which we cannot investigate with this data. Further research should focus on the determinants of these changes, aiming to disentangling the role of both preference and constraints. When information derived from online dating databases will be available for reasonably long periods, scholars will have new promising tools to further analyze mating processes and their changes over time. Education expansion leads to an increase in educational hypogamy, more than an increase in singlehood among highly educated women. Regarding age difference between partners, the tendancy towards an

increase in age hypogamy and a decline in large age hypergamy are neither dramatic nor general in the countries under study. We confirmed that men and women with a preference for educational hypergamy, are facing more and more constraints, leading to an increase in mean and standard deviation in age difference between partners. This is also the case, as we hypothesized, for low educated men and women, who face increasing difficulties to find a suitable partner. The dramatic consequences of educational expansion on mating behavior should thus be examined precisely for different socio-economic characteristics of both partners, such as professional activity, wealth, place of birth, etc.).

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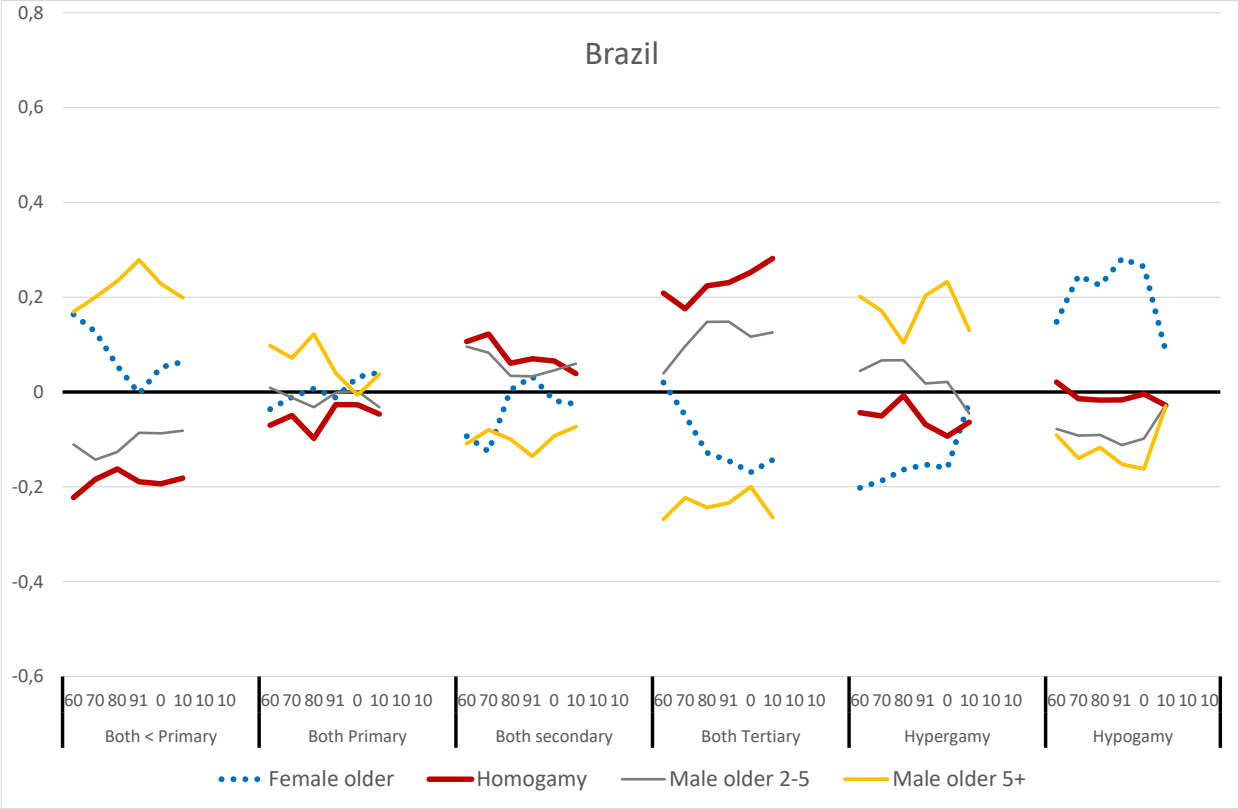
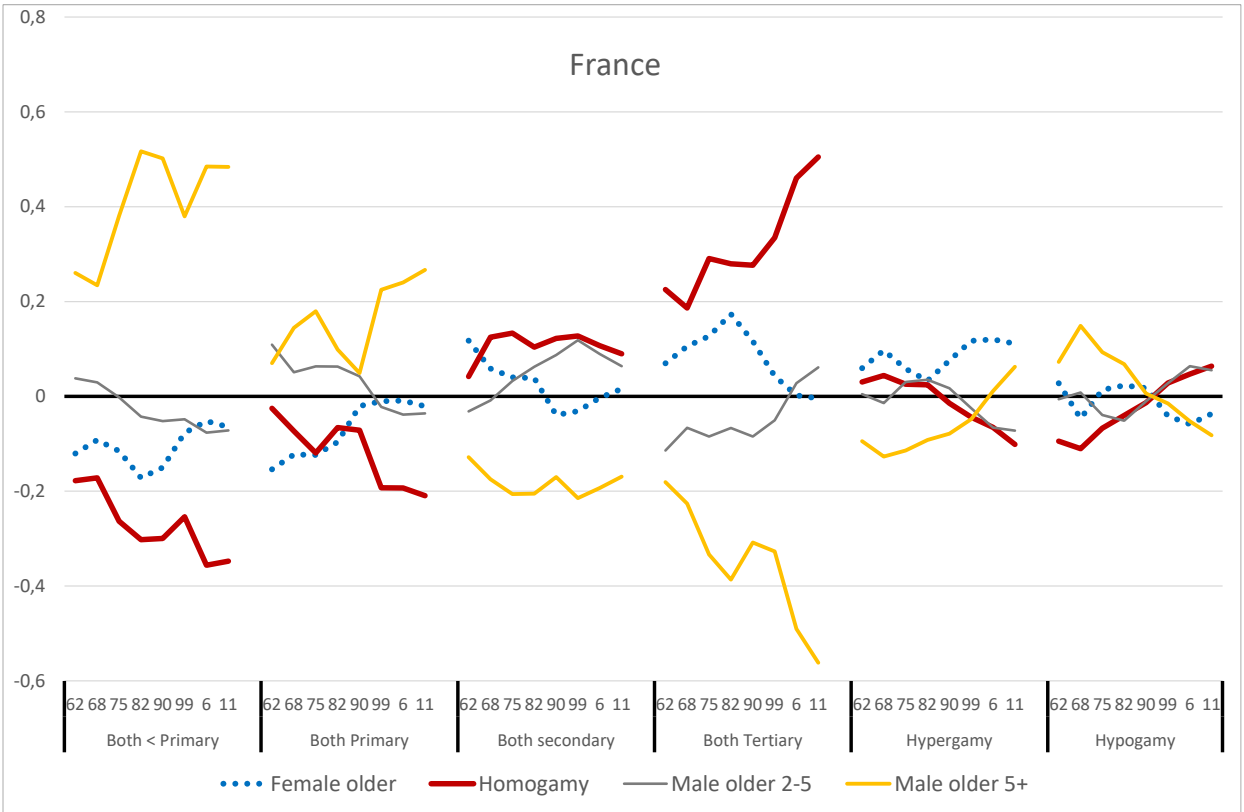
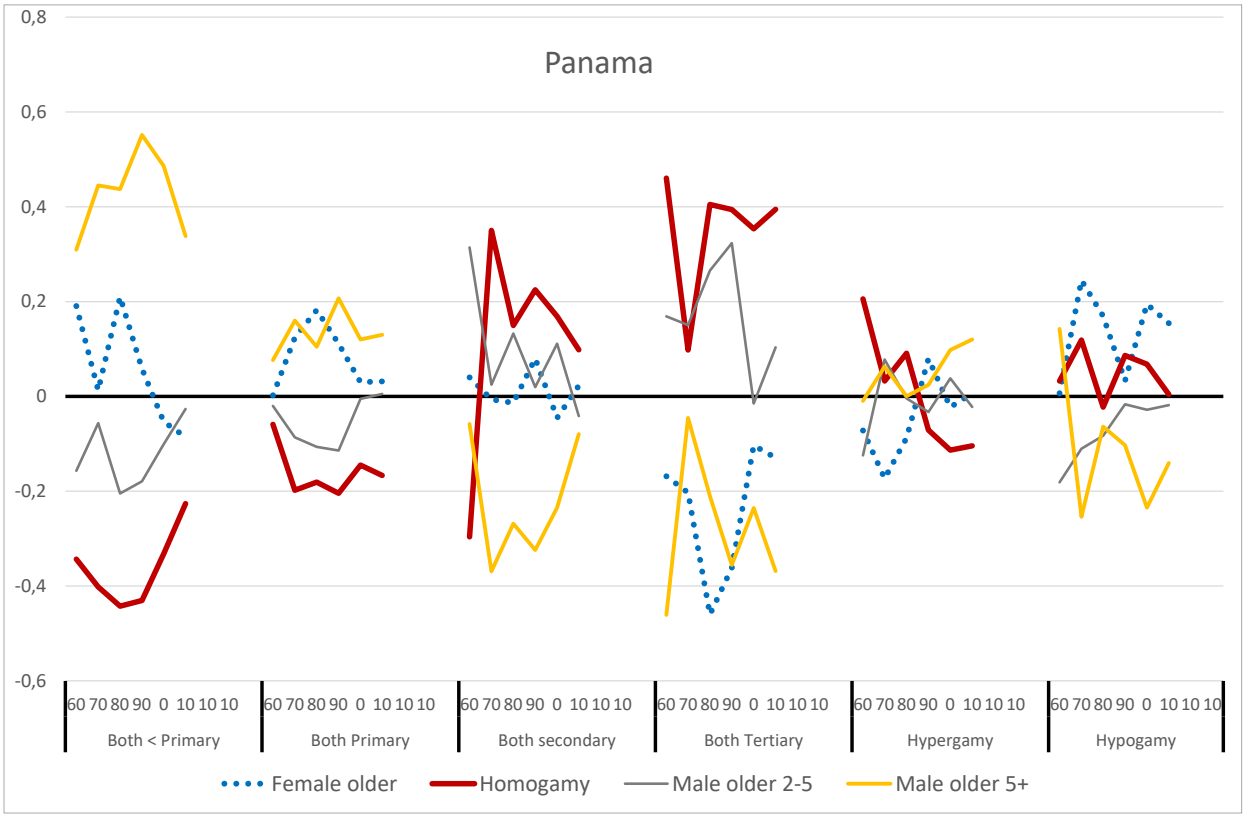
Appendix. Parameters from loglinear models associating educational pairing and age differences. One model per country and year.



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-0,2
-0,4
-0,6
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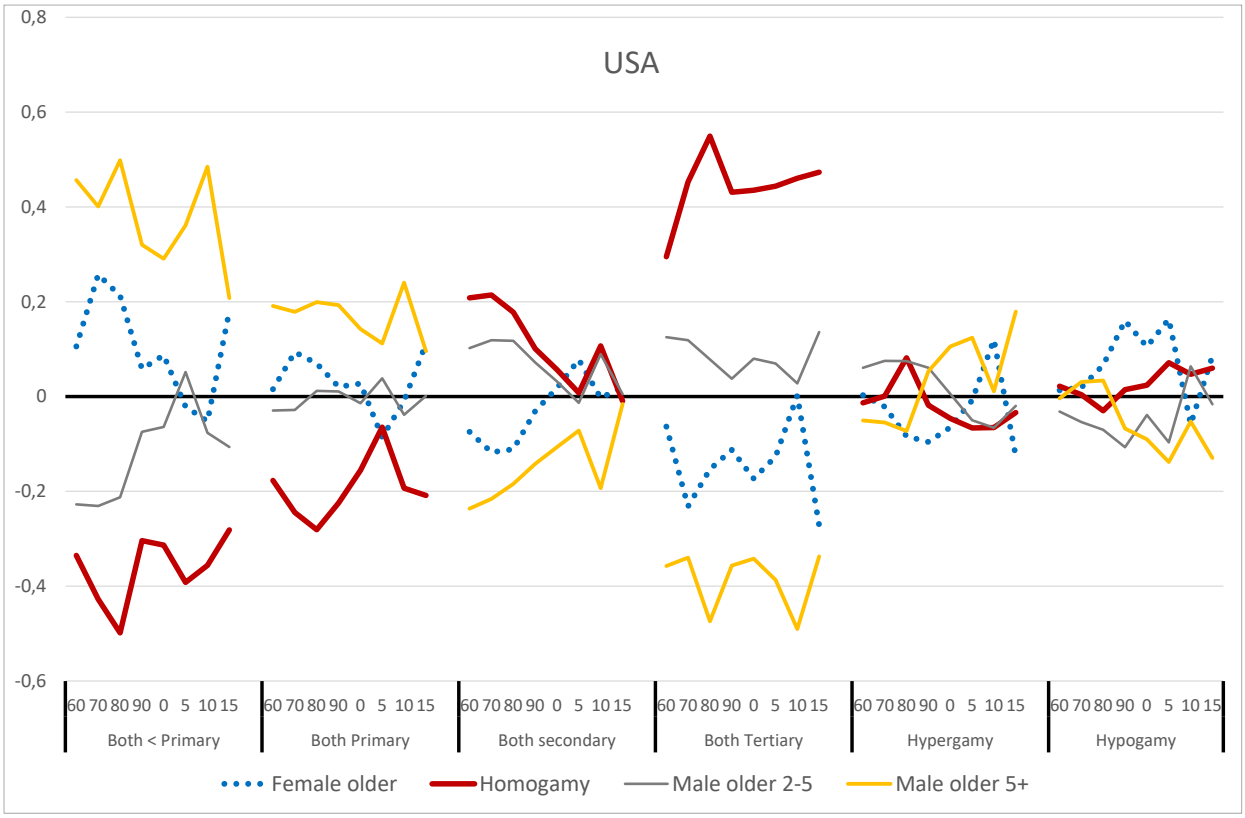
Both < Primary
Both Primary
Both secondary
Both Tertiary
Hypergamy
Hypogamy
Female older
Homogamy
Male older 2-5
Male older 5+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Both < Primary
Both Primary
Both secondary
Both Tertiary
Hypergamy
Hypogamy
Female older
Homogamy
Male older 2-5
Male older 5+