Love and money with inheritance: marital sorting between labor income and inherited wealth in the modern partnership [1]

Etienne Pasteau
Paris School of Economics

Junyi Zhu
Deutsche Bundesbank

Preliminary draft – 2017.02.09

Abstract

As the capital is regaining the importance in rich countries (Piketty and Zucman 2014), dynamics of wealth inequalities are affected more by the inheritance distribution. The relative attraction derived from inherited wealth and acquired human capital in martial choices can change. We expand the traditional dimension of assortative mating through only labor income to both labor income and inheritance as Frémeaux (2014) accomplished. This paper studies the concentration and substitutability of these two traits in forming partnership using Panel of Household Finance (PHF) data for Germany. Since WWII, relative to France, German aristocratic wealth has been more negatively impacted, less social stratification has been developed in Germany and half of Germany went through decades of communism. However, our results resembles to the quantitative and distributional outcomes from France. We develop a stylized multidimensional matching model in an attempt to fit the sorting pattern by emphasizing the signalling effect of inheritance in marital sorting. Through this exercise, we hope to shed the light on the interaction between martial sorting and wealth accumulation.

Keywords: Assortative mating, Inheritance, Labor income, Multidiemsional matching

JEL-Classification: D10, D31, J12, J62, D83

1 Results and opinions expressed in this paper are those of the authors and do not necessarily reflect views of the Deutsche Bundesbank. Email: etienne.pasteau@ens.fr and junyi.zhu@bundesbank.de

1. Introduction

"*I love her: but it crowns my happiness and pride to think that when she becomes mine, our firm will at the same time gain a very considerable increase of capital*"[2]. With these words Thomas Buddenbrook expresses his view of his upcoming marriage with his fiancée Gerda Arnoldsen in Thomas Mann's family saga and monument of the German literature The Buddenbrooks (1901), whose father's wealth without any doubt reinforces his love to her. This importance of inherited wealth for matrimonial strategies in the 19th Century's Europe, as revealed in novels or in the real society, was pointed out by Thomas Piketty in his seminal work Capital in the Twenty-First Century (2013), providing insights into the rigid structure of the societies of "patrimonial capitalism" that France and Great-Britain constituted at the time. Thomas Piketty equally argues that the last decades have seen a return of the importance of inherited wealth in those two countries, together with an increase in wealth inequality, which may lead to a renewed importance of inherited wealth for mating choices. Frémeaux (2014) has provided impressive evidence on these issues for the French case, showing that marital sorting on inherited wealth revives: in France heirs tends to marry heiresses, and wealth enhances this likelihood. He takes advantage of the detailed information on inherited wealth and parental wealth available in the French Wealth Survey (Enquête Patrimoine) to bring precise estimates of the importance of inherited wealth for the mating process. For Germany however, data tracing wealth across generations is scarcer, which means that few studies have addressed this topic so far.

Using a new dataset containing detailed information on households' finances in Germany, we enquire whether inherited wealth does play a role, directly or indirectly, in today's German partnerships. Of course, modern Germans do not live in a Buddenbrook-like world: such a cynic view of marriage would be deemed contrary to the dominant view of partnership induced mainly by mutual affection. Nevertheless, we cannot exclude a priori that individuals take this information into account on the matrimonial market, insofar as it can substantially raise the starting point for a couple's standard of living in a world where past wealth tends to acquire more importance, and as some individuals may present strong dynastic preferences. The German equivalent of the French *Enquête Patrimoine* is the Panel on Household Finance (PHF) of the Deutsche Bundesbank, although the latter contains less information regarding inherited

2 "*Ich liebe sie, aber es macht mein Glück und meinen Stolz desto größer, dass ich, indem sie mein eigen wird, gleichzeitig unserer Firma einen bedeutenden Kapitalzufluss erobere.", Die Buddenbrooks,* T. Mann, 1953 (1901), G Verlag, p.

wealth and fewer observations. Nonetheless, we make use of it in order to achieve a first estimate of the existence and extent to which assortative mating patterns rely on inherited wealth in Germany. The empirical analysis is partially parallel to Frémeaux (2014) in order to compare the results with France. Bach, Thiemann, and Zucco (2015) reports the gini coefficients for wealth distribution in Germany and France are 0.78 and 0.69 respectively. As a result, studying potential marital sorting on inherited wealth as done for France (Frémeaux, 2014) does make sense for Germany, a land in which there is a relatively higher level of wealth inequality. Our comparison study reveals the distributional characteristics in marital sorting are quite close between France and Germany. Although they are the neighbouring countries and enjoy cultural proximity, German aristocratic wealth has been more negatively impacted by WWII, there is less social stratification given the German political and institutional setting, and Germany has been partially (for the West) or directly (for the East) affected by decades of communism. Our efforts can also be useful for discussions on causes and consequences of enduring wealth inequality or for analysing the degree of social stratification.

We extend Fernández, Guner and Knowles (2005) to build a stylized model to describe the martial sorting pattern between inheritance and labor income. The model imposes a correlation structure between inheritance and labor income where there is a belief about this relationship and inheritance serves as a signal for labor income. Each participant in the marriage market has uncertainty on the potential mate's performance in the labor market. A tradeoff between the matching quality and uncertain pecuniary payoff for the marriage arises.

In section 2 we present a review of the existing literature on assortative mating and inherited wealth. Section 3 illustrates the PHF data, characteristics of couples in PHF as well as inherited wealth. Some evidence of assortative mating is provided in section 4 using contingency tables and risk-ratios. Section 5 presents the other distributional characteristics on bi-dimensional martial sorting. Section 6 discusses a comparison between French and German results. Section 7 initiates the exploration on the interaction between bi-dimensional martial sorting and household wealth accumulation. Section 8 provides a stylized theoretical model. Section 9 concludes the paper.

2. Assortative mating and inherited wealth

Since the influential work of Sorokin (1927), sociologists and economists have striven to investigate the degree of social stratification within a given society by looking at the extent of social mobility as measured by the difference between an individual's status and his parents' status. One important form of social mobility is marriage, which can

allow an individual to enter another social group or to experience a change in his standard of living. In fact, a certain degree of homogamy is often observed, which means that partners tend to be chosen from the same social group, be this group defined by education or social status. Several empirical studies have stressed the importance of homogamy based on educational attainment since the 1960s: a relatively high level of homogamy on education level has been found in the US [Kalmijn (1991)], in France [Vanderschelden (2006)], and in Germany [Blossfeld & Timm (1997)]. The last decades have seen a general reinforcement of this sorting on education, for instance in the US [Mare & Schwartz (2005)] or in Germany [Grave & Schmidt (2012)]. In France however, homogamy based on educational attainment appears to be decreasing over time, except among the graduates of elite schools; this may be related to a general decrease in social-class identity, except at the top of the society [Bouchet-Valat (2014)].

Economists have been particularly interested in studying the impact of this observed educational homogamy on income inequality. Indeed, educational background is highly correlated with income, which means that increased assortative mating may lead to more polarization in terms of earnings. While Kremer (1997) had concluded that increased marital sorting was not leading to an increase in income inequality (even if it could decrease intergenerational mobility), Fernández and Rogerson (2000) argued that when the negative correlation between fertility and education as well as the sensitivity of wages to the supply of skilled workers are taken into account, increased assortative mating leads to more income inequality. In the same line, Schwartz (2010) provides evidence that the increase in earnings inequality observed in the US since the 1960s would have been 25%-30% lower without the increase in assortative mating.

A key issue for income inequality proves to be the labour supply adjustments occurring after the mating: As highlighted by Greenwood, Guner, Kocharkov, and Santos (2014), "*for positive assortative matching to have an impact on income inequality, married women must work*." They argue that marital sorting in potential wage will affect income inequality between couples only if spouses do not adjust their labour supply. In this respect, Pestel (2016) contends that in Germany, the post-mating labour supply reaction of women is different according to the region. In Western Germany, women with high earnings potential married to high wage-earners stop working or reduce the numbers of hours worked. Consequently, the sorting on potential wage (i.e. on educational attainment) does not lead to an increase in income inequality between couples because of the labour supply reaction of married women. In Eastern Germany, however, the labour supply reaction following the mating is rather small. As a result, sorting on potential wage (i.e. educational attainment) reinforces income inequality. Moreover,

Pestel finds that sorting on education and income (as measured by income correlation within couples) is higher in the East than in the West.

Another effect of assortative mating on education or potential earnings pertains to the reproduction of inequality through generations. Since educational background of the parents strongly determines the educational achievements of the children [see for instance Holmund, Lindahl and Plug (2011)], assortative mating potentially has an important effect on future income inequality, even if it does not systematically impact current income inequality, due to a labour supply reaction. For instance, Ermisch, Francesconi, and Siedler (2006) have provided evidence for Germany that assortative mating plays a leading role in the reproduction of the socio-economic status (as measured by permanent family income) generation after generation. According to them, this is mostly due to a strong correlation of human capital within couples. Indeed, marrying someone with a high earning potential, but not working, does not affect current income, but leads to a high potential income for the children that benefited from the higher level of education of their parents. This comes in line with the seminal approach of Becker (1974), which introduced the concept of marriage market: he described positive assortative mating as "a positive correlation between the traits of husbands and wives"[3], which aims at maximising the "household-produced commodities" of the household ("quality of meals [sic], the quality and quantity of children, prestige, recreation, companionship, love, and health status"[4]).

While assortative mating related to education and income is now well-documented in the literature, there are fewer studies for sorting on inherited wealth or parental wealth. Charles, Hurst, and Killewald (2013) use American data from the Panel Study of Income Dynamics to study the extent of marital sorting based on parental wealth. They estimate a correlation of 0.4 in parental wealth among married spouses. For France, Nicolas Frémeaux (2014) studied sorting on inherited wealth and estimated a correlation of level of inherited wealth between spouses of 0.25; he finds a stronger marital sorting on inherited wealth than on labour income. Decomposing inherited wealth and labour income quantiles, Frémeaux argues that similarity of inherited wealth is higher for the wealthiest inheritors. Moreover, both dimensions appear to be rather non-substitutable: for the mating process in France, being a top wage-earner is not equivalent to being a top heir.

Various explanatory mechanisms have been pointed out for sorting on parental or inherited wealth. Charles, Hurst, and Killewald (2013) argue that controlling for

3 Becker (1973), p.300
4 Ibid, p. 301

education only accounts for one quarter of the sorting on parental wealth: marrying someone from a different socio-economic background is thus something rather rare even adjusting for the level of educational attainment. As a possible channel, they suggest that "*people from the same background may have similar tastes or greater opportunity for interaction because of similar neighbourhoods of residence or places of employment or education*"[5]. This is in line with Bozon and Héran (1988), who stressed the importance of the meeting place for couple formation for France. Even if individuals often perceive the first encounter with their partner as happening by chance, the socio-spatial segregation favours homogamy. Places of study, places of holiday, working places, as well as friends' parties, are selective places where individuals having a high social background meet. On the other hand, individuals from poorer social backgrounds meet their partners in public places more often, for instance in popular night clubs. Therefore, even if there is no systematically conscious matrimonial strategy pushing individuals to marry their likes, the different places that people frequent as a result of their social background leads de facto to a preselection of potential partners. Another mechanism highlighted by Arrondel and Frémeaux (2014) is the sorting on savings preferences and attitudes to risk, which are related to transmission of these preferences between generations and are correlated with parental wealth.

Concerning the more general question of the renewed importance of inherited wealth in Western societies, evidence for Germany remains scarce. Using a mortality multiplier approach and combining national accounts, tax statistics, and survey data, Schinke (2014) found a U-shaped evolution of the annual flow of inherited wealth (as a proportion of national income). While the importance of inherited wealth had decreased until the 1960s, the annual flows of inheritance and gifts have since then increased steadily in both countries. According to this measure, inherited wealth seems to have slightly less importance in Germany than in France: In 2011 it represented almost 11% of annual income in Germany and around 15% of annual income in France. In terms of wealth accumulation dynamics, Piketty (2011) accounts for this trend by stressing that in a low-growth environment with a relatively high rate of return to capital, past wealth tends to acquire more importance than new wealth, leading potentially to an increase in wealth inequality in the future.

By contrast, several German studies have stressed the equalising effect of inherited wealth for wealth inequality in Germany. Westerheide (2005) found, on average, a high propensity to save intergenerational transfers but he contends that different saving propensities lead to an equalising effect for the wealth distribution. Kohli et al. (2006)

5 Charles, Hurst and Killewald (2013), p.52

use data from the German socio-economic panel (SOEP) and show that the growing wave of inherited wealth leads to a decrease in relative wealth inequality because inheritance represent a lower share of total wealth for wealthy households. More recently, Bönke, Corneo, and Westermeier (2015) have used PHF-data to show that inherited wealth represented one third of household private wealth on average. They pointed out that this proportion was rather stable across the wealth distribution: inheritance is not of relatively higher importance for the wealthiest German households. This led them to the conclusion that inheritance was not a dominant factor in wealth building, specifically for the middle classe or the wealthiest households: wealth inequality is not affected by inheritance according to them.

Finally, let us underline that overall wealth inequality is relatively higher in Germany. Grabka and Westermeier (2014) find a Gini coefficient of 0.78 for individual net wealth, stable since 2002. Comparing the results to other Western countries, it proves to be substantially higher than in France (0.68) and in Italy (0.61), but lower than in the US (0.87). They also find a interdecile ratio p90/p50 of 13, which means that the "poorest" individual from the top 10% wealthiest individuals had 13 times more wealth than the median individual. In addition to this, an important German historical feature remains to be dividing: median net wealth is substantially higher in Western Germany than in Eastern Germany. Bach, Thiemann, and Zucco (2015) confirm that wealth inequality is higher in Germany than in France or Spain, finding a Gini coefficient of 0.78 for Germany, 0.69 for France and 0.58 for Spain (correcting missing top distribution from the Household Finance and Consumption Survey (HFCS), 2011). According to their estimates, the 1% wealthiest German households own 33% of the total private wealth in Germany, whereas the 1% wealthiest French households own 21% of the total private wealth in France. Moreover, inherited wealth has more importance in household net wealth in Germany (at least in the Western part) than in France, according to Tiefensee and Westermeier (2016). They find a present value of wealth transfers received amounting to 31.4% of household net worth in Western Germany and 23.2% in France. Data and individualized inheritance

We then discuss our data and the characteristics of inheritance traced to individuals.

3. Data

3.1 Overview of The Panel on Household Finances (PHF)

The Panel on Household Finances (PHF) is a panel survey on household finance and wealth in Germany, which entails detailed information on financial and non-financial

wealth and various sources of income. The first wave of data collection was implemented by the Deutsche Bundesbank in 2010/2011 and the second wave in 2014.

The first wave contained 3,565 households (8,135 persons, with 7,084 being over 16) and the second wave 4,461 households (10,201 persons, with 8,825 being over 16). In the second wave, 2,191 households are panel members who were already surveyed in the first wave and 2,270 households were refresher members. In both waves wealthy households were oversampled in order to improve the estimation of the top of the wealth distribution. The PHF database is processed by a multiple imputation step, following Rubin's methodology (1987). Item non-response is thus dealt with by an imputation with five implicates for almost all the variables.

For our analysis, we use the second wave database to yield a larger sample of couples which can be more informative for the assortative mating patterns at the top of the wealth and income distributions. However, since the second wave questionnaire omits the collection of inherited wealth which was received before and reported in the first wave interview for the panel households, we then retrieve this piece of information from the first wave.

In order to select couples, we combine information from the family matrix (describing the relationships between household members) with the marital status declared. We ignore the very few homosexual couples because this simplifies the interpretation of the results. We include both married and non-married couples, and we will use the terms "partners" and "spouses", "wife" and "female partner", "husband" and "male partner" interchangeably thereafter, without distinguishing between married and non-married couples. We end up with 2,472 heterosexual couples (4,944 persons) for which we have information on both spouses. This amounts to 61.61% of the 8,825 adults present in the second wave of the PHF survey (with weights, 60.77%)[6]. Moreover, in order to check whether our results are dependent on the older couples and to be able to impute a wage rate for the non-working individuals (i.e. estimate a kind of permanent income that would be more relevant to assortative mating), we also use a subsample of 1,989 couples (3,978 persons) for which both partners are younger than 65. This amounts to 49.57% of the 8,025 adults present in the second wave of the PHF survey (with household weights, 44.44%).

Depending on the structure of inherited wealth, the PHF entails them in different sections. The inheritance section presents all substantial inheritances and gifts received

6 This is broadly the same order of magnitude as stated by Destatis in *Alleinlebende in Deutschland-Ergebnisse des Mikrozensus 2011*, Begleitsmaterial zur Pressekonferenz am 11 Juli 2012 in Berlin, Statistisches Bundesamt.

by members of the household, apart from the household's main residence. Households are asked to report all large inheritances and gifts: money, housing (except if this is their main residence), grounds, firms, stock, jewellery, pieces of art, and life insurance. For each item are given the year in which it was received, its value at that time, from whom it was received and which member(s) of the household were among the receivers. The smallest values declared are between 100 and 1500 euros; however, not all households would declare such very small amounts. The highest value declared is 17 million euro.

The housing section presents information on the way the household main residence was acquired. Therefore, if members of the household were given or have inherited housing in which they still live at the time of the survey, the information is not included in the inheritance section but mentioned in the housing section instead. The particular question is "How did you become the owner of your main residence: did you purchased it, built it yourself, received it as an inheritance or received it as a gift?". Unfortunately, the housing section does not give any information on the origin of the inherited housing: we do not know which member of the household was the beneficiary or from whom he received this.

In order to explore assortative mating, we need to know the respective inherited wealth of wives and husbands. Therefore, not knowing the origin of the inherited household main residence proves problematic, all the more that inherited or given housing (or housing directly financed with a gift or an inheritance) is an important form of intergenerational wealth transmission. As a result we will examine different case scenarios with different assignment rules of the inherited housing within couples, which should allow for a better understanding of the potential role of inherited wealth on assortative mating patterns.

Information on inheritance and gift values are taken from the question: "*Which value had the inheritance/the gift, when the household received it?*" As a result, inheritance and gifts' values need to be standardised to ensure comparability. We use the Bundesbank's discount rate for the years 1949 to 1998, and the European Central Bank's interest rates for main refinancing operations for the years 1999 to 2014, in order to get an actualised value with 2014 as the reference year. For instance, the declared value of inheritances received in 1960 is multiplied by 7.95; those received in 1980 by 3.52; those received in 2000 by 1.39. If the household has inherited his main residence, we take its current value (in 2014) as the value for this type of inherited wealth. We are aware that this methodology is quite coarse, insofar as we are using Bundesbank's interest rates before 1989 for Eastern Germany. However, we checked that this actualisation of the inheritance value was not affecting the main results. In

addition to this, we also implemented the analysis restricting the sample to Western Germany.

3.2 Descriptive statistics for the couple population

This section presents various descriptive statistics for the couple population. All numbers are obtained using the households' weights. Table 1 presents the proportion of individuals in a stable relationship (marriage or stable partnership declared within the survey, with cohabitation) by age, high education level and employment status for each gender. Women are more likely than men to be in a relationship for the youngest ages (16-25 and 26-35), which corresponds to the fact that they tend to marry up. Between 36 and 65, around 70%-72% of men and women are in a relationship. After 66, women are less likely than men to be in a relationship, which reflects the lower life expectancy of men (there are more widows than widowers). Having this picture in mind is important for the interpretation of our analysis and results.

Most of them have professional and vocational training. The proportion of university graduates is comparable for both genders (11.73% of the men, 11,36% of the women). There is a higher proportion of women without any higher education (16.96%) than among the men (7.28%).

While 59.97% of the men are employed full-time, this is the case of only 25.18% of the women. Consequently, 13.42% of the women are homemakers (housewives) and 29.09% of them are employed part-time, while this is the case of respectively 0.16% and 5.16% of the men. A higher proportion of pensioners is found for men (26.85%) than for women (20.09%), which is related to the difference of gender age distributions as described above.

Table 2 presents the regional distribution of couples. In order to guarantee the anonymity of the households taking part in the PHF survey, no information is given on the detailed Bundesland of residence. Instead, the Bundesländer are grouped into four regions. Therefore, in order to control for the region of residence, this is only possible to control for these four categories. Only 20.03% of the couples are living in the East (which corresponds to the former German Democratic Republic (DDR)).

Table 3 presents the distribution of household estimated net wealth and annual labor income of partners for the couple population. This is close to the actual couple estimated net wealth since only 36 couples out of the 2472 are living in a multi-couple household. The median net wealth of the couples is 80,600€, which proves higher than the values for all households: according to the Deutsche Bundesbank's report (2016) on

the 2014 PHF survey, the median net wealth for all households is 60,400€. The interquantile ratio p90/p50 is 6.20 for the couples while it is 5.83 for all households.

The labor incomes are always substantially lower for the women, which can be related to the fact that fewer of them are employed full-time and that they are more likely to be homemaker than men. The median value of labor income amounts to 26 000€ for men in a stable relationship and 10 000€ for women in a stable relationship. The interquantile ratio p90/p50 is 2.47 for the men in couple and 3.61 for the women; overall labor income is more equally distributed than household net wealth (eg. s.d. of the former is much smaller).

Table 4 presents the distribution of couples by status of homeownership and current value of the main residence conditional on ownership type. A majority of the couples (57.21%) owns its main residence, whereas this is the case of only 44% of all households. We observe a higher disparity for the value of inherited main residence among couple households with the top and bottom distribution being higher and lower than the counterparts in the distribution of all the main residence among couple households. For instance, the p95 and p98 can be about two to three times higher in the pool of inherited main residence than the counterparts in the total distribution.

3.3 Assignment of inherited housing within the couple

In order to determine the degree of assortative mating, we use the information on the origin of the inherited wealth of the couple. In the inheritance section, it is always stated whether inherited wealth belongs to the wife or to the husband. We refer the analysis only using the inheritance wealth from inheritance section as case 0. However, in case the couple lives in an inherited housing (this is the case for 13.04% of the couples), the information on the origin of it (whether it comes from the wife side or from the husband side) is not available in the PHF database. As a result we do not know a priori to which spouse this potentially substantial part of the inherited wealth (see Table 4) shall be attributed. Two different assignment strategies are implemented to attribute inherited household main residence.

Our first strategy is to assign the inherited household main residence randomly within each couple living in an inherited housing. This is done by creating a dummy variable for each couple that takes the values 0 or 1 according to a random draw that is realised taking into account the weighting. We repeat this procedure 500 times (100 random draws for each of the 5 implicates) and the estimates and descriptive statistics we present thereafter are the average value of the results across the 500 different random

draws. We will refer to this assignment as “random assignment of inherited housing”, or case 1.

Our second strategy is to use probit regressions to estimate the probability of each spouse to be an heir. We estimate first a probit regression on the women-in-couple population, excluding the women living in an inherited housing (for which a prediction is performed).[7]

$$P(Heiress = 1|x) = \varphi(\beta.x),$$

where x is a set of covariates (region, education, age, nationality,…).

The estimated coefficients β are used to predict the probability that each woman in a couple living in an inherited housing is an heiress. The same probit prediction is run on the men-in-couple population to obtain a similar prediction for men living in an inherited housing. Finally, the inherited housing is assigned to the spouse with the highest probability to be an inheritor. This method substantially relies on the hypothesis that being an inheritor, as defined in the inheritance section, is explained by the same determinants as having inherited the main residence. We cannot exclude this possiblity, but this assignment rule makes more sense than a pure random assignment since there can exist common mechanism between inhering main residence and receiving other forms of inherited wealth. We will refer to this strategy as “probit-based assignment of inherited housing”, or case 2.

3.4 Inherited wealth distribution

Table 5 presents the distribution of inherited wealth from the inheritance section for the men and the women in a stable relationship. The majority of them have received no inheritance or gift: only 19.06% of the men in a stable relationship are heirs and 20.15% are heiresses. Some of them could be potential receiver of inheritance (for instance if their parents are still alive at the time of the survey) but the PHF database does not include information on parental wealth. As a result, we only consider assortative mating on observed inherited wealth and not potential inherited wealth. This can lead to an

7 Alternative, we can further perform the other two bounding scenarios: adjusted perfect substitution – assigning non-heiress status to those married women with an inherited housing and performing the probit prediction on the sample of all the married women; and adjusted perfect complementarity – assigning heiress status to those women with an inherited housing and performing the probit prediction on the sample of all the married women. The so-called “adjustment” through the prediction step is to reconcile the deviation between the perfect substitution/complementarity hypothesis and the heiress status strongly explainable by the observables used in the probit model (eg. the sample receiving an inherited housing might be very poor, the sample only receiving the non-housing inheritance might be quite rich and wealth is highly correlated with inheritance status). This imputation is actually parallel to the expectation-maximization algorithm with two opposite starting points (ie. these two bounding scenarios).

underestimation of the actual level of marital sorting on wealth, since partners may take into consideration parental wealth that is to be transmitted in the future.

The comparison of the inherited wealth distribution without inherited main residence (Table 5) with the inherited wealth distribution after assignment of inherited main residence shows that taking into account inherited main residence expands the proportion of heirs and heiresses, and increases significantly the quantiles thresholds. Moreover, both assignment strategies yield similar distributions. Contrasting heirs and non-heirs, heiresses and non-heiresses.

This section presents descriptive statistics for the heirs and the non-heirs, heiresses and non-heiresses. All of them are obtained using household weights. Table 6 presents the proportion of heirs and heiresses among the men and women in a stable relationship, by region. On the one hand, proportionally more heirs and heiresses live in the South than in the rest of the country. On the other hand, proportionally fewer heirs and heiress are located in the East than in the rest of the country. Therefore, it is necessary to control for the region of residence if we want to investigate whether heirs are more often committed with heiresses than with non-heiresses: particularly, household wealth level is much higher in the south compared to other areas and more matings arise in the neighborhood. Note that the great gender difference in the East (11.63% of heirs against 15.58% of heiresses) is mostly attributed by weighting: without using household weights, the proportions were respectively 17.50% for the men and 17.68% for the women.[8]

Table 6 also presents the proportion of heirs and heiresses for each age class. The chance to receive inheritance is almost always increasing with age. The smaller proportion of heirs and heiresses for those aged more than 76 can be interpreted as a cohort effect (World War II) rather than an age effect. As a result we need to also control for age in assessing the assortative mating across income and inherited wealth, to rule out a mundane age effect: mating is more likely to happen within the same generation and age is highly correlated with both income and inherited

Table 6 finally presents the higher education degree according to inheritance status and gender, for the individuals in a stable relationship. Heirs and heiresses are more likely to have a university degree (with a proportion of 97.4% and 88.17% respectively) than non-heirs and non-heiresses (with a proportion of 91.6% and 81.7% respectively). Therefore, we need to control for the education level if we want to determine whether

8 For example, since richer households have smaller weights due to oversampling, this change after weighting possibly implies that more eastern heirs belong to richer households than eastern heiresses do (eastern well-off heiresses might have migrated to the west given that women tend to marry up compared to the men and the west men is much more wealthy than their east counterparts).

heirs are mating more likely with heiresses than with non-heiresses simply due to education-based attraction only.

4. Evidence of assortative mating: contingency tables and risk-ratios

4.1 Contingency tables

A standard way of presenting assortative mating in the literature is to display contingency tables, showing the difference between the observed mating pattern and what could have been a random mating pattern. Our contingency tables classify men into four types: heir with top 50% income, heir with bottom 50% income, non-heir with top 50% income and non-heir with bottom 50% income. The same classification is imposed on men. Consequently, we have a four by four contingency table. The random mating simply generates cell proportion of couples as a product of the marginal proportions of women and husbands according to sorting dimensions (ie. income and heritor status). Table 7 illustrates such a hypothetical random mating. These cell proportions are then compared to the observed proportions in the sample. This allows us to spot which couple categories are overrepresented in reality as compared to a fictional random mating between women and men of the sample.

4.1.1 Labour income

We implement this exercise first on the labor income, distinguishing between women and men above and under the median. Dividing the male sample into men above the median and men below the median, and dividing the female sample between women above and below the median should yield a two by two random mating contingency table with 25% in each cell in theory. Table 8 illustrates the distribution in the hypothetical random mating case. However, since we do not have exactly 50% of "top50 wife" and 50% of "top50% husband" due to the fact that several individuals earn exactly the median labor income, the cell proportions are not exactly 50%.

Table 9. presents the actual observed distribution of couples according to the PHF weighted sample. At first sight we observe that the cell proportions are higher than 25% in the diagonal cells (bottom-bottom and top-top) and lower than 25% in the non-diagonal cells (bottom-top and top-bottom).

In order to make sense of theses absolute differences, Table 10 presents the relative difference between observed couple distribution and random mating, i.e. the absolute difference in each cell divided by the random mating value from Table 8. For example, with respect to the random distribution predicting 24.25% of bottom-bottom type of

couples in the population, we witness a surplus of 2.69% / 24.36% = 11.05% of bottom-bottom couples in the observed distribution.

To sum up, Table 10 shows that there exists a strong sorting on labor income, since there is a surplus in bottom 50 husband-bottom 50 wife couples and top 50 husband-top50 wife couples as compared to bottom 50 husband-top 50 wife couples and top 50 husband-bottom 50 wife couples, i.e. we find more couples in the diagonal of the table.

Our current (labor) income concept covers wages, self-employed income and public pensions. Since replacement ratios between wages and pensions are lower than 100%, and that we do not include private pension income (which can rather be considered as capital income), retired individuals have often lower current income than working individuals. Consequently, in order to check whether our results are entirely driven by the cohort effect – poorer old men and women marry and richer young men and women marry, we implement the exact same procedure on the subsample of working age couples, and we obtain Table 11, which presents a lower but still substantial level of assortative mating on current income.

Besides the cohort effect, there can exist the survival bias to complicate the assessment. It may not be surprising that couple sorting less assortatively have more chances to divorce: after a certain age, we observe only long-lasting partnerships among higher degree of assortative mating.[9] As a result, we will always control by age in the following analysis, and also provide a robust analysis for the subsample of working-age couples.

Moreover, we may underestimate sorting on labour income insofar as there is a labour supply reaction after household formation: women with high income marrying high wage earners may decide to fully or partially exit labor market. To correct this, we can use the wage rate as a proxy of “potential income” or “permanent income”. To determine such a wage rate for working individuals, we use the labour income and the number of hours worked. For the non-working individuals such as housewives or unemployed, as well as for self-employed people (for which the self-reported number of working hours can be highly unreliable or incomparable), we impute such a wage rate using a Heckman procedure. Dividing our subsample of working-age couples by the median wage rates for men and women, we implement the exact same calculation as above and produce the contingency Table 12. It reassures us that sorting on wage rate should be, by avoiding the extortion from extensive margin, higher than sorting on labor income as displayed in Table 11.

9 The focus of this paper is the entry of marriage although duration is also shaped by assortative mating.

4.1.2 Inheritance status: heirs and heiresses

We implement this exercise on the other sorting dimension on inheritor status, distinguishing between heiresses and non-heiresses as well as heirs and non-heirs. We present the results first taking heed of inherited wealth according to the inheritance section only, and then taking also into account inherited housing according to different assignment rules (random and probit-based).

4.1.2.1 Without inherited housing – Case 0

In this section, a man (a woman) is an heir (an heiress) as long as he (she) has some inherited wealth reported in the inheritance section only. In our couple sample, the weighted proportion of such heiresses is 20.13% and the weighted proportion of such heirs is 19.06%. As a result, Table 13 presents the cell proportions under the hypothetical random sorting. Exactly as in the current income case, we compute cell proportion of the random mating table by multiplying the margin's proportions: with 20.13% of heiresses and 19.06% of heirs, there would be 20.13%*19.06%=3.84% of couples made of one heir and one heiress in the couple sample if the mating were random.

Table 14 presents the observed weighted distribution of couples according to our PHF sample of couples. We note that this distribution is quite different from the random mating distribution: for instance, 9.35% of the couples are of the type "heir-heiress" in the observed sample, whereas a random sorting of the women and the men of the couple sample should have yielded a proportion of 3.84% of these couples.

Likewise, we produce the relative difference between observed and random in Table 15. For instance, we observe a surplus of 5.51%/3.84%=143.45% heir/heiress couples in the observed distribution relative to the random sorting.

From this, we can conclude that there are "too many" couples of type "heir/heiress" (143.45% more than would have been predicted by a random sorting) and of type "non-heir/non-heiress" (8.50% more than would have been predicted by a random sorting). There are "too few" couples of type "non-heir/heiress" (33.72% less than would have been predicted by a random sorting) and of type "heir/non-heiress" (36.20% less than would have been predicted by a random sorting). Therefore, these distribution tables seem to substantiate the hypothesis of a sorting on inherited wealth, even if we have only considered inherited wealth from the inheritance section for now. Finally, in order to check whether our results are entirely driven by a cohort effect, we implement the

exact same procedure on the subsample of working age couples, and we obtain Table 16, which presents a very similar pattern.

4.1.2.2 Random assignment of inherited housing – Case 1

We implement the exact same procedure using the heir and heiress status as defined by combining inherited wealth from the inheritance section with the information on inherited housing. In this section, inherited housing has been assigned randomly within each couple living in an inherited housing (first case described in section 3.3). Table 17 presents the observed weighted distribution of the couple types; this is the average for the 500 random draws (100 random draws for each of the 5 implicates). Table 18 presents the relative difference between observed distribution and a random mating, for the entire couple population.[10]

As in section 4.1.2.1, we see a surplus of couples "heir/heiress" and "non-heir/non-heiress" and too few couples "non-heir/heiress" and "heir/non-heiress". There is no substantial difference between the entire couple population and the subpopulation of working-age couples. Compared with the previous section, which was considering inherited status using information from the inheritance section only, the surplus of couples "heir/heiress" is lower: 84.27% (Table 18) instead of 143.45% (Table 15).

4.1.2.3 Probit-based assignment of inherited housing – Case 2

In this section, inherited housing has been assigned based on a probit estimation within each couple living in an inherited housing (second case described in section 3.3). Table 19 presents the observed weighted distribution of the couple types. Table 20 presents the relative difference between observed distribution and a random mating, for the entire couple population.

Overall, the assortative mating on the inheritor status proves robust across the three allocation scenarios for inherited housing. Furthermore, this cannot be rejected as a pure cohort effect, insofar as we observe a very similar pattern qualitatively and quantatively while restricting the analysis to a subsample of working-age couples.

4.1.3 Two dimensional analyisis

We are now interested in combining both dimensions of marital sorting by resorting to the same evaluation as above. Instead of 2*2 tables, we will now extend to the 4*4 tables, allowing for a joint classification according to both their labour income and inheritor's status.

10 The replication on the subsample of working-age couples is again not much different.

4.1.3.1 Without inherited housing – Case 0

In this section, a man (a woman) is an heir (an heiress) as long as he (she) has some inherited wealth reported in the inheritance section only. Table 21 presents what would be a random mating in terms of cell proportions, taking as given the marginal distributions.

Table 22 presents the observed weighted distribution of the couples according to their inheritance and current labour income status.

We then produce the relative difference between observed and random mating in Table 23. We can observe that sorting on inherited wealth proves relatively stronger that sorting on income. Indeed, the general picture is that there is a surplus of couples "heir/heiress" for all labor income combination (the entire bottom-right block is dark green; a block refers to a couple type according to the dimensions of heir/heiress status): for instance, there are 125.73% more couples of type "heiresses in the top 50 income / heirs in the top 50 income distribution" in the observed couple distribution than in the random mating table. Conversely, in the bottom-left and top-right blocks, there are "too few" couples in all cells, even when we could have expected a surplus due to sorting on labor income. The positive sorting on income does not seem to compensate the negative sorting on inherited wealth.

Following what we implement for the 2*2 tables, we check that these results also hold for the subsample of working-age couples. It seems to be the case that the pattern is broadly the same, as shown in Table 24.

4.1.3.2 With inherited housing – Cases 1 and 2

Table 25 presents the relative difference between observed distribution and a random mating, for the entire couple population, when inherited housing has been assigned randomly within each couple living in an inherited housing (first case described in section 3.3). Table 26 presents the relative difference between observed distribution and a random mating, for the entire couple population, inherited housing has been assigned using a probit-based rule within each couple living in an inherited housing (second case described in section 3.3).

Compared to the previous section (inherited wealth from the inheritance section only), the assortative mating appears relatively lower, insofar as the numbers in Table 25 and Table 26 are in absolute value lower than in Table 23. This could be due to the crudeness of our assignment procedure for inherited main residence, leading to underestimating the true extent of assortative mating. This could also be due to special characteristics of the couples living in an inherited main residence as compared to other

heirs. However, the general pattern remains very close, with too many couples in the bottom-right block (heir/heiress) and too few in the top-right (non-heir/heiress) and the bottom-left (heir/non-heiress) blocks. This means that sorting on inherited wealth appears to be stronger than sorting on labor income. This holds for the three assignment rules for inherited housing. The robustness checks, first with the subsample of working-age couples, and second with the subsample of couples living in Western Germany, provide both similar results, for all measures of inheritance.

4.2 Risk ratios

4.2.1 Methodology

Following Frémeaux (2014), we also use risk-ratios to present assortative mating patterns. Our risk-ratio reflects the ratio of the likelihood to mate the partner belonging to some part of gender-specific distribution (eg. top T% of the inherited wealth distribution for female/male) when he/she belongs to the same part of distribution for his/her own gender (eg. top T% of the inherited wealth distribution for male/female) in relative to the likelihood when he/she does not belong to this part of distribution. T takes 20, 10 and 5 in our analysis. The superiority of risk ratios is to allow for controlling for potential effects such as age, education and region of residence which are jointly correlated with inheritance and marital sorting. Since significant inheritance is not widespread across the whole population in Germany as described previously, only 25% population has a positive inherited wealth in our data. However, we choose to define the quantiles on the inherited wealth distribution with zero value covered, which is equivalent to our construction of income quantiles by including those population latent in the labor market.

Risk-ratios are defined as

$\mathrm{RR}_{\mathrm{T,Wife}} = \frac{\mathrm{P(My\ husband\ is\ top\ T\%|I\ am\ top\ T\%)}}{\mathrm{P(My\ husband\ is\ top\ T\%|I\ am\ bottom\ (100-T)\%)}}$ from the wife's perspective. The interpretation is: "Among the women that are in a stable relationship, women from the top T% of the inherited wealth distribution for female are on average $RR_{T,Wife}$ times more likely than women from the bottom (1-T)% of the same distribution to mate with a top T% husband of the inherited wealth distribution for male". Likewise, $RR_{T,Husb}$ is defined in the same way from the husband's perspective - $\mathrm{RR}_{\mathrm{T,Husb}} = \frac{\mathrm{P(My\ wife\ is\ top\ T\%|I\ am\ top\ T\%)}}{\mathrm{P(My\ wife\ is\ top\ T\%|I\ am\ bottom\ (100-T)\%)}}$.

Moreover, we would like to disentangle pure sorting on inherited wealth from sorting on generation – older men and women are more likely to inherit and match with each

other - and sorting on education- inheritance is positively associated with education level and people tend to mate with partners with similar education. In addition to this, Germany has a strong regional differentiation in terms of inherited wealth: there is more private wealth to inherit in the South (Hessen, Baden-Württemberg and Bayern) than in the rest of Germany, and less private wealth to inherit in ex-Eastern Germany than in ex-Western Germany.

We illustrate the procedure by taking the wife's perspective for example. The denominator and numerator in the risk ratio is estimated by probit regression- $P(\text{TopTman} = 1|\text{TopTwoman}, X) = \varphi(\, b_0.\text{TopTwoman} + b_1.X)$ where TopTman and TopTwoman are the dummies for being in top T% of gender-specific distributions, X is a set of control variables (age of the woman, education of the woman, and region of residence of the couple) and φ the distribution function of the normal distribution. Following Cummings (2009), we deduce the average log-risk ratio from performing a prediction of log risk ratio: $\ln RR_{T,\text{Wife}} = \ln[\frac{\sum_{i=1}^{2472} \omega_i.\varphi(\, b_0 + b_1.X_i)}{\sum_{i=1}^{2472} \omega_i.\varphi(\, b_1.X_i)}]$, where ω_i is the household weight. Next we use the delta method to derive the standard-error. This is a standardized estimate in the sense we are dividing the average probability conditional on that all the sample are in the top T% distribution with the other average probability conditional on that all the sample are not in the top T% distribution.

4.2.2 Results for all couples

We present risk-ratios from the wives' perspective and from the husbands' perspective. Results are very similar for both genders. Next, we restricted our analysis to the working-age couples and found generally same trends although the estimated risk-ratios were less precise, potentially due to the smaller sample size.

Table 27 presents the risk-ratios for different distributions in four columns:

- Inherited wealth from the inheritance section only (case 0)
- Inherited wealth from the inheritance section and the random assignment of inherited housing (case 1)
- Inherited wealth from the inheritance section and probit-based assignment of inherited housing (case 2)
- Labor income

For each of these variables, risk-ratios are computed for different quantiles. For the inherited wealth variables, a risk-ratio is also computed using the dummies for Heir and

Heiress (this is not done for labor income in the fourth column). Since there are only 19.06% of heirs and 20.13% of heiresses when we only take into account inherited wealth from the inheritance section (case 0), we do not compute a risk-ratio for the top 20% for this measure of inherited wealth. Moreover, we control first by age, then by age and education, and thirdly by age, education and region; we present here only our results with all controls but detailed tables can be found in Table 28. Finally, we provide for each estimate of risk-ratio the significance in terms of difference with one. One means that among the women that are in a stable relationship, women from the top T% of the inherited wealth distribution are on average as likely as women from the bottom (1-T)% of the inherited wealth distribution to mate with a top T% husband from the inherited wealth distribution, i.e. no assortative mating on inherited wealth.

Overall, for the measures of inherited wealth under all scenarios and for labor income, risk-ratios are almost always significantly different from one at the 1%-level: there is sorting on inherited wealth as well as on current income, even when one control by age, education and region. However, it remains true that there could be some omitted variables, particularly those unobserved (preferences, socialisation, …), driving this mating pattern: indeed, these risk-ratios are purely descriptive and do not reveal in any case that individuals develop conscious strategies to marry their like in terms of inherited wealth, as could have been the case in the 19th Century of Europe.

We observe that the risk-ratios are lower for the labor income than for the inherited wealth, comparing to the sorting on labor income when we only control by age. This is broadly explained by the education level: education being equal, females with high labor income are only 1.5-2.0 more likely to mate with a male partner with high current income than the female partners with low labor income. This could reflect as well the labour supply reaction after the mating, which can lead a woman with high wage potential to become a housewife or to work part-time. We will enquire further into this issue later, using the working-age couple subpopulation.

A striking feature of Table 27 is that risk-ratios tend to increase with the distribution of inherited wealth. For instance, if we take the second column (inherited wealth from the inheritance section and random assignment of inherited housing) with controls by age, education and region, the risk-ratio increases from 2.209 for the top 20% to 2.917 for the top 10% and 4.412 for the top2% of the inherited wealth distribution. However, for cases 1 and 2, we also observe that risk-ratios are slightly lower for the top 5% than for the top 10%, which means that the concentration trend may not be persistent over the inherited wealth distribution.

Comparing the four measures of inherited wealth, risk-ratios proves higher when one considers only inherited wealth from the inheritance section (case 0) than when one considers both inherited wealth from the inheritance section and inherited housing (cases 1 and 2). Again, this could be that our methods for assigning inherited main residence are imprecise and lead to underestimate of the true extent of marital sorting on inherited wealth. Moreover, the different assignment rules for inherited housing within the couples yield different results: risk-ratios are lower for the probit-based assignment rule (case 2) than for the random assignment rule (case 1).

Table 29 provides the same risk-ratios from the husbands' perspective. We observe results very similar to those obtained from the wives' perspective. In fact we observe very similar risk-ratios from the wives' and from the husbands' perspective. In fact it seems to be the case that risk-ratios are slightly lower when computed from the husbands' perspective than when computed from the wives' perspective, which would mean that the difference in the probability of marrying someone with inherited wealth between heiresses and non-heiresses is more marked than the difference between heirs and non-heirs. The difference appears however to be rather small and non-economically significant.

To sum up, risk-ratios show that there exists some marital sorting both on current income and inherited wealth, that is not reducible to an age, educational or regional effect. Moreover, assortative mating proves to be stronger at the top of the inherited wealth distribution and labor income distribution: not only heirs tend to marry heiresses, but rich heirs to marry rich heiresses. This is of particular interest in terms of dynamic wealth inequality, insofar as such a mating pattern seems a priori to be favourable to an increasing wealth concentration, all the more in a German context of rather low inheritance taxation.

4.2.3 Results for working-age couples

As a robustness check, we consider only the working-age couples, i.e. the 1989 couples for which both partners are aged between 16 and 65. We compute new percentile thresholds within this subpopulation. The results reconfirm the existence of some marital sorting on wealth in Germany. Table 30 presents the results from the wives' perspective and Table 31 presents the results from the husbands' perspective. First, an heiress has 2 to 3 times more chances to mate with an heir that a non-heiress has, even when controlling for age, education and region of residence. This is very close to what the results for the entire couple population (Table 27). The equivalent similarity can be observed from the husband's perspective.

There appears to be higher risk-ratios for sorting on inherited wealth than for income. Indeed, considering the top20 and top10, risks ratios are higher for inherited wealth (cases 0-1-2) than for labor income or wage rate. For example, considering the top 10% of the distribution of the working-age women in a stable relationship (Table 30), the risk-ratio is 1.7-2.2 for inherited wealth (cases 1-2) and 1.5-1.6 for labor income and wage rate. Equally, considering the top 10% of the distribution of the working-age men in a stable relationship (Table 31), the risk-ratio is 1.7-2.2 for inherited wealth (cases 1-2) and 1.6-1.8 for labor income and wage rate.

Concerning the concentration aspects, restricting the analysis to the subpopulation of working-age couples leads to insignificant results for the very top of the inherited wealth distribution (top 5% and top2%) and no concentration pattern such as the one that was observed for the entire couple population, except for the labor income and the wage rate. This could be first due to the smaller sample size (1989 working-age couples instead of 2472 couples). Also, it could be argued that many working-age couples are still waiting for an inheritance (because their parents are still alive): therefore, there could be some assortative mating on parental wealth (future inherited wealth) that we cannot observe with the PHF data. In other studies such as Frémeaux (2014), the information on parental wealth could be used as a proxy for expected inheritance, in order to have a more accurate view of actual marital sorting on inherited wealth. We cannot implement such a strategy with the PHF data due to data restriction. As a result, the statement that marital sorting on inherited wealth increases in the top quantiles of inherited wealth is not verified with this subpopulation of working-age couples.

4.2.4 Results for all couples excluding Eastern Germany

As a second robustness check, we consider only the couples living in Western Germany (i.e. we exclude the couples living in the ex-Democratic German Republic). This subpopulation entails 2554 couples, for which new percentile thresholds are computed. The results confirm that the existence of some marital sorting on wealth in Germany does not depend on the inclusion of the Eastern part in the data. Table 32 presents the results from the wives' perspective and Table 33 presents the results from the husbands' perspective. The risk-ratios are very similar to those obtained for the entire German couple population. However, the risk-ratios on labor income appear to be slightly lower in the Western German subpopulation than in the entire German population, in line with Pestel (2016).

5. Other assessments of assortative mating: bi-diemsnional perspective

From a purely pecuniary point of view, marrying a rich heir with low current income or marrying a non-heir with very high current income should not be so different because it amounts to an equivalent life-cycle disposable income (Frémeaux, 2016). There are nevertheless plenty of reasons to think that this is not the case in social life, for instance if labor income is deemed riskier than wealth, or the other way round. Therefore, we need to investigate how equivalent labor income and inherited wealth are playing in the degree of sorting. First, we will show that rich heirs and high-wage earners are not the perfect substitutes in the marriage market. Second, we will follow Frémeaux's methodology (2014) to assess this degree of substitutability between income and inherited wealth.

5.1 Overlapping of both dimensions

In order to show that both dimensions are overlapping (though not fully), we provide in Table 34 the proportion of top T% men and women in a stable relationship in terms of labor income that are equally top T% in terms of inherited wealth. From these tables, we can argue that the income dimension and the inherited wealth dimensions are positively correlated but not perfectedly.

5.2 Substitutability between inherited wealth and income

We will implement the substitutability analysis first from the wives' perspective and second from the husbands' perspective. The procedure is described in the following (we take the wives' perspective for the description):

- For the effect of the wife's position in the labor income and inherited wealth distribution on the probability of being together with a man from the top of the distribution of inherited wealth.

  1. We run a probit estimation with the form

  $P(TopTmaninh = 1|TopTwomaninh, TopTwomaninc, age = \varphi(b_0.TopTwomaninh + b_1.TopTwomaninc + b_2.age)$,
  where TopTmaninh is a dummy variable equal to 1 if the male partner belongs to the top T% of the inherited wealth distribution, TopTwomaninh is a dummy variable equal to 1 if the female partner belongs to the top T% of the inherited wealth distribution, TopTwomaninc is a dummy variable equal to 1 if the female partner belongs to the top T% of the inherited wealth distribution, Age is the age of the female partner and φ is the distribution function of the normal distribution.

2. We compute the marginal effect of TopTwomaninh on TopTmaninh
3. We compute the marginal effect of TopTwomaninc on TopTmaninh
4. We compare the two marginal effects by compute the difference between the former and the latter, and run a test to know whether this difference is significant

- For the effect of the wife's position in the labor income and inherited wealth distribution on the probability of being together with a man from the top of the distribution of labor income

  1. We run a probit estimation with the form

  $$P(TopTmaninc = 1|TopTwomaninh, TopTwomaninc, age = \varphi(b_0.TopTwomaninh + b_1.TopTwomaninc + b_2.age)$$

  where TopTmaninc is a dummy variable equal to 1 if the male partner belongs to the top T% of the labor income distribution, TopTwomaninh is a dummy variable equal to 1 if the female partner belongs to the top T% of the inherited wealth distribution, TopTwomaninc is a dummy variable equal to 1 if the female partner belongs to the top T% of the inherited wealth distribution, Age is the age of the female partner, and φ is the distribution function of the normal distribution.

  2. We compute the marginal effect of TopTwomaninh on TopTmaninc
  3. We compute the marginal effect of TopTwomaninc on TopTmaninc
  4. We compare the two marginal effects by compute the difference between the former and the latter, and run a test to know whether this difference is significant

Table 35 presents the results obtained with the implementation of the procedure we have just described. We observe that belonging to the top of the labor income distribution has always a positive impact on the probability of being together with someone from the top of the inherited wealth distribution (except for the top 2% women). Belonging to the top of the inherited wealth distribution has always a positive impact on the probability of being together with someone from the top of the labor income distribution (except for the top 5% and top 2% men). Therefore, we can affirm that there is some degree of substitutability between labor income and inherited wealth in terms of mating.

However, the difference between the two dimensions (the rows "Difference", with colours) indicates that the substitutability between them is not perfect. In fact, belonging to the top of the labor income distribution increases more the probability of being together with someone from the top of the labor income distribution than belonging to

the top of the inherited wealth distribution. Equally, belonging to the top of the inherited wealth distribution increases more the probability of being together with someone from the top of the inherited wealth distribution than belonging to the top of the labor income distribution.

6. Distributional statistics on assortative mating: comparing German with French Results

We provide two sets of statistics assessing the degree of assortative mating on labor income and inherited wealth which can be directly comparable between Frémeaux (2014) and our German outcomes. Table 36 collects the risk ratios on mating in different dimensions from both countries. Overall the scales are close. Particularly when we consider mainly two cases (1 and 2) which account for the inherited housing and thus more comparable to the French study, all the ratios are in the range around two to three for both countries. It seems the degree of sorting on inherited wealth is larger than that on labor income for both.

Table 37 is simply the counterpart of Table 35 which measures the added chance by belonging to top 10% distribution to mate with the partner also at top 10% for either dimension. Again, all the figures including the differences are quite close.

This observation of close distributional characteristics in marital sorting between France and Germany is very intriguing. Although they are the neighbouring countries and enjoy cultural proximity, German aristocratic wealth has been more negatively impacted by WWII, there is less social stratification given the German political and institutional setting, and Germany has been partially (for the West) or directly (for the East) affected by decades of communism.

7. Discussions – cause and consequence of marital sorting on household wealth

Table 5.2.A. Median couple net wealth according to inheritance status

	Non-heiress	Heiress	
Non-heir	50.000	160.000	63.000
Heir	200.000	200.000	200.000
	65.000	189.800	80.600

Self-estimated household net wealth. Inheritance status according to the inheritance section only.

Grey=cell median net wealth lower than the median net wealth of the couple population (80.600€)

Yellow=cell median net wealth higher than the median net wealth of the couple population (80.600€)

Example: The median net wealth of couples made of a non-heir and an heiress is 160.000€. The median net wealth of couples in which thewoman is an heiress is 189.800€.

Table 5.2.B. Median couple net wealth according to current labour income status

	Bottom 50% current labour income WIFE	Top 50% current labour income WIFE	
Bottom 50% current labour income HUSBAND	29.800	70.000	50.400
Top 50% current labour income HUSBAND	112.000	136.000	127.200
	60.000	100.000	80.600

Self-estimated household net wealth. Current labour income is the sum of employment income, self-employment income, bonuses, public pensions.

Grey=cell median net wealth lower than the median net wealth of the couple population (80.600€)

Yellow=cell median net wealth higher than the median net wealth of the couple population (80.600€)

Example: The median net wealth of couples made of a top 50% man and a bottom 50% woman according to the current labourincome distribution is 112.000€. The median net wealth of couples in which the man is in the bottom 50% of the current labour income distribution is 50.400€.

Table 5.2.C. Median couple net wealth according to inheritance and current labour income status

		Non-heiress		Heiress			
		Bottom 50% current labour income WIFE	Top 50% current labour income WIFE	Bottom 50% current labour income WIFE	Top 50% current labour income WIFE		
Non-heir	Bottom 50% current labour income HUSBAND	10.240	44.800	148.000	109.000	30.000	63.000
	Top 50% current labour income HUSBAND	56.000	103.600	192.000	200.000	101.800	
Heir	Bottom 50% current labour income HUSBAND	106.000	144.500	204.000	150.600	155.200	200.000
	Top 50% current labour income HUSBAND	261.800	250.000	238.000	200.000	248.000	
		43.000	84.600	200.000	168.200	80.600	
		65.000		189.800			

Self-estimated household net wealth. Inheritance status according to the inheritance section only.

Grey=cell median net wealth lower than the median net wealth of the couple population (80.600€)

Yellow=cell median net wealth higher than the median net wealth of the couple population (80.600€)

Example: The median net w ealth of the couples made of an heir w ho is in the top 50% of the current labour income distribution and of an heiress w hich is in the bottom 50% of the current labour income distribution is 238.000€. The median net w ealth of the couples in w hich the w oman is an heiress and in the top 50% of the current labour income distribution is 168.200€. The median net w ealth of the couples in w hich the w oman is an heiress is 189.800€

[To be completed]

8. A Simple Model of Marital Sorting with Inheritance

The economy is populated by a large number of people who live for two periods. This population is composed of equal numbers of females and males. Each person has two defining characteristics at birth. They have a particular earning ability $\theta^g \in \{0,1\}$ and an inheritance to receive (or not) in the future, $\alpha^g \in \{0,1\}$, where $g \in \{f,m\}$ is a gender index. The low realization, $\theta^g = 0$, corresponds to a low-earnings type, while $\theta^g = 1$ is a high earnings type. A value of $\alpha^g = 1$ assures a future inheritance. $\alpha^g = 0$ implies that no

insurance will be received. The values of these variables are known by the individuals themselves and only the inheritance status is known by the other actors in the economy.[11] Additionally, the actors know the conditional distributions $F(\alpha^g \mid \theta^f, \theta^m)$.[12]

Let us think of the second period of the lives of our agents. They are now all matched in married households (more on this later) consisting of one female and one male. The couple is characterized by the characteristics $(\theta^f, \alpha^f, \theta^m, \alpha^m)$. Each spouse in a relationship would have an intrinsic quality level (think of love) γ^g. The prevailing wage rate for low-earners is w_0^g, while w_1^g stands for the wage of the high-earners. The gender pay gap is introduced through the restrictions $w_i^m > w_i^f$, where $i \in \{0, 1\}$. Then the joint utility derived from both members of the household is given by

$$V(\gamma^g; \theta^f, \alpha^f, \theta^m, \alpha^m) = \beta[w_0^f(1-\theta^f) + w_1^f\theta^f + w_0^m(1-\theta^m) + w_1^m\theta^m] + (1-\beta)(\alpha^f + \alpha^m) + \gamma^g.$$

β measures the degree of substitutability between labor income and inheritance in the marriage payoff function.

At the beginning of the first period of their lives, young individuals of each gender are indexed by the future income abilities (θ^g, α^g). They are now to enter in a marriage matching game which would deliver the prevailing marital matching structure in this economy. It is important to emphasize that in general the individual characteristics are not known by the other players in the marriage matching game. They are slowly revealed to them though.

We assume that marriage matching happens in two stages – the potential spouses sort firstly on the inheritance and on the earning ability conditional on the first stage sorting outcome. In the first stage, there are two rounds of random matching on the dimension of inheritance and the draw of earning ability for the potential mate follows $F(\alpha^g \mid \theta^f, \theta^m)$ where the joint type of heritor status is formed in each round of random matching.[13] In the first round, the match is either accepted by both potential partners

[11] In the future, we can further introduce a learning process which let the inheritance status to be revealed in the later stage.

[12] The assumption states the marginal distributions of earning ability from each gender for anyone of the four matching types on heritor status (eg. heir with heiress) are common knowledge. Namely, there are social norms or institutions in predetermining the ability distributions in each marital matching market. We impose this assumption in order to facilitate the sequential sorting setup – the marginal ability distribution can be still undetermined after the equilibrium distribution of matches on heritor status is established in the first stage. See an example in the following text. In the future, we may allow the interaction between sorting on inheritance and the marginal distribution of earning ability conditional on joint heritor types by introducing less rigid assumption.

[13] To introduce learning, one more round of random matching can be introduced in the beginning when inheritance status is not revealed.

resulting in a potential marriage, or is rejected by at least one of the potential partners.[14] After two rounds, the matching on inheritance is settled. The agents can only observe α^g of the potential mate delivered by random matchings. Thus, they form the marriage pay off function by taking the expectation of the earning ability from the opposite gender according to $F(\alpha^g \mid \theta^f, \theta^m)$. The payoff function also contains a random gender and match-specific quality γ^g coming from a distribution $G(\gamma^g)$ with a non-negative support which appears in both rounds. In the second stage of the matching, the agents sort on earning ability conditional on the match of heritor status in the first stage. A similar two rounds of random matching follow. In the first round, the draw of earning ability from the potential mate settled in the end of first stage is revealed. In the end of the second stage matching, all the marriages are formed, ie. matching on both inheritance and earning ability comes to the end. Potentially, we may allow the distribution of matching quality to differ in either stage. The tradeoff between love and money may deviate from the counterpart between love and inheritance. We assume that the value of single life is always lower than the value of married life, which basically amounts to having the lowest realization of the match-specific quality at zero. Therefore, in the end all individuals would accept their matches.

Each stage of matching can be fitted using the framework in section II.C – sorting and gender of Fernández, R., Guner, N., and Knowles, J. (2005), particularly the part on simulation results in Appendix 2. The model is recursively solved and started with the second stage. We can jointly fit the equilibrium distribution of four heritor types and sixteen earning ability types (ie. each four earning ability types conditional on four heritor types) with the empirical observations. We can either follow the simulation study in Fernández, R., Guner, N., and Knowles, J. (2005) to justify our results from empirics or estimate the parameters such as β as the degree of substitutability between labor income and inheritance and characteristics of matching quality distribution $G(\gamma^g)$.

9. Conclusion

[To be completed]

[14] All the matches in the first stage is still potential because they can be rejected in the second stage when earning ability is revealed.

References

ARRONDEL L., FRÉMEAUX N., 2016, "'For richer, for poorer': Assortative mating and savings preferences", Economica, Vol.83 (331), 518-543

BACH S., THIEMANN A., ZUCCO A., 2015, "The Top tail of the wealth distribution in Germany, France, Spain and Greece", DIW Discussion Papers, No. 1502

BECKER G., 1974, "A theory of marriage", in Schultz T. (ed.) Economics of the Family: Marriage, Children and Human Capital, University of Chicago Press, 299-351

BLOSSFELD H.-P., TIMM A., 1997, "Der Einfluss des Bildungssystems auf den Heiratsmarkt – Eine Längsschnittanalyse der Wahl des ersten Ehepartners im Lebenslauf", Kölner Zeitschrift für Soziologie und Sozialpsychologie, 49(3), 440-476

BÖNKE T., CORNEO G., WESTERMEIER C., 2015, "Erbschaft und Eigenleistung im Vermögen der Deutschen: Eine Verteilungsanalyse", Diskussionsbeiträge, Economics, 2015/10, Fachbereich Wirtschaftswissenschaft, Freie Universität Berlin

BOUCHET-VALAT M., 2014, "Les évolutions de l'homogamie de diplôme, de classe et d'origines sociales en France (1969-2011) : ouverture d'ensemble, repli des élites", Revue française de sociologie, 3, Vol.55

BOZON M., HÉRAN F., 1988, "La découverte du conjoint. II. Les scènes de rencontre dans l'espace social ", Population, 43(1), 121-150

CHARLES K, HURST E., KILLEWALD A., 2013, "Marital sorting and parental wealth", Dmography, 50(1), 51-70

CUMMINGS P., 2009, "Methods for estimating adjusted risk-ratios", The Stata Journal, 9, Number 2, 175-196

DEUTSCHE BUNDESBANK, 2016, "Vermögen un Finanzen privater Haushalte in Deutschland: Ergebnisse der Vermögensbefragung 2014", Monatsbericht, März, 61

ERMISCH J., FRANCESCONI M., SIEDLER T., 2006, "Intergenerational mobility and marital sorting", The Economic Journal, vol.116, 513, 659-679

Fernández, R., Guner, N., and Knowles, J. (2005). Love and Money: A Theoretical and Empirical Analysis of Household Sorting and Inequality. The Quarterly Journal of Economics, 120(1), 273-344.

FERNÁNDEZ R., ROGERSON R, 2000, “Sorting and long-run inequality”, NBER Working Paper, No.7508

FRÉMEAUX N., 2014, “The role of inheritance and labour income in marital choices”, Population, 69(4), 495-530

GRABKA M., WESTERMEIER C., 2014, “Anhaltendes hohe Vermögensungleicheit in Deutschland”, DIW Wochenbericht, No.9, 151-164

GRAVE B., SCHMIDT C., 2012, “The Dynamics of assortative mating in Germany”, Ruhr Economic Papers, 346

GREENWOOD J., GUNER N., KOCHARKOV G., SANTOS C., 2014, “Marry your like: Assortative mating and income and income inequality”, American Economic Review: Papers and Proceedings, 104(5), 348-353

HOLMUND H., LINDAHL M., PLUG E., 2011, „The Causal effect of parents’ schooling on children’s schooling: A comparison of estimation methods”, Journal of Economic Literature, 49:3, 615-651

KALMINJ M., 1991, “Status Homogamy in the United States”, American Journal of Sociology, 97(2), 496-523.

KREMER M., 1997, “How much does sorting increase inequality?”, Quaterly Journal of Economics, vol.112, No.1

MARE R., 1991, “Five decades of educational assortative mating”, American Sociological Review, Vol.56, No.1, 15-32

MARE R., SCHWARTZ C., 2005, “Trends in educational assortative marriage from 1940 to 2003”, Demography, 42(4), 621-646

PIKETTY T., 2011, “On the Long-Run Evolution of Inheritance: France 1820-2050.”

The Quarterly Journal of Economics, 127(3), 1071-1131.

PIKETTY T., 2014, Capital in the 21st Century, Harvard University Press

PESTEL N., 2016, “Marital sorting, Inequality and the Role of Female Labour Supply: Evidence from East and West Germany“ Economica. doi: 10.1111/ecca.12189

SCHWARTZ C., 2010, “Earnings Inequality and the changing association between spouses’ earnings”, American Journal of Sociology, vol.115, No.5, 1124-1157

SOROKIN P., 1959 (1927), Social and Cultural Mobility, New York Free Press

VANDERSCHELDEN M., 2006, “Homogamie socioprofessionnelle et ressemblance en termes de niveau d’études : constat et évolution au fil des cohortes d’unions”, Économie et statistique, 398-399, p. 33-58.

WESTERHEIDE P., 2005, « Auswirkungen von Erbschaften und Schenkungen auf die Vermögensbildung privater Personen und Haushalte : Eine empirische Analyse auf der Basis des sozio-ökonomischen Panels“, Jahrbücher für Nationalökonomie und Statistik, No.4, 459-481

Table 1 Age, high education level and employment status of individuals in a stable relationship by gender

Proportion of individuals in a stable relationship by age and gender		
	Men	Women
16-25	11.2%	24.1%
26-35	55.5%	70.4%
36-45	72.1%	71.2%
46-55	70.1%	73.0%
56-65	71.0%	71.3%
66-75	73.1%	59.9%
76+	65.7%	33.8%
Distribution of high education level by gender		
	Men	Women
No university degree or professional training	7.3%	17.0%
Currently studying	1.0%	1.6%
Professional and vocational training	70.4%	63.7%
University of applied science or engineering school	7.6%	4.8%
University	11.7%	11.4%
Doctorate / Habilitation	1.9%	1.1%
Other	0.2%	0.5%
Distribution of employment status by gender		
	Men	Women
Employed full-time	60.0%	25.2%
Employed part-time	5.2%	29.1%
Parental leave	1.4%	4.7%
Unemployed	3.3%	3.4%
Pupil, student or unpaid intern	1.2%	2.1%
Retiree, pensioner	26.9%	20.1%
Early retiree or unfit for work	2.0%	2.0%
Homemaker	0.2%	13.4%

Table 2 Region of residence for couples

East (Berlin, Brandenburg, Mecklenburg-Vorpommern, Sachsen, Sachsen-Anhlat, Thüringen)	20%
South (Bayern, Baden-Württemberg, Hessen)	36%
West (Nordrhein-Westfalen, Rheinland-Pfalz, Saarland)	28%
North (Bremen, Hamburg, Schleswig-Holstein, Niedersachsen)	16%

Table 3 Distribution of estimated household net wealth and labor income for the couples

	Estimated household net wealth	Annual labor income	
		Men	Women
p10	370	7,320	0
p10	7,580	13,120	1,580
Median	80,600	26,000	10,000
p80	300,000	46,000	23,780
p90	500,000	64,340	36,136
p95	693,000	87,940	46,652
p98	1,014,000	122,142	70,520
Mean	196,177	34,924	15,989
s.d.	484,457	46,065	26,705

Table 4 Distribution of couples by main residence ownership and current value of the main residence conditional on ownership type

Couples by acquiry of main residence		Current value of the main residence		
			Couples with ownership	Couples with inherited ownership
Not owning main residence	43%	p10	71,200	50,000
Owning main residence not through inheirtance	44%	p10	1,000,000	75,000
Owning main residence through inheirtance	13%	Median	190,000	176,000
		p80	350,000	361,000
		p90	450,000	600,000
		p95	600,000	1,000,000
		p98	1,000,000	3,000,000
		Mean	256,674	318,253
		s.d.	331,616	571,587

Table 5 Distribution of inherited wealth for the population of heirs and heiresses

	Case 0[1)]		Case 1		Case 2	
	Heirs (19.1%)[2)]	Heiresses (20.2%)	Heirs (24.3%)	Heiresses (24.7%)	Heirs (23.8%)	Heiresses (24.9%)
Median	0	0	0	0	0	0
p70	0	0	0	0	0	0
p80	0	2,095	17,522	17,442	15,329	16,631
p90	48,262	58,071	119,640	112,934	120,000	109,674
p95	159,624	141,524	445,125	230,725	240,001	231,984
p98	372,215	251,772	564,888	421,900	544,680	493,898
Mean	34,896	30,793	55,259	49,945	51,371	55,833

Notes: 1) Case 0 - inherited wealth from the inheritance section only; Case 1 - inherited wealth from the inheritance section and from the random assignment of inherited housing; ans Case 2 - inherited wealth from the inheritance section and from the probit-based assignment of inherited housing. 2) Percents in all the parenthese reflect the estimated proportions of heirs and heiresses in each case.

Table 6 Region of residence, age and high education of heirs/non-heirs and heiresses/non-heiress in a stable relationship

	Region of residence	
	Heirs	Heiresses
East[1)]	20.4%	20.5%
South	19.2%	16.8%
West	22.5%	25.2%
North	11.6%	15.6%
	Age corhorts	
	Heirs	Heiresses
[16-25]	6.4%	6.4%
[26-35]	10.6%	14.4%
[36-45]	13.2%	18.0%
[46-55]	21.9%	19.8%
[56-65]	23.7%	26.2%
[66-75]	24.3%	28.4%
[76 +[	22.5%	20.1%

	High education level			
	Heirs	Non-heirs	Heiresses	Non-heiresses
No university degree or professional training	2.6%	8.4%	11.8%	18.3%
Currently studying	0.5%	1.1%	1.3%	1.7%
Professional and vocational training	65.2%	71.6%	63.6%	63.8%
University of applied science or engineering school	8.2%	7.5%	6.3%	4.4%
University	18.9%	10.0%	14.4%	10.6%
Doctorate / Habilitation	4.1%	1.3%	1.4%	1.0%
Other	0.5%	0.1%	1.3%	0.3%

Note: 1) East (Berlin, Brandenburg, Mecklenburg-Vorpommern, Sachsen, Sachsen-Anhlat, Thüringen), South (Bayern, Baden-Württemberg, Hessen), West (Nordrhein-Westfalen, Rheinland-Pfalz, Saarland) and North (Bremen, Hamburg, Schleswig-Holstein, Niedersachsen)

Table 7 Hypothetical cell proportion for the couple population in the random mating classified by gender-specific income distribution

	Wife's labor income in bottom 50%	Wife's labor income in top 50%
Husband's labor income in bottom 50%	25%	25%
Husband's labor income in top 50%	25%	25%

Table 8 Hypothetical cell proportion for the couple population in the random mating classified by gender-specific income distribution conditional on acutal marginal distributions

	Wife's labor income in bottom 50%	Wife's labor income in top 50%
Husband's labor income in bottom 50%	24.4%	24.7%
Husband's labor income in top 50%	25.3%	25.6%

Table 9 Observed cell proportion for the couple population in the actual mating classified by gender-specific income distribution

	Wife's labor income in bottom 50%	Wife's labor income in top 50%
Husband's labor income in bottom 50%	27.1%	22.0%
Husband's labor income in top 50%	22.6%	28.3%

Table 10 Relative difference in cell proportion between observed and random mating for the whole couple population classified by gender-specific income distribution

	Wife's labor income in bottom 50%	Wife's labor income in top 50%
Husband's labor income in bottom 50%	11.0%	-10.9%
Husband's labor income in top 50%	-10.6%	10.5%

Table 11 Relative difference in cell proportion between observed and random mating for the working-age couples classified by gender-specific income distribution

	Wife's labor income in bottom 50%	Wife's labor income in top 50%
Husband's labor income in bottom 50%	9.1%	-8.9%
Husband's labor income in top 50%	-9.0%	8.8%

Table 12 Relative difference in cell proportion between observed and random mating for the subpopulation of working-age couples classified by gender-specific income distribution after Heckman correction

	Wife's wage rate in bottom 50%	Wife's wage rate in top 50%
Husband's wage rate in bottom 50%	19.9%	-19.8%
Husband's wage rate in top 50%	-19.8%	19.7%

Table 13 Hypothetical cell proportion for the couple population in the random mating conditional on acutal inheritance status for husbands and wives (case 0)

	Non-heiress (inheritance section only)	Heiress (inheritance section only)
Non-heir (inheritance section only)	64.6%	16.3%
Heir (inheritance section only)	15.2%	3.8%

Table 14 Observed cell proportion for the couple population in the actual mating classified by inheritance status for husbands and wives (case 0)

	Non-heiress (inheritance section only)	Heiress (inheritance section only)
Non-heir (inheritance section only)	70.1%	10.8%
Heir (inheritance section only)	9.7%	9.4%

Table 15 Relative difference in cell proportion between observed and random mating for the whole couple population classified by inheritance status for husbands and wives (case 0)

	Non-heiress (inheritance section only)	Heiress (inheritance section only)
Non-heir (inheritance section only)	8.5%	-33.7%
Heir (inheritance section only)	-36.2%	143.5%

Table 16 Relative difference in cell proportion between observed and random mating for the subpopulation of working-age couples classified by inheritance status for husbands and wives (case 0)

	Non-heiress (inheritance section only)	Heiress (inheritance section only)
Non-heir (inheritance section only)	6.8%	-31.6%
Heir (inheritance section only)	-31.9%	148.0%

Table 17 Observed cell proportion for the couple population in the actual mating classified by inheritance status for husbands and wives (case 1)

	Non-heiress (inheritance section+random assignment of inherited housing)	Heiress (inheritance section+random assignment of inherited housing)
Non-heir (inheritance section+random assignment of inherited housing)	61.8%	13.9%
Heir (inheritance section+random assignment of inherited housing)	13.1%	11.3%

Table 18 Relative difference in cell proportion between observed and random mating for the whole couple population classified by inheritance status for husbands and wives (case 1)

	Non-heiress (inheritance section+random assignment of inherited housing)	Heiress (inheritance section+random assignment of inherited housing)
Non-heir (inheritance section+random assignment of inherited housing)	9.1%	-27.1%
Heir (inheritance section+random assignment of inherited housing)	-28.3%	84.3%

Table 19 Observed cell proportion for the couple population in the actual mating classified by inheritance status for husbands and wives (case 2)

	Non-heiress (inheritance section+random assignment of inherited housing)	Heiress (inheritance section+random assignment of inherited housing)
Non-heir (inheritance section+random assignment of inherited housing)	61.8%	14.4%
Heir (inheritance section+random assignment of inherited housing)	13.3%	10.6%

Table 20 Relative difference in cell proportion between observed and random mating for the whole couple population classified by inheritance status for husbands and wives (case 2)

	Non-heiress (inheritance section+random assignment of inherited housing)	Heiress (inheritance section+random assignment of inherited housing)
Non-heir (inheritance section+random assignment of inherited housing)	8.1%	-24.4%
Heir (inheritance section+random assignment of inherited housing)	-25.8%	77.8%

Table 21 Hypothetical cell proportion for the couple population in the random mating classified by gender-specific income distribution and inheritance status for husbands and wives (case 0)

		Non-heiress (inheritance section only)		Heiress (inheritance section only)	
		Wife's labor income in bottom 50%	Wife's labor income in top 50%	Wife's labor income in bottom 50%	Wife's labor income in top 50%
Non-heir (inheritance section only)	Husband's labor income in bottom 50%	16.26%	16.50%	4.11%	4.16%
	Husband's labor income in top 50%	15.82%	16.05%	4.00%	4.04%
Heir (inheritance section only)	Husband's labor income in bottom 50%	3.18%	3.23%	0.80%	0.81%
	Husband's labor income in top 50%	4.37%	4.44%	1.11%	1.12%

Table 22 Observed cell proportion for the couple population in the actual mating classified by gender-specific income distribution and inheritance status for husbands and wives (case 0)

		Non-heiress (inheritance section only)		Heiress (inheritance section only)	
		Wife's labor income in bottom 50%	Wife's labor income in top 50%	Wife's labor income in bottom 50%	Wife's labor income in top 50%
Non-heir (inheritance section only)	Husband's labor income in bottom 50%	19.85%	16.26%	2.53%	2.39%
	Husband's labor income in top 50%	15.41%	18.61%	2.24%	3.64%
Heir (inheritance section only)	Husband's labor income in bottom 50%	2.34%	1.78%	2.33%	1.57%
	Husband's labor income in top 50%	2.02%	3.56%	2.93%	2.52%

Table 23 Relative difference in cell proportion between observed and random mating for the whole couple population classified by gender-specific income distribution and inheritance status for husbands and wives (case 0)

		Non-heiress (inheritance section only)		Heiress (inheritance section only)	
		Wife's labor income in bottom 50%	Wife's labor income in top 50%	Wife's labor income in bottom 50%	Wife's labor income in top 50%
Non-heir (inheritance section only)	Husband's labor income in bottom 50%	22.06%	-1.48%	-38.44%	-42.38%
	Husband's labor income in top 50%	-2.54%	15.98%	-43.98%	-9.98%
Heir (inheritance section only)	Husband's labor income in bottom 50%	-26.30%	-44.74%	189.05%	93.40%
	Husband's labor income in top 50%	-53.72%	-19.73%	164.47%	125.73%

Table 24 Relative difference in cell proportion between observed and random mating for the subpopulation of working-age couples classified by gender-specific income distribution and inheritance status for husbands and wives (case 0)

		Non-heiress (inheritance section only)		Heiress (inheritance section only)	
		Wife's labor income in bottom 50%	Wife's labor income in top 50%	Wife's labor income in bottom 50%	Wife's labor income in top 50%
Non-heir (inheritance section only)	Husband's labor income in bottom 50%	20.06%	0.30%	-48.75%	-46.48%
	Husband's labor income in top 50%	-6.44%	12.72%	-32.68%	0.95%
Heir (inheritance section only)	Husband's labor income in bottom 50%	-17.35%	-38.79%	153.74%	111.20%
	Husband's labor income in top 50%	-45.26%	-23.25%	218.22%	111.87%

Table 25 Relative difference in cell proportion between observed and random mating for the whole population of couples classified by gender-specific income distribution and inheritance status for husbands and wives (case 1)

		Non-heiress (inheritance section+ random assignment of inherited housing)		Heiress (inheritance section+ random assignment of inherited housing)	
		Wife's labor income in bottom 50%	Wife's labor income in top 50%	Wife's labor income in bottom 50%	Wife's labor income in top 50%
Non-heir (inheritance section+ random assignment of inherited housing)	Husband's labor income in bottom 50%	23.73%	1.00%	-33.22%	-39.96%
	Husband's labor income in top 50%	-4.39%	15.74%	-32.90%	-1.55%
Heir (inheritance section+ random assignment of inherited housing)	Husband's labor income in bottom 50%	-16.48%	-39.26%	117.01%	49.98%
	Husband's labor income in top 50%	-41.94%	-15.34%	92.42%	77.81%

Table 26 Relative difference in cell proportion between observed and random mating for the whole population of couples classified by gender-specific income distribution and inheritance status for husbands and wives (case 2)

		Non-heiress (inheritance section+ probit-based assignment of inherited housing)		Heiress (inheritance section+ probit-based assignment of inherited housing)	
		Wife's labor income in bottom 50%	Wife's labor income in top 50%	Wife's labor income in bottom 50%	Wife's labor income in top 50%
Non-heir (inheritance section + probit-based assignment of inherited housing)	Husband's labor income in bottom 50%	21.39%	-0.34%	-25.93%	-37.07%
	Husband's labor income in top 50%	-4.86%	15.84%	-36.81%	2.83%
Heir (inheritance section + probit-based assignment of inherited housing)	Husband's labor income in bottom 50%	-15.06%	-33.85%	112.22%	36.65%
	Husband's labor income in top 50%	-36.50%	-17.09%	90.99%	70.66%

Table 27 Risk-ratios for the whole couple population, wives' perspective

	Case 0			Case 1			Case 2					
	Inherited wealth from the inheritance section only			Inherited wealth from the inheritance section and random assignment of inherited housing			Inherited wealth from the inheritance section and probit-based assignment of inherited housing			Labour Income		
	Estimate[1)]	Significance[2)]	S.E.	Estimate	Significance	S.E.	Estimate	Significance	S.E.	Estimate	Significance	S.E.
Heir/Heiress	3.48	***	0.101	2.32	***	0.091	2.26	***	0.092			
Top20				2.21	***	0.103	2.13	***	0.103	1.35	***	0.111
Top10	4.16	***	0.143	2.92	***	0.158	3.09	***	0.156	1.80	***	0.167
Top5	6.69	***	0.225	2.21	***	0.258	2.13	**	0.321	2.34	***	0.244
Top2	5.34	***	0.366	4.41	***	0.465	5.50	***	0.486	3.04	***	0.428

Note: 1) Risk ratio is simply P(husband with characteristic Y|wife WITH characteristic Y, X) / P(husband with characteristic Y|wife WITHOUT characteristic Y, X). Y are inheritance status (eg. heir or non-heir) or distributional features (eg. belonging to top 20% of inherited wealth distribution/labor income or not) and X are the control variables (age, education and region). Distributional features are defined within their own genders. For example, according to the inherited wealth distribution from the inheritance section and random assignment of inherited housing (case1), a top 10% heiress has 2.92 times more chances than a bottom 90% heiress to mate with a top 10% heir.
2) Significantly different from one, at: *10% **5% ***1%.

Table 28 Risk-ratios for the whole couple population using different control variables, wives' perspective

		Case 0			Case 1			Case 2					
		Inherited wealth from the inheritance section only			Inherited wealth from the inheritance section and random assignment of inherited housing			Inherited wealth from the inheritance section and probit-based assignment of inherited housing			Labour Income		
		Estimate[1)]	Significance[2)]	S.E.	Estimate	Significance	S.E.	Estimate	Significance	S.E.	Estimate	Significance	S.E.
Control by age	Heir/Heiress	3.48	***	0.101	2.32	***	0.091	2.26	***	0.092			
	Top20				2.21	***	0.103	2.13	***	0.103	1.35	***	0.111
	Top10	4.16	***	0.143	2.92	***	0.158	3.09	***	0.156	1.80	***	0.167
	Top5	6.69	***	0.225	2.21	***	0.258	2.13	**	0.321	2.34	***	0.244
	Top2	5.34	***	0.366	4.41	***	0.465	5.50	***	0.486	3.04	***	0.428
Control by age and education	Heir/Heiress	3.48	***	0.101	2.32	***	0.091	2.26	***	0.092			
	Top20				2.21	***	0.103	2.13	***	0.103	1.35	***	0.111
	Top10	4.16	***	0.143	2.92	***	0.158	3.09	***	0.156	1.80	***	0.167
	Top5	6.69	***	0.225	2.21	***	0.258	2.13	**	0.321	2.34	***	0.244
	Top2	5.34	***	0.366	4.41	***	0.465	5.50	***	0.486	3.04	***	0.428
Control by age, education and region	Heir/Heiress	3.48	***	0.101	2.32	***	0.091	2.26	***	0.092			
	Top20				2.21	***	0.103	2.13	***	0.103	1.35	***	0.111
	Top10	4.16	***	0.143	2.92	***	0.158	3.09	***	0.156	1.80	***	0.167
	Top5	6.69	***	0.225	2.21	***	0.258	2.13	**	0.321	2.34	***	0.244
	Top2	5.34	***	0.366	4.41	***	0.465	5.50	***	0.486	3.04	***	0.428

Note: 1) Risk ratio is simply P(husband with characteristic Y|wife WITH characteristic Y, X) / P(husband with characteristic Y|wife WITHOUT characteristic Y, X). Y are inheritance status (eg. heir or non-heir) or distributional features (eg. belonging to top 20% of inherited wealth distribution/labor income or not) and X are the control variables (age, education and region are introduced sequentially). Distributional features are defined within their own genders. For example, under the controls of age, education and region, according to the inherited wealth distribution from the inheritance section and random assignment of inherited housing (case1), a top 10% heiress has 2.92 times more chances than a bottom 90% heiress to mate with a top 10% heir.
2) Significantly different from one, at: *10% **5% ***1%.

Table 29 Risk-ratios for the whole couple population, husbunds' perspective

	Case 0			Case 1			Case 2					
	Inherited wealth from the inheritance section only			Inherited wealth from the inheritance section and random assignment of inherited housing			Inherited wealth from the inheritance section and probit-based assignment of inherited housing			Labour Income		
	Estimate[1)]	Significance[2)]	S.E.	Estimate	Significance	S.E.	Estimate	Significance	S.E.	Estimate	Significance	S.E.
Heir/Heiress	3.29	***	0.097	2.26	***	0.089	2.12	***	0.089			
Top20				2.19	***	0.104	2.00	***	0.104	1.64	***	0.120
Top10	3.90	***	0.145	2.81	***	0.159	2.76	***	0.167	2.18	***	0.179
Top5	6.29	***	0.246	2.17	***	0.259	1.97	**	0.263	2.52	***	0.255
Top2	4.82	***	0.354	4.03	***	0.443	4.61	***	0.463	3.28	***	0.446

Note: 1) Risk ratio is simply P(husband with characteristic Y|wife WITH characteristic Y, X) / P(husband with characteristic Y|wife WITHOUT characteristic Y, X). Y are inheritance status (eg. heir or non-heir) or distributional features (eg. belonging to top 20% of inherited wealth distribution/labor income or not) and X are the control variables (age, education and region). Distributional features are defined within their own genders. For example, according to the inherited wealth distribution from the inheritance section and random assignment of inherited housing (case1), a top 10% heir has 2.81 times more chances than a bottom 90% heir to mate with a top 10% heiress.
2) Significantly different from one, at: *10% **5% ***1%.

Table 30 Risk-ratios for the subpopulation of working-age couples, wives' perspective

	Case 0			Case 1			Case 2					
	Inherited wealth from the inheritance section only			Inherited wealth from the inheritance section and random assignment of inherited housing			Inherited wealth from the inheritance section and probit-based assignment of inherited housing			Labour income		
	Estimate[1)]	Significance[2)]	S.E.	Estimate	Significance	S.E.	Estimate	Significance	S.E.	Estimate	Significance	S.E.
Heir/Heiress	3.23	***	0.126	2.16	***	0.111	2.09	***	0.107			
Top20				1.97	***	0.122	1.79	***	0.119	1.42	***	0.132
Top10	3.14	***	0.179	2.39	***	0.191	2.13	***	0.192	1.65	**	0.207
Top5	3.89	***	0.288	1.74		0.335	1.29		0.344	2.18	**	0.303
Top2	1.49		0.500	2.00		0.664	1.81		0.553	2.97	*	0.581

Note: 1) Risk ratio is simply P(husband with characteristic Y|wife WITH characteristic Y, X) / P(husband with characteristic Y|wife WITHOUT characteristic Y, X). Y are inheritance status (eg. heir or non-heir) or distributional features (eg. belonging to top 20% of inherited wealth distribution/labor income or not) and X are the control variables (age, education and region). Distributional features are defined within their own genders. For example, according to the inherited wealth distribution from the inheritance section and random assignment of inherited housing (case1), a top 10% heiress has 2.39 times more chances than a bottom 90% heiress to mate with a top 10% heir.
2) Significantly different from one, at: *10% **5% ***1%.

Table 31 Risk-ratios for the subpopulation of working-age couples, husbands' perspective

	Case 0			Case 1			Case 2					
	Inherited wealth from the inheritance section only			Inherited wealth from the inheritance section and random assignment of inherited housing			Inherited wealth from the inheritance section and probit-based assignment of inherited housing			Labour income		
	Estimate[1)]	Significance[2)]	S.E.	Estimate	Significance	S.E.	Estimate	Significance	S.E.	Estimate	Significance	S.E.
Heir/Heiress	3.28	***	0.129	2.20	***	0.117	2.23	***	0.122			
Top20				1.97	***	0.130	1.79	***	0.131	1.87	***	0.139
Top10	2.98	***	0.188	2.23	***	0.199	1.91	***	0.213	1.87	***	0.213
Top5	3.38	***	0.313	1.61		0.326	1.07		0.353	2.31	***	0.297
Top2	1.16		0.505	1.65		0.609	1.53		0.512	2.70	**	0.456

Note: 1) Risk ratio is simply P(husband with characteristic Y|wife WITH characteristic Y, X) / P(husband with characteristic Y|wife WITHOUT characteristic Y, X). Y are inheritance status (eg. heir or non-heir) or distributional features (eg. belonging to top 20% of inherited wealth distribution/labor income or not) and X are the control variables (age, education and region). Distributional features are defined within their own genders. For example, according to the inherited wealth distribution from the inheritance section and random assignment of inherited housing (case1), a top 10% heir has 2.23 times more chances than a bottom 90% heir to mate with a top 10% heiress.
2) Significantly different from one, at: *10% **5% ***1%.

Table 32 Risk-ratios for the subpopulation of couples residing in western Germany, wives' perspective

	Case 0			Case 1			Case 2					
	Inherited wealth from the inheritance section only			Inherited wealth from the inheritance section and random assignment of inherited housing			Inherited wealth from the inheritance section and probit-based assignment of inherited housing			Labour income		
	Estimate[1)]	Significance[2)]	S.E.	Estimate	Significance	S.E.	Estimate	Significance	S.E.	Estimate	Significance	S.E.
Heir/Heiress	3.25	***	0.105	2.23	***	0.096	2.23	***	0.094			
Top20	3.19	***	0.108	2.13	***	0.112	2.11	***	0.111	1.29	**	0.119
Top10	4.56	***	0.156	2.91	***	0.176	3.16	***	0.174	1.79	***	0.186
Top5	5.56	***	0.245	2.48	***	0.277	2.87	***	0.280	2.19	***	0.271
Top2	4.99	***	0.433	5.61	***	0.472	6.44	***	0.519	2.63	*	0.522

Note: 1) Risk ratio is simply P(husband with characteristic Y|wife WITH characteristic Y, X) / P(husband with characteristic Y|wife WITHOUT characteristic Y, X). Y are inheritance status (eg. heir or non-heir) or distributional features (eg. belonging to top 20% of inherited wealth distribution/labor income or not) and X are the control variables (age, education and region). Distributional features are defined within their own genders. For example, according to the inherited wealth distribution from the inheritance section and random assignment of inherited housing (case1), a top 10% heiress has 2.91 times more chances than a bottom 90% heiress to mate with a top 10% heir.
2) Significantly different from one, at: *10% **5% ***1%.

Table 33 Risk-ratios for the subpopulation of couples residing in western Germany, husbands' perspective

	Case 0			Case 1			Case 2					
	Inherited wealth from the inheritance section only			Inherited wealth from the inheritance section and random assignment of inherited housing			Inherited wealth from the inheritance section and probit-based assignment of inherited housing			Labour income		
	Estimate[1)]	Significance[2)]	S.E.	Estimate	Significance	S.E.	Estimate	Significance	S.E.	Estimate	Significance	S.E.
Heir/Heiress	3.14	***	0.102	2.20	***	0.095	2.14	***	0.095			
Top20	3.06	***	0.106	2.07	***	0.112	1.92	***	0.111	1.67	***	0.130
Top10	4.04	***	0.155	2.75	***	0.196	2.69	***	0.182	2.16	***	0.194
Top5	4.89	***	0.253	2.40	***	0.274	2.46	***	0.279	2.40	***	0.273
Top2	4.52	***	0.414	5.41	***	0.468	5.15	***	0.503	2.81	**	0.523

Note: 1) Risk ratio is simply P(husband with characteristic Y|wife WITH characteristic Y, X) / P(husband with characteristic Y|wife WITHOUT characteristic Y, X). Y are inheritance status (eg. heir or non-heir) or distributional features (eg. belonging to top 20% of inherited wealth distribution/labor income or not) and X are the control variables (age, education and region). Distributional features are defined within their own genders. For example, according to the inherited wealth distribution from the inheritance section and random assignment of inherited housing (case1), a top 10% heir has 2.75 times more chances than a bottom 90% heir to mate with a top 10% heiress.
2) Significantly different from one, at: *10% **5% ***1%.

Table 34 The proportion of top T% individuals in a stable relationship at the gender-specific labor income distribution located also within top T% at the gender-specific inherited wealth distribution

T	**Men**	**Women**
Top10	21.6%	12.4%
Top5	16.9%	10.6%
Top2	2.6%	6.7%

Note: Inherited wealth according to the inheritance section only. For example, among the top 10% husbands in terms of labor income, 21.64% are also top 10% men in terms of inherited wealth.

Table 35 Change in chance to mate a partner at the top 10, 5 and 2% of the inherited wealth or labor income distributions gained by the wives or husbands belonging to the same top distribution

	Wives' perspective						Husbands' perspective					
	Inheritance			Labor income			Inheritance			Labor income		
	Estimate[1)]	Significance[2)]	S.E.	Estimate	Significance	S.E.	Estimate	Significance	S.E.	Estimate	Significance	S.E.
Top 10 inherited wealth[3)]	0.166	***	0.017	0.065	***	0.020	0.162	***	0.016	0.039		0.024
Top 10 labor income	0.057	**	0.022	0.138	***	0.019	0.042	**	0.019	0.135	***	0.020
Difference	0.109	***	0.028	-0.073	***	0.027	0.120	***	0.029	-0.096	**	0.036
Top 5 inherited wealth	0.113	***	0.017	0.052	***	0.016	0.109	***	0.017	0.022		0.017
Top 5 labor income	0.035	*	0.018	0.093	***	0.017	0.043	**	0.017	0.095	***	0.017
Difference	0.078	***	0.025	-0.042	*	0.023	0.066	**	0.026	-0.073	***	0.026
Top 2 inherited wealth	0.043	***	0.001	0.016		0.016	0.043	***	0.010	0.001		0.011
Top 2 labor income	-0.001		0.012	0.054	***	0.015	0.018		0.014	0.049	***	0.013
Difference	0.044	***	0.017	-0.038	*	0.023	0.025		0.017	-0.048	***	0.018

Note: 1) For example, 0.166 (first column, first line) means that for a female partner, belonging to the top 10% of the inherited wealth distribution increases by 16.6% the probability to mate a male partner belonging to the top 10% of the inherited wealth distribution. The equivalent interpretation applies to 0.057 (first column, second line) in terms of top 10% labor income distribution for both genders. 0.109 (first column, third line) is the difference between the above two figures. It provides an assessment about the degree at which the first dimension (inherited wealth) overperforms/underperforms the second dimension (labor income) in terms of the chance to mate a partner at the same top distribution of either dimension.

2) Significantly different from one, at: *10% **5% ***1%.

3) Inherited wealth is taken from the approach of Case 2: inheritance section plus probit-based assignment rule of inherited housing.

Table 36 Risk-ratios in wives' perspective: French vs German results

	Top T% distribution		10	5
French[1)]	Inheritance		3.29***[3)]	3.58***
	Current Income		1.56***	2.00***
	Permanent Income		2.14***	2.86***
German[2)]	Inheritance	Case 0	4.16***	6.69***
		Case 1	2.92***	2.21***
		Case 2	3.09***	2.13**
	Current Income		1.80***	2.34***
	Permanent Income		1.50*	2.11**

Note: 1) Frémeaux (2014); 2) Table 27 except permanent income which is taken from the column of wage rate in Table 30; 3) Significantly different from one, at: *10% **5% ***1%.

Table 37 Counterpart of Table 35 in Frémeaux (2014) for the French result

Table 5. Variations in the probability of having a spouse at the top of the income or inheritance distribution by ego's position in the distribution

Characteristics of ego	Panel A: Male partners		Panel B: Female partners	
	Inheritance	Permanent income	Inheritance	Permanent income
Top 10% inheritance [1]	0.200***	0.041***	0.203***	0.059***
	(0.000)	(0.000)	(0.000)	(0.000)
Top 10% permanent income [2]	0.067***	0.285***	0.052***	0.280***
	(0.000)	(0.000)	(0.000)	(0.000)
Difference [1-2]	0.133***	– 0.244***	0.151***	– 0.221***
	(0.000)	(0.000)	(0.000)	(0.000)