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Épargner, Hériter, Divorcer

Essais sur les inégalités de patrimoine et de niveaux de vie en France

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PHD THESIS

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Savings, Bequests, Divorce

Essays on Inequality of Wealth and Living Standards in France

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"Et surtout n'oublie pas Ithaque.
Y parvenir est ton unique but.
Mais ne presse pas ton voyage
Prolonge-le le plus longtemps possible
Et n'atteint l'île qu'une fois vieux,
Riche de tous les gains de ton voyage
Tu n'auras plus besoin qu'Ithaque t'enrichisse.
Ithaque t'a accordé le beau voyage,
Sans elle, tu ne serais jamais parti.
Elle n'a rien d'autre à te donner.
Et si pauvre qu'elle te paraisse
Ithaque ne t'aura pas trompé.
Sage et riche de tant d'acquis
Tu auras compris ce que signifient les Ithaques."[1]

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[1] Cavafy C., Le Chemin vers Ithaque, 1911 (trad. Lacarrière J.)

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Contents

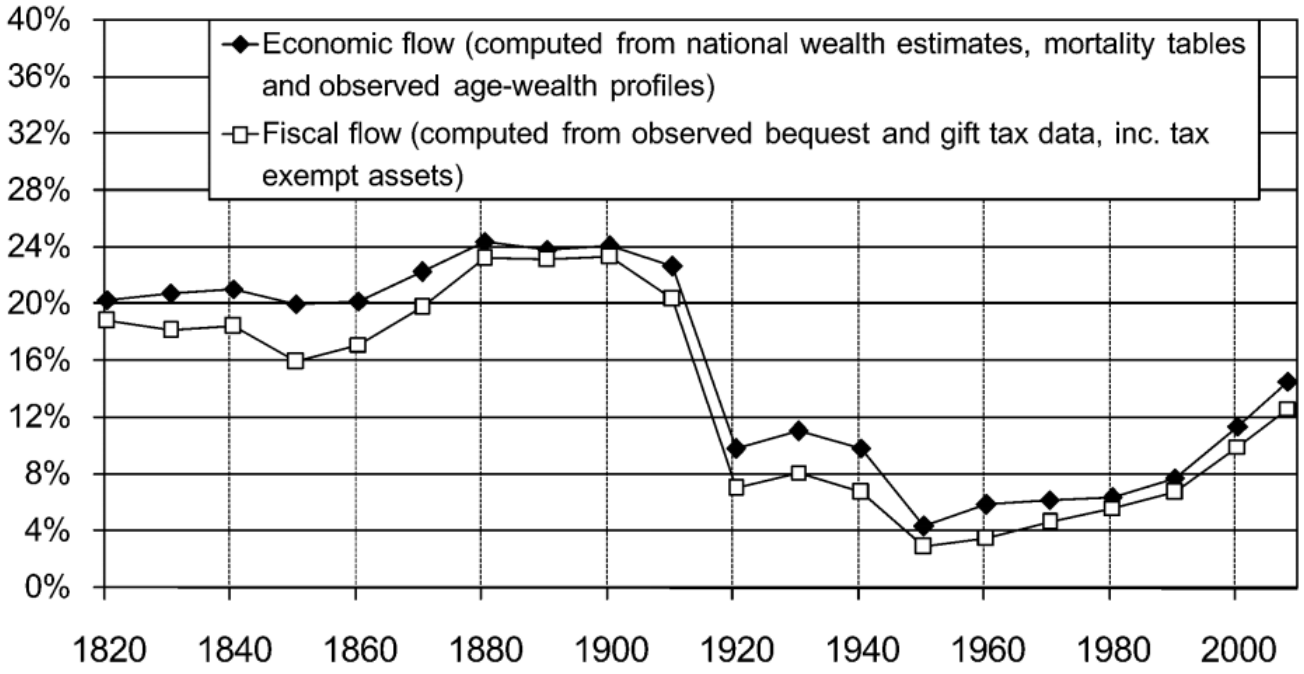
Summary

Understanding the determinants of wealth accumulation is a long standing economic and political concern. In the 17^{th} century, for instance, Baltasar Gracian already stated that "the rich inherit, the poor have no relations", highlighting with provocation how bequests may play an important part in explaining wealth inequality.

Recent work on wealth inequality has renewed with these old questions, putting them under the spotlights. Piketty, Postel Vinay Rosenthal (2006) have documented the long run evolution of wealth concentration in France. This work highlights the high level and rising trend of wealth concentration in France during the whole 19^{th} and the early 20^{th} centuries, followed by a sharp decline from the beginning of World War I to the early 1970s. Recent evolutions support the idea of a new increasing trend.

These recent evolutions in wealth concentration seem to appear along with two other features, which are of particular interest to understand the drivers of wealth accumulation.
The first one is the "changing nature of wealth" over time, as it has been pointed out by Piketty and Zucman (2014). While housing was not a major part of private wealth until the early 1920s, it is now striking to notice its importance, particularly from the mid 1990s. The second one is the rise in the inheritances and gifts flow in France (Figure 1) that may lead to a growing share of bequests in wealth accumulation. These elements renew the old concern about the role of intergenerational transmissions in the reproduction of inequality.

Figure 0.0.1: Annual Inheritance Flow as a Fraction of National Income, France, 1820-2008



Source : On The Long Run Evolution of Inheritance, Piketty (2011)

The recurrent discussions about intergenerational inequality sometimes rely on the observation that wealth is mainly held by the elders as a sufficient finding to support conclusions about young generations presented as "sacrified". Nevertheless, several mechanical reasons may explain this wealth inequality between generations. First, since wealth is partly due to accumulation of savings, it is rather natural that the younger households have not yet reached their elders' wealth. Secondly, inheritances arrive later and later in life because of the large rise in life expectancy, which increases the gap between the younger and the older households. These two common explanations have been mainly advanced to explain intergenerational wealth inequality since different cohorts face different housing markets, economic trends, labor market situations, pension rights and bequest legislations during their life cycle. However, it draws also attention to intra-generational wealth inequality because the saving behaviors and the receipt of bequests may dramatically differ within a generation according, for instance, to the socio-economic backgrounds. Interestingly, on British data, Atkinson (1971) already stated that life cycle factors could not completely ex-

plain wealth inequality, showing that inequality within age groups was comparable to inequality across the population.

Since fiscal system has an impact on this inequality, incentives to accumulate (through savings) or transmit wealth (through gifts and inheritances) are repeatedly debated. For instance, recent debates about incentives to subscribe to private pension plans or about bequest taxation are directly related to this question of wealth inequality. Taxation of intergenerational transfers is often considered as an useful tool to reduce inequality between and within generations. As any taxation, this one may have side effects. In a survey of empirical and theoretical literature on taxation of intergenerational transfers, Kopczuk (2012) details the trade-off between reducing wealth inequality thanks to taxation on one hand and economic efficiency on the other hand. Some issues about economic efficiency concern of course the impact of taxation on wealth accumulation and inter vivos gifts, but others are related to the labor supply of recipients. In this perspective, the effect of bequests on retirement or on entrepreneurship is of great interest.

These considerations about wealth concentration raise new questions or put old debated ones on the front stage. The mechanisms of wealth accumulation, its potential effects on economic behaviors are all research questions on the agenda. The three first chapters of this dissertation attempt to shed a light on these topical questions.

First, saving turns out to be a fundamental channel to understand how income impacts wealth inequality. If the rich households save more than the poor ones, large inequality in wealth may appear within the same generation. Even though the aggregate saving rate has remained stable during the last decades in France, this apparent stability in mean may hide huge differences between households.
This question of individual savings rates is the focus of a controversial debate among

economists. The concern is less about the level of savings between households (for which it is clear that the rich save more) but about the share of their income they save. The first chapter attempts to answer this long term question of the link between savings and income. If it is doubtless that households with the highest current income save more, the question of the link between savings and *permanent* income still divides the pro-Keynes and the pro-Friedman economists. Keynes (1936) stated that saving is a luxury good that poor households could not afford. Friedman (1957) objected that saving is overall the outcome of a long-term decision. Households foreseeing a decrease in their income would tend to "smooth" their consumption. From that perspective one should not focus on the link between consumption and current income, but rather between consumption and *permanent* income. The *permanent* income is defined as the actualized sum of expected income excluding transitory shocks. Friedman found no link between saving rate and *permanent* income.

But, so far, evidence remains inconclusive. In France, doubtless because of the lack of suitable data, this question has been scarcely studied. Thanks to a new and rich dataset that combines both fiscal information about households' income and for the very first time information on their consumption behaviors, we assess how saving rates are linked with current income and, above all, with *permanent* income. We document the fact that whatever the definition of income used (current or *permanent*), the more French households earn, the more they save. We then conclude to an increasing saving rate in income, giving more support to the Keynesian consumption function.

Secondly, if it appears obvious that income has a direct link on wealth accumulation through savings, it is also clear that wealth may influence income through several channels. For instance, capital returns are one of them since they constitute an additional source of income. But wealth by itself may also affect directly work incentives and then labor market behavior. In this perspective, the question of gifts and inheritances is of great interest. First, because social justice questions are here at stake: can we consider as fair that some people make a living thanks to inheritances? Sec-

ond, because economic efficiency of wealth transmission is also of interest. Indeed, this is all the more of concern as little is known about how bequests affect economic behaviors such as firm creation or early labor force exit. Bequest taxation is still a hot topic in France. The recent changes in gifts and inheritances taxation [2] emphasized the need for a better understanding of the effect of bequests, particularly on economic behavior, in order to answer some important questions such as: should tax exemptions on gifts be reduced according to the age of the beneficiary or the use of this bequest? Is the receipt of a large bequest the burden described by A. Carnegie[3] to such an extent that governments should avoid people suffering from it? To what extent bequests impact wealth accumulation and labor market decisions is the focus of the two following chapters.

In the second chapter, we study the impact of intergenerational transmissions on two components of households' behavior: Do they lead to a greater propensity to buy a main home and to create or buy out a firm? Using the French Wealth Survey 2009-2010, we show that households who received a gift or a bequest buy their main home more often. For the creation or the buyout of a firm, gifts also exhibit a significant effect while inheritances do not. This latter may arrive too late to favor entrepreneurship. Donations received before 35 years old have a stronger effect on these two outcomes which tends to suggest that early gifts are the most useful ones. The link between gifts and primary residence purchase is also found to be stronger since the rise in the real estate prices that occurred in the 2000s.

In the third chapter, we follow the analysis of the link between inheritance and labor market behavior. We focus on older workers and on the specific effects of inheritance

[2] In 2007 the tax exemption threshold for gifts and inheritances has been set from 50,000 to 150,000 euros. It has been decreased to 100,000 euros in 2012.

[3] "Why should men leave great fortunes to their children? If this is done from affection, is it not misguided affection? Observation teaches that, generally speaking, it is not well for the children that they should be so burdened. Neither is it well for the state. (...) Wise men will soon conclude that, for the best interests of the members of their families and of the state, such bequests are an improper use of their means", Carnegie (1889).

on their labor market exit. Indeed, little is known on the relationship between private wealth and retirement, particularly when public pensions play an important role like they do in the French context, whereas it has crucial implications both for the financing of public pensions and for labor market policies. Here, we use retrospective calendars from the French Wealth Survey and rely on the precise timing of receipt. We find that, for any age between 55 and 65, chances of current labor market exit are 40% higher among individuals who inherit at that age than among individuals who inherit in the next few years. To go further in understanding the effect of inheritance receipt on labor force participation, we develop a model of retirement choice with risk aversion and an endogenous replacement rate and we test its predictions. We show the importance of risk aversion in the labor force exit decision. We find that inheritance receipt triggers current labor force exit because risk averse individuals plan their retirement date according to the certainty equivalent of their bequest, not its expected value.

So, wealth and income are linked with economic behaviors and demographic event such as the death of a relative. Other demographic events may also have huge effects both on wealth and income: unions and disunions. As the number of marriages tends to decrease in France, divorces and separations are more and more frequent. They have large consequences on both ex-spouses, but its economic impact may be very different for each partner. It is well-documented that women generally experience a large decrease in their living standards after union dissolution, whereas men's living standards are often presented as stable or increasing. By raising both poverty and gender inequality, divorce raises important questions: Is women's economic situation more deteriorated than men after divorce? What is the proper effect of divorce on living standards and labor market behavior? Which component of living standard plays the biggest role in the observed variations?

In the fourth chapter, we study the economic consequences of the dissolution of a marital union (marriage or civil partnership). Thanks to a new and very rich admin-

istrative dataset on French couples which broke up their marriage or civil partnership in 2009, this chapter measures and analyses the variations in living standards for men and women, the contribution of the different components of living standards in these evolutions and more specifically the labor market behavior. We focus on divorcees remained single one year after the separation. By matching divorcees to still married spouses who are identical to them on a large range of characteristics, and using a difference-in-differences approach, we are also able to further assess a causal effect of divorce on living standards and on labor market behavior of men and women after divorce.

Our findings show that both women and men support a loss in average, but still of larger magnitude for women (20%) than for men (3%). Contrary to the common belief, they also suggest that custodial status only plays a minor role in the explanation of the large women's impoverishment, probably thanks to important family and welfare benefits targeted to lone parents and large families. We highlight the role played by child support payments and especially public transfers, in mitigating the loss in living standards for mothers. Economic consequences of divorce are above all highly dependent on the share of couple's resources each spouse provides before divorce, resulting mainly from marital specialization. We indeed observe a massive labor market reentry of women who were inactive during marriage, though not sufficient to compensate negative economic consequences of divorce.

Chapter 1

Permanent Income and Savings

Do The French High Income Households Save More? [1]

Abstract

Are saving rates linked with income? This question is crucial from a policy making point of view: are consumption taxes regressive? What effect have taxes on aggregate consumption? Should retirement savings be subsidised?,...

Whatever the country and the period, saving rates proved to be positively correlated with current income. Keynes (1936) stated that saving is a luxury good that poor households could not afford. Intuitively, many people would find obvious that the richer you are, the more you save. But Friedman (1957) objected there are reasons to doubt that this link is that obvious when taken into account the lifetime income. He recalls that saving is overall the outcome of a far-seeing decision. For instance, households who foresee a decrease in their income would tend to *smooth* their consumption, saving first more in expectation of later dissavings. From that perspective one should focus certainly not on the link between consumption and current income, but rather on the link between consumption and *permanent* income. The *perma-*

[1] This chapter is based on a joint work with Pierre Larmarche (Garbinti and Lamarche (2014)).

nent income is defined as the actualised sum of expected income excluding transitory shocks. Friedman found no link between saving rate and *permanent* income.
This controversial result has been widely discussed among economists. If empirical research may have found results rather consistent with Keynes' and shown a positive link between saving rates and *permanent* income, several papers have although enforced Friedman's thesis.

Using French data that combine both fiscal information about households' income and for the very first time information on their consumption behaviours, we estimate the link between saving rates, current income and *permanent* income. To that aim we compute *permanent* income thanks to different methods that have never been used conjointly, which enables us to check for robustness.
Our results suggest that households with high income (whatever current or *permanent* income) also have higher saving rates.

1.1 Introduction

The link between saving rates and income is crucial regarding policy making: what is the effect of taxes on the aggregate consumption - and similarly, which reaction in terms of consumption will induce a tax-cut? Should saving rates vary with income, the effect would vary whether the tax-cut is applied to the poorest or the richest part of the population. Similarly are taxes on consumption (such as VAT) regressive? If propensity for consumption is heterogenous along the income distribution it then could be justified to apply non uniform tax rates with respect to the type of good. The link between consumption and income determines also widely issues on financing retirement savings or on wealth accumulation since heterogeneity in terms of saving rates will induce heterogeneity in terms of retirement savings and more generally in terms of wealth.

As simple as it may sound, this question has been widely discussed among economists during the 20^{th} century and remains one of the most important economic controver-

sies.

Whatever the country and the period, the link between saving rates and current income appears to be positive. According to Keynes (1936), this most consensual result is due to the fact that saving is a luxury good that the poorest households can afford. Nevertheless, Friedman (1957) rejects Keynes' view about saving. He states that saving relies on a far-seeing process, consistently with classical theory. For instance, a household facing an unexpected or transitory increase of its income would not consume all this windfall income and save a significant part of it. For instance, if people expect a low replacement rate when they will retire, they are likely to save more during their working life and dissave when retired in order to smooth their consumption over their lifetime. Consequently current income and saving rates are tied but this obvious fact tells nothing about long run savings. Following Friedman's perspective, saving rates have to be related to *permanent* income, which can be defined as the actualised sum of expected income excluding transitory shocks. Friedman (1957) then shows that there is no significant link between saving rates and *permanent* income.

However it is possible to find reasons for heterogeneous saving rates along the income distribution: differences in terms of life expectancy or time preference between rich and poor households, bequest motives, differences in terms of capital yields... These reasons are described in section 1.2. Friedman's point of view is controversial and empirical results are not consistent with each others. While empirical approach seems to give more credit to Keynes' ideas (Mayer (1966), Mayer (1972), Dynan, Skinner, and Zeldes (2004), Bozio, Emmerson, O'Dea, and Tetlow (2013), ...), other papers enforce Friedman's point of view (Gustman and Steinmeier (1998), Venti and Wise (2000), Alan, Atalay, and Crossley (2006),...). These inconsistent results may reflect national specificities as well as differences in methods and data[2].

While academic research on that topic is active in anglo-saxon countries, papers on French data remain scarce. Masson (1988) and Loisy (1999) show results for current income, and Lollivier and Verger (1999) following King and Dicks-Mireaux (1982) perform an ambitious computation of the permanent income based on a full modelling of life-cycle income. Students' master theses from Paris School of Economics

[2]This issue is discussed in section 2.10.

(Boissinot (2003) et Antonin (2009)) tackle this issue with a simplified computation of the permanent income. All these studies conclude to an increasing saving rate along the income distribution.

This weak number of papers testifies the lack of reliable data combining information on income and consumption. Indeed computation of saving rates may be sensitive to measurement errors that may affect both income and consumption. We use the data from Insee's French Wealth Survey 2010[3] that is matched with tax files, ensuring reliable information on income. We also take advantage of the new module dedicated to consumption in this survey to estimate saving rates. The data contains also very detailed information about careers of households belonging to the survey which eases the computation of the permanent income.

We are then able to use different methods that have so far never been applied conjointly to estimate the link between saving rates and income and so assess the sensitivity of our estimations. Our results are consistent with the previous works on French data and suggest an increasing saving rate along the (current and permanent) income distribution.

1.2 Theoretical models

A two-period life-cycle model is helpful to understand consumption and saving behavior. We consider a representative agent living during 2 periods: she is active during the first period and retired during the second one. At the beginning of the first period, her wealth is zero, she earns an income (net from taxes) Y_1 and consumes C_1. Without credit constraints (assuming everybody can borrow with the same interest rate), her savings' yield is denoted r and so she will get at the beginning of the following period $(Y_1 - C_1)r$[4].

During the second period, she earns a pension denoted Y_2 and consumes C_2. With no incertitude over the life expectancy and no bequest motive, the agent consumes all her wealth. Her time preference is denoted δ. The agent maximises the actu-

[3] Enquête Patrimoine 2010.

[4] Note that if her saving was negative, she has actually to reimburse an amount $(1+r)(Y_1 - C_1)$ during the second period.

alised sum of utilities (depending on her consumption) with respect to her budget constraint:

$$U_1 = U(C_1) + \frac{1}{1+\delta}U(C_2)$$

with respect to:

$$A_2 = C_2 = (1+r)(Y_1 - C_1) + Y_2$$

which might be written as:

$$C_1 + \frac{1}{1+r}C_2 = Y_1 + \frac{1}{1+r}Y_2$$

Permanent income Y^P may be defined as constant income that, once actualised, is equal to the actualised sum of income, *i.e.*:

$$Y^P + \frac{1}{1+r}Y^P = Y_1 + \frac{1}{1+r}Y_2$$

Following one of the central assumptions in life-cycle models with permanent income, the agent tends to smooth her consumption over time. A perfect smoothing leads to $C_1 = C_2 = C^P$ [5] and then:

$$Y^P + \frac{1}{1+r}Y^P = C^P + \frac{1}{1+r}C^P$$

This means that for each period, the agent consumes her permanent income Y^P.

[5] Such a smoothing may be obtained with the first order condition of the maximisation program under budget constraint: $\frac{U'(C_1)}{U'(C_2)} = \frac{1+r}{1+\delta}$. Perfect smoothing then relies on the equality between yield rate r and time preference δ, and $C_1 = C_2$ is due to strict concavity of utility U. Then $\delta = r$ means that agents and financial markets have the same actualisation rate. This classical framework emphasizes the fact that financial markets have to reflect agents' preferences.

Saving rates s_j for a period j are[6]:

$$\begin{aligned} s_1 &= \frac{1}{2+r}(1-\lambda) \\ s_2 &= \frac{1+r}{2+r}(1-\frac{1}{\lambda}) \end{aligned}$$

where λ denotes the replacement rate such as: $Y_2 = \lambda Y_1$.

At each period, saving rates do not depend on the level of permanent income. Since remplacement rate λ is lower than 1, we get $s_1 > 0$ and $s_2 < 0$. In order to smooth her consumption, the agent chooses positive savings at the first period then negative at the second one.
These results are closely related to the assumptions of the model and the modification of some of them leads to completely different conclusions.

Now, if we assume that interest rate is not the same for everybody and that individuals with high income are able to find financial assets with yield r^H above the one r^L which the poorest individuals can access, we then obtain: $s_1^H < s_1^L$ and $s_2^H > s_2^L$. The upper yield enables the richest individuals to save less at the first period and capital income at the second period implies less dissaving.
If the remplacement rate is lower for the richest individuals (λ^H) than for the poorest ones (λ^L) and if we suppose r constant, we obtain the exact opposite result: in order to compensate a relative decrease of their income, the richest individuals will spare more money during the first period and spend more at the second one.
A similar outcome is obtained when assuming a lower preference for the present for the richest: their consumption is then postponed to their retirement time, during which they will consume more than they earn[7].
This simple model with 2 periods can easily be extended to T periods (and even

[6]Here we used the fact that: $s_j = \frac{Y_j - Y^P}{Y_j}$.

[7]If we add to the first order condition ($\frac{U'(C_1)}{U'(C_2)} = \frac{1+r}{1+\delta}$) a utility function $U(C) = ln(C)$, we get $s_1 = (\frac{1}{2+\delta})(+\frac{1+\delta}{1+r}\lambda)$ and $s_2 = 1 - (\frac{1}{2+\delta})(1 + \frac{1+r}{\lambda})$. Therefore if $\delta^B > \delta^H$: $s_1^B < s_1^H$ and $s_2^B > s_2^H$. Dynan, Skinner, and Zeldes (2004) obtain a similar result using an isoelastic utility function $U(c) = \frac{C^{1-\gamma}-1}{1-\gamma}$ and applying numerical simulations.

infinite number of periods). Former results remain valid in that case.

Furthermore it is possible to introduce uncertainty over the level of income or over medical expenditures that occur at the end of life. This leads to a very different and even more controversial conclusion: Dynan, Skinner, and Zeldes (2004) showed that in such a situation the poorest are those who spare the most so to address the risk of a lower income. Even if this result comes from a simple modification of the standard model, this point of view is, as far as we know, not considered as serious neither in empirical literature nor in the theoretical one.

The modification of other assumptions leads to higher saving rates for the richer individuals. This is the case, for instance, if we introduce a taste for wealth (including wealth in the utility function (Carroll (1998)) or a bequest motive (either considering inheritance as a luxury good or assuming "dynastic" behavior for rich households who anticipate a lower permanent income for their children and conversely, as in Fan (2006) or De Nardi (2004)).

Interestingly, Blau (2015) studying the effect of pension plans on household saving, shows that the crowd-out of private saving by public and private pensions depends dramatically on plans characteristics and that all pension plans are not valued the same by households.

So, outcomes of the theoretical models may vary considerably, depending on assumptions. The question of the spread of saving rates according to the level of income then remains overall an empirical question which may have major implications in terms of public policies. There exists no unique and perfect way of computing what permanent income is. It justifies the use of several approaches to solve this issue (*cf.* section 1.4).

1.3 Data

1.3.1 The French Wealth Survey

We mostly rely on the French Wealth Survey, wave 2010. This survey has several advantages. For the first time in a French survey dedicated to assets and income, part of the questionnaire deals with consumption. This allows to link saving and income. The French Wealth Survey has also been matched with tax return files since 2004. Therefore very reliable information about households' income is available. This is particularly crucial since saving is computed as the difference between income and consumption which makes saving rates highly sensitive to measurement errors. The professional history of the head of the household[8] and his potential partner is also available. The age of the end of studies, the beginning of active life, periods of unemployment, health troubles, inactivity periods (after a child's birth for instance) are also reported. Detailed information about housing and rents paid by tenants enables the computation of imputed rents for owners, which is necessary when studying saving rates (*cf.* appendix 1.C).

1.3.2 Estimating non-durable consumption

For the first time, a questionnaire dedicated to consumption habits has been submitted to one third of the sample of the survey. This questionnaire has been elaborated following the guidelines from Browning, Crossley, and Weber (2003). They show that interrogation of households with expenditure diaries is not necessary to obtain an accurate estimation of total consumption when detailed information about expenditure is available in another survey. This methodology has first been proposed by Skinner (1987) who used the Consumer Expenditure Survey in order to estimate total consumption for households belonging to the Panel Study of Income Dynamics. More recently, Blundell, Pistaferri, and Preston (2004) developed a similar methodology in order to analyse the evolution of consumption in this survey over a long period of

[8]Head of the household is defined as the main income earner regardless her or his gender.

time. Browning, Crossley, and Weber (2003) exhibit a list of sub-items with strong explanatory power: food at home and away, utilities paid by the households (water, gas, electricity...). Moreover, the consumption module contains information about several types of expenditures: clothing, transportation, vehicles, health, school or childcare, services at home, culture, ...

The use of the Household Budget Survey 2006 then enables to estimate an equation that links non-durable consumption and the different sub-items of consumption, and apply the obtained coefficients on the French Wealth Survey in order to obtain the consumption for the households that have answered to the consumption module. Using equivalent concepts of consumption, saving rates that are obtained through this method are close to those given by National Accounts. The method is described precisely in appendix 1.A.

Total consumption excludes here durable goods. Indeed households do not have to answer about their expenditures over the past year for durables goods such as cars, fridges,... It is not an easy task to include durable goods in the analysis of saving rates since these goods are more comparable to a stock than a consumption flow [9]. Empirical work focuses rather on the saving rate *excluding durable consumption*. We follow this approach which turns to be the most stable one. However we present results obtained with the estimation of durable consumption in the appendix 1.A as a robustness check. It shows no change in our conclusions.

1.3.3 Descriptive statistics

We focus on median saving rates. While the mean does not fit the analysis of an heterogenous indicator such as saving rates, the median does and proves to be robust to extreme values due for instance to measurement errors.

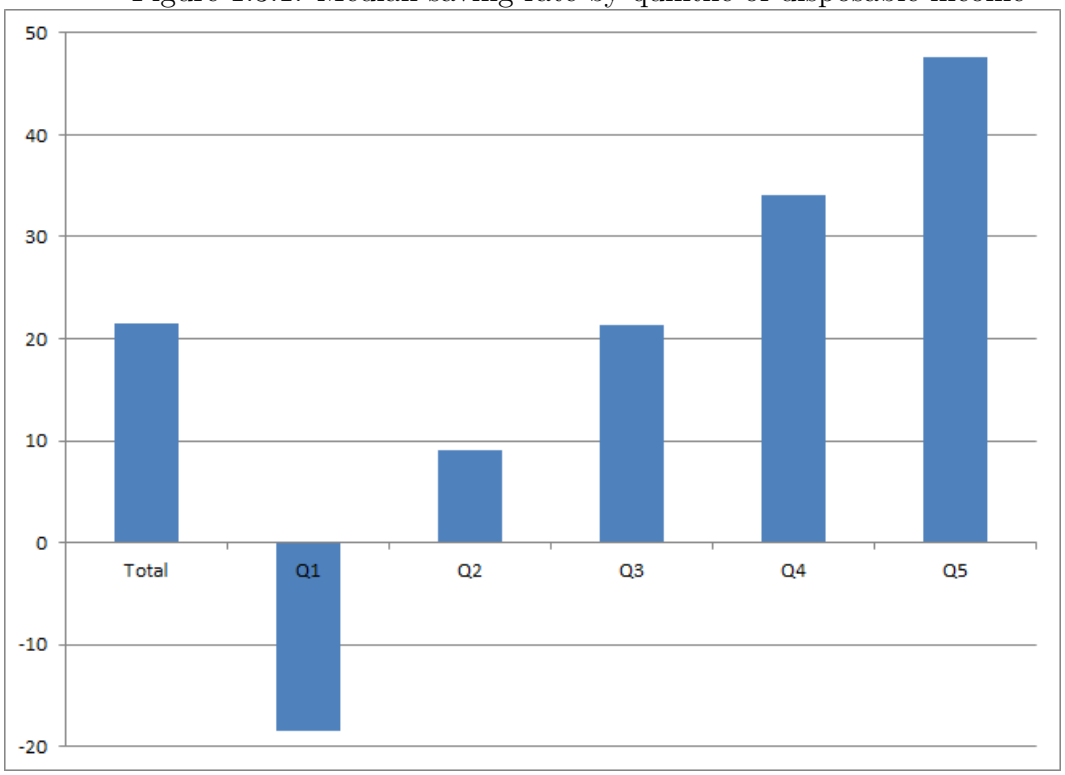
As expected, saving rates increase with current disposable income (*cf.* figure 1.3.1). It is consistend with the break downs of National Accounts (*cf.* Accardo, Bellamy,

[9] Indeed expenditures for durable goods are rather exceptional and consequently it is tough to set up the number of year over which such expenditures has to be smoothed. For example, buying a car happens scarcely every year. Which period of time should we choose to allocate such a purchase: 2 years? 5 years? 10 years?

Consalès, Fesseau, Le Laidier, and Raynaud (2009)). We exclude from our sample households with yearly disposable income less than EUR 2,000. Hence we put aside outliers whose income are poorly measured. Despite this, median saving rate for the first quintile of disposable income remains negative. Other sources of information show that negative saving rates (relative to current income) are widely spread among the population. In 2010, according to EU-SILC data, 19% of households reported that their income could not cover all their expenditure.

Dissaving episode may happen during lifetime when current income are particularly low and appear to be less than expected or previously earned by the household. Dissaving may then be seen as a way of smoothing over time a transitory low income. If this assumption is right then negative saving rates for the first quintile of income should become positive or at least zero thanks to the use of permanent income instead of current income. Indeed this is the case since the different methods all show median saving rates for the first quintile slightly positive (*cf.* section 1.5.2).

Figure 1.3.1: Median saving rate by quintile of disposable income

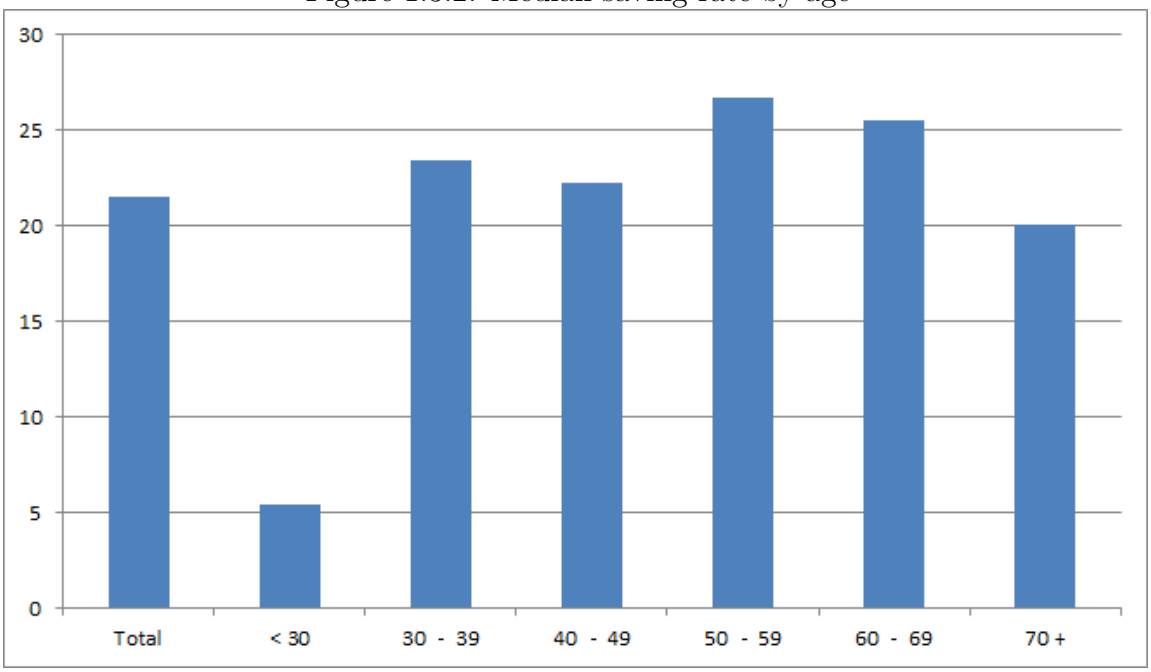


Disposable income (€) : p20 = EUR 16 600, p40 = EUR 23 700, p60 = EUR 32 800, p80 = EUR 45 700
Source: French Wealth Survey 2010, households with yearly disposable income > 2 000 €

Median saving rates broken down by age do not follow any particular pattern (*cf.*

figure 1.3.2). However median saving rates for households with reference person less than 30 is lower than for the other age categories and a slight decrease appear for older households.

Figure 1.3.2: Median saving rate by age



Source: French Wealth Survey 2010, households with yearly disposable income > 2 000 €

1.4 Empirical approach: from current to permanent income, five different strategies

Our main approach relies on the following equation:

$$\frac{S}{Y} = f(Y^P) + X\beta + u$$

where S and Y respectively denote household savings and its current income as observed at the moment of the survey, Y^P permanent income, X covariates (such as age) and u an error term. Savings S are computed as the gap between income and consumption ($S = Y - C$). When age is used as a covariate, quintiles of income are computed within each age class.

In order to approximate the permanent income Y^P, we use five methods which so far have never been used conjointly.

Method 1: Subsetting the sample

The easiest method is definitively the one used for instance by Carroll (1998). This method aims at excluding the households who have faced a transitory evolution of their income. Carroll uses a very simple question about particularly high, low or normal income for the past year. Only households with normal income are kept in the sample and then current income for these households is assumed to be equal to the permanent one. This method is pretty much consistent with permanent income such as defined by Carroll: *"the annual income that a household would receive if there were no transitory shocks to income"*. This method turns out to be quite rough but enables to exclude households with exceptional variation of income.

Following this idea, we use a question in the French Wealth Survey asking households whether they earned exceptional amounts of money during the year. We restrict the sample to households without any exceptional income. Permanent income is then identified with current disposable income[10]. This first method is less sophisticated than the one used by Carroll (1998) because we do not exclude households who faced an unexpected decrease of their income. This is hence a very first assessment that needs to be completed.

Method 2: level of education as a proxy for permanent income

Empirical literature often uses an "instrument" to approximate permanent income. Such an instrument is a variable that has to be strongly tied to permanent income, but not to transitory shocks on income that may occur during a lifetime. It should also have no effect *per se* on saving behavior (independently of the effect through permanent income). The most commonly used method consists of using the level of

[10]Disposable income is defined as the sum of labour income, retirement income, social benefits and capital income, net from taxes (various income taxes, housing taxes)

education. Indeed education level, once reached, is a very stable component of human capital and therefore of income that one can expect during his lifetime. As such, level of education is not linked to transitory evolutions of income. Since information about level of education is usually collected through surveys, this is a very convenient and wide-spread method used for instance in Mayer (1966), Dynan, Skinner, and Zeldes (2004), Alan, Atalay, and Crossley (2006). However, if level of education is strongly correlated with permanent income, it could also be linked to saving behavior. Indeed persons with the highest level of education might also be the ones with the highest saving rates[11]. This does not invalidate conclusions obtained thanks to this method, but may lead to a slightly more subtle interpretation: the method would highlight the link between saving behavior and level of education, with level of education still strongly correlated with expected income.

With this two-step method, we first regress current disposable income over a function g of the instrument and dummies for age classes.

$$Y_i = \alpha + g(Instrument_i) + X_i\beta + v_i$$

The function g is set as the combination of the level of education for the head of the household and her or his partner. Levels of education are gathered in five categories. Once current income is regressed, we use the estimated parameters to compute a predicted income for each household. This prediction is the proxy for permanent income. Consistently with method 1, the estimation is run over the sample excluding the households with exceptional income.

Method 3: Use of income for years N-1 and N-2

When panel data are available, it is possible to average past (or even future) income. The underlying idea that the longer the period of observation, the weakest the correlation between transitory shocks and average income, which in this case may be

[11] because, for instance, they would have lowest preference for present.

considered as permanent income. This method has been implemented for example by Mayer (1972) and Dynan, Skinner, and Zeldes (2004). Although appealing, this method has been hardly ever used, mainly because of the difficulty of getting panel data.

The matching between the French Wealth Survey and tax files enables us to use fiscal income for the two years before the fieldwork for 97% of households in the sample. We use this information by averaging income over three years. Friedman (1957) was stating that households' outlook seemed to be forecast to about three years[12]. In order to identify properly this mean as the permanent income, we adopt a two-step approach. First, households whose income in 2009 is higher or lower than 20% of the 3-year average are excluded. Such households stand for 25% of the sample (*cf.* table 1.4.1). Only households with stable income are then kept in the sample. For these households the mean income over three years appears as a good approximation for permanent income. Fiscal income is not exactly disposable income (in particular social benefits are missing and taxes not substracted). To rescale it to disposable income, we assume that the ratio between disposable income and fiscal income in 2009 is constant over the two previous years. This assumption is all the more acceptable as these households have by definition a stable income. Then, the average over the three years is multiplied by this ratio.

Method 4: average of income instrumented by level of education

[12] *"A horizon of about three years seems to have characterized the outlook of consumer units, though it should be noted that the results are not very sensitive to the length of the horizon"*. We are by the way very grateful to the anonymous referee who provided us with this statement in Friedman (1957).

Table 1.4.1: Distribution of ratio $\frac{Mean(fiscal\,income\,2007\,to\,2009)}{fiscal\,income\,2009}$

p10	p25	p50	p75	p90
-0.24	-0.09	- 0.02	0.03	0.217

Note: The variation between fiscal income in 2009 and the mean for fiscal income between 2007 and 2009 is less than -24% for 10% of the households; for 10% of households, it is more than 22%.

We combine methods 2 and 3. So, we compute predicted average income by regressing the average income from fiscal earnings by the level of education, following the same methodology as previously.

Method 5: computation of a permanent income over the whole life cycle

One last and more sophisticated method consists of computing directly the permanent income thanks to income equations. This method has been used for instance by King and Dicks-Mireaux (1982) and improved by Lollivier and Verger (1999). It enables to smooth income over the whole life cycle. The method implemented by Lollivier and Verger (1999) is particularly rich since it combines numerous elements such as anticipations of individuals about their career, variations of income due to retirement or even difference in labour market participation between men and women.

Our last method is widely derived from this approach. As a consequence we follow the main guidelines from Lollivier and Verger (1999), but we update the specifications for some models and combine new sources of information in the computation. If the intuition behind this method is quite simple, its implementation requires numerous steps. Details of the computation is exposed in appendix 1.B. Please report to Lollivier and Verger (1999) for a complete justification of each step. We will here present quickly the main ideas and explain the intuitions.

The starting point is the computation of the permanent income Y^P for each individual, defined as the constant flow of income which, once actualised, corresponds to the actualised sum of income earned over the lifetime. We extend the 2-period model exposed in section 1.2 to T periods from beginning of active life to death. We have:

$$Y^P = \frac{\sum_{a=a_1}^{a_2} \frac{R_i(a)}{\prod_{t=a_1}^{a} [1+\rho(t)]}}{\sum_{a=a_1}^{a_2} \frac{1}{\prod_{t=a_1}^{a} [1+\rho(t)]}}$$

where a stands for age, a_1 age at the beginning of active life, a_2 age at death, $\rho(t)$ actualisation factor corresponding to real interest rate for year t corresponding to age a and $R_i(a)$ the income trajectory that depends on age a.
For each individual it is thus necessary to compute the different elements in this formula.

The age at the beginning of active life a_1 is directly known thanks to the questionnaire of the French Wealth Survey which contains precise questions about the age at the end of school, the beginning of professional life, etc. Age at death is imputed thanks to mortality tables[13].
Rates of return are those computed by Piketty (2010) so to reflect yields that households may expect. For the future part, these series have be extended with the average yield as observed over the last 20 years: 6% [14].

Following Payen and Lollivier (1990), income trajectory R_i[15] is decomposed into two terms: $R_i(a) = s(t).Y_i(a)$.
$s(t)$ stands for the general index of wages for year t; it enables to take into account the evolution of equalized income for all the wage earners during a given year. It is computed thanks to the evolution of wages. Finally, $Y_i(a)$ denotes the pattern of income for the individual i at age a. It depends on the age of the individual and reflects the effect of human capital and its evolution through lifetime. It is modeled so:

$$ln\, Y_i(a) = X_i\beta + c(a_i) + q_i + u_i$$

X_i stands for the initial stock of human capital (level of education, social status of the parents) and its evolution (career, health troubles, short or long unemployment periods, status in employment, either in the public or private sector). $c(a_i)$ is the effect of age[16], it is modeled as a spline function and a dummy for retirement

[13] We use the tables by Blanpain and Chardon (2011) which have the advantage to be recent and are broken down by gender and 7 social categories.
[14] Other methods have been tested without any significant change in our conclusions (*cf.* appendix 1.B).
[15] in constant euros 2009.
[16] It is assumed to remain the same for every individual for a given level of education.

that is instrumented to address possible endogeneity of the decision to retire. q_i is the term standing for unobserved heterogeneity [17] and $u_{i,t}$ is the error term.

The estimation is made for households where male partner is a wage earner. Indeed the difficulty to follow properly the income of self-employed, to distinguish their transitory income from their expected income or even to compute a general index for their income leads us to exclude them from the sample. Moreover we exclude complex households where other persons than the head of the household and her or his possible partner bring back income (children working on a short term basis, old parents living with their children,...) because it is cumbersome to estimate a proper permanent income for these individuals. They represent 10% of the sample.

The sample is stratified according to gender and level of education. [18] This enables the estimations to vary according to the level of education and leads to different yields with regards to the level of education.

The computation of the equation of income for women is slightly more complex since it is necessary to take into account the decision to participate in the labour market and stops due to children. This brings us to consider different sub-groups and address for potential selection effect. Interested readers may find all relevant technical details in appendix 1.B. Once permanent income is estimated for men and women, both are combined to computed permanent income for the household.

For each member of the household, the estimations of permanent income are made with individual data from fiscal income declaration. It is thus a *fiscal* permanent income. To this regard, it does not include social benefits, capital income or exclude taxes and is not then fully comparable to disposable income. We impute these elements to get a permanent disposable income (*cf.* appendix 1.B).

[17] q_i is estimated with $\widehat{q_i} = \alpha\widehat{\zeta_{i,t}}$ (which is the estimator of minimal variance), with $\alpha = \frac{{\sigma_q}^2}{{\sigma_q}^2+{\sigma_u}^2}$ and $\zeta_{i,t} = q_i + u_{i,t}$. In order to estimate this coefficient α, we need external data. Thus we take the estimation given by Barge and Payen (1982) which enables α to vary with age.

[18] We define 4 levels of education for each of the 4 cohorts we distinguish in the sample.

1.5 Results

1.5.1 Saving rates increase with current income...

We eventually find classical results from empirical literature (*cf.* table 1.5.1): median saving rate increases significantly with quintile of current income. Regressions shown here are median regressions where saving rate is the dependent variable and covariates are dummies for quintiles of current income and for age classes. In order to ease interpretation of results, regressions are estimated without any constant and include dummies for every quintile.

If we do not take into account age in the regression (left column), median saving rate (excluding durables from consumption) for households in the second quintile of income[19] is 4.3%. It is significantly higher thant saving rate for households in the first quintile of income. When controlling by age, median saving rate for households in the second quintile of income and whose reference person is between 41 and 65 is 7.9%. It is significantly higher than median saving rate for households in the first quintile of income. Median saving rates in the last two quintiles are each of them significantly higher than the one in the quintile just below. Age effect turns to be also significant: median saving rate for younger and older households are lower.

With French data from the Household Budget Survey, Antonin (2009) and Boissinot (2003) get similar results with saving rate slightly lower for the wealthiest households. Exception made for age effect, these results are also very close to those found by Dynan, Skinner, and Zeldes (2004). With a comparable definition of saving (*i.e.* income minus consumption), they get a median saving rate ranging from -22.7% for the poorest households to +45.5% for the wealthiest ones. The gaps between median rates according to quintile of income are also comparable with those shown by Bozio, Emmerson, O'Dea, and Tetlow (2013) on English data. For years 2007 to 2009, they estimate the gap between median saving rates for households in the first quintile and for those in the second one to be 19%, between the first and the third quintiles 30%,

[19] Properly speaking, households in the second quintile of income are households whose income is included between the first and the second quintiles of income. We use this shortcut in the following text in order to lighten the presentation.

between the first and the fourth 31% and finally the first and the fifth 51%. Correspondingly, our results lead to gaps of 24%, 36%, 49% and 61% and thus appear to be slightly stronger. Their shorter range of variations may be explained by the fact that Bozio, Emmerson, O'Dea, and Tetlow (2013) take into account not only age but also household structure.

Table 1.5.1: Saving and current income (median regression)

Quintile 1	-19.5^{***}	-14.4^{***}
Quintile 2	$4.3^{\bullet\bullet\bullet}$	$7.9^{\bullet\bullet\bullet}$
Quintile 3	$16.7^{\bullet\bullet\bullet}$	$18.0^{\bullet\bullet\bullet}$
Quintile 4	$29.4^{\bullet\bullet\bullet}$	$30.7^{\bullet\bullet\bullet}$
Quintile 5	$41.0^{\bullet\bullet\bullet}$	$43.9^{\bullet\bullet\bullet}$
Age		
< 41		-5.1^{**}
41 to 65		Ref.
> 65		-4.5^{***}
# obs.	4,467	4,467

Saving rate (with durables excluded from consumption)

H0

Coeff = 0: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Median saving rate for q_j¿ median saving rate q_{j-1}: $^{\bullet\bullet\bullet}p < 0.01$, $^{\bullet\bullet}p < 0.05$, $^{\bullet}p < 0.1$

Lecture: If age is not taken into account, median saving rate for households in the second quintile is 4.3%. It is significantly higher than the one for households in the first quintile.

1.5.2 ... and with permanent income

We focus now on the link between saving rate and the several measures of permanent income that we have implemented (*cf.* table 1.5.2). Whatever the method, we find a positive link between income and saving rate. Exception made of specification (1), median saving rates for the poorest households turn out to be positive (specifications (2) and (4)) or zero (specification (3), with a median saving rate not significantly different from zero). This confirms that exclusion of households with exceptional income (specification (1)) is quite rough and needs to be improved with other specifications. The use of level of education tends to smooth saving rates and reduce the gaps. Such an effect is expected since level of education and age enable to get rid of a major part of individual heterogeneity.

Median saving rate for households in the fifth quintile and whose head of the household is between 41 and 65 changes from about 45% (specifications (1) and (3)) to 35% (specifications (2) and (4)). The conclusion still holds and saving rates keep on increasing with permanent income. Regarding age, saving rates for the oldest are lower while, for the youngest, they turn out to be not significant in the 3 specifications out of 4.

Antonin (2009) and Boissinot (2003) find on French micro-data similar results about the link between saving rate and permanent income, although figures appear to be sensitive to methodological choices for estimating permanent income in Boissinot (2003). On English data, Bozio, Emmerson, O'Dea, and Tetlow (2013) come to the same conclusion with instrumentation by level of education, though they find a less wide gradient for saving rates. For the comparable period (2007-2009), they get a 5 points gap between the saving rates of the first and last quintiles of permanent income. We have a 25-30 points gap. This could be due to the fact that schooling is a less strong determinant for the professional career in the United Kingdom that it is in France (*cf.* for example Baudelot and Establet (2009)). On our French sample, those who are more than 65 have lower saving rates than the others. For these authors, people who are more than 80 have particularly high saving rates: 24 points higher than the 20-29 ones and 18 points higher tan the 40-49 ones. Nevertheless, they control for type of household and year and do not compute quintiles of income by age group. The coefficients for these controls are not in the tables and it is then hardly possible to compare exactly their results with ours.

Results from Dynan, Skinner, and Zeldes (2004) are particularly close to ours. They implement a slightly different method that consists of regressing directly saving rate on level of education. The table 1.5.2 does not give results for such a method, but table 1.5.3 enables to compare our results with those by Dynan, Skinner, and Zeldes (2004)[20]: median saving rates range for Dynan, Skinner, and Zeldes (2004) from 16%

[20]We compare in this case results from table 1.5.3 to those of the first column out of table 6 in Dynan, Skinner, and Zeldes (2004) for which methods are the same.

to 34% while ours are between 13% to 32%.

Recent work from Gandelman (2015) on Latin American data yields similar conclusions over 14 countries. His main results are not directly comparable with ours since he uses the head of household's partner level of education as an intrument.

Table 1.5.2: Saving and permanent income: 1^{st} approaches

	(1) Without any except. income	(2) Instrumentation by education	(3) Mean fiscal income	(4) Mean fiscal income instrumented by education
Quintile 1	-14.4^{***}	4.2	3.3	11.2^{***}
Quintile 2	$8.2^{\bullet\bullet\bullet}$	7.6	$13.8^{\bullet\bullet\bullet}$	14.7
Quintile 3	$18.0^{\bullet\bullet\bullet}$	$23.3^{\bullet\bullet\bullet}$	$23.5^{\bullet\bullet\bullet}$	$24.9^{\bullet\bullet\bullet}$
Quintile 4	$31.3^{\bullet\bullet\bullet}$	$29.6^{\bullet\bullet\bullet}$	$33.2^{\bullet\bullet\bullet}$	$30.4^{\bullet\bullet\bullet}$
Quintile 5	$44.0^{\bullet\bullet\bullet}$	$34.2^{\bullet\bullet}$	$41.6^{\bullet\bullet\bullet}$	$35.8^{\bullet\bullet\bullet}$
Age				
< 41	-5.1^{**}	-3.7	-3.0	-3.3
41 to 65	Ref.	Ref.	Ref.	Ref.
> 65	-4.7^{***}	-8.0^{***}	-9.8^{***}	-10.0^{***}
# obs.	4,361	4,361	3,220	3,220

Saving rates excluding durables

H0

Coeff = 0: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Median rate for q_j¿ Median rate for q_{j-1}: $^{\bullet\bullet\bullet}p < 0.01$, $^{\bullet\bullet}p < 0.05$, $^{\bullet}p < 0.1$

Sample: households without any exceptional income

Lecture: If we restrict the sample to households without any exceptional income, median saving rate for the wealthiest is 44%. It is significantly higher than the one for households with lower income. Median saving rate for the wealthiest households is 41.6% if we take as the measure of the permanent income the average over 3 years of the income.

Results in table 1.5.2 are obtained over the total sample, whatever the profession of the head of the household. Indeed the head of the household may be wage earner, retired formerly wage earner, self-employed or retired from self-employment. However income for self-employed are known as less well measured and their saving behaviors may be difficult to be assessed. We then have reproduced our results by subsetting the sample to households with a head of the household wage earner or retired one. (*cf.* table 1.5.4, column (1) to (4)). Our conclusions prove to be robust to this restriction and median saving rates keep on increasing with quintile of permanent income.

Table 1.5.3: Saving and level of education of the reference person

	All	Wage earners only
No diploma	12.9^{***}	14.7^{***}
Brevet, BEPC, CEP	$15.7^{\bullet\bullet\bullet}$	$15.5^{\bullet\bullet\bullet}$
Bac, BEP, CAP	$22.0^{\bullet\bullet\bullet}$	$21.9^{\bullet\bullet\bullet}$
Bac +2 to +4	$25.4^{\bullet}$	$26.4^{\bullet\bullet}$
>Bac +4	$31.8^{\bullet}$	$33.5^{\bullet}$
Age		
< 41	-7.8^{***}	-6.8^{***}
41 to 65	Ref.	Ref.
> 65	−0.3	0.6
# obs.	4,361	3,253

H0

Coeff = 0: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Median rate for $level_j$¿ Median rate for $level_{j-1}$: $^{\bullet\bullet\bullet}p < 0.01$, $^{\bullet\bullet}p < 0.05$, $^{\bullet}p < 0.1$

Sample: households without any exceptional income

Lecture: The median saving rate for households whose reference person' s level of education is BAC+2 to BAC+4 is 25.4%. It is significantly higher (for a level of 10%) than for households whose reference person's level of education is BAC, BEP, CAP.

These results where the sample is subset to wage earners and former wage earners present a second advantage: they are more easily comparable to those obtained with our computation of permanent income over the life cycle. Column (5) of table 1.5.4 corresponds to the regression of the saving rate over quintiles of permanent income computed over the life cycle (*cf.* section 1.4 and appendix 1.B for more details on computations). This new method leads to an identical conclusion than previously stated. Median saving rates for each quintile are significantly higher than the one for the quintile just below. The different results are summarized by figure 1.5.1.

Table 1.5.4: All estimations (wage earners and former wage earners)

	(1) Without any except. income	(2) Instrumentation by education	(3) Mean fiscal income	(4) Mean fiscal income instrumented by education	(5) Computed Life Cycle income
Quintile 1	-13.8^{***}	2.8	4.2	9.7^{**}	0.0
Quintile 2	$8.9^{\bullet\bullet\bullet}$	9.0	$14.8^{\bullet\bullet\bullet}$	$16.6^{\bullet}$	$16.7^{\bullet\bullet\bullet}$
Quintile 3	$18.7^{\bullet\bullet\bullet}$	$22.2^{\bullet\bullet\bullet}$	$23.0^{\bullet\bullet\bullet}$	$24.3^{\bullet\bullet\bullet}$	$23.9^{\bullet\bullet\bullet}$
Quintile 4	$31.4^{\bullet\bullet\bullet}$	$30.4^{\bullet\bullet\bullet}$	$32.8^{\bullet\bullet\bullet}$	$30.6^{\bullet\bullet}$	$30.1^{\bullet\bullet}$
Quintile 5	$41.7^{\bullet\bullet\bullet}$	$34.9^{\bullet\bullet}$	$39.3^{\bullet\bullet\bullet}$	$35.2^{\bullet\bullet}$	$40.6^{\bullet\bullet\bullet}$
Age					
< 41	-4.0^{*}	-3.0	-2.7	-3.1	0.9
41 to 65	Ref.	Ref.	Ref.	Ref.	Ref.
> 65	-3.8^{**}	-5.5^{***}	-7.0^{***}	-7.8^{***}	-3.9^{*}
# obs.	3,253	3,253	2,496	2,496	2,074

Saving rates excluding durables

Sample: wage earners and former wage earners

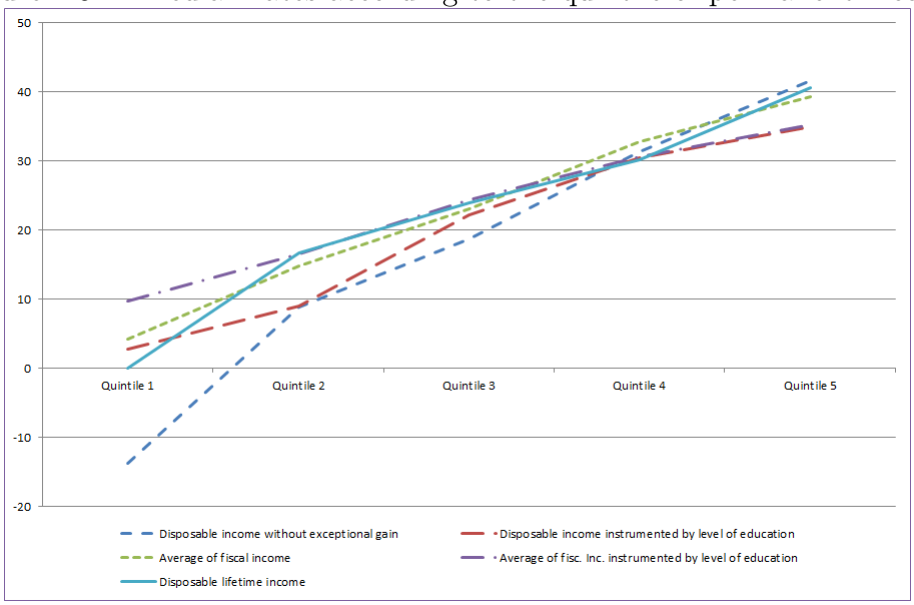
H0

Coeff = 0: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Median rate for q_j¿ Median rate for q_{j-1}: $^{\bullet\bullet\bullet}p < 0.01$, $^{\bullet\bullet}p < 0.05$, $^{\bullet}p < 0.1$

Lecture: If we subset the sample to households without any exceptional income and whose reference person is or was a wage earner, the median saving rate for the wealthiest is 41.7%. It is significantly higher than the one for poorer households. the median saving rate for the wealthiest households is 39.3% when taking the average over 3 years of the income as a measure of permanent income.

Figure 1.5.1: Median rates according to the quintile of permanent income



Sample: wage earners or former wage earners

1.6 Conclusion

Thanks to the French Wealth Survey 2010 and to the new module on consumption, we are able to combine five different methods to shed a new light on a quite old and sometimes controversial debate. All these different methods lead to the same conclusion: households with the highest permanent income save a more important share of their income than poorer ones.
These results are consistent with those previously obtained through the few existing works on French data and also with the majority of studies on foreign data. However some other papers (essentially using US data) have concluded the absence of this increasing saving rate.

These differences may overall reflect national specificities more than differences in methods or data. This argument is consistent with Bozio, Emmerson, O'Dea, and Tetlow (2013). They find similar results on UK data but conclude to absence of link between saving rates and permanent income on US data (consistently with Gustman and Steinmeier (1998) and Venti and Wise (1998)). Data, periods, cohorts or methods would not then be the sole reason for discrepancies between results but rather national specificities which may induce different saving behaviors. For instance differences in confidence in the future, in the will of wealth transmission to heirs or in the valuation of public and private pension plans may play an important role in the anticipation of households and in their long-run behavior.

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Appendix

1.A Estimation of consumption

Estimating households' consumption, something new in the French Wealth Survey 2010

In order to estimate consumption, we use the module of the survey dedicated to consumption. This module has been submitted to one third of the sample of the survey, according to a random selection of the households. These households have answered a questionnaire in which they had been requested to describe their consumption during the past year. Thanks to this questionnaire, we have at our disposal expenditure for three precise sub-items of consumption: food consumption at home, food consumption outside and utilities (also defined as expenditures regularly billed): heating, water, telecommunication... Households also have to answer whether or not they made regular expenditures for other sub-items, such as clothing, public transportation, cultural life...

It then becomes possible to compute total consumption using these sub-items as proxies for total consumption. Indeed Browning, Crossley, and Weber (2003) show that it is not necessary to collect a comprehensive list of sub-items to approximate properly total consumption. We assume that consumption of a given good x_i follows a Engel-curve specification:

$$x_i = \alpha_i + \beta_i x + u_i$$

where x is total consumption and u_i a residual. Conditionally to the fact that for each good x_i, the related coefficient β_i is strictly positive[21], we can write for B goods and an arbitrary set of weights $(\omega_1, ..., \omega_B)$:

$$x = -(\sum_{i=1}^{B} \alpha_i \frac{\omega_i}{\beta_i}) + \frac{\omega_1}{\beta_1} x_1 + ... + \frac{\omega_B}{\beta_B} x_B - (\sum_{i=1}^{B} \frac{\omega_i}{\beta_i} u_i)$$

This equation can be estimated with OLS. We use data from French Household Bud-

[21] This Engel's assumption is confirmed on French data by Clerc and Coudin (2010).

get Survey (Hereafter HBS) 2006 which gives accurate information on households' expenditure following the Eurostat COICOP classification. This classification enables us to reconstruct sub-items described in the module on consumption and to estimate an equation that links total consumption (excluding durables) with these sub-items.

In our main approach, we exclude consumption of durable goods. Several reasons justify this choice: first, durables are considered as assets in the French Wealth Survey and consistently are not classified as a flow but as a stock . Moreover, Browning and Crossley (1999) show that consumption of durables is more sensitive to temporary shocks on income than consumption of non durables.

Sub-items used in the estimation are: food consumption at home, food consumption outside and utilities. We use a 3-degree polynomial specification (to improve the power of explanation of our model and relax specification constraints). We also include 8 dummy variables for some regular expenditures (clothing, public transportation, ...). To build these dummies from the HBS, we assume that the regularity reported in the "consumption module" of the French Wealth Survey (FWS) is correlated with expenditure amount reported in the HBS. For instance, in the "consumption module", half of the households report they have regular expenditure for clothing. We consider that households with expenditure for clothing over the median in HBS have regular expenditure. The equation obtained on HBS data is fairly predictive since R^2 reaches 0.78 (*cf.* table 1.A.1).

Finally we estimate the log consumption and use stratified hot-deck imputations to allocate error terms computed on HBS data. This solution addresses potential heteroskedasticity. The implemented stratification is based on the quartiles of food consumption (at home and away), the quartiles of expenditures for utilities, the status of tenure (owner, tenant or free use) and the quintiles of disposable income. All in all, the stratification encompasses 240 classes.

When durables are excluded, following COICOP classification, total consumption

combines:

- Food and non-alcoholic beverages (01)
- Alcoholic beverages, tobacco and narcotics (02)
- Clothing and footwear (03)
- Housing, water, electricity, gas and other fuels (04)
- Routine maintenance of the house (056)
- Health (06)
- Transport (07) excluding vehicle purchase (071)
- Communications (08)
- Cultural life (094, 095, 096 and 097)
- Education (10)
- Restaurants and hotels (11)
- Miscellaneous goods and services (12)

Assessment of the estimation of total consumption

The OLS estimation of the model on HBS data is associated with a 78% R^2 (see table 1.A.1). This result is comparable with those obtained by Browning, Crossley, and Weber (2003) on Italian and Canadian data (between 56% and 79%).

Table 1.A.1: Explanatory power of the model

	R^2
Comprehensive model	0.78
x_a	0.39
x_r	0.36
x_f	0.32
$(\mathbb{1}_{x_1}, ...\mathbb{1}_{x_8})$	0.48

In 2009 National Accounts evaluate households final consumption expenditure to 1,058 billions euros (current, ESA 2005). We need to subtract expenditure for durables that total 99 billions euros over the same period. Similarly National Accounts take account of insurance services (36 billions), FISIM (13 billions) and estimate imputed rents for home-owners (151 billions). These expenditures are included neither in the French Wealth Survey nor in the HBS. We substract them from the households final consumption expenditure to get a total consumption consistent with the concept in the surveys. It reaches 759 billions.

After imputation of consumption in the French Wealth Survey[22], we find that total expenditure for consumption represents 754 billions euros. This figure has been computed over the 4,519 households that have answered the module on consumption. The coverage rate of consumption is about 90% (*cf.* table 1.A.2).

Table 1.A.2: Average consumption and disposable income in 2009 according to National Accounts and the French Wealth Survey 2010

	Average consumption	Average disposable income
National Accounts	38,200	45,700
Including: Durable goods	3,600	-
Imputed rents	5,500	5,500
Insurance services	1,300	1,600
FISIM	500	500
Consumption excluding durables - FWS-like	27,400	38,100
Consumption excluding durables in the FWS	24,500	34,600
Coverage rate	90%	91%

Note: FISIM: Financial Intermediation Services Indirectly Measured. Furthermore, the row 'Insurance services' corresponds to average amounts paid by households for insurance and also capital income paid to households. In order to address the issue of outliers, we have excluded about 300 households who declared to spend for consumption twice their annuel income, or yearly earnings particularly low (less than 2,000 euros).

We also check our saving rates are closed to those given by National Accounts (*cf.* tables 1.A.2 and 1.A.3). We include imputed rents in our analysis in order to take

[22]The French Wealth Survey excludes households living in communities on the contrary to Nation Accounts which includes them.

into account the fact that home-owners provide themselves with a housing service[23].

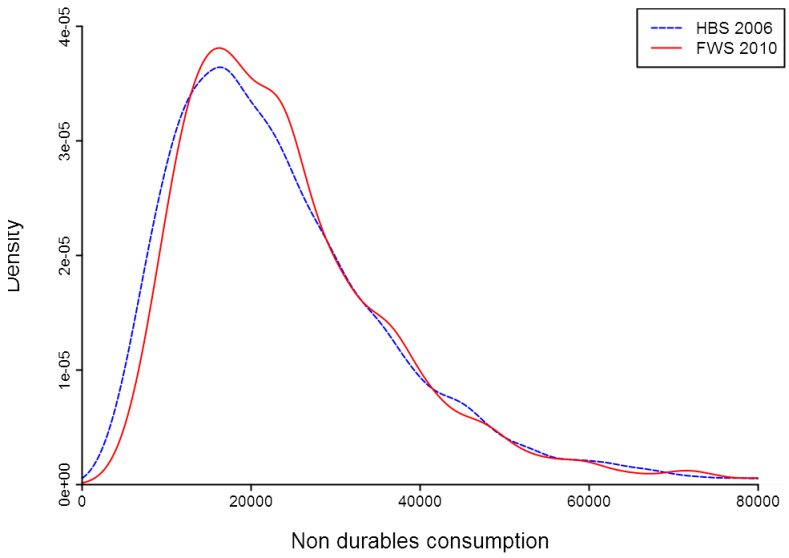
Table 1.A.3: Comparison of saving rates (%)

National Accounts	28.7	**25.2**	19.5	17.1
French Wealth Survey	29.1	**25.8**	20.4	17.7
Imputed rents	No	**Yes**	No	Yes
Durables	No	**No**	Yes	Yes

Saving rates excluding FISIM and insurance services

Finally we compare the distribution of consumption for non durables (*cf.* figure 1.A.1) between FWS and HBS. We proceed similarly for consumption of food at home (*cf.* figure 1.A.2), food outside (figure 1.A.3) and utilities (figure 1.A.4). Distributions prove to be quite close.

Figure 1.A.1: Comparison of distributions of non-durables observed in the Household Budget Survey and the French Wealth Survey



[23]In the computation of saving rates, imputed rents for home-owners are then added to both consumption and income.

Figure 1.A.2: Comparison of distributions of food at home observed in the Household Budget Survey and the French Wealth Survey

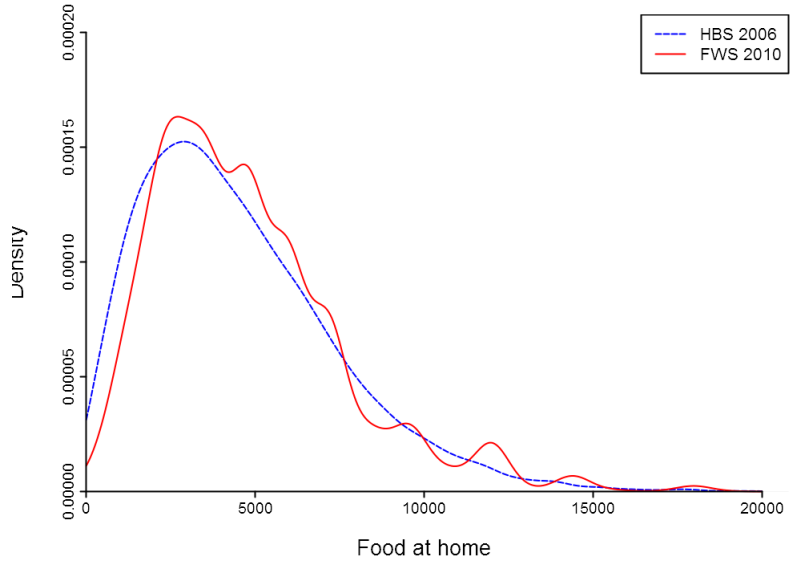
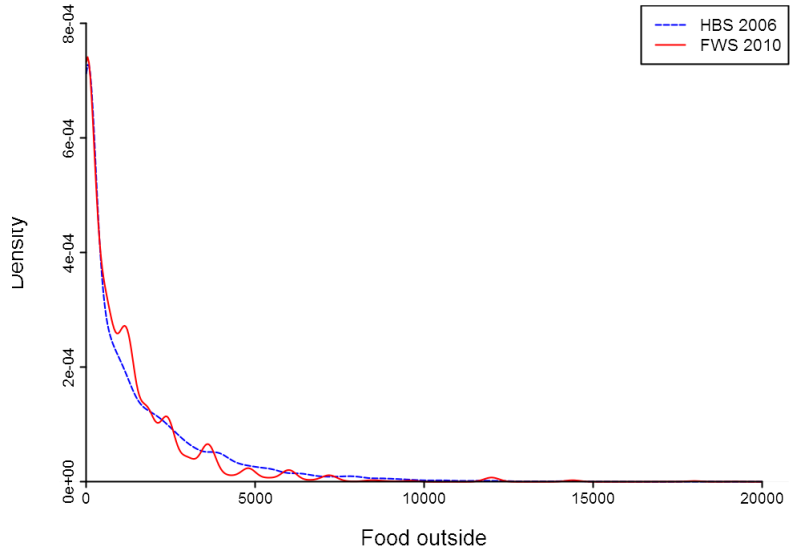
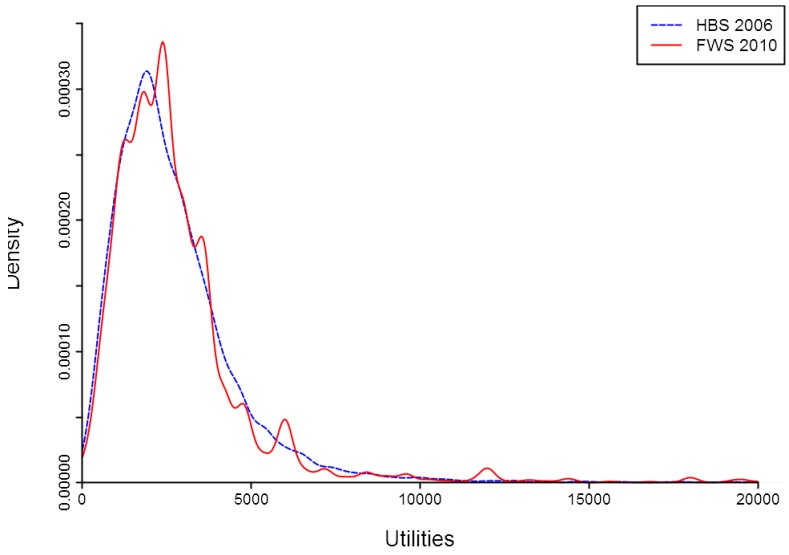


Figure 1.A.3: Comparison of distributions of food outside observed in the Household Budget Survey and the French Wealth Survey



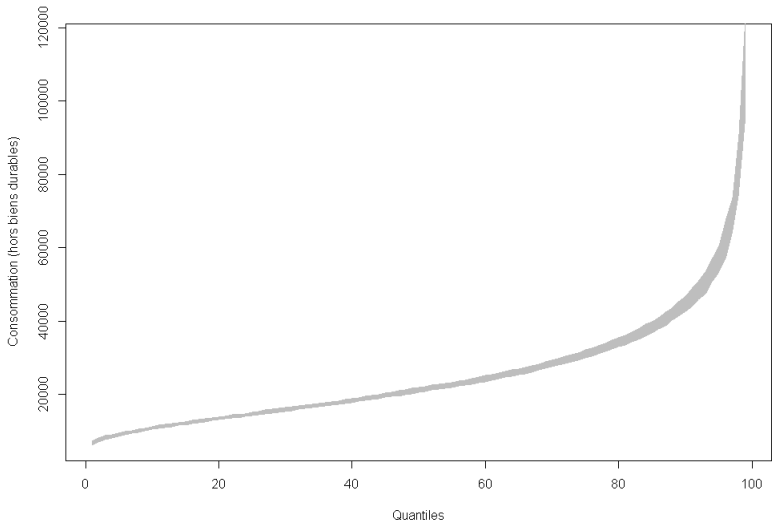
We now focus on the variance of the estimation. To do so, we assume that the estimation of the coefficients follow a normal law whose parameters are estimated through the regression. It is thus possible to replicate the estimation of consumption taking into account not only the error term of the equation but also the uncertainty

Figure 1.A.4: Comparison of distributions of utilities observed in the Household Budget Survey and the French Wealth Survey



on the estimation itself. The figure 1.A.5 shows the range for the various quantiles of estimation when using 1,000 estimations. Finally we find that the variance of the estimation is pretty low. The coefficient of variation for average consumption is 0.7%. It is also confirmed by figure 1.A.5.

Figure 1.A.5: Variance of the estimation of consumption



Finally, in order to compute alternate estimations closer to the concepts of Na-

tional Accounts and check for robustness of our findings, we impute consumption for durables in the survey. The method is exposed in next section.

Imputation of consumption for durables

We add a share of durable goods to our measurement of consumption. There are several solutions to impute a consumption for durables. The first one would consist of estimating the equation over a consumption that includes durables. However, as emphasized previously, the main drawback of such a method is that doing so we omit the specificity of durables. In particular, explanatory power of the model is significantly lower with durables than without. Another solution is to attribute a given amount of consumption for durables according to the stock of durables held by the household. The underlying assumption is that households consume a quantity of durables proportional to what they possess. If S_i^d denotes the stock of durables possessed by the household i and N the number of households, we compute the consumption of durables for the household i as:

$$x_i^d = \frac{S_i^d}{\sum_{k=1}^{N} S_k^d} \sum_{k=1}^{N} x_k^d$$

and we measure the total consumption for durables ($\sum_{k=1}^{N} x_k^d$) with National Accounts. This solution improves mechanically the coverage rate of consumption, as the consumption for durables is calibrated on National Accounts.

Robustness checks: saving rates taking account of durable goods

Table 1.A.4: Saving and current income with or without durable goods

Quintile 1	-19.5^{***}	-28.1^{***}	-14.4^{***}	-23.2^{***}
Quintile 2	$4.3^{\bullet\bullet\bullet}$	$-2.5^{\bullet\bullet\bullet}$	$7.9^{\bullet\bullet\bullet}$	$-1.2^{\bullet\bullet\bullet}$
Quintile 3	$16.7^{\bullet\bullet\bullet}$	$8.0^{\bullet\bullet\bullet}$	$18.0^{\bullet\bullet\bullet}$	$10.8^{\bullet\bullet\bullet}$
Quintile 4	$29.4^{\bullet\bullet\bullet}$	$21.2^{\bullet\bullet\bullet}$	$30.7^{\bullet\bullet\bullet}$	$23.6^{\bullet\bullet\bullet}$
Quintile 5	$41.0^{\bullet\bullet\bullet}$	$33.6^{\bullet\bullet\bullet}$	$43.9^{\bullet\bullet\bullet}$	$36.5^{\bullet\bullet\bullet}$
Age				
< 41			-5.1^{**}	-4.4^{*}
41 to 65			Ref.	Ref.
> 65			-4.5^{***}	-5.7^{***}
Durable goods	No	Yes	No	Yes
# obs.	4,467	4,467	4,467	4,467

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 1.A.5: Saving and permanent income: 1st approaches, with and without durable goods

	Without any except. income		Instrumentation by level of ed.		Average fiscal income		Av. fisc. inc. intrum. lev. ed.	
Quintile 1	-14.4^{***}	-23.0^{***}	4.2	-0.5	3.3	-1.7	11.2^{***}	5.4
Quintile 2	$8.2^{\bullet\bullet\bullet}$	$-1.0^{\bullet\bullet\bullet}$	7.6	-0.8	$13.8^{\bullet\bullet\bullet}$	$4.5^{\bullet}$	14.7	8.0
Quintile 3	$18.0^{\bullet\bullet\bullet}$	$10.9^{\bullet\bullet\bullet}$	$23.3^{\bullet\bullet\bullet}$	$17.0^{\bullet\bullet\bullet}$	$23.5^{\bullet\bullet\bullet}$	$13.7^{\bullet\bullet\bullet}$	$24.9^{\bullet\bullet\bullet}$	$19.1^{\bullet\bullet\bullet}$
Quintile 4	$31.3^{\bullet\bullet\bullet}$	$24.5^{\bullet\bullet\bullet}$	$29.6^{\bullet\bullet\bullet}$	$21.0^{\bullet}$	$33.2^{\bullet\bullet\bullet}$	$25.4^{\bullet\bullet\bullet}$	$30.4^{\bullet\bullet\bullet}$	22.1
Quintile 5	$44.0^{\bullet\bullet\bullet}$	$36.6^{\bullet\bullet\bullet}$	$34.2^{\bullet\bullet}$	$25.8^{\bullet\bullet}$	$41.6^{\bullet\bullet\bullet}$	$34.2^{\bullet\bullet\bullet}$	$35.8^{\bullet\bullet\bullet}$	$27.7^{\bullet\bullet}$
Age								
< 41	-5.1^{**}	-4.5^{*}	-3.7	-5.0^{*}	-3.0	-1.0	-3.3	-3.8
41 to 65	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
> 65	-4.7^{***}	-6.1^{***}	-8.0^{***}	-9.3^{***}	-9.8^{***}	-10.5^{***}	-10.0^{***}	-12.1^{***}
Durable goods	No	Yes	No	Yes	No	Yes	No	Yes
# obs.	4,361	4,361	4,361	4,361	3,220	3,220	3,220	3,220

H0

Coeff = 0: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Median rate for $q_j >$ median rate for q_{j-1}: $^{\bullet\bullet\bullet}p < 0.01$, $^{\bullet\bullet}p < 0.05$, $^{\bullet}p < 0.1$

Table 1.A.6: Saving and permanent income: 1st approaches with and without durable goods (wage earners only)

	Without any except. income		Instrumentation by level of ed.		Average fiscal income		Av. fisc. inc. intrum. lev. ed.	
Quintile 1	-13.8^{***}	-20.9^{***}	2.8	-4.2	4.2	-0.8	9.7^{**}	4.5
Quintile 2	$8.9^{\bullet\bullet\bullet}$	$-0.8^{\bullet\bullet\bullet}$	9.0	-0.2	$14.8^{\bullet\bullet\bullet}$	4.8	$16.6^{\bullet}$	7.8
Quintile 3	$18.7^{\bullet\bullet\bullet}$	$12.3^{\bullet\bullet\bullet}$	$22.2^{\bullet\bullet\bullet}$	$15.3^{\bullet\bullet\bullet}$	$23.0^{\bullet\bullet\bullet}$	$15.0^{\bullet\bullet\bullet}$	$24.3^{\bullet\bullet\bullet}$	$16.8^{\bullet\bullet\bullet}$
Quintile 4	$31.4^{\bullet\bullet\bullet}$	$23.5^{\bullet\bullet\bullet}$	$30.4^{\bullet\bullet\bullet}$	$22.1^{\bullet\bullet\bullet}$	$32.8^{\bullet\bullet\bullet}$	$25.3^{\bullet\bullet\bullet}$	$30.6^{\bullet\bullet}$	$23.0^{\bullet\bullet}$
Quintile 5	$41.7^{\bullet\bullet\bullet}$	$35.5^{\bullet\bullet\bullet}$	$34.9^{\bullet\bullet}$	$27.5^{\bullet\bullet}$	$39.3^{\bullet\bullet\bullet}$	$32.6^{\bullet\bullet\bullet}$	$35.2^{\bullet\bullet}$	$27.5^{\bullet\bullet}$
Age								
< 41	-4.0^{*}	-4.3^{*}	-3.0	-3.5	-2.7	-1.3	-3.1	-3.3
41 to 65	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
> 65	-3.8^{**}	-4.8^{**}	-5.5^{***}	-6.2^{***}	-7.0^{***}	-7.3^{***}	-7.8^{***}	-9.0^{***}
Durable goods	No	Yes	No	Yes	No	Yes	No	Yes
# obs.	3,253	3,253	3,253	3,253	2,496	2,496	2,496	2,496

H0

Coeff = 0: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Median rate for $q_j >$ median rate for q_{j-1}: $^{\bullet\bullet\bullet}p < 0.01$, $^{\bullet\bullet}p < 0.05$, $^{\bullet}p < 0.1$

1.B Computation of the permanent income over the life cycle

General principle for the estimation over men

The methodology presented hereafter is widely inspired from works by Lollivier and Verger (1999) and King and Dicks-Mireaux (1982). We have mainly followed their guidelines and we have updated and improved some steps by changing specifications and adding new sources of data. We present here the different steps of this computation and the main justifications. The interested reader may report for additional elements to Lollivier and Verger (1999) and King and Dicks-Mireaux (1982).

This method consists of computing a permanent income denoted Y^P for each individual. Y^P is defined as the constant flow of income which corresponds to the actualized sum of income earned in a lifetime[24]:

$$Y^P = \frac{\sum_{a=a_1}^{a_2} \frac{R_i(a)}{\prod_{t=a_1}^{a} [1+\rho(t)]}}{\sum_{a=a_1}^{a_2} \frac{1}{\prod_{t=a_1}^{a} [1+\rho(t)]}}$$

where a stands for age, a_1 age at the beginning of active life, a_2 age at death, $\rho(t)$ actualisation factor which corresponds to real interest rate for year t and $R_i(a)$ the income at age a (in constant euros 2009).
Several elements of this definition need to be computed.

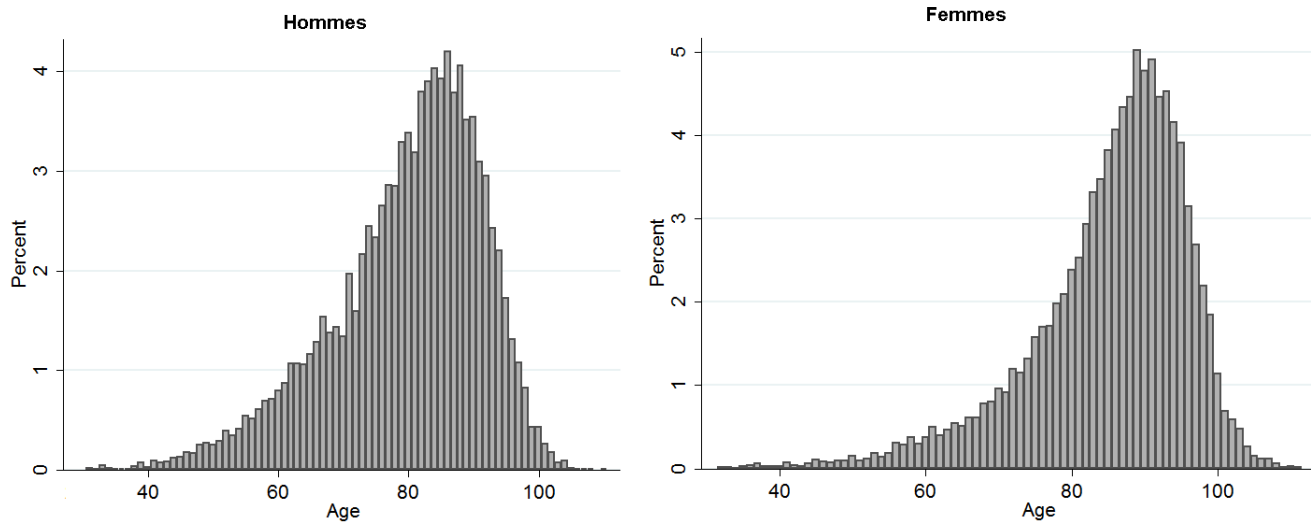
The age at the beginning of active life a_1 is known thanks to the French Wealth Survey which includes a detailed questionnaire about the age at the end of school, the beginning of active life, etc. Following guidelines by Lollivier and Verger (1999), when individuals began to work before 20, we only retain career after 20. The restriction aims at avoiding to take into account parts of the professional career that are not representative of the entire professional life (temporary jobs, summer

[24] We extend the 2-period model exposed in section 1.2 to T periods.

jobs,...).

The age at death a_2 is imputed thanks to mortality tables (*cf.* figures 1.B.1). We use those computed by Blanpain and Chardon (2011). These tables are recent and broken down by gender and professional categories. 7 professional categories are distinguished: farmers, craftsmen-merchants, managers, qualified employees, employees, workmen, inactive persons.

Figure 1.B.1: Imputed ages at death



Interest rates $\rho(t)$ retained so to be representative of yields faced by households are those by Piketty (2010) (Figure 1.B.2). For the future part, these series are extended with the average yield observed over the last 20 years: 6% [25].

R_i is the wage (in constant euros 2009). It can be decomposed as the sum of two terms, in order to distinguish evolutions due to age and due to economic situation: $R_i(a) = s(t).Y_i(a)$.

$s(t)$ **stands for the general index of wages** for year t and enables to take into account evolutions of income for the wage earners as a whole for a given year (*cf.*

[25] Other options have been tested, in particular the use of a time serie of the yields for 10-year Treasure bonds. This does not induce any change in our conclusion: estimated saving rates change slightly regarding the choice of the time serie and of the future yield but the significance of the gaps between the quintiles does not change. This is mainly due to the fact that our calculations of permanent income are made by cohort and yield changes are more likely to affect the hierarchy between than within cohorts.

Figure 1.B.2: Real interest rates (%)

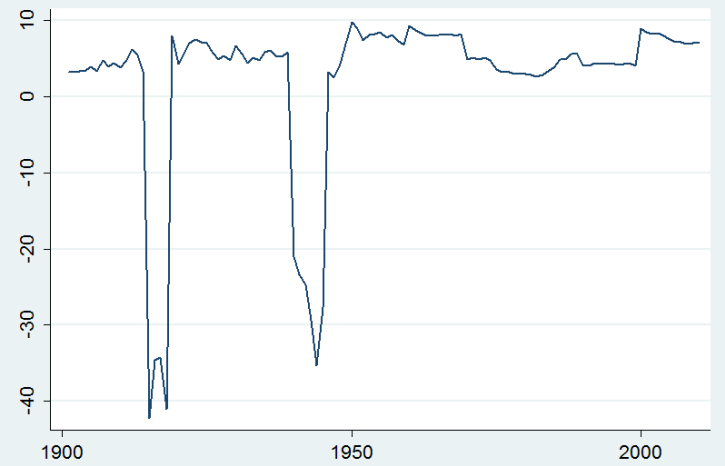


figure 1.B.3). For $s(t)$, we use the evolution of the per hour wage, following Lollivier and Verger (1999). Between 1956 and 2009, we retain the index for the per hour wage[26]. Before 1956, such an index did not exist and evolutions of wages have been computed thanks to the work by Carre, Dubois, and Malinvaud (1972) [27]. For the future part we retain an increase by 0.5% with regards to the recent evolutions. Other options have been also tested (0%, 1% and 2%) without any significative change.

$Y_i(a)$ **stands for the trajectory of income** [28] **for the individual** i at age a (*cf.* for instance Payen and Lollivier (1990)). It depends on the age of the individual and reflects the effect of human capital and its evolution along age. We model:

$$ln\, Y_i(t,a) = X_i\beta + c(a_i) + q_i + u_{i,t}$$

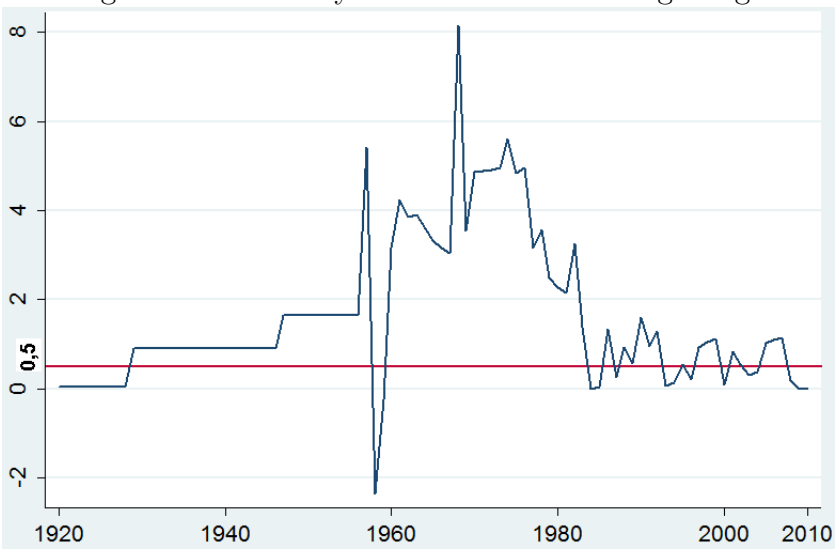
X_i denotes the initial stock of human capital as well as characteristics reflecting individual heterogeneity (level of education, health troubles, long or short periods of unemployment, sector of employment - private or public).

[26]This "index of the workmen's per hour wage" exists since 1956. It has been extended to all wage earners of the private sector in 1986 as the "index for the per hour wage".

[27]They focus on the growth of the French GDP and conclude to an yearly increase of the average wage by 0.35% between 1896 and 1929 and 0.45% between 1929 and 1957.

[28]in constant euros 2009.

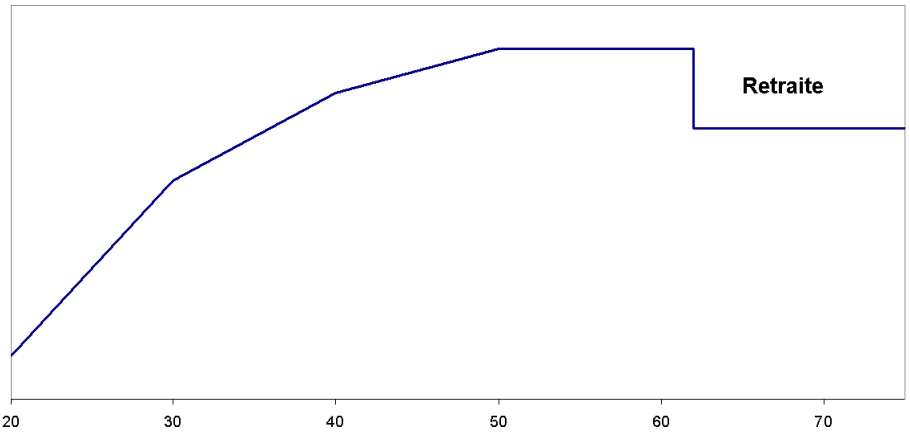
Figure 1.B.3: Yearly evolution of the average wage



$c(a_i)$ is the effect of age (assumed to be the same for all, it only varies with the level of education). In order to avoid a too demanding specification, we model it with a spline function and a dummy for the age of retirement. The spline function is specified with a knot every 10 years till 50 years and then becomes constant (*cf.* figure 1.B.4). This is equivalent to assume stability for income after 50 with just a potential shift due to retirement.

q_i reflects unobserved heterogeneity and $u_{i,t}$ is the usual term of error. With cross-

Figure 1.B.4: Effect of age with spline



sectional data, it can be cumbersome to identify separately q_i and $u_{i,t}$. One method consists of assuming that q_i follows a normal law $N(0, \sigma_q)$ and $u_{i,t}$ follows $N(0, \sigma_u)$. Then the estimator of minimal variance for q_i is: $\widehat{q_i} = \alpha\widehat{\zeta_{i,t}}$ with $\alpha = \frac{{\sigma_q}^2}{{\sigma_q}^2+{\sigma_u}^2}$ and $\zeta_{i,t} = q_i + u_{i,t}$.

Because of the coefficient α, the computation of this estimator requires the use of external data. We use the estimation given by Barge and Payen (1982) who computed α for several ages.

Subsetting the sample to wage earners

The estimation is made on households in which the man is a wage earner (or retired from wage earning). Indeed it is difficult to follow properly income from self- employed and especially to distinguish their transitory income from anticipated income. Calculating a general index of income for them is also difficult. This leads us to exclude them from the sample[29]. We also exclude complex households where other persons than the reference person or his partner earn income (children with a small job, old parent living at home...) because it is not possible to properly estimate the permanent income for these other individuals. We then reduce the sample size by 10%.

The sample is then stratified according to gender and level of education. Four different levels of education are defined for each of the four cohorts (table 1.B.1). Salary equations are then more accurate because we allow estimations to vary according to the level of education. This allows for instance different returns of education according to the level of education.

The fact that decision for retirement may depend on the wage has to be taken into account to address potential endogeneity. We instrument the dummy variable for retirement by the fact of being more than 60. Indeed in most of the cases it is nec-

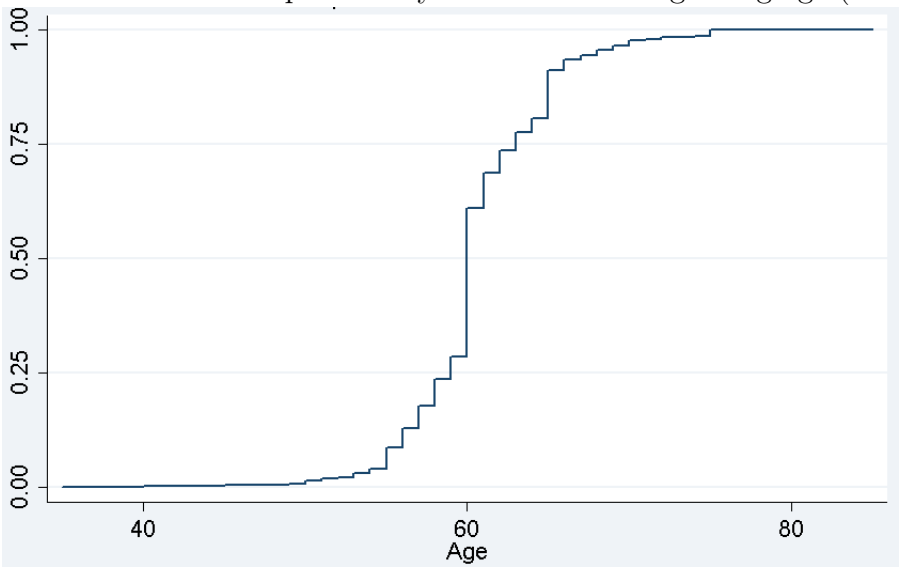
[29]Here again we follow recommendations by Lollivier and Verger (1999). This implies to assume the stability of the wage-earner status (for the man) and of the household structure (life as a couple and number of children). These assumptions may be relaxed only thanks to questionable imputations and random reallocations.

Table 1.B.1: Level of education

	Age at the end of schooling			
Cohort	**Level 1**	**Level 2**	**Level 3**	**Level 4**
≤ 35	≤ 18	19 & 20	21 & 22	≥ 23
36 to 45	≤ 18	19	20 to 22	≥ 23
46 to 55	≤ 16	17 & 18	19 & 20	≥ 21
$\geq$ 56+	≤ 14	15 & 16	17 & 18	≥ 19
	Proportion			
	31 %	19 %	21 %	29 %

essary to be 60 to receive a pension. This dummy then reflects an effect due to the legal pension scheme. Being 60 is highly correlated with the decision for retirement (figure 1.B.5) and has no effect on the income but through retirement. It can thus be used as an instrument. Instrumentation is made with a classical 2SLS procedure (table 1.B.7).

Figure 1.B.5: Cumulated probability for retirement regarding age (for men)

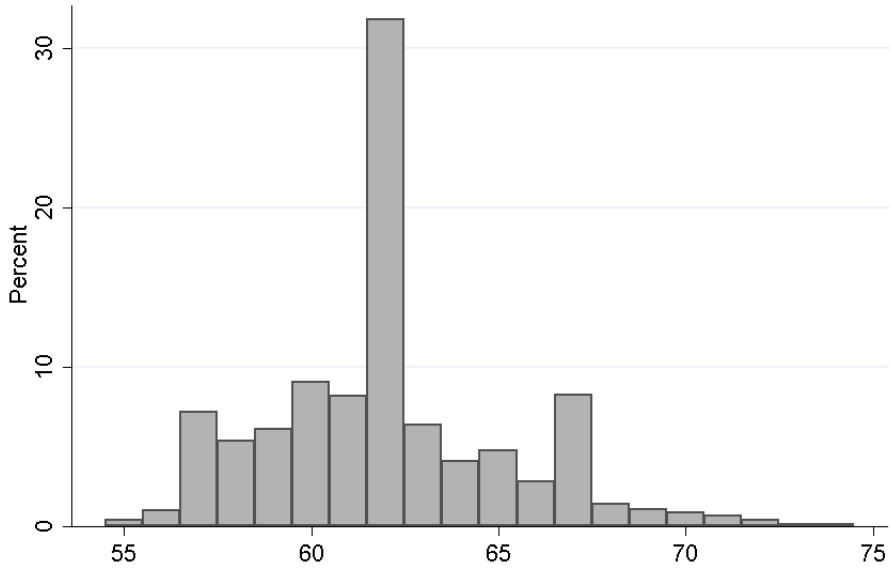


Kaplan-Meier estimator

Finally for working men it is necessary to impute an age for retirement. We use a Cox model (semi parametric duration model) in order to take into account the determinants of income and its variation along age. Since these estimations are made on observations of retirement before 2009, we integrate the legal changes active individuals will face after 2009. To do so we add 1 or 2 years to the estimated age according

to the cohort the individual belong (figure 1.B.6).

Figure 1.B.6: Imputed age for retirement (men)



Estimations for women

For women, the computation of the income equation turns out to be a bit more complicated since decision for participation in the labour market and potential stops due to pregnancy have to be taken into account. This brings us to distinguish three different sub-groups: one with women who are working and have previously worked (group 1), one with women who have worked but are not working anymore (group 2), and one with women who have never worked (group 3). Most of the women belong to group 1 or 2 (table 1.B.2).

Table 1.B.2: Proportion of women in each group

Group 1	Group 2	Group 3
82 %	9 %	9 %

Women whose partner is wage earner

Some assumptions are then required. Women less than 40 who have already worked

but are not working anymore report in most cases that they have stopped working to raise their children (*cf.* table 1.B.3).

Table 1.B.3: Reasons for stopping professional activity

Age	Children	Disability or disease	Other
$\leq$ -30	82 %	3 %	15 %
31-40	83 %	3 %	13 %
$\geq$ 41+	47 %	18 %	36 %

We assume that some of them will come back to work once their children grown up. Thanks to the Family and Employment Survey 2005[30], we compute a probability of coming back to work for women who had stopped to raise their children. These probabilities are given according to level of education and child rank (table 1.B.4).

Table 1.B.4: Probability of coming back to work 10 years after having given birth

Level of education	1st child	2nd child	3rd child
< Bac	0.58	0.58	0.52
Bac+	0.75	0.77	0.76

Sample: women who have stopped working one year or more after a child birth

Families and Employment Survey 2005, Kaplan-Meier estimator

Thanks to these probabilities, we randomly draw women from group 2 and impute them a step back to professional life 10 years after. Eventually women from group 3 (who have never worked) are supposed to never begin to work. It is a very simplistic assumption, but quite strong only for younger women since Lollivier (1995) hardly ever observe late entries on labour market. Moreover the absence of information about their entry on labour market, their potential job, the component q_i of their income, etc., make this assumption preferable to the one where these women may decide to come to the labour market and for which crucial parameters for estimating a labour income would be imputed randomly.

[30]We are grateful to Anne Solaz for providing us with data from Pailhé and Solaz (2012).

It then becomes possible to estimate income equations for women. Since only women who worked or who have worked are given a strictly positive labour income, the sample of reference is composed by women belonging to the first and the second groups. Only women from the first group earn labour income in the sample; they are then used to estimate income equations. The decision for participation in the labour market has to be taken into account in order to address for potential selection bias (table 1.B.8). The significant corrective term (inverse of Mills ratio) is added both to income equation and instrumentation of the dummy for retirement[31], following procedure 19.2 of Wooldridge (2010) (table 1.B.9). Lastly, we add pension income for potential widows. The amount of this pension is calculated thanks to income tables and the kind of husband's sector of activity (private vs. public sector).
Once individual permanent income is computed, households' permanent income is easily obtained.

For each member of the household, estimations of permanent income are made thanks to individual information from tax declaration. We thus compute a "*fiscal permanent income*" which consequently does not include social benefits, tax-free capital income and taxes. This income is not fully equivalent to disposable income. In order to integrate these relevant elements of income, we assume that the share of each of them is constant over time or corresponds to what households anticipate[32]. We then may add or substract each of these elements to *fiscal permanent income* to finally get a "*disposable permanent income*". We think this assumption preferable to the alternative one that would consist of not taking into account these elements. Indeed the share of social benefits over disposable income turns out to be significant for the poorest households and leaving taxes apart from the analysis could then be misleading (*cf.* table 1.B.5). The distributions of both fiscal and disposable permanent income are presented in table 1.B.6, for both current and permanent incomes.

[31] During the 2SLS procedure, we then instrument with two instruments: the corrective term and the dummy for being more than 60.

[32] Practically this means that the ratios $\frac{social\,benefits}{fiscal\,income}$, $\frac{capital\,income}{fiscal\,income}$ et $\frac{taxes}{fiscal\,income}$, once computed, are applied to permanent income.

Table 1.B.5: Increase from fiscal income according to the income quintile (%)

		Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Social benefits	Mean	23.4	7.1	5.8	3.6	2.5
	Median	0.0	0.0	0.0	0.0	0.0
Capital income	Mean	9.7	7.7	6.5	7.6	5.7
	Median	1.3	1.1	1.4	1.5	1.7
Income taxes	Mean	-5.2	-8.8	-7.4	-8.5	-11.2
	Median	-4.1	-7.4	-7.2	-8.2	-9.6
Disposable income / **Fiscal income**	Mean	135.3	108.8	107.9	105.9	100.3
	Median	104.6	100.2	100.3	100.5	97.8

Table 1.B.6: Comparison current vs. permanent income (€ 2009)

	Mean	p25	p50	p75
Full sample				
Fiscal income	35 888	20 612	31 515	43 196
Fiscal permanent income	28 685	16 470	24 893	35 947
Disposable income	36 662	22 095	32 218	43 758
Disposable permanent income	29 487	17 102	26 030	36 675
Less than 40				
Fiscal income	34 890	21 009	31 358	42 263
Fiscal permanent income	34 334	21 084	31 476	42 286
Disposable income	35 240	22 221	31 755	42 871
Disposable permanent income	34 989	23 512	32 316	42 267
41 to 60				
Fiscal income	41 136	22 998	36 102	49 178
Fiscal permanent income	29 984	18 949	25 546	36 209
Disposable income	41 198	23 988	36 571	48 625
Disposable permanent income	30 351	18 778	26 361	36 508
61+				
Fiscal income	30 504	18 899	27 062	37 554
Fiscal permanent income	20 042	10 902	16 592	25 266
Disposable income	32 701	20 414	28 176	37 953
Disposable permanent income	21 576	11 708	17 722	26 750

Regression charts

Table 1.B.7: Equation for men's income

Level of education	1	2	3	4
Retirement	-0.182***	-0.214***	-0.254***	-0.278***
Age				
≤ 30	0.023**	0.058***	0.021	0.027
31-40	0.017***	0.003	0.029***	0.044***
41-50	0.001	0.013**	0.018***	0.023***
Unemployment and temporary leaves				
Long term unemployment	-0.227***	-0.332***	-0.196***	-0.397***
Short term unemployment	-0.150***	-0.212***	-0.150***	-0.202***
Leaves for disease	-0.252***	-0.256***	-0.299**	-0.332
Profession				
Civil servants	0.243***			
Civil servants - managers				0.171***
Civil servants - employees				0.035
Managers (private sector)	0.277***	0.336***	0.400***	0.349***
Employees and workmen (private sector)	Ref.	Ref.	Ref.	Ref.
Father's profession				
Father farmer	-0.059**	-0.044	-0.095***	-0.018
Father self employed	0.017	0.036	0.093**	0.145***
Father manager	0.028	0.077	0.056	0.209***
Father employee	0.021	-0.015	-0.013	0.074**
Father workmen	Ref.	Ref.	Ref.	Ref.
Father out of labour market	-0.027	-0.136**	0.030	-0.112
Level of education				
No diploma	Ref.	Ref.	Ref.	Ref.
Primary school	0.114***	0.080*	0.148*	0.058
CAP, BEP	0.145***	0.134***	0.157**	-0.073
Brevet des collèges	0.110***	0.172***	0.260***	0.041
Bac pro ou technique	0.269***	0.226***	0.288***	0.047
Bac général	0.286**	0.169*	0.402***	0.112
Bac + 2				0.194*
Bac + 2 and more	0.319***	0.246***	0.435***	
Bac + 3 and more				0.534***
Perception of career				
Rather better	0.119***	0.126***	0.159***	0.179***
Equivalent	Ref.	Ref.	Ref.	Ref.
Rather worse	-0.155***	-0.128***	-0.110***	-0.228***
n.a.	-0.199***	-0.243**	-0.094	-0.416***
Stat. Fisher 1^{st} step	1,867.5	1,678.3	1,339.4	2,563.8
Observations	2,319	1,415	1,560	2,300

Male wage earners, yearly income ¿ 1,000 €

Robustness check for the retrospective part of income: taking into account survival probabilities

1.B.0.1 Method

The initial formula for computing permanent income Y^P over the entire life cycle can be written (*cf.* section 1.4) as follows:

Table 1.B.8: Female out of labour market (for other reasons than retirement)

Level of education	1	2	3	4
Number of children				
0	0.633***	0.392*	0.664***	0.467***
1	0.310***	0.311**	0.376***	0.389***
2	0.279***	0.139	0.109	0.314***
3+	Ref.	Ref.	Ref.	Ref.
Profession				
Civil servant	0.603***	0.931***	1.726***	1.491***
Wrokmen	Ref.	Ref.	Ref.	Ref.
Managers (private sector)	1.044***	0.916***	0.900***	1.290***
Self employed	0.385*	0.663***	0.870***	1.120***
Level of education				
No	Ref.	Ref.	Ref.	Ref.
Primary school	0.298**	0.493**	-0.033	-0.668
CAP, BEP	-0.063	0.207	-0.180	-0.516
Brevet des collèges	-0.080	0.154	-0.314	-0.461
Bac pro ou technique	0.790*	0.276	-0.293	-0.536
Bac général			-0.108	-0.173
Bac ou plus	-0.590***	0.060		
Bac + 2				-0.288
Bac + 2 or more			-0.147	
Bac + 3 or more				-0.369
Father's profession				
Farmer	0.103	0.497**	-0.199	-0.211
Self employed	0.032	0.123	-0.215	-0.453**
Manager	-0.341	-0.003	-0.254	-0.647***
Employee	0.015	0.083	-0.059	-0.329**
Workmen	Ref.	Ref.	Ref.	Ref.
Out of labour market	-0.175	0.440	-0.007	0.378
Observations	1,536	1,112	1,379	1,670

Women whose partner is wage earner, groups 1 & 2.

Table 1.B.9: Equation of income for women whose partner is wage earner

Level of education	1	2	3	4
Retirement	-0.357***	-0.342***	-0.391***	-0.551***
Age				
≤ 30	0.057	0.066*	-0.009	0.005
31-40	0.054***	-0.001	0.037***	0.020**
41-50	0.006	0.016	0.012	0.019***
Unemployment and stops				
Long term unemployment	-0.106	-0.112*	-0.284***	-0.428***
Short term unemployment	0.070	-0.031	-0.250***	-0.188**
Long leaves for disease	-0.261	-0.204	0.247	-0.294
Profession				
Civil servant	0.040	-0.185	-0.289**	-0.071
Manager	0.164	-0.198	-0.063	-0.019
Workman	Ref.	Ref.	Ref.	Ref.
Self employed	-0.235*	-0.492***	-0.273**	-0.006
Father's profession				
Father farmer	-0.053	-0.314***	0.073	0.083
Father self employed	-0.021	-0.100	0.064	-0.015
Father manager	0.030	0.001	0.118*	0.037
Father employee	-0.079	-0.157**	0.078	0.046
Father workmen	Ref.	Ref.	Ref.	Ref.
Father out of labour market	-0.005	-0.300**	-0.148	-0.424**
Level of education				
No diploma	Ref.	Ref.	Ref.	Ref.
Primary school	0.052	-0.170	0.058	0.604
CAP, BEP	0.246***	0.060	0.206	0.723**
Brevet des collèges	0.221**	0.127	0.383***	0.654*
Bac pro ou technique	0.487***	-0.004	0.428***	0.733**
Bac général			0.378**	0.771**
Bac or more	1.049***	0.285**		
Bac + 2				0.876**
Bac + 2 or more			0.606***	
Bac + 3 or more				1.106***
Perception of career				
Rather better	Ref.	Ref.	Ref.	Ref.
Equivalent	-0.039	-0.281***	-0.229***	-0.167***
Rather worse	-0.412***	-0.453***	-0.453***	-0.588***
n.a.	-0.680***	-0.615***	-1.102***	-1.015***
Inverse Mills ratio	-1.728***	-2.308***	-1.564***	-1.164**
Stat. Fisher 1^{st} step	1,240.9	1,255.2	1,244.3	1,147.1
Observations	1,305	941	1,199	1,464

$$\sum_{j=1}^{M} \frac{Y^P}{\prod_{t=1}^{j}[1+\rho(t)]} = \sum_{j=1}^{M} \frac{R_i(a_j)}{\prod_{t=1}^{j}[1+\rho(t)]} \tag{1.1}$$

where a_j stands for the age reached by the individual at year j, a_1 her age when entering labour market, a_M her age at death, $\rho(t)$ the interest rate at t and $R_i(a_j)$ the real income of individual i at age a_j.

This relies on the assumption that individuals anticipate their age of death. We can relax this assumption by assuming that individuals take into account not a deterministic age of death but rather their probability to be still alive for a given age. They then shape their anticipations according to these probabilities.

If we call a_T the age of an individiual at time T (for any T) and assume that interest rate is anticipated as constant in the future and equal to ρ_f, this individual will anticipate at the time of the survey the future actualized income $\frac{R(a_{T+1})}{1+\rho_f}$ with a probability equal to his probability of dying at $T+1$, *i.e.* equal to $S(a_{T+2}) - S(a_{T+1})$ were $S(a_t)$ designates the survival function at age a_t.

She will anticipate the futur actualized income $\frac{R(a_{T+1})}{1+\rho_f} + \frac{R(a_{T+2})}{(1+\rho_f)^2}$ with a probability $S(a_{T+3}) - S(a_{T+2})$ and the futur actualized income $\sum_{j=1}^{J} \frac{R(a_{T+j})}{(1+\rho_f)^j}$ with a probability $S(a_{T+J+1}) - S(a_{T+J})$.

If we sum up all the anticipated income weighted with their probabilities and discounted starting from age a_1 when entering the labour market, the formula (2.2) becomes:

$$\sum_{j=1}^{T} \frac{Y^P}{\prod_{t=1}^{j}[1+\rho(t)]} + \sum_{j=1}^{\infty} \frac{S(a_{T+j}) \times Y^P}{(1+\rho_f)^j \prod_{t=1}^{T}[1+\rho(t)]} = \sum_{j=1}^{T} \frac{R_i(a_{T+j})}{\prod_{t=1}^{j}[1+\rho(t)]} + \sum_{j=1}^{\infty} \frac{S(a_{T+j}) \times R_i(a_{T+j})}{(1+\rho_f)^j \prod_{t=1}^{T}[1+\rho(t)]}$$

To implement this formula, we again use the mortality tables from Blanpain and Chardon (2011). The survival probability varies according to gender and 7 social-professional categories and is provided from 30 up to 100 years old. The individuals less than 30 at survey's time are given a probability of 1 to survive till to 30 (we

assume that the individuals less than 30 anticipate that they will live at least to 30). The survival probability for all ages between 100 and 110 are considered as equal to the one for 100. After 110, the probability is set to 0: we assume that nobody anticipates living after 110.

To compute the anticipated survivor retirement pension received by a widow after her husband's death, we need to take into account not only the survival probability for women but also for men. At date T, the actualized pension $\frac{P_i(T+1)}{1+\rho}$ will be anticipated with a probability equal to the probability that the husband dies at T and that the wife dies at $T+1$. Similarly the actualized pension $\frac{P_i(T+1)}{1+\rho} + \frac{P_i(T+2)}{(1+\rho)^2}$ will be anticipated with a probability equal to the product of the probability for the husband to die at T and the probability for the wife to die at $T+2$.

If we sum the pension weighted by the different survival probabilities for both husband and wife, discounting from the beginning of active life:

$$\sum_{j=1}^{\infty} \frac{P_i(a^F_{T+j})}{(1+\rho_f)^j \prod_{t=1}^{T}[1+\rho(t)]} \times S_F(a^F_{T+j}) \times [S_H(a^H_T) - S_H(a^H_{T+j})]$$

where S_F et S_H respectively stand for survival functions for women and men and a^F_{T+j} age for women at $T+j$. Practically, this is equivalent to adding to each income $R_i(a_{T+j})$ for women the term $P_i(a^F_{T+j}) \times [S_H(a^H_T) - S_H(a^H_{T+j})]$.

1.B.0.2 Results

The results obtained with this method are given in column (2) of table 1.B.10. Final conclusions are not affected by the method for taking into account life expectancies.

Table 1.B.10: Permanent income: various methods to take into account anticipations of life expectancy

	(1)	(2)
Method	Initial	Probabilistic
Quintile 1	0.0	3.0
Quintile 2	$16.7^{\bullet\bullet\bullet}$	$16.8^{\bullet\bullet\bullet}$
Quintile 3	$23.9^{\bullet\bullet\bullet}$	$23.9^{\bullet\bullet}$
Quintile 4	$30.1^{\bullet\bullet}$	$30.5^{\bullet\bullet}$
Quintile 5	$40.6^{\bullet\bullet\bullet}$	$40.5^{\bullet\bullet\bullet}$
Age		
< 41	0.9	0.9
41 to 65		Ref.
> 65	-3.9^{*}	-1.9
# obs.	2,074	2,074

Saving rates without durable goods

H0

Coeff = 0: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Median rate for q_j¿ median rate for q_{j-1}: $^{\bullet\bullet\bullet}p < 0.01$, $^{\bullet\bullet}p < 0.05$, $^{\bullet}p < 0.1$

1.C Calculation of imputed rents

To get closer to National Accounts' concepts for income and consumption, we compute imputed rents for home owners. The underlying idea is that home owners are different from tenants in the sense that they provide themselves with a housing service. This "fictitious" rent is therefore included in both their income (because they benefit from this housing service) and consumption (because they consume this housing service). The method for estimating imputed rents directly stems from the methodology implemented by Driant and Jacquot (2005). It relies on hedonic price method assuming that rents paid by tenants depend on housing characteristics (number of rooms, surface, type of housing, date of construction,...). Equations are then estimated over the tenants taking into account characteristics of their accommodation. The estimated equation follows:

$$\log(rent_i) = X_i\,\beta + u_i$$

with X the vector of characteristics of the accommodation and u_i a residual. Once the parameters estimated over the tenants, we get a predictive rent for the home owners. Furthermore in order to take account of potential heteroskedasticity issues and non-normality for the residuals, we use a stratified hot-deck that allocates residuals of tenants to home owners. The stratification is based on the degree of urbanisation (9 classes) and the size of the dwelling (6 classes).

Chapter 2

L'achat de la résidence principale et la création d'entreprise sont-ils favorisés par les donations et héritages ?[1]

2.1 Résumé

La question de la distribution du patrimoine entre les générations est régulièrement au centre du débat public. Le principal constat est que la richesse est détenue principalement par les plus âgés et que les "jeunes générations" héritent de plus en plus tard. Différentes mesures fiscales, visant notamment à encourager les donations, ont tenté de pallier ce déséquilibre. On peut néanmoins s'interroger sur la finalité et l'efficacité économique des transmissions intergénérationnelles.

On s'intéresse ici à l'impact de ces transmissions sur deux facettes des comportements des ménages. Leur permettent-elles, d'une part, d'acheter plus fréquemment leur résidence principale et, d'autre part, de créer plus facilement une entreprise ? À partir de l'enquête Patrimoine 2009-2010, nous montrons que les ménages ayant reçu une donation ou un héritage achètent plus fréquemment leur résidence principale.

[1]This chapter is based on a joint work with Luc Arrondel & André Masson (Arrondel, Garbinti et Masson (2014)).

Pour la création d'entreprise, l'effet de la donation reste significatif tandis que celui de l'héritage ne l'est plus. Lorsque les donations sont reçues avant 35 ans, l'effet est plus important tant sur la probabilité d'acheter sa résidence principale que sur celle de créer ou reprendre une entreprise, ce qui tend à accréditer l'idée que ce sont les donations précoces qui sont le plus utiles. Par ailleurs, le lien entre donation et achat de la résidence principale est plus fort depuis la hausse des prix de l'immobilier des années 2000.
L'étude est menée grâce à un modèle de durée et complétée par une modélisation qui tient compte de l'hétérogénéité des comportements. L'effet causal de la donation sur l'achat de la résidence principale est évalué en utilisant une méthode de variable instrumentale. L'instrument utilisé est le nombre de frères et sœurs. Le résultat obtenu est local et concerne les enfants des parents les plus aisés. L'effet causal estimé sur cette population est plus fort que les effets obtenus par les modèles précédents.

Abstract

Issues about wealth distribution between generations are of great political concern. In France, researchers have emphasized the fact that wealth is mainly hold by the elder and that young generations inherit later and later. Fiscal measures aiming at mitigating this generational gap have been voted to create incentives for donations.
I study here the impact of intergenerational transmissions on two components of households behavior: Do they lead to a greater propensity to buy a main home and to create or buy out a firm? Using "Patrimoine" Survey 2009-2010, I show that households who received a gift or a bequest buy more often their main home. For the creation or the buyout of a firm, gifts also exhibit a significant effect while bequests do not. Donations received before 35 years old have a stronger effect on these two outcomes which tends to suggest that early gifts are the most useful ones. The link between gifts and main home purchase is also found stronger since the rise in the real estate prices that occurred in the 2000's.

I use a discrete time duration model, complemented with a "split population" one in order to take into account heterogeneity in households behavior. Causal effect of donations is also assessed with an instrumental variable method. The size of the sibling is used as an instrument and enables to evaluate a local effect on the population of people born from a wealthy family. In this subpopulation, the causal effect is found stronger than the ones computed thanks to other models.

2.2 Introduction

La transmission du patrimoine : un sujet d'actualité

La question de la distribution du patrimoine entre les générations a récemment été au centre du débat public. Le principal constat est que le patrimoine est davantage détenu par les plus âgés et que les "jeunes générations" héritent de plus en plus tard (autour de 50 ans).

Différentes mesures fiscales ont été prises pour tenter de pallier ce déséquilibre intergénérationnel. En 2007, la loi Travail, Emploi et Pouvoir d'Achat (TEPA) a modifié de nombreuses dispositions relatives aux transmissions de patrimoine. Elle a notamment relevé les abattements qui existaient pour les donations et successions. L'un des relèvements les plus importants concernait les transmissions vers les enfants : l'abattement qui était jusqu'alors de 50 000 € (par enfant et par parent) fut multiplié par trois et porté à 150 000 €. Il fut ensuite ramené à 100 000 € en août 2012[2].

La question de l'efficacité de ces incitations fiscales mérite d'être posée et c'est ce à quoi s'attache cette étude. Cette question doit s'envisager sous deux angles complémentaires.

Le premier concerne l'impact de la fiscalité sur les comportements de transmissions des ménages. Ce point est abordé au travers des travaux recensés dans la revue de littérature (cf. section 2.3).

Le deuxième angle concerne la manière dont ces transmissions sont utilisées par leurs bénéficiaires. C'est le cœur-même de cette étude. Après un rappel des résultats de la littérature, on étudie l'effet des transmissions de patrimoine sur deux facettes des comportements des jeunes générations. Leur permettent-elles, d'une part, d'acheter plus fréquemment leur résidence principale (cf. section 2.6) et, d'autre part, de créer plus facilement une entreprise (cf. section 2.7) ?

À partir de l'enquête Patrimoine 2009-2010 (cf. section 2.4), on montre que les

[2] cf. État des lieux 2.A.

ménages ayant reçu une donation ou un héritage achètent plus fréquemment leur résidence principale. Pour la création d'entreprise, l'effet de la donation reste significatif tandis que celui de l'héritage ne l'est plus. Par ailleurs, le lien entre donation et achat de la résidence principale apparaît plus fort depuis la hausse des prix de l'immobilier des années 2000 (cf. section 2.6.2).

Lorsque les donations sont reçues avant 35 ans (cf. section 2.8), l'effet est plus important tant sur la probabilité d'acheter sa résidence principale que sur celle de créer ou reprendre une entreprise, ce qui tend à accréditer l'idée que ce sont les donations précoces qui sont les plus utiles. L'étude est menée grâce à des modèles de durée à temps discret.

Un premier modèle classique (cf. section 2.5.1) est complété par un modèle ("split population", cf. section 2.5.2) qui tient compte de l'hétérogénéité des comportements entre les ménages qui souhaitent acquérir leur résidence principale et ceux qui veulent rester locataires ou encore entre ceux qui ont une volonté de créer une entreprise et ceux qui préfèrent rester salariés. Ce second modèle permet également d'évaluer l'importance relative des différents groupes au sein de la population.

Enfin, l'effet causal de la donation sur l'achat de la résidence principale est estimé en utilisant une méthode de variable instrumentale et en linéarisant le modèle (cf. section 8). L'instrument utilisé est le nombre de frères et sœurs. Le résultat obtenu est local et concerne les enfants des parents les plus aisés : ils reçoivent plus fréquemment des donations et celles-ci sont plus conséquentes. L'effet causal estimé sur cette population est plus fort que les effets obtenus par les modèles précédents.

2.3 Revue de littérature

2.3.1 Les ménages sont-ils sensibles aux incitations fiscales concernant la taxation des donations et successions ?

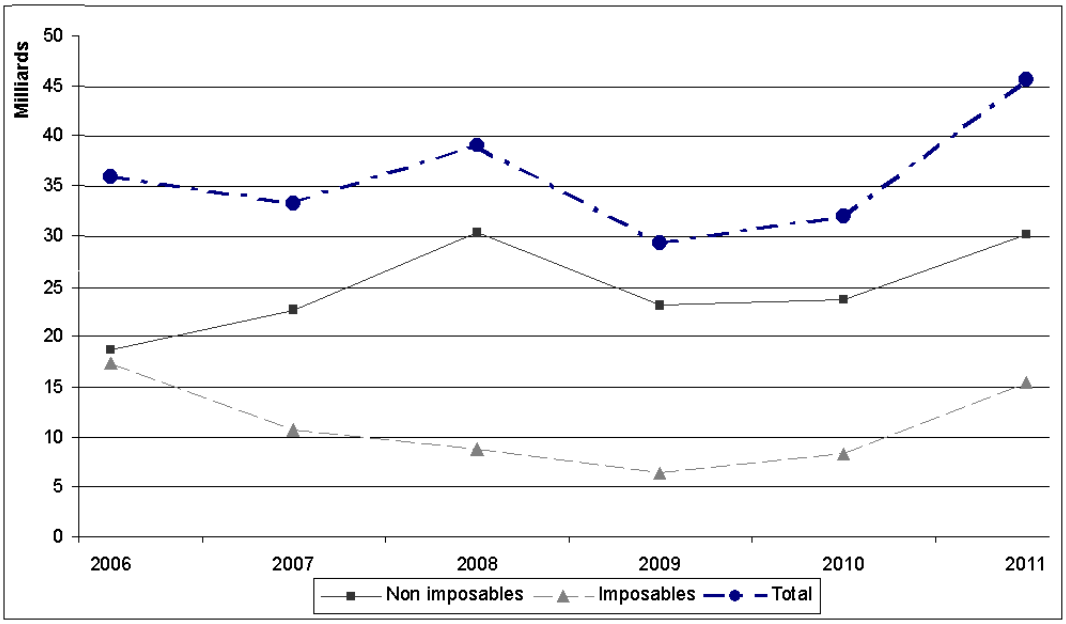
Sur données françaises, Arrondel et Laferrère (2001) montrent que les ménages qui possèdent un patrimoine dont la transmission par succession est taxable ont une probabilité plus élevée d'effectuer une donation que ceux dont le patrimoine est comparable mais non taxable. Ils montrent aussi que l'effet s'étend aux montants transmis : ils sont plus élevés pour les ménages au patrimoine taxable. Les séries longues qu'ils présentent laissent apparaître un lien entre fiscalité et donations. Les tendances récentes (Graphique 2.3.1) peuvent également s'interpréter de cette manière puisque les deux hausses dans les montants transmis par donations correspondent à des modifications de législation : l'une effective en 2007 avec la loi TEPA qui a multiplié par 3 l'abattement vers les enfants (cf. paragraphe précédent) et l'autre anticipée en 2011, à la veille d'un changement de majorité qui laissait présager une forte diminution de ce même abattement (diminution qui s'est d'ailleurs concrétisée en août 2012) [3].

Dans le même ordre d'idées, sur données américaines, Joulfaian et McGarry (2004) concluent que l'introduction d'une différence de taxation entre donations et successions a un effet de court terme sur les donations des plus aisés et Bernheim, Lemke et Scholz (2004) montrent que les ménages qui s'attendent à une forte baisse de la taxation relative des successions par rapport aux donations diminuent ou retardent leurs donations.

Cela dit, toujours sur données américaines, plusieurs auteurs (McGarry (2001), Poterba (1998), Joulfaian et McGarry (2004)) mettent en évidence le fait que les ménages n'utilisent pas totalement les avantages fiscaux liés aux donations : la donation ne répond donc pas uniquement à un motif d'optimisation fiscale. Cette limite dans la manière dont les ménages répondent aux incitations fiscales est cohérente avec la théorie économique relative aux motifs de transmission entre générations.

[3] cf. annexe 2.A pour des détails concernant l'évolution de la taxation des donations et successions.

Graphique 2.3.1: Evolution récente des montants transmis par donations



Source : DGFip - application Moorea

En effet, une fiscalité des successions et donations avantageuse, bien qu'elle soit incitative, n'est pas en soi suffisante pour que les parents transmettent à leurs enfants. La théorie économique avance plusieurs motifs pour expliquer l'existence de legs. Deux hypothèses sont les plus souvent retenues. D'un côté, l'altruisme intergénérationnel cherche à rapprocher, par les transferts matériels, les différences de niveaux de vie entre les générations. De l'autre, dans une logique d'échange, les legs servent de moyens de paiement en contrepartie des services et attentions rendus par les enfants. Ainsi, dans le cas d'une donation, on peut se demander si elle intervient au moment où les enfants en ont besoin (logique altruiste) ou bien si elle vise plutôt, comme dans le "Roi Lear", à répondre à l'affection de sa progéniture (logique d'échange). De plus, les incertitudes concernant la durée de vie des parents, leur santé, l'utilisation qui sera faite par les enfants des montants transmis peuvent également apporter d'autres éléments d'explication au fait que la substitution entre donation et succession n'est pas parfaite.

Si, comme le montrent par exemple Arrondel et Laferrère (2001), il existe un lien entre la fiscalité et les pratiques de transmissions, on peut néanmoins s'interroger sur

la finalité et l'efficacité économique de telles mesures. En effet, par un effet Carnegie, les transmissions peuvent inciter leurs bénéficiaires à diminuer leur offre de travail. Mais à l'inverse, elles peuvent leur permettre de réaliser des projets tels la créations d'entreprise ou l'achat de la résidence principale.

2.3.2 La fiscalité doit-elle inciter aux donations ?

En 1891, dans son *Évangile de la richesse*, Andrew Carnegie affirme que "les parents qui laissent à leur fils une énorme fortune détruisent généralement ses talents, sa motivation et l'incitent à mener une vie moins utile et moins méritante que celle qu'il aurait menée autrement" [4]. Holtz-Eakin, Joulfaian et Rosen (1993) testent cette conjoncture sur données américaines et concluent qu'un célibataire en activité qui perçoit un héritage de 150 000 $ a une probabilité de quitter le monde du travail 4 fois supérieure à celle de celui qui hérite de moins de 25 000 $. Joulfaian et Wilhelm (1994) trouvent que l'effet de l'héritage sur l'augmentation de la consommation est de faible ampleur tout en étant plus élevé que l'effet observé sur la diminution de l'offre de travail, jugé particulièrement faible. Sur données norvégiennes, Bo, Halvorsen et Thor (2012) constatent une baisse des revenus pour les héritiers les plus jeunes et pour ceux recevant les héritages les plus importants, ils concluent à une baisse de leur offre de travail. Ils montrent également que les départs à la retraite interviennent plus tôt pour les héritiers les plus âgés.

D'autre travaux s'interrogent sur la manière dont les donations et héritages permettent de desserrer les contraintes de crédit et autorisent ainsi des entrepreneurs potentiels à créer leur entreprise. Sur données britanniques, Blanchflower et Oswald (1998) montrent ainsi que les personnes qui ont reçu une donation ou un héritage ont une probabilité plus élevée de devenir entrepreneur individuel. Sur données américaines, Evans et Jovanovic (1989) et Evans et Jovanovic (1987) concluent que

[4] *"the parent who leaves his son enormous amount of wealth generally deadens the talents and the energies of the son, and tempts him to lead a less useful and less worthy life than he otherwise would..."* , Carnegie (1962).

les entrepreneurs potentiels ont une plus grande probabilité de mener à bien leur projet s'ils possèdent un patrimoine initial et attribuent cela à l'existence de contraintes de liquidité. Holtz-Eakin, Joulfaian et Rosen (1994) montrent que les contraintes de liquidité exercent une influence sur la survie des entreprises et que les entrepreneurs ayant reçu un héritage important ont une probabilité plus élevée de rester entrepreneurs et de dégager de meilleures performances [5]. Le fait qu'un patrimoine déjà constitué augmente la longévité d'une entreprise est également corroboré par Fairlie et Krashinsky (2012). À partir de données suédoises, Lindh et Ohlsson (1998) concluent également à l'existence de contraintes de crédit. Hurst et Lusardi (2004) soulignent cependant que les contraintes de liquidité n'empêchent pas la création des petites entreprises aux Etats-Unis dans la mesure où celles-ci ne nécessitent qu'un faible apport initial. L'importance du milieu familial est soulignée dans plusieurs études américaines qui insistent sur l'avantage comparatif que représente le fait d'avoir un parent travailleur indépendant ou d'avoir pu se former en travaillant dans une entreprise familiale (Fairlie et Robb (2007), Hout et Rosen (2000)). Sur les données françaises de l'enquête Insee "Actifs financiers 1992", Laferrère (1998) détecte l'existence de contraintes de liquidité que les transferts peuvent contribuer à lever, mais souligne le rôle prépondérant et complémentaire de l'environnement familial, à travers notamment la transmission du capital humain ou social adapté : de fait, les transferts patrimoniaux augmentent beaucoup plus la probabilité de devenir indépendant pour les fils de salariés que pour les fils d'indépendants. Sur les données françaises de l'enquête Patrimoine 2004, Arrondel et Masson (2011) retrouvent le rôle clef de l'origine familiale. Les auteurs concluent qu'avoir reçu une donation augmente sensiblement la probabilité d'avoir créé ou repris une entreprise ; cependant, les autres formes de transmission sont sans effet significatif, soit parce qu'elles sont de montant trop faible ou destinées à un autre usage (aides financières), soit parce qu'elles arrivent trop tard (héritages).

[5] Performances qu'ils mesurent par les recettes de l'entreprise.

2.3.3 Les transmissions favorisent-elles l'acquisition du logement ?

La littérature existante est plus riche dans le cas de l'acquisition du logement[6]. La plupart des études montrent que les transferts familiaux réduisent le temps d'acquisition du logement et l'auto-épargne des enfants, augmentent la valeur du logement et réduisent les montants empruntés. Guiso et Jappelli (2002) sur données italiennes et Engelhardt et Mayer (1998) sur données américaines concluent ainsi que l'effet de loin le plus important concerne la hausse de la valeur du logement, l'impact sur le temps d'acquisition étant limité[7]. Sur les données françaises plus riches de l'enquête Insee "Actifs financiers 1992", Spilerman et Wolff (2012) obtiennent des résultats qui vont dans le même sens, mais les transferts engendrent une réduction du coût d'acquisition du logement (auto-épargne, montant de l'emprunt) plus marquée que dans les études étrangères. En outre, toutes choses égales par ailleurs, le patrimoine détenu par les parents pendant la jeunesse des enfants a des effets comparables à celui des transferts, ce qui montre que l'influence de la richesse parentale sur le devenir patrimonial et le bien-être des enfants peut emprunter des chemins plus complexes.

Par rapport à ces études, notre travail apporte deux contributions essentielles. La première, de nature empirique, vient de ce qu'elle repose sur les données riches et récentes de l'enquête Insee "Patrimoine 2010" qui permettent de traiter à la fois de l'actif le plus important pour l'ensemble des ménages, à savoir le logement, mais aussi du statut d'entrepreneur qui concerne une population plus ciblée ; c'est pourquoi nous nous sommes limités ici à la probabilité de devenir propriétaire ou entrepreneur. La seconde contribution, d'ordre méthodologique, est double : l'utilisation de "*split models*" permet d'isoler dans les modèles de durée à hasards proportionnels la sous-population vraiment "intéressée" par l'acquisition du logement ou la création d'entreprise ; et le recours à une variable instrumentale autorise la correction d'un éventuel biais d'endogénéité concernant l'effet des transferts. Ces deux corrections (hétérogénéité et

[6] Voir les références économiques mais aussi sociologiques dans Spilerman et Wolff (2012).

[7] Guiso et Jappelli en concluent que les transferts (*inter vivos*) contribuent assez peu à lever des contraintes de crédit particulièrement fortes sur le marché italien.

causalité réciproque) conduisent à accroître l'ampleur des effets causaux de la donation sur l'acquisition du logement par rapport aux estimations initiales – estimations qui confèrent déjà un rôle plus important à la donation sur l'accession à la propriété que dans les études étrangères[8].

2.4 Les données

2.4.1 L'enquête Patrimoine 2009-2010

Les enquêtes Patrimoine de l'Insee ont pour but de décrire précisément les actifs financiers et non-financiers des ménages. Elles collectent également des informations détaillées sur la structure familiale, le parcours scolaire et professionnel, les revenus de ces ménages. Depuis 1998, les enquêtes Patrimoine de l'Insee ont lieu tous les 6 ans environ : 1998-1999, 2003-2004 et 2009-2010. Ces enquêtes ont pris la suite des enquêtes Actifs Financiers (1986-1987 et 1992-1993).

On utilise l'enquête Patrimoine 2009-2010. Elle permet de connaître les donations et héritages reçus par les ménages, la date d'acquisition du logement principal des ménages propriétaires, la date de mise en couple ou de divorce, le nombre d'enfants ainsi que leur année de naissance. Des informations précises sur les entreprises possédées par le ménage sont également exploitables. Cette enquête, à la qualité, reconnue apparaît donc comme une source particulièrement riche pour répondre à un questionnement sur le lien entre la réception d'une donation ou d'un héritage et l'achat de la résidence principale ou la création d'entreprise.

2.4.2 L'échantillon retenu et les choix effectués

Pour l'étude de l'achat de la résidence principale, nous nous sommes restreints aux propriétaires qui ont acheté leur logement. Ceux ayant hérité leur logement ou l'ayant

[8]Dans le cas de la création ou de la reprise d'une entreprise, la faiblesse des échantillons concernés rend beaucoup moins précise l'estimation par variable instrumentale. C'est pourquoi cette estimation n'est pas présentée ici.

reçu par donation ont été exclus de l'échantillon car nous centrons notre analyse sur la décision d'achat. Cette sélection s'impose d'ailleurs d'elle-même dans la mesure où notre perspective est celle de l'estimation d'un effet causal (cf. partie 2.9) [9]. L'approche est ici une approche par ménage car notre *a priori* est que la décision d'achat est une décision qui implique autant la personne de référence que son éventuel conjoint.

Dans le même esprit, pour l'étude de la création et reprise d'entreprises, nous nous sommes restreints aux entreprises qui ont été créées ou achetées à un tiers hors de la famille. Ainsi, nous n'incorporons pas des entreprises qui auraient été héritées totalement ou en partie. L'approche choisie ici est une approche individuelle (par personne de référence). L'effet que nous étudierons porte sur la création et la reprise d'entreprises qui ont survécu jusqu'au moment de l'enquête. Les entreprises qui auraient été créées et auraient disparu avant l'enquête ne sont donc pas prises en compte.

Quel que soit le phénomène étudié, si plusieurs donations ou héritages ont été reçus, on prend en compte l'année de la première transmission. De la même manière, si plusieurs entreprises ont été créées ou reprises, on prend en compte l'année de la plus ancienne. Par ailleurs, nous étudions les comportements des individus à partir de l'année de leur 15 ans. Pour l'achat de la résidence principale, au vu de la distribution des âges d'achat, nous nous sommes restreints aux âges inférieurs à 80 ans. Cela revient à exclure 0,2 % des achats constatés. Pour la création et reprise d'entreprise, nous nous sommes restreints aux âges inférieurs à 60 ans, ce qui exclut 2,2 % des créations et reprises.

Enfin, nous avons fait le choix de nous centrer sur le fait d'avoir reçu une donation ou un héritage plutôt que sur les montants transmis. L'exploitation des montants reçus en donation ou héritage s'avère en effet difficile. Les montants sont fréquemment absents et, lorsqu'ils ont été renseignés, c'est le plus souvent sous la forme de tranches

[9] Nos conclusions ne s'avèrent pas sensibles à ce choix. On trouvera les estimations effectuées en intégrant ces logements exclus en annexe 2.E).

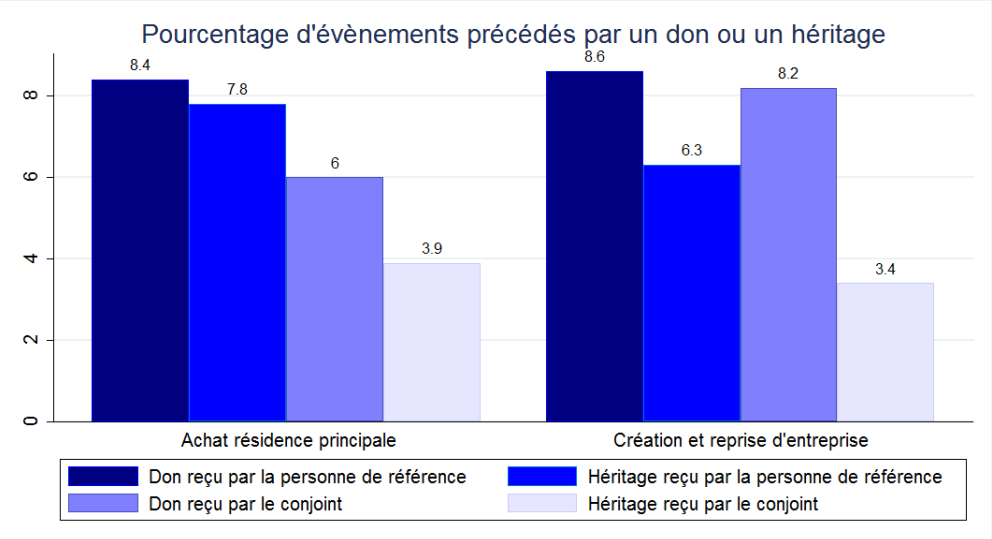
de montants. La nécessité de revaloriser les montants en fonction de l'année où ils ont été reçus constituerait une difficulté supplémentaire.

2.4.3 Quelques statistiques descriptives

Fréquence des dons et héritages

8,4 % des acheteurs (on désigne désormais ainsi les personnes de référence des ménages qui ont acheté leur résidence principale) déclarent avoir reçu un don avant d'acheter et 7,8 % un héritage (Graphique 2.4.1). À titre de comparaison, sur l'ensemble de l'échantillon sélectionné, 11 % des personnes de référence et 9,3 % des conjoints déclarent avoir reçu une donation, 15 % des personnes de référence et 11 % des conjoints déclarent avoir reçu un héritage. 8,6 % des entrepreneurs ont reçu une donation avant de créer ou reprendre une entreprise et 6,3 % ont reçu un héritage.

Graphique 2.4.1: Fréquence des dons et héritages

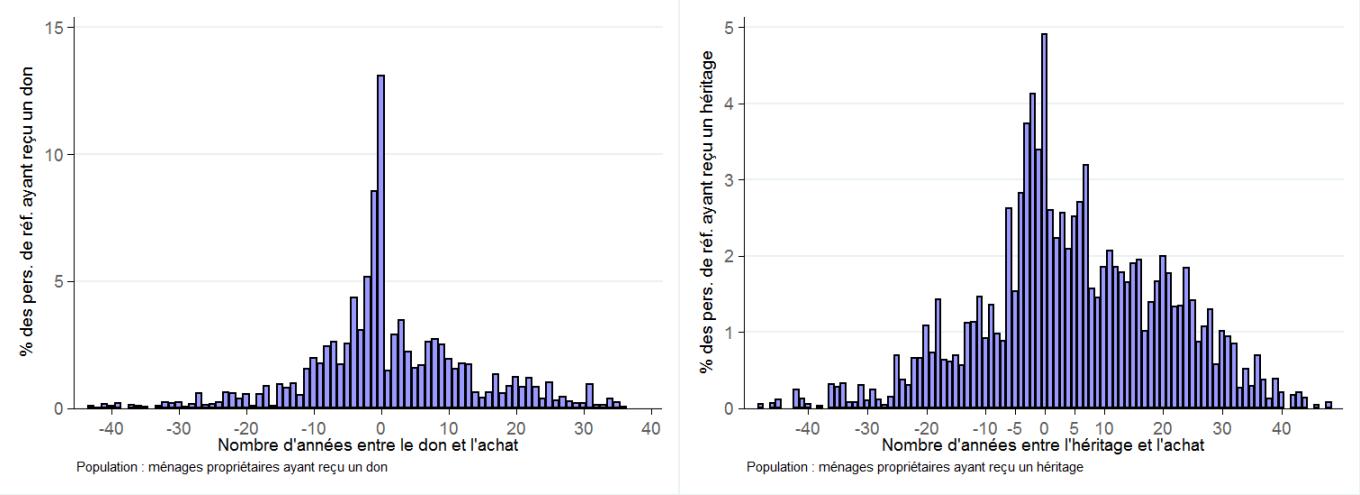


Source : Échantillon Enquête Patrimoine 2009-2010.
Lecture : Partie gauche : Parmi les ménages qui ont acheté leur résidence principale, 8,4 % des personnes de référence (PR) ont reçu un don avant l'achat et 7,8 % un héritage. 6 % des conjoints ont reçu un don avant l'achat et 3,9 % ont reçu un héritage avant.
Partie droite : Parmi les ménages où la PR a créé ou repris une entreprise, 8,6 % des PR ont reçu un don avant la création/reprise et 6,3% ont reçu un héritage avant.

Quand les dons et les héritages ont-ils lieu ?

Les acheteurs qui ont reçu un don l'ont reçu le plus souvent l'année de leur achat (Graphique 2.4.2). Si l'on observe la durée qui sépare le moment où le don est reçu et celui où la résidence principale est achetée, on constate que 13 % des acheteurs qui ont reçu un don l'ont reçu l'année de l'achat, 8,5 % l'année précédant l'achat et 5 % deux ans auparavant. En ce qui concerne les héritages, 5 % des acheteurs l'ont reçu l'année de l'achat, 4 % l'année précédant l'achat et 3,8 % deux ans auparavant.

Graphique 2.4.2: Délai entre donation/héritage reçus par la personne de référence et achat de la résidence principale

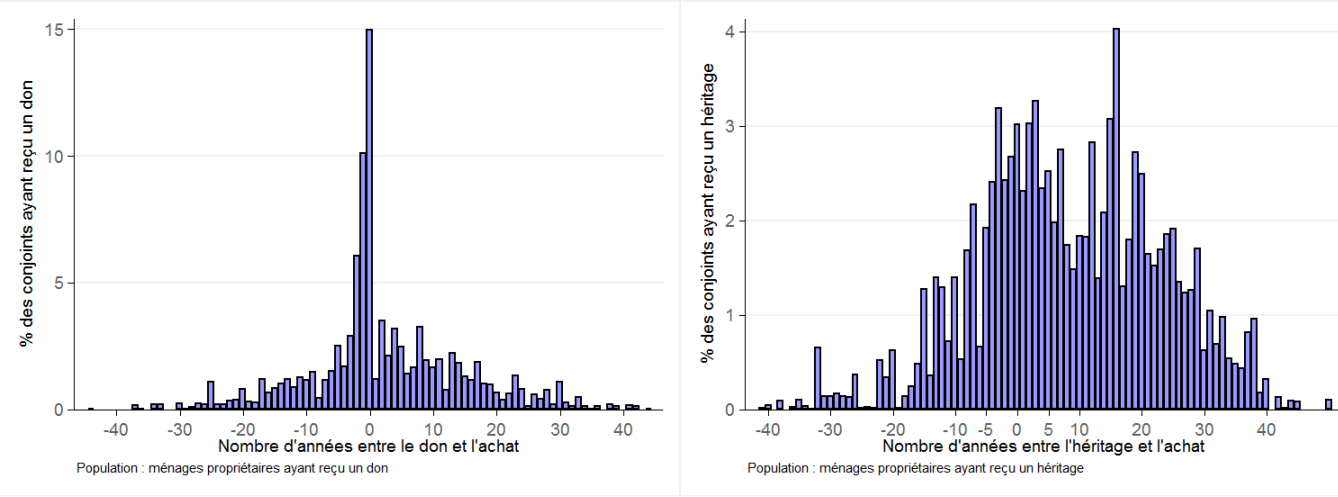


Source : Échantillon Enquête Patrimoine 2009-2010
Lecture : 13 % des acheteurs qui ont reçu un don l'ont reçu l'année de l'achat, 8,5 % l'année précédant l'achat et 5 % deux ans auparavant.

Les donations perçues par leur conjoint présentent un profil assez similaire (Graphique 2.4.3) : l'année de réception la plus représentée est celle où l'achat a lieu. Les héritages reçus ont un profil différent, encore plus concentré après l'achat que celui des personnes de référence. De plus, à la différence des héritages reçus par les personnes de référence, l'année de l'achat n'est pas l'année la plus fréquente où l'héritage est perçu. Seuls 3 % des héritages perçus par les conjoints l'ont été l'année de l'achat.
De même, chez les entrepreneurs[10], les donations et héritages ont le plus souvent été reçus l'année de l'achat (Graphique 2.4.4). 10 % des entrepreneurs qui ont reçu un don l'ont reçu l'année de la création. La distribution apparaît toutefois nettement moins

[10]Pour des raisons de lisibilité, on désigne ainsi les personnes qui ont créé une entreprise ou en ont repris une à un tiers hors de leur famille.

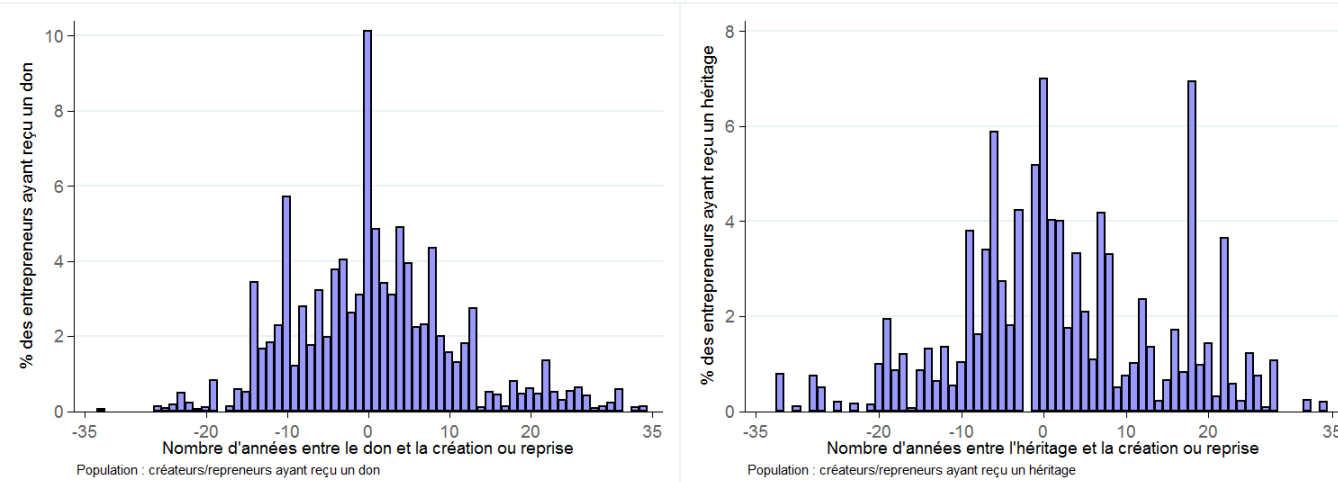
Graphique 2.4.3: Délai entre donation/héritage reçus par le conjoint et achat de la résidence principale



Source : Échantillon Enquête Patrimoine 2009-2010
Lecture : 15 % des conjoints qui ont reçu un don l'ont reçu l'année de l'achat, 10 % l'année précédant l'achat et 6 % deux ans auparavant.

symétrique que pour les ménages acheteurs de leur résidence principale. Les héritages sont également perçus le plus souvent l'année de la création (7 % des héritages perçus).

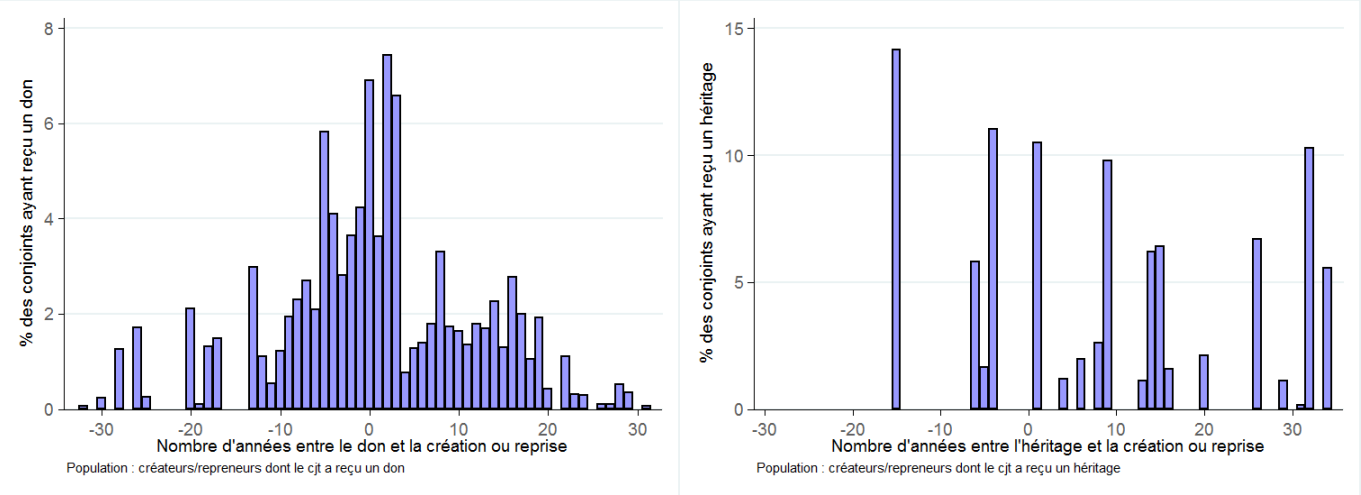
Graphique 2.4.4: Délai entre donation/héritage reçus par les entrepreneurs et création/reprise d'entreprise



Source : Échantillon Enquête Patrimoine 2009-2010
Lecture : 10 % des entrepreneurs qui ont reçu un don l'ont reçu l'année de l'achat, 3 % l'année précédant l'achat et 2,5 % deux ans auparavant. 7 % des entrepreneurs qui ont reçu un héritage l'ont reçu l'année de l'achat et 5 % l'année précédente.

En ce qui concerne les conjoints des entrepreneurs, la distribution ne laisse pas apparaître de profil particulier (Graphique 2.4.5).

Graphique 2.4.5: Délai entre donation/héritage reçus par le conjoint et création/reprise d'entreprise



Source : Échantillon Enquête Patrimoine 2009-2010

2.5 La modélisation retenue

2.5.1 Un modèle de durée semi-paramétrique à hasards proportionnels et temps discret

Modèle de durée à hasards proportionnels

Si l'on suivait un échantillon de personnes jusqu'à leur décès, il serait aisé de connaître la totalité des événements passés qu'elles ont connus au cours de leur vie. Ici, nous n'avons qu'une information partielle, tronquée : lorsque les ménages sont interrogés pour l'enquête Patrimoine, il est possible de connaître leur passé mais évidemment pas leur futur. On considère donc que toute l'information concernant la vie des ménages n'est pas disponible : plus tard, après l'enquête, certains ménages achèteront leur résidence principale, créeront une entreprise, etc.

Le cadre d'analyse de ce type de données est celui des modèles de durée où l'on considère que l'on n'observe les comportements des individus que jusqu'à un certain moment (le moment de l'enquête) et donc que l'information concernant les comportements futurs du ménage est "censurée" car inconnue à ce moment-là.

Le modèle choisi est le modèle à hasards proportionnels. C'est un modèle classique, qui offre une grande flexibilité et qui est largement répandu dans la littérature. Il peut se formaliser ainsi :

$$\lambda(T = t|X_{i,t} = x_{i,t}) = \lambda_0(t)exp(x'_{i,t}\beta)$$

ou encore :

$$\log \lambda(T = t|X_{i,t} = x_{i,t}) = \log \lambda_0(t) + x'_{i,t}\beta$$

où $\lambda(T = t|X_{i,t} = x_{i,t})$ désigne la probabilité, pour un individu i ayant les caractéristiques observables $x_{i,t}$, que l'événement étudié (achat de la résidence principale ou création d'entreprise) se produise à l'instant t[11] sachant qu'il ne s'est pas produit jusque-là. $\lambda(t|X_{i,t})$ est généralement nommé "taux de hasard instantané" ou "probabilité instantanée" et correspond mathématiquement à $\lambda(T = t) = \lim_{dt\to 0} \frac{P(t\leq T<t+dt \,|\, T\geq t)}{dt}$. $\lambda_0(t)$ désigne cette même probabilité pour un individu pour lequel les valeurs des variables observées seraient toutes égales à zéro. Il s'agit d'une référence pour la procédure d'estimation qui est nommée "taux de hasard de base". β est le vecteur des effets des variables X.

Il s'agit d'une modélisation qui suppose que les variables ont un effet multiplicatif sur le taux de hasard. Pour comprendre ce que cela signifie, supposons que l'on s'intéresse à l'achat de la résidence principale, que le fait d'être en couple soit un des déterminants de cet achat et que son effet estimé par le modèle soit $\beta_{en\,couple} = 0,6$. Cela signifie qu'entre une personne en couple (pour laquelle la variable "en couple"=1) et une personne qui n'est pas en couple ("en couple"=0), la probabilité instantanée que la première achète sa résidence principale à un instant t est $1,8$ fois supérieure (car $exp(0,6) \approx 1,8$) à la probabilité instantanée de la seconde.

Temps discret ou temps continu ?

Les événements que nous observons (réception d'une donation ou d'un héritage,

[11] C'est-à-dire lorsque la variable aléatoire T qui désigne le temps écoulé atteint la valeur t

mariage, achat d'une résidence principale, ...) se déroulent de manière continue au cours du temps mais nous n'avons que l'information concernant l'année où ils se produisent. Nous n'avons pas d'information infra-annuelle telle que le jour, la semaine ou le mois où les événements se produisent. Notre cadre d'analyse est donc un cadre à temps discret (annuel) où l'on observe annuellement l'ensemble des événements qui se sont produits de manière continue au fil de l'année (c'est-à-dire des événements qui suivent un modèle sous-jacent continu).
Cette situation conduit naturellement à un choix de modèle dit "Log log complémentaire"[12].

Le fait que ce modèle découle naturellement de l'hypothèse de hasards proportionnels et d'un cadre d'étude à temps discret, le rend particulièrement adapté aux données que nous utilisons. Pour Kalbfleisch et Prentice (2002) : *"This discrete model is then the uniquely appropriate one for grouped data from the continuous relative risk model"* (p.47).

Dans le cadre de ce modèle, il est nécessaire de modéliser la dépendance au temps ($\lambda_0(t)$). Nous avons opté pour un choix non paramétrique afin de n'imposer aucune forme fonctionnelle *a priori* . Concrètement, cela se traduit par l'introduction parmi les variables de contrôle $X_{i,t}$ d'une indicatrice pour chaque année t_j. On introduit donc la totalité des indicatrices $\mathbb{1}_{t=t_j}$ en plus des variables de contrôle déjà envisagées [13].

2.5.2 Un raffinement dans la modélisation : la prise en compte de l'hétérogénéité des comportements

Le modèle précédent permet d'estimer sur l'ensemble de la population étudiée les déterminants des comportements d'achat de la résidence principale et de création d'entreprise.
Il serait également intéressant de connaître l'effet des différentes variables sur ces

[12] cf. annexe 2.B pour une démonstration.
[13] Le modèle est estimé sans la constante afin de ne pas avoir de problème de colinéarité.

comportements pour la sous-population des personnes réellement intéressées soit par l'achat de la résidence principale, soit par la création d'entreprise. En effet, il est tout à fait possible qu'au sein de la population, certaines personnes ne souhaitent pas créer d'entreprise et ce quelle que soit leur situation socio-économique. De la même manière, certains ménages peuvent souhaiter rester locataires. Ces individus doivent être pris en compte différemment de ceux qui sont potentiellement intéressés par la création d'entreprise ou l'achat de leur logement. Malheureusement aucune variable de l'enquête Patrimoine ne permet de distinguer les individus potentiellement intéressés de ceux qui ne le sont pas.

En l'absence d'une telle variable, nous utilisons le modèle développé par Schmidt et Witte (1989) afin de tenir compte de cette hétérogénéité. Ce modèle est nommé "*split population model* " car il permet de faire l'hypothèse que la population est "découpée" en deux sous-populations : l'une potentiellement intéressée par la création d'entreprise (resp. l'achat de la résidence principale) et l'autre qui ne souhaite pas du tout en créer une (resp. acheter). C'est un modèle fréquemment employé en biostatistique où, à la suite de Maller et Zhou (1996), il est généralement nommé "*cure model* " car il est utilisé afin d'étudier les phénomènes de rechute après un traitement et permet de prendre en compte le fait qu'une partie de la population est "guérie" après le traitement initial et n'est donc pas soumise à un risque de rechute. À notre connaissance, il n'existe pas de nom français pour ce modèle, nous le nommerons donc par la suite soit "*split model* ", soit "modèle avec hétérogénéité". Le modèle "log log complémentaire" qui est le modèle initial sera appelé "modèle sans hétérogénéité". Des précisions sur le "*split model*" sont présentées en annexe 2.C.

2.6 Les donations et héritages favorisent l'achat de la résidence principale

2.6.1 Les déterminants de l'achat de la résidence principale

Donations, héritages et autres déterminants

Sur l'ensemble de la population, le fait que la personne de référence ou son conjoint ait reçu une donation ou un héritage est associé à une probabilité supérieure d'achat de la résidence principale (Tableau 2.6.1). Recevoir une donation ou un héritage desserre la contrainte de financement et permet de moins s'endetter. Les ménages dont la personne de référence a reçu une donation ont une probabilité 1,62 fois supérieure d'acheter leur résidence principale par rapport à ceux qui n'en ont pas reçu. Pour l'héritage ce coefficient est de 1,5. Si c'est le conjoint qui a reçu une donation, la probabilité d'achat est multipliée par 1,41. S'il a perçu un héritage, elle est multipliée par 1,38.

ENCADRÉ 1: **Interprétation des coefficients exponentialisés**

Ces coefficients correspondent au modèle continu sous-jacent. Comme expliqué dans le paragraphe 2.5.1, notre modèle est un modèle à temps discret qui correspond à l'observation annuelle d'évènements qui se produisent au fil des jours, de façon continue. Les coefficients du tableau 2.6.1 sont appelés "coefficients exponentialisés" car ce ne sont pas les valeurs des coefficients β de la modélisation du paragraphe 2.5.1 mais leur exponentielle (c'est-à-dire $exp(\beta)$). L'avantage des coefficients exponentialisés est qu'ils permettent une lecture immédiate des résultats. Ainsi, le coefficient 1,62 signifie que la probabilité instantanée $\lambda(T = t)$ d'achat pour un ménage dont la personne de référence a reçu une donation est 1,62 fois supérieure à celle d'un ménage qui n'en a pas reçue.

Si l'on se restreint aux ménages désireux d'acheter leur résidence principale (*"split model"*), les coefficients multiplicateurs sont du même ordre de grandeur. Si la personne de référence d'un ménage désireux d'acheter a hérité, la probabilité que ce ménage achète est 1,53 fois supérieure à celle d'un ménage n'ayant pas hérité. Si c'est le conjoint qui a hérité, elle est 1,42 fois supérieure. Concernant la donation, les coefficients apparaissent légèrement supérieurs à ceux du modèle sans hétérogénéité. Par exemple, si la personne de référence de l'un des ménages désireux d'être propriétaire

Tableau 2.6.1: Déterminants de l'achat de la résidence principale (coefficients exponentialisés)

	Modèle sans hétérogénéité (complémentaire log log)	**Modèle avec hétérogénéité (*split model*)**
	Coeff.	Coeff.
Dons et héritages reçus par la pers. de réf. (PR)		
Don reçu PR	**1,62 (***)**	**1,81 (***)**
Héritage reçu PR	**1,50 (***)**	**1,53 (***)**
Parents PR		
Au moins un parent PR en vie	1,16 (***)	1,19 (***)
Parents PR en vie et prop de leur resid principale	1,24 (***)	1,23 (***)
Parents PR en vie et détenteurs de valeurs mobilières	1,01 (ns)	1,00 (ns)
Parents PR en vie et détenteurs d'assurance vie	1,05 (ns)	1,01 (ns)
Aides reçues par PR		
Don ponctuel	1,07 (ns)	1,07 (ns)
Versements réguliers	0,96 (ns)	0,93 (ns)
Prêt	1,04 (ns)	1,05 (ns)
Mise disposition d'un logement ou paiement d'un loyer	0,78 (**)	0,76 (***)
PR actif en emploi l'année précédente	1,34 (***)	1,35 (***)
Ménage créateur/repreneur d'entreprise	2,00 (***)	2,12 (***)
Don reçu PR × Ménage créateur/repreneur d'entreprise	0,76 (**)	0,82 (ns)
Héritage reçu PR × Ménage créateur/repreneur d'entreprise	0,81 (ns)	1,07 (ns)
Diplôme PR		
Sans diplôme	Réf.	Réf.
CEP	1,12 (**)	1,14 (***)
CAP,BEP	1,46 (***)	1,50 (***)
Brevet des collèges	1,46 (***)	1,47 (***)
Bac pro ou technique	1,95 (***)	1,94 (***)
Bac général	1,46 (***)	1,45 (***)
Bac + 2	1,89 (***)	1,93 (***)
Bac + 3 et plus	1,50 (***)	1,51 (***)
Couple et conjoint		
En couple	1,86 (***)	1,87 (***)
En couple avec patrimoine au départ	1,25 (***)	1,29 (***)
Dons et héritages reçus par le conjoint (CJ)		
Don reçu CJ	1,41 (***)	1,64 (***)
Héritage reçu CJ	1,38 (***)	1,42 (***)
Conjoint actif en emploi l'année précédente	1,23 (***)	1,23 (***)
Parents CJ		
Au moins un parent CJ en vie	1,36 (***)	1,39 (***)
Parents CJ en vie, non détenteurs de valeurs mobilières et prop de leur resid principale	1,16 (***)	1,19 (***)
Parents CJ en vie, non prop de leur résid principale et détenteurs de valeurs mobilières	0,89 (ns)	0,86 (ns)
Parents CJ en vie et prop de leur resid principale et détenteurs de valeurs mobilières	1,00 (ns)	1,03 (ns)
Parents CJ en vie et détenteurs d'assurance vie	1,02 (ns)	1,00 (ns)
Aides reçues par CJ		
Don ponctuel	0,99 (ns)	0,96 (ns)
Versements réguliers	1,02 (ns)	0,93 (ns)
Prêt	0,96 (ns)	0,95 (ns)
Mise disposition d'un logement ou paiement d'un loyer	0,85 (ns)	0,86 (ns)
Ménage a eu son 1er enfant au cours des 2 années précédentes	1,27 (***)	1,25 (***)
Ménage a eu un enfant (pas le 1er) au cours des 2 années précédentes	1,40 (***)	1,39 (***)
Pourcentage de ménages qui ne souhaitent pas acheter leur résidence principale		4,16 % (***)

Enquête Patrimoine 2009-2010, personnes âgées de moins de 80 ans. Les coefficients sont exponentialisés.
Lecture : Dans le modèle sans hétérogénéité, la probabilité instantanée d'achat est multipliée par 1,62 si la personne de référence a reçu une donation. Elle est multipliée par 1,81 dans le modèle avec hétérogénéité.

a reçu une donation, la probabilité que le ménage achète sa résidence principale est 1,81 fois supérieure à celle d'un ménage n'ayant perçu aucune donation. Elle est 1,64 fois supérieure si c'est le conjoint qui a reçu une donation.

Les coefficients estimés par le modèle avec hétérogénéité apparaissent systématiquement plus élevés que ceux du modèle sans hétérogénéité. Cela dit, les intervalles de confi-

ance à 95 % de ces estimations se chevauchent : il n'est pas possible de conclure à la significativité de cette différence, pas plus d'ailleurs qu'il n'est possible de conclure à sa non-significativité[14].

Le fait que la personne de référence ou son conjoint ait des parents en vie joue positivement sur la probabilité d'acheter. Il est possible de voir dans cet effet un effet de collatéral. Lors de la souscription d'un crédit, les banques peuvent en effet demander aux parents d'un acheteur de se porter caution afin de garantir le prêt. Ceci n'est envisageable que si le patrimoine des parents le permet. La possession d'une résidence principale par les parents de la personne de référence ou de son conjoint est donc un bon indicateur de leur capacité à se porter caution.

Lorsque la personne de référence ou son conjoint sont en activité, la probabilité d'acheter est plus élevée. Là encore, il est possible de relier ceci à une plus grande facilité d'obtention d'un prêt immobilier lorsque le ménage dispose de revenus réguliers.

D'autres déterminants tels que le fait d'être en couple (une fois que l'activité du conjoint est contrôlée) ou d'avoir eu un enfant sont également associés à une probabilité d'achat plus élevée. L'achat immobilier est une étape importante dans la vie d'un couple et peut donner un sentiment de sécurité et de pérennité à un ménage qui souhaite s'installer et élever des enfants.

Enfin, si la personne de référence a bénéficié d'un logement mis à disposition par ses parents ou du paiement de son loyer par ceux-ci, la nécessité d'acquérir sa résidence principale est certainement moindre et sa probabilité d'acheter est 20 % inférieure à celle d'un ménage n'ayant pas disposé de tels avantages.

[14] L'écart-type du coefficient 1,62 est de 0,069 soit un $IC_{0,95} = [1,489\,;\,1,759]$. L'écart-type du coefficient de 1,81 est de 0,086 soit un $IC_{0,95} = [1,646\,;\,1,983]$. Rappelons qu'en cas de chevauchement des intervalles de confiance, on ne peut conclure ni à la significativité ni à la non-significativité de la différence.

Plus de 9 ménages sur 10 préfèrent être propriétaires ou préfèreraient l'être s'ils ne le sont pas

Un autre intérêt du *"split model"* est de permettre d'estimer la part de ménages qui souhaiteraient acquérir leur résidence principale. Pour les ménages dont la personne de référence est âgée de 15 à 80 ans, cette part est ici estimée à un peu moins de 96 %.

Un sondage récent mené par l'IFOP en février 2011 [15] conclut que 92 % des Français préfèrent être propriétaires ou préfèreraient l'être s'ils sont locataires. En tenant compte de la marge d'erreur de nos résultats et de celle d'un sondage réalisé auprès d'un millier de personnes, ces deux estimations sont tout à fait concordantes.

2.6.2 Évolution en fonction de l'âge

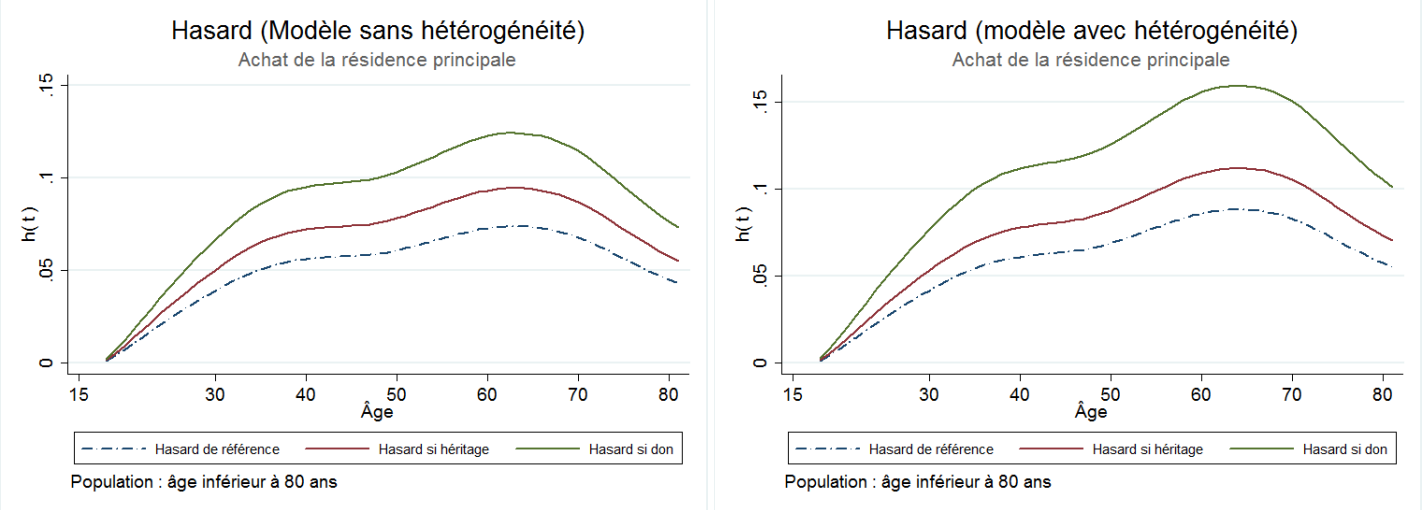
Évolution de la probabilité annuelle d'achat

La probabilité instantanée[16] d'acheter sa résidence principale, c'est-à-dire la probabilité annuelle d'achat sachant que l'achat n'a pas été effectué jusqu'ici, (Graphiques 2.6.1) [17] augmente fortement entre 15 et 35 ans. Elle augmente plus légèrement entre 35 et 65 ans pour décroître ensuite. Ce schéma est assez intuitif : l'accession à la propriété accompagne l'installation du ménage dans sa vie active et familiale, ce qui correspond à la forte hausse jusqu'à 35 ans. À partir de 65 ans, une grande partie des ménages qui souhaitent acheter et qui en ont eu la possibilité l'on déjà fait. Les ménages n'ayant pas encore acheté sont ceux qui jusqu'ici n'ont soit pas souhaité acheter, soit n'en ont pas eu l'opportunité. Le passage à la retraite implique généralement une baisse des revenus et l'avancée en âge rend plus difficile l'obtention d'un crédit immobilier. Ces ménages ont alors une probabilité de plus en plus faible d'accéder à la propriété par l'achat.

[15] Sondage réalisé par l'IFOP auprès d'un échantillon de 1 009 personnes par l'intermédiaire d'un questionnaire auto-administré en ligne, du 15 au 17 février 2011.

[16] Le calcul d'une probabilité nécessite de choisir un type de ménage qui sert alors de ménage de référence. cf. 2)

[17] Ces graphiques sont issus d'un lissage de type *lowess* (pour LOcally WEighted Scatterplot Smoothing) appliqué aux estimations du hasard obtenues de manière non paramétrique (cf. 2.5.1 pour l'explication du choix de la modélisation de la dépendance au temps). Le lecteur intéressé pourra trouver des détails sur la procédure en annexe 2.D.



Graphique 2.6.1: Probabilités instantanées ("hasard") d'achat de la résidence principale

Légende : Le hasard $h(t)$ représente la probabilité instantanée d'acheter sa résidence principale à l'âge t. Ceci peut s'interpréter comme une probabilité annuelle d'achat sachant que l'achat n'a pas eu lieu précédemment.
Source : Échantillon Enquête Patrimoine 2009-2010.

ENCADRÉ 2: **Choix d'un ménage de référence pour le calcul des probabilités**

Que ce soit pour calculer des probabilités instantanées ou des probabilités cumulées (probabilité d'acheter avant un certain âge), il est nécessaire de choisir un ménage de référence, c'est-à-dire un ménage dont on choisit les caractéristiques. Il est alors possible de calculer pour ce ménage de référence les probabilités avec et sans donation, avec et sans héritage. Pour les probabilités d'acheter sa résidence principale, le ménage de référence a les caractéristiques suivantes :

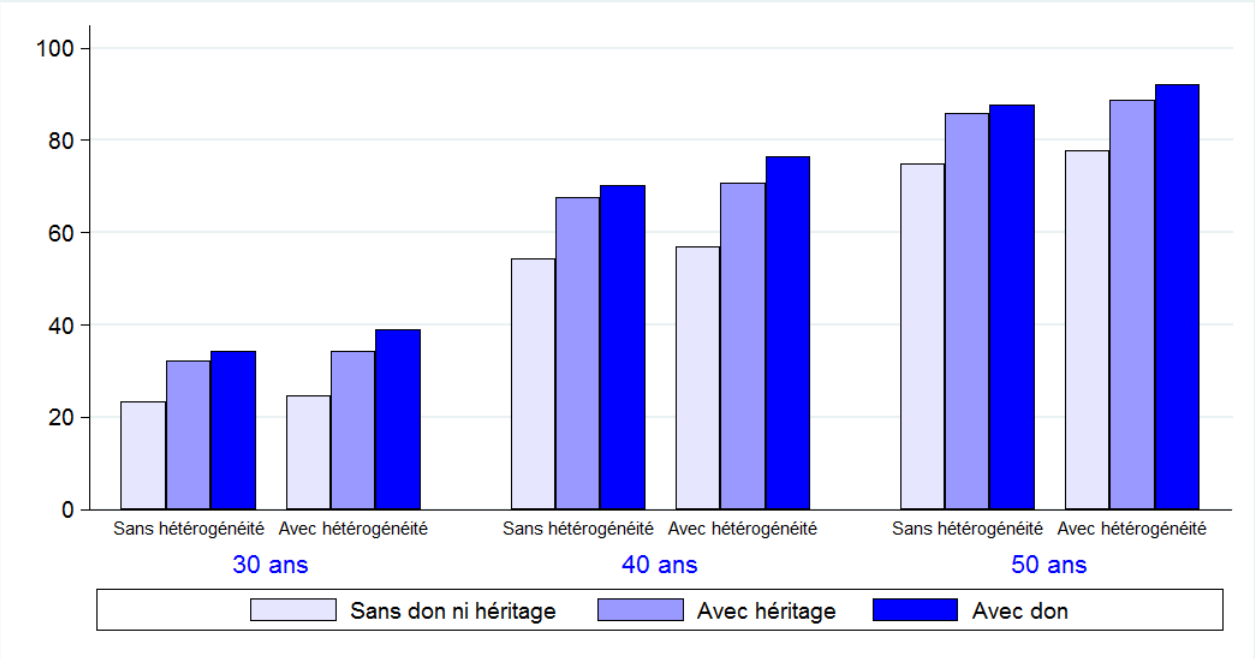
- Au moins un parent de la personne de référence est en vie
- Diplôme de la personne de référence : Bac +2
- En couple
- Au moins un parent du conjoint est en vie
- Personne de référence et conjoint sont tous deux actifs en emploi l'année précédente

Pour les probabilités de créer ou reprendre une entreprise, le ménage de référence est le même que le précédent à ceci près que les parents de la personne de référence et de son conjoint ont eu l'une des professions suivantes : employés, ouvriers, cadres ou professions intermédiaires.

L'effet cumulé de la donation et de l'héritage sur la probabilité de devenir propriétaire

Les informations obtenues jusqu'ici permettent de calculer la probabilité qu'un ménage de référence (cf. 2) achète sa résidence principale avant un âge donné selon qu'il a ou non reçu une donation ou un héritage (Graphique 2.6.2)[18].

Graphique 2.6.2: Probabilité d'acheter sa résidence principale avant l'âge de...



Dans le modèle de base sans hétérogénéité, la probabilité qu'un ménage devienne propriétaire si la personne de référence est âgée de moins de 40 ans et n'a reçu ni donation ni héritage est de 54 %. Cette probabilité s'élève à 68 % si elle a reçu un héritage et à 70 % en cas de donation. Ainsi pour ce ménage, la probabilité d'acheter est multipliée par 1,25 en cas d'héritage et 1,29 en cas de donation. Si l'on se restreint aux ménages désireux d'acquérir leur logement (modèle avec hétérogénéité), pour un ménage du même type, cette probabilité est multipliée par 1,25 si la personne de référence a perçu un héritage et par 1,34 si elle a perçu une donation. On retrouve

[18]En effet, la probabilité d'acheter avant l'âge t s'écrit :
$P(T \leq t) = 1 - S(t) = 1 - \prod_{j=1}^{t}(1 - \lambda_j)$.
La connaissance des probabilités instantanées λ_j permet donc aisément de calculer les probabilités $P(T \leq t)$

ici que l'estimation de l'effet de l'héritage est sensiblement la même pour les deux modèles alors que, pour la donation, elle est un peu plus élevée dans le *"split model"*.

Pour les ménages où la personne de référence est âgée de moins de 30 ans, la probabilité cumulée d'acheter est multipliée par 1,37 en cas d'héritage et 1,46 en cas de donation (1,38 et 1,57 dans le *"split model"*). Si la personne de référence est âgée de moins de 50 ans, cette probabilité n'est plus multipliée que par 1,14 en cas d'héritage et 1,17 en cas de donation (les coefficients sont alors quasiment les mêmes pour le *"split model"* : 1,14 et 1,18)[19]. Remarquons qu'il existe une explication mécanique au fait que le rapport entre les probabilités d'achat apparaît décroître en fonction de l'âge: plus la personne de référence avance en âge et plus la probabilité cumulée d'achat est importante. Cette hausse de la probabilité cumulée conduit à un rapport de probabilité moindre[20].

Robustesse de l'estimation

Une variable importante dans la décision d'achat est absente de l'enquête Patrimoine : le revenu du ménage au moment de l'achat. Afin d'approximer cette variable, nous avons jusqu'ici contrôlé à la fois par l'activité de la personne de référence et de son conjoint ainsi que par le diplôme de la personne de référence. Pour vérifier que ces variables constituent une approximation correcte du revenu, nous avons introduit le

[19]Remarque technique : Les coefficients calculés ici ne correspondent pas à ceux présentés dans le tableau 2.6.1. Cela peut s'expliquer par le fait que l'effet de la donation ou de l'héritage ne commence qu'à partir de l'âge où sont reçus une donation ou un héritage. Nous avons utilisé l'âge moyen auquel une donation ou un héritage sont reçus. Cet âge a été calculé sur la sous-population d'intérêt (les moins de 30 ans puis les moins de 40 ans et enfin les moins de 50 ans). Pour un ménage dont la personne de référence est âgée de moins de 40 ans, par exemple, il est de 27 ans. Par conséquent, pour ce ménage, la probabilité annuelle d'achat jusqu'au 27 ans de la personne de référence est la probabilité instantanée d'achat en l'absence de donation et d'héritage. L'effet de la donation ou de l'héritage ne commence donc qu'à partir de la 27$^{\text{è}}$ année de la personne de référence. Plus la donation ou l'héritage interviennent tôt et plus l'écart entre la probabilité cumulée sans donation ni héritage et celle avec l'un ou l'autre sera important.

[20]À mesure que l'âge avance, la fonction de survie s'approche de 0 que ce soit pour ceux ayant reçu un don ou ceux n'en ayant pas reçu (avec une décroissance plus rapide pour ceux ayant reçu un don). Par conséquent les fonctions de répartition deviennent de plus en plus proches de 1. Le rapport entre les deux fonctions de répartition s'approchent donc lui aussi de 1. Par exemple, si la PR a reçu un don à 15 ans, on a $S_{ref}(60ans) = 0,12$ et $S_{don}(60ans) = 0,03$. Le rapport entre les deux fonctions de survie est élevé : la probabilité de ne pas avoir encore acheté à 60 ans est 4 fois plus élevée pour le ménage dont la PR n'a jamais reçu de don. Le rapport entre F_{don} et F_{ref} est de $\frac{0,97}{0,88} = 1,10$.

revenu du ménage en 2009. Puisque nous cherchons principalement à appréhender la hiérarchie des revenus au moment de l'achat, nous avons découpé ce revenu en déciles, ceux-ci étant plus robustes à des variations de revenu. Les résultats obtenus (Tableau 2.6.2) varient très peu par rapport à ceux des modèles précédents. Les seuls changements notables concernent les coefficients qui correspondent au fait que la personne de référence et son conjoint sont en activité ainsi que ceux qui correspondent aux diplômes. Ils s'avèrent tous moins élevés une fois pris en compte les déciles de revenus, ce qui correspond bien à l'intuition que les diplômes et le fait d'être en activité constituent de bons *proxys* du revenu.

Donations et prix de l'immobilier : Les donations perçues après 2000 sont liées à des probabilités d'achat plus élevées

Au cours des dernières années, les prix de l'immobilier ont considérablement augmenté et le rythme de l'augmentation s'est accru à partir des années 2000 jusqu'à une période de baisse, d'environ un an, débutée fin 2008 (Graphique 2.6.3). Les montants nécessaires à l'achat d'un bien immobilier sont donc devenus de plus en plus importants. Face à cette hausse, les contraintes de crédit ont pesé de plus en plus sur les ménages.

Il est donc naturel de se demander si les donations ont un effet plus important depuis la hausse des prix de l'immobilier. Pour cela, nous avons croisé le fait de recevoir une donation avec la date à laquelle la donation a été reçue : avant ou après 2000.

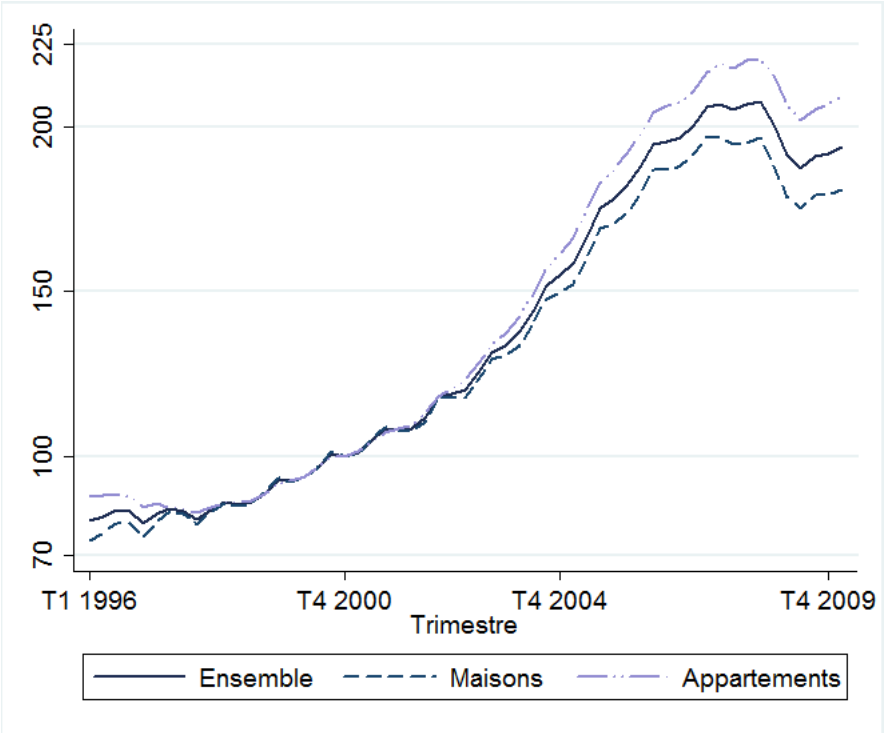
La probabilité annuelle d'achat est multipliée par 1,4 à 1,5 si la personne de référence a reçu une donation avant 2000 et par plus de 2 si la donation a été reçue après 2000 (Tableau 2.6.3). L'importance que revêtent les donations paraît donc s'être accrue à mesure que les prix de l'immobilier augmentaient.

Tableau 2.6.2: Déterminants de l'achat de la résidence principale avec déciles de revenu 2009 (coefficients exponentialisés)

	Modèle sans hétérogénéité (log log complémentaire)		**Modèle avec hétérogénéité (*split model*)**	
	Coeff.	Coeff.	Coeff.	Coeff.
Dons et héritages reçus par la pers. de réf. (PR)				
Don reçu	**1,62 (***)**	**1,62 (***)**	**1,81 (***)**	**1,83 (***)**
Héritage reçu	**1,50 (***)**	**1,49 (***)**	**1,53 (***)**	**1,52 (***)**
Parents PR				
Au moins un parent PR en vie	1,16 (***)	1,15 (***)	1,19 (***)	1,18 (***)
Parents PR en vie et prop de leur resid ppale	1,24 (***)	1,25 (***)	1,23 (***)	1,24 (***)
Parents PR en vie et détenteurs de valeurs mobilières	1,01 (ns)	1,02 (ns)	1,00 (ns)	1,01 (ns)
Parents PR en vie et détenteurs d'assurance vie	1,05 (ns)	1,05 (ns)	1,01 (ns)	1,01 (ns)
Aides reçues par PR				
Don ponctuel	1,07 (ns)	1,07 (ns)	1,07 (ns)	1,08 (ns)
Versements réguliers	0,96 (ns)	0,98 (ns)	0,93 (ns)	0,95 (ns)
Prêt	1,04 (ns)	1,02 (ns)	1,05 (ns)	1,04 (ns)
Mise disposition d'un logement ou paiement d'un loyer	0,78 (**)	0,80 (**)	0,76 (***)	0,78 (**)
PR actif en emploi l'année précédente	1,34 (***)	1,26 (***)	1,35 (***)	1,26 (***)
Ménage créateur d'entreprise (ou reprise)	2,00 (***)	2,06 (***)	2,12 (***)	2,21 (***)
don reçu av PR × Ménage créateur d'entreprise (ou reprise)	0,76 (**)	0,76 (**)	0,82 (ns)	0,8 (ns)
heritage reçu av PR × Ménage créateur d'entreprise (ou reprise)	0,81 (ns)	0,83 (ns)	1,07 (ns)	1,06 (ns)
Décile de revenus 2009				
p10		Réf.		Réf.
p20		0,96 (ns)		0,95 (ns)
p30		1,09 (ns)		1,10 (ns)
p40		1,36 (***)		1,40 (***)
p50		1,38 (***)		1,41 (***)
p60		1,66 (***)		1,72 (***)
p70		1,66 (***)		1,73 (***)
p80		1,74 (***)		1,83 (***)
p90		1,80 (***)		1,82 (***)
p100		1,50 (***)		1,50 (***)
Diplôme PR				
Sans diplôme	Réf.	Réf.	Réf.	Réf.
CEP	1,12 (**)	1,07 (ns)	1,14 (***)	1,08 (ns)
CAP,BEP	1,46 (***)	1,31 (***)	1,50 (***)	1,33 (***)
Brevet des collèges	1,46 (***)	1,27 (***)	1,47 (***)	1,28 (***)
Bac pro ou technique	1,95 (***)	1,67 (***)	1,94 (***)	1,64 (***)
Bac général	1,46 (***)	1,21 (***)	1,45 (***)	1,19 (***)
Bac + 2	1,89 (***)	1,56 (***)	1,93 (***)	1,58 (***)
Bac + 3 et plus	1,50 (***)	1,23 (***)	1,51 (***)	1,24 (***)
Couple et conjoint				
En couple	1,86 (***)	1,81 (***)	1,87 (***)	1,82 (***)
En couple avec patrimoine au départ	1,25 (***)	1,21 (***)	1,29 (***)	1,24 (***)
Dons et héritages reçus par le conjoint (CJ)				
Don reçu CJ	1,41 (***)	1,40 (***)	1,64 (***)	1,64 (***)
Héritage reçu CJ	1,38 (***)	1,32 (***)	1,42 (***)	1,36 (***)
Conjoint actif en emploi l'année précédente	1,23 (***)	1,12 (***)	1,23 (***)	1,12 (***)
Parents CJ				
Au moins un parent CJ en vie	1,36 (***)	1,33 (***)	1,39 (***)	1,35 (***)
Parents CJ en vie, non détenteurs de valeurs mobilières et prop de leur resid principale	1,16 (***)	1,16 (***)	1,19 (***)	1,18 (***)
Parents CJ en vie, non prop de leur résid principale et détenteurs de valeurs mobilières	0,89 (ns)	0,90 (ns)	0,86 (ns)	0,86 (ns)
Parents CJ en vie et prop de leur resid principale et détenteurs de valeurs mobilières	1,00 (ns)	1,03 (ns)	1,03 (ns)	1,06 (ns)
Parents CJ en vie et détenteurs d'assurance vie	1,02 (ns)	1,01 (ns)	1,00 (ns)	1,01 (ns)
Aides reçues par CJ				
Don ponctuel	0,99 (ns)	0,97 (ns)	0,96 (ns)	0,93 (ns)
Versements réguliers	1,02 (ns)	1,03 (ns)	0,93 (ns)	0,94 (ns)
Prêt	0,96 (ns)	0,96 (ns)	0,95 (ns)	0,95 (ns)
Mise disposition d'un logement ou paiement d'un loyer	0,85 (ns)	0,83 (ns)	0,86 (ns)	0,85 (ns)
Ménage a eu son 1er enfant au cours des 2 années précédentes	1,27 (***)	1,27 (***)	1,25 (***)	1,25 (***)
Ménage a eu un enfant (pas le 1er) au cours des 2 années précédentes	1,40 (***)	1,39 (***)	1,39 (***)	1,39 (***)
Pourcentage de ménages qui ne souhaitent pas acheter leur résidence principale			4,16 % (***)	4,14 % (***)

Enquête Patrimoine 2009-2010, personnes âgées de moins de 80 ans. Les coefficients sont exponentialisés.
Lecture : cf. tableau 2.6.1.

Graphique 2.6.3: Évolution des prix de l'immobilier ancien, 1996-2010 (base 100 en 2000)



2.7 Les donations favorisent la création et à la reprise d'entreprise

2.7.1 Les déterminants de la création et reprise d'entreprise

Donations, héritages et autres déterminants

Avoir reçu une donation est associé à une probabilité de création ou reprise d'entreprise 1,5 fois plus élevée. Ici, à la différence de ce qu'il se passe pour l'achat de la résidence principale, le fait de recevoir un héritage n'est pas significatif au seuil de 10 %. Si la donation permet de desserrer des contraintes de crédit, les héritages, plus tardifs, semblent intervenir trop tard [21].

Si le ménage est propriétaire de sa résidence principale ou si les parents de la per-

[21] Le lecteur intéressé par des détails relatifs aux coefficients exponentialisés et aux probabilités considérées ici pourra se référer à l'encadré 1.

Tableau 2.6.3: Déterminants de l'achat de la résidence principale (en fonction de l'année où la donation a été reçue, avec et sans déciles de revenu 2009) (coefficients exponentialisés)

	Modèle sans hétérogénéité (log log complémentaire)		**Modèle avec hétérogénéité (*split model*)**	
	Coeff.	Coeff.	Coeff.	Coeff.
Dons et héritages reçus par la pers. de réf. (PR)				
Don reçu avant 2000	**1,42 (***)**	**1,40 (***)**	**1,54 (***)**	**1,54 (***)**
Don reçu après 2000	**2,92 (***)**	**2,95 (***)**	**3,57 (***)**	**3,63 (***)**
Héritage reçu	1,51 (***)	1,49 (***)	1,53 (***)	1,53 (***)
Parents PR				
Au moins un parent PR en vie	1,15 (***)	1,14 (***)	1,18 (***)	1,17 (***)
Parents PR en vie et prop de leur resid ppale	1,23 (***)	1,24 (***)	1,23 (***)	1,24 (***)
Parents PR en vie et détenteurs de valeurs mob	0,99 (ns)	1,00 (ns)	0,98 (ns)	0,99 (ns)
Parents PR en vie et détenteurs d'ass vie	1,05 (ns)	1,05 (ns)	1,02 (ns)	1,02 (ns)
Aides reçues par PR				
Don ponctuel	1,06 (ns)	1,07 (ns)	1,07 (ns)	1,07 (ns)
Versements réguliers	0,94 (ns)	0,96 (ns)	0,9 (ns)	0,92 (ns)
Prêt	1,04 (ns)	1,01 (ns)	1,05 (ns)	1,03 (ns)
Mise dispo logement ou paiement loyer	0,78 (**)	0,80 (**)	0,76 (***)	0,78 (**)
PR actif en emploi l'année précédente	1,35 (***)	1,26 (***)	1,36 (***)	1,27 (***)
Ménage créateur d'entreprise (ou reprise)	2,01 (***)	2,07 (***)	2,15 (***)	2,23 (***)
Don reçu PR × Ménage créateur d'entreprise (ou reprise)	0,70 (***)	0,71 (***)	0,77 (*)	0,76 (*)
Héritage reçu PR × Ménage créateur d'entreprise (ou reprise)	0,83 (ns)	0,85 (ns)	1,05 (ns)	1,04 (ns)
Décile de revenus 2009				
p10		Réf.		Réf.
p20		0,96 (ns)		0,94 (ns)
p30		1,09 (ns)		1,10 (ns)
p40		1,36 (***)		1,39 (***)
p50		1,38 (***)		1,4 (***)
p60		1,66 (***)		1,71 (***)
p70		1,66 (***)		1,73 (***)
p80		1,75 (***)		1,83 (***)
p90		1,81 (***)		1,84 (***)
p100		1,52 (***)		1,51 (***)
Diplôme PR				
Sans diplôme	Réf.	Réf.	Réf.	Réf.
CEP	1,12 (***)	1,07 (ns)	1,14 (***)	1,08 (*)
CAP,BEP	1,47 (***)	1,31 (***)	1,5 (***)	1,34 (***)
Brevet des collèges	1,45 (***)	1,27 (***)	1,46 (***)	1,27 (***)
Bac pro ou technique	1,93 (***)	1,65 (***)	1,9 (***)	1,61 (***)
Bac général	1,45 (***)	1,2 (***)	1,44 (***)	1,18 (***)
Bac + 2	1,88 (***)	1,55 (***)	1,91 (***)	1,56 (***)
Bac + 3 et plus	1,5 (***)	1,21 (***)	1,51 (***)	1,23 (***)
Couple et conjoint				
En couple	1,87 (***)	1,81 (***)	1,88 (***)	1,83 (***)
En couple avec patrimoine au départ	1,26 (***)	1,22 (***)	1,29 (***)	1,24 (***)
Dons et héritages reçus par le conjoint (CJ)				
Don reçu CJ	1,42 (***)	1,40 (***)	1,65 (***)	1,64 (***)
Héritage reçu CJ	1,36 (***)	1,30 (***)	1,41 (***)	1,35 (***)
Conjoint actif en emploi l'année précédente	1,23 (***)	1,12 (***)	1,23 (***)	1,12 (***)
Parents CJ				
Au moins un parent CJ en vie	1,35 (***)	1,32 (***)	1,37 (***)	1,33 (***)
Parents CJ en vie, non détenteurs de valeurs mobilières et prop de leur resid principale	1,16 (***)	1,16 (***)	1,2 (***)	1,19 (***)
Parents CJ en vie, non prop de leur résid principale et détenteurs de valeurs mobilières	0,89 (ns)	0,9 (ns)	0,87 (ns)	0,87 (ns)
Parents CJ en vie et prop de leur resid principale et détenteurs de valeurs mobilières	1,01 (ns)	1,03 (ns)	1,04 (ns)	1,07 (ns)
Parents CJ en vie et détenteurs d'assurance vie	1,02 (ns)	1,02 (ns)	0,99 (ns)	1,00 (ns)
Aides reçues par CJ				
Don ponctuel	0,98 (ns)	0,96 (ns)	0,96 (ns)	0,94 (ns)
Versements réguliers	1,01 (ns)	1,02 (ns)	0,92 (ns)	0,94 (ns)
Prêt	0,96 (ns)	0,97 (ns)	0,94 (ns)	0,94 (ns)
Mise dispo logement ou paiement loyer	0,83 (ns)	0,81 (ns)	0,83 (ns)	0,82 (ns)
Ménage a eu son 1er enfant au cours des 2 années précédentes	1,27 (***)	1,27 (***)	1,25 (***)	1,25 (***)
Ménage a eu un enfant (pas le 1er) au cours des 2 années précédentes	1,39 (***)	1,39 (***)	1,39 (***)	1,39 (***)
Pourcentage de ménages qui ne souhaitent pas acheter leur résidence principale			4,49 % (***)	4,41 % (***)

Enquête Patrimoine 2009-2010, personnes âgées de moins de 80 ans. Les coefficients sont exponentialisés.
Lecture : cf. tableau 2.6.1.

Tableau 2.7.1: Déterminants de la création et reprise d'entreprise

	Modèle sans hétérogénéité (log log complémentaire)	**Modèle avec hétérogénéité (*split model*)**
	Coeff.	Coeff.
Dons et héritages reçus par la pers. de réf. (PR)		
Don reçu PR	**1,45 (***)**	**1,48 (***)**
Héritage reçu PR	**1,17 (ns)**	**1,18 (ns)**
Parents PR		
Au moins un parent PR en vie	2,24 (***)	2,44 (***)
Parents PR en vie et propriétaires de leur residence principale	1,19 (**)	1,21 (**)
Parents PR en vie et détenteurs de valeurs mobilières	1,07 (ns)	1,04 (ns)
Parents PR en vie et détenteurs d'assurance vie	1,22 (**)	1,27 (**)
Profession parents PR		
Père PR agriculteur	2,25 (***)	2,51 (***)
Père PR indpt	1,71 (***)	1,83 (***)
Père PR prof lib	1,67 (***)	1,89 (***)
Père PR cadre ou prof int	1,01 (ns)	1,01 (ns)
Père PR employé ou ouvrier	Réf.	Réf.
Père PR "autre"	0,95 (ns)	0,93 (ns)
Mère PR agr, idpt, prof lib	1,24 (*)	1,33 (**)
Mère PR cadre ou prof int	1,22 (ns)	1,27 (ns)
Mère PR employée ou ouvrière	Réf.	Réf.
Mère PR "autre"	1,04 (ns)	1,04 (ns)
Aides reçues par PR pendant études		
Don ponctuel	1,34 (ns)	1,42 (ns)
Versements réguliers	1,05 (ns)	0,91 (ns)
Prêt	0,91 (ns)	0,88 (ns)
Mise à disposition d'un logement ou paiement d'un loyer	1,36 (ns)	1,47 (ns)
PR ayant connu une période de chômage dans les 3 années précédentes	0,99 (ns)	1,00 (ns)
Ménage propriétaire de sa résidence ppale	2,08 (***)	2,17 (***)
Ménage propriétaire de sa résidence ppale × Don reçu PR	0,55 (***)	0,62 (*)
Ménage propriétaire de sa résidence ppale × Héritage reçu PR	1,20 (ns)	1,36 (ns)
Diplôme PR		
Sans diplôme	Réf.	Réf.
CEP	0,61 (**)	0,61 (**)
CAP,BEP	2,37 (***)	2,54 (***)
Brevet des collèges	2,12 (***)	2,26 (***)
Bac pro ou technique	2,76 (***)	2,97 (***)
Bac général	1,51 (**)	1,55 (**)
Bac + 2	1,97 (***)	2,13 (***)
Bac + 3 et plus	2,39 (***)	2,53 (***)
Couple et conjoint		
En couple	1,08 (ns)	1,09 (ns)
En couple avec patrimoine au départ	1,12 (ns)	1,11 (ns)
Dons et héritages reçus par le conjoint (CJ)		
Don reçu CJ	1,11 (ns)	1,22 (ns)
Héritage reçu CJ	1,10 (ns)	1,11 (ns)
Parents CJ		
Au moins un parent CJ en vie	1,97 (***)	2,09 (***)
Parents CJ en vie et prop. de leur residence principale	1,24 (***)	1,28 (***)
Parents CJ en vie et détenteurs de valeurs mobilières	0,91 (ns)	0,87 (ns)
Parents CJ en vie et détenteurs d'assurance vie	0,97 (ns)	0,98 (ns)
Conjoint actif l'année précédente	0,94 (ns)	0,97 (ns)
Ménage a un enfant	0,80 (**)	0,80 (**)
Ménage a au moins 2 enfants	0,99 (ns)	0,98 (ns)
Pourcentage de ménages qui ne souhaitent pas créer une entreprise		51,09 % (***)

Enquête Patrimoine 2009-2010, personnes âgées de moins de 60 ans. Les coefficients sont exponentialisés.
Lecture : cf. tableau 2.6.1.

sonne de référence ou de son conjoint sont en vie ou possèdent du patrimoine, la probabilité que la personne de référence devienne entrepreneur est plus élevée. Ces facteurs jouent dans le sens d'un desserrement des contraintes de crédit, soit parce

que le ménage possède déjà un bien qu'il peut hypothéquer, soit parce que les parents peuvent se porter caution. Il est alors plus facile d'obtenir un prêt bancaire.

Le fait que les parents de la personne de référence aient été agriculteurs, travailleurs indépendants ou aient exercé une profession libérale est associé à une probabilité supérieure d'être créateur ou repreneur d'une entreprise. Par exemple, si le père de la personne de référence est agriculteur, la probabilité instantanée de création ou reprise d'entreprise est 2,25 à 2,5 fois supérieure à celle d'un ménage où le père de la personne de référence est employé ou ouvrier. Cette probabilité est multipliée par 1,7 à 1,8 s'il est travailleur indépendant, et par 1,7 à 1,9 s'il exerce une profession libérale.

Les diplômes ont également un effet significatif. Le diplôme associé à la probabilité la plus élevée de créer ou reprendre une entreprise est le baccalauréat professionnel ou technique, ce qui correspond bien à la vocation de ce diplôme.

Près de la moitié des 15-60 ans seraient prêts à créer ou reprendre une entreprise

Le *"split model"* permet de calculer le pourcentage de personnes qui n'envisagent pas de créer ou reprendre une entreprise. Ce pourcentage est estimé à 51 %, ce qui signifie que 49 % n'y sont pas hostiles et pourraient donc envisager de devenir entrepreneurs. Il s'agit là d'une estimation que l'on peut comparer à celles proposées par Blanchflower et Oswald (1998).

Tableau 2.7.2: Pourcentage de personnes qui souhaiteraient devenir travailleurs indépendants si elles en avaient le choix

États-Unis	Royaume-Uni	Allemagne	France (notre estimation)
63 %	48 %	49 %	49 %

Source : Blanchflower et Oswald (1998) pour les 3 premières colonnes

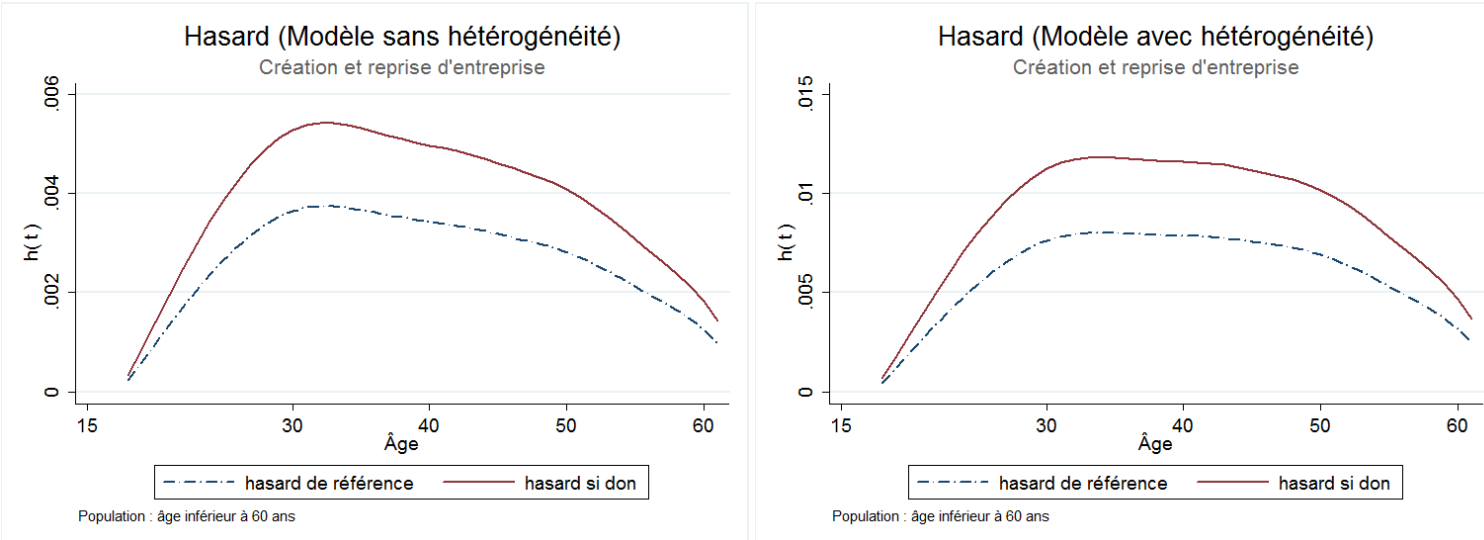
Dans leur étude, Blanchflower et Oswald exploitent le *Social Survey Programme* pour lequel un échantillon de personnes sélectionnées aléatoirement dans plusieurs pays a

été interrogé. Il leur a notamment été demandé ce qu'elles préféreraient être (employé, entrepreneur, ne sait pas) si elles en avaient le choix. Blanchflower et Oswald (1998) présentent les pourcentages obtenus pour les américains, anglais et allemands (Tableau 2.7.2): ils s'avèrent tout à fait comparables à notre estimation.

2.7.2 Évolution en fonction de l'âge

Évolution de la probabilité annuelle d'achat

La probabilité instantanée de créer ou reprendre une entreprise augmente fortement entre 15 et 32 ans. Elle se stabilise ensuite, sur un pallier légèrement décroissant qui se prolonge jusqu'à l'âge de 50 ans, âge à partir duquel une décroissance nette s'amorce. Après 50 ans, les personnes souhaitant devenir entrepreneurs et n'ayant pas réussi à l'être ont une probabilité moindre de créer ou reprendre une entreprise. Ceci peut refléter aussi bien des contraintes de crédit qui deviennent plus fortes à mesure que l'âge augmente (les conditions d'obtention d'un prêt sont plus restrictives à 50 ans qu'à 30 ans) qu'un certain découragement.



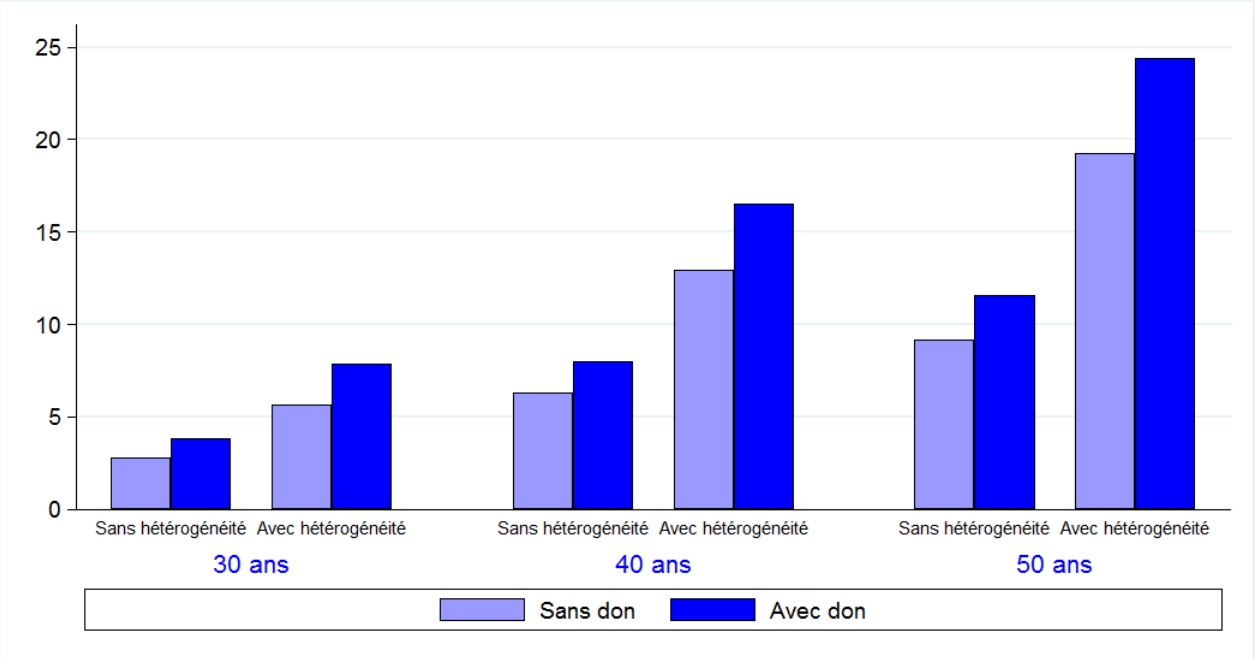
Graphique 2.7.1: Probabilités instantanées ("hasard") de création ou reprise d'entreprise

Légende : Le hasard $h(t)$ représente la probabilité instantanée de créer ou reprendre une entreprise à l'âge t. Ceci peut s'interpréter comme une probabilité annuelle de création/reprise sachant que celle-ci n'a pas eu lieu précédemment.
Source : Échantillon Enquête Patrimoine 2009-2010.

L'effet cumulé de la donation et de l'héritage sur la probabilité de créer ou reprendre une entreprise

De même que pour l'achat de la résidence principale, il est possible de calculer des probabilités cumulées [22].

Graphique 2.7.2: Probabilité de créer ou reprendre une entreprise avant l'âge de...



La probabilité de créer ou reprendre une entreprise avant 30 ans est multipliée par 1,4 si la personne de référence a reçu une donation. Les probabilités de créer ou reprendre une entreprise avant 40 ans et avant 50 ans sont multipliées par 1,3. Ce résultat est le même quelle que soit la modélisation retenue (modèle avec ou sans hétérogénéité). Bien sûr, dans le modèle avec hétérogénéité, les personnes qui envisagent de devenir entrepreneurs ont des probabilités plus élevées de le devenir que dans le modèle sans hétérogénéité. Mais le rapport entre les probabilités cumulées avec et sans donation ne varie que très peu entre les deux modèles.

[22] cf. paragraphe 2.6.2

2.8 Les donations reçues avant 35 ans sont liées à des probabilités d'achat et de création d'entreprise encore plus élevées

Grâce au graphique 2.6.2 (cf. paragraphe 2.6.2), il a été possible d'établir que le lien entre donation et achat de la résidence principale est d'autant plus important que la donation intervient tôt : plus la donation est perçue jeune et plus le rapport entre la probabilité d'acheter avec et sans donation est élevé.
Le graphique 2.7.2 (cf. paragraphe 2.7.2) a permis d'aboutir aux mêmes conclusions concernant le lien entre donation et création/reprise d'entreprise.

L'analyse portant sur l'intérêt d'une donation perçue tôt peut être encore approfondie. Jusqu'ici l'effet sur la probabilité annuelle de devenir propriétaire a été supposé constant quel que soit l'âge de la personne de référence. Il est possible de lever cette hypothèse en effectuant un simple croisement entre le fait de recevoir un don et l'âge de la personne de référence. Pour cela on décompose la variable "don reçu" en deux : "don reçu avant 35 ans" et "don reçu après 35 ans" (cf. tableaux 2.8.1 et 2.8.2).

Le fait de recevoir une donation après 35 ans est associé à une probabilité annuelle d'achat 1,4 fois supérieure à celle d'un ménage où la personne de référence n'en a pas reçu (Tableau 2.8.1). Si la donation intervient avant que la personne de référence ne soit âgée de 35 ans, le rapport entre ces deux probabilités est encore supérieur : il est de 2,3.
Si l'on se restreint aux ménages qui souhaitent acheter leur résidence principale (modèle avec hétérogénéité), la probabilité annuelle d'achat est multipliée par 1,5 si la personne de référence perçoit une donation après 35 ans et par 2,3 si elle la perçoit avant 35 ans.

Du côté de la création et reprise d'entreprise, en cas de donation la probabilité de création ou reprise est multipliée par 1,8 si la personne de référence a moins de 35 ans et par 1,3 si elle est plus âgée (Tableau 2.8.2). Les chiffres sont identiques dans

Tableau 2.8.1: Déterminants de l'achat de la résidence principale (avec découpage selon l'âge, avec et sans déciles de revenu 2009) (coefficients exponentialisés)

	Modèle sans hétérogénéité (log log complémentaire)		**Modèle avec hétérogénéité (*split model*)**	
	Coeff.	Coeff.	Coeff.	Coeff.
Dons et héritages reçus par la pers. de réf. (PR)				
Don reçu × PR agée de moins de 35 ans	**2,29 (***)**	**2,33 (***)**	**2,33 (***)**	**2,39 (***)**
Don reçu × PR agée de plus de 35 ans	**1,38 (***)**	**1,36 (***)**	**1,54 (***)**	**1,55 (***)**
Héritage reçu	1,49 (***)	1,48 (***)	1,52 (***)	1,52 (***)
Parents PR				
Au moins un parent PR en vie	1,16 (***)	1,15 (***)	1,19 (***)	1,18 (***)
Parents PR en vie et prop. de leur residence ppale	1,23 (***)	1,24 (***)	1,23 (***)	1,24 (***)
Parents PR en vie et détenteurs de valeurs mobilières	0,99 (ns)	1 (ns)	0,99 (ns)	1 (ns)
Parents PR en vie et détenteurs d'assurance vie	1,04 (ns)	1,04 (ns)	1,02 (ns)	1,02 (ns)
Aides reçues par PR				
Don ponctuel	1,06 (ns)	1,07 (ns)	1,07 (ns)	1,08 (ns)
Versements réguliers	0,96 (ns)	0,98 (ns)	0,93 (ns)	0,95 (ns)
Prêt	1,04 (ns)	1,02 (ns)	1,05 (ns)	1,03 (ns)
Mise disposition d'un logement ou paiement loyer	0,78 (**)	0,8 (**)	0,76 (**)	0,78 (**)
PR actif en emploi l'année précédente	1,34 (***)	1,26 (***)	1,35 (***)	1,26 (***)
Ménage créateur d'entreprise (ou reprise)	2 (***)	2,06 (***)	2,12 (***)	2,21 (***)
Don reçu PR × Ménage créateur d'entreprise (ou reprise)	0,74 (**)	0,73 (**)	0,8 (**)	0,78 (*)
Héritage reçu × Ménage créateur d'entreprise (ou reprise)	0,81 (ns)	0,83 (ns)	1,07 (ns)	1,06 (ns)
Décile de revenus 2009				
p10		Réf.		Réf.
p20		0,96 (ns)		0,95 (ns)
p30		1,09 (ns)		1,1 (ns)
p40		1,36 (***)		1,4 (***)
p50		1,38 (***)		1,4 (***)
p60		1,67 (***)		1,72 (***)
p70		1,67 (***)		1,73 (***)
p80		1,75 (***)		1,83 (***)
p90		1,82 (***)		1,84 (***)
p100		1,51 (***)		1,51 (***)
Diplôme PR				
Sans diplôme	Réf.	Réf.	Réf.	Réf.
CEP	1,13 (***)	1,07 (ns)	1,14 (***)	1,08 (ns)
CAP,BEP	1,47 (***)	1,32 (***)	1,5 (***)	1,34 (***)
Brevet des collèges	1,46 (***)	1,27 (***)	1,47 (***)	1,28 (***)
Bac pro ou technique	1,95 (***)	1,67 (***)	1,94 (***)	1,64 (***)
Bac général	1,47 (***)	1,21 (***)	1,46 (***)	1,20 (***)
Bac + 2	1,89 (***)	1,56 (***)	1,93 (***)	1,58 (***)
Bac + 3 et plus	1,51 (***)	1,23 (***)	1,52 (***)	1,24 (***)
Couple et conjoint				
En couple	1,86 (***)	1,81 (***)	1,87 (***)	1,82 (***)
En couple avec patrimoine au départ	1,25 (***)	1,21 (***)	1,28 (***)	1,23 (***)
Dons et héritages reçus par le conjoint (CJ)				
Don reçu CJ	1,43 (***)	1,41 (***)	1,62 (***)	1,61 (***)
Héritage reçu CJ	1,38 (***)	1,32 (***)	1,41 (***)	1,36 (***)
Conjoint actif en emploi l'année précédente	1,24 (***)	1,12 (***)	1,23 (***)	1,12 (***)
Parents CJ				
Au moins un parent CJ en vie	1,36 (***)	1,33 (***)	1,39 (***)	1,35 (***)
Parents CJ en vie, non détenteurs de valeurs mobilières et prop de leur resid principale	1,16 (***)	1,16 (***)	1,19 (***)	1,18 (***)
Parents CJ en vie, non prop de leur résid principale et détenteurs de valeurs mobilières	0,89 (ns)	0,90 (ns)	0,87 (ns)	0,87 (ns)
Parents CJ en vie et prop de leur resid principale et détenteurs de valeurs mobilières	1,00 (ns)	1,04 (ns)	1,03 (ns)	1,06 (ns)
Parents CJ en vie et détenteurs d'assurance vie	1,01 (ns)	1,01 (ns)	1,00 (ns)	1,01 (ns)
Aides reçues par CJ				
Don ponctuel	0,99 (ns)	0,97 (ns)	0,96 (ns)	0,94 (ns)
Versements réguliers	1,01 (ns)	1,02 (ns)	0,94 (ns)	0,95 (ns)
Prêt	0,96 (ns)	0,97 (ns)	0,96 (ns)	0,95 (ns)
Mise disposition d'un logement ou paiement d'un loyer	0,84 (ns)	0,82 (ns)	0,84 (ns)	0,84 (ns)
Ménage a eu son 1er enfant au cours des 2 années précédentes	1,27 (***)	1,27 (***)	1,25 (***)	1,25 (***)
Ménage a eu un enfant (pas le 1er) au cours des 2 années précédentes	1,40 (***)	1,39 (***)	1,39 (***)	1,39 (***)
Pourcentage de ménages qui ne souhaitent pas acheter leur résidence principale			3,73 % (***)	3,73 % (***)

Enquête Patrimoine 2009-2010, personnes âgées de moins de 80 ans. Les coefficients sont exponentialisés.

les deux modèles avec et sans hétérogénéité.

Tableau 2.8.2: Déterminants de la création et reprise d'entreprise

	Modèle sans hétérogénéité (log log complémentaire)	**Modèle avec hétérogénéité (*split model*)**
	Coeff.	Coeff.
Dons et héritages reçus par la pers. de réf. (PR)		
Don reçu avant 35 ans	**1,81 (***)**	**1,79 (***)**
Don reçu après 35 ans	**1,25 (*)**	**1,29 (*)**
Héritage reçu	1,17 (ns)	1,18 (ns)
Parents PR		
Au moins un parent PR en vie	2,25 (***)	2,44 (***)
Parents PR en vie et propriétaire de leur residense principale	1,18 (**)	1,21 (**)
Parents PR en vie et détenteurs de valeurs mobilières	1,07 (ns)	1,04 (ns)
Parents PR en vie et détenteurs d'assurance vie	1,22 (**)	1,26 (**)
Profession parents PR		
Père PR agriculteur	2,25 (***)	2,5 (***)
Père PR indpt	1,71 (***)	1,83 (***)
Père PR prof lib	1,68 (***)	1,89 (***)
Père PR cadre ou prof int	1,01 (ns)	1,01 (ns)
Père PR employé ou ouvrier	Réf.	Réf.
Père PR "autre"	0,94 (ns)	0,93 (ns)
Mère PR agr, idpt, prof lib	1,24 (*)	1,32 (**)
Mère PR cadre ou prof int	1,22 (ns)	1,27 (ns)
Mère PR employée ou ouvrière	Réf.	Réf.
Mère PR "autre"	1,04 (ns)	1,04 (ns)
Aides reçues par PR pendant études		
Don ponctuel	1,33 (ns)	1,41 (ns)
Versements réguliers	1,04 (ns)	0,92 (ns)
Prêt	0,92 (ns)	0,88 (ns)
Mise dispo logement ou paiment loyer	1,34 (ns)	1,44 (ns)
PR ayant connu une période de chômage dans les 3 années précédentes	0,99 (ns)	1,00 (ns)
Ménage propriétaire de sa résidence ppale	2,06 (***)	2,16 (***)
Ménage propriétaire de sa résidence ppale × Don reçu PR	0,56 (**)	0,63 (*)
Ménage propriétaire de sa résidence ppale × Héritage reçu PR	1,21 (ns)	1,36 (ns)
Diplôme PR		
Sans diplôme	Réf.	Réf.
CEP	0,61 (**)	0,61 (**)
CAP, BEP	2,38 (***)	2,54 (***)
Brevet des collèges	2,12 (***)	2,26 (***)
Bac pro ou technique	2,77 (***)	2,98 (***)
Bac général	1,52 (**)	1,55 (**)
Bac + 2	1,97 (***)	2,12 (***)
Bac + 3 et plus	2,4 (***)	2,53 (***)
Couple et conjoint		
En couple	1,08 (ns)	1,09 (ns)
En couple avec patrimoine au départ	1,12 (ns)	1,11 (ns)
Dons et héritages reçus par le conjoint (CJ)		
Don reçu	1,12 (ns)	1,23 (ns)
Héritage reçu	1,10 (ns)	1,11 (ns)
Parents CJ		
Au moins un parent CJ en vie	1,97 (***)	2,09 (***)
Parents CJ en vie et prop. de leur residence principale	1,24 (***)	1,28 (***)
Parents CJ en vie et détenteurs de valeurs mobilières	0,91 (ns)	0,88 (ns)
Parents CJ en vie et détenteurs d'assurance vie	0,97 (ns)	0,98 (ns)
Conjoint actif l'année précédente	0,94 (ns)	0,97 (ns)
Ménage a un enfant	0,81 (**)	0,8 (**)
Ménage a au moins 2 enfants	0,99 (ns)	0,98 (ns)
Pourcentage de ménages qui ne souhaitent pas créer une entreprise		50,39 % (***)

Enquête Patrimoine 2009-2010, personnes âgées de moins de 60 ans. Les coefficients sont exponentialisés.

2.9 Peut-on mettre en évidence un effet causal de la donation ?

L'effet de l'héritage sur l'achat de la résidence principale ou la création d'entreprise est généralement interprété comme un effet causal. En effet, même si le fait de recevoir un jour un héritage peut être anticipé, on considère que le montant exact est rarement connu et, surtout, que la date de décès est exogène (cf. par exemple Holtz-Eakin, Joulfaian et Rosen (1994), Blanchflower et Oswald (1998), Laferrère (1998)). Sauf exception criminelle, un héritage n'intervient pas parce qu'une décision d'acquisition d'un logement ou de création d'entreprise a été précédemment prise [23].
Dans le cas d'une donation, la question de l'exogénéité mérite cependant d'être examinée plus attentivement.

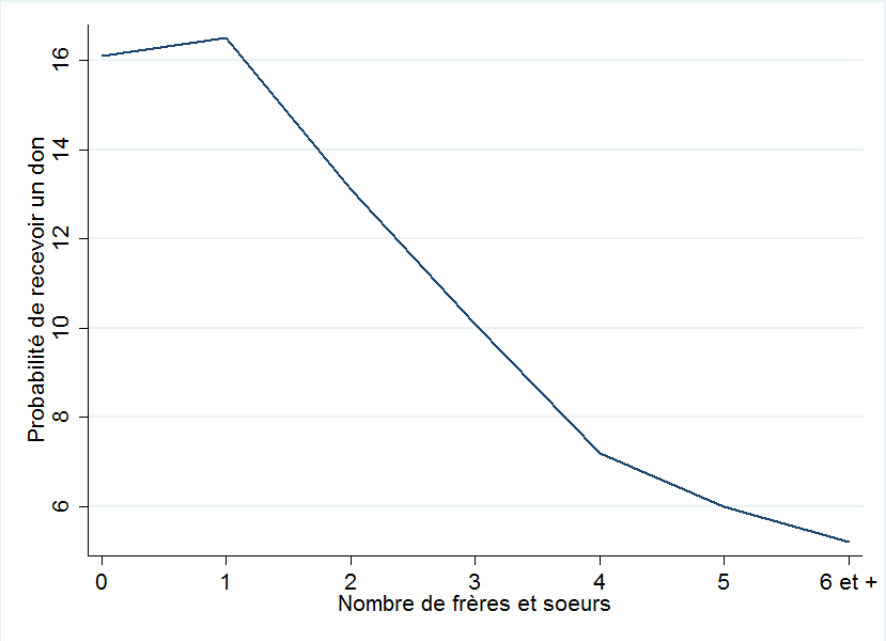
2.9.1 Décision et donation : quel effet causal ?

Tous les résultats précédents vont dans le sens d'un lien important entre donation et achat du logement ou création d'entreprise. On peut s'interroger cependant sur la manière dont se déroule la prise de décision concernant l'achat et la création d'entreprise. Est-ce que les parents effectuent une donation une fois que les enfants ont déjà décidé d'acheter ou est-ce que les enfants décident d'acheter parce qu'ils ont reçu une donation ? Les mêmes questions peuvent se poser pour la création et reprise d'entreprise. Dans les deux cas, la donation aura certes pour effet de desserrer la contrainte de crédit ou de rendre le crédit moins pesant, mais il serait intéressant de savoir en quoi le fait de recevoir une donation est véritablement à l'origine de l'opération immobilière ou professionnelle. Pour répondre à cette question, la méthode usuelle est de recourir à l'instrumentation. Il s'agit de trouver une variable "instrumentale"

[23] Notons cependant que pour la création d'entreprise, Hurst et Lusardi (2004) ont mis en doute l'exogénéité du fait de recevoir un héritage, montrant que l'effet sur la création d'entreprise est le même selon que l'on utilise le fait d'avoir reçu un héritage avant ou après. Notre stratégie d'estimation diffère de la leur sur deux points principaux. Premièrement, nous contrôlons par le patrimoine et la profession des parents. Ces contrôles sont absents de leur spécification ce qui conduit probablement à ce que leurs variables de réception d'un héritage captent l'effet important que la profession des parents a sur le fait de devenir indépendant. Deuxièmement, nous utilisons comme source d'identification le moment où l'héritage intervient et si le fait de recevoir un héritage peut-être anticipé, la date exacte l'est nettement moins.

liée à la probabilité de recevoir une donation mais qui soit non corrélée à d'autres caractéristiques inobservées qui pourraient avoir un effet sur l'achat de la résidence principale. À cette fin, nous utilisons le nombre de frères et sœurs. En effet, la probabilité de recevoir une donation est fortement liée au nombre de frères et sœurs. Pour les familles qui ont au moins 2 enfants, plus ce nombre est élevé et plus la probabilité que l'un des enfants reçoive une donation diminue (graphique 2.9.1).

Graphique 2.9.1: Probabilité de recevoir un don en fonction du nombre de frères et soeurs



2.9.2 Instrumentation : un effet causal mais local

Le nombre de frères et sœurs est utilisé comme variable instrumentale. L'idée est que la taille de la fratrie a un effet direct sur la probabilité de recevoir un don mais n'a d'effet sur la probabilité d'acheter que par le canal des donations. De plus, le nombre d'enfants peut être considéré non lié à la part inexpliquée du modèle initial[24]. La

[24]Dans le modèle théorique de transmission beckérien, le nombre d'enfants peut être considéré comme lié au capital économique ou humain des parents qui anticiperaient ainsi ce qu'ils souhaiteraient leur transmettre. Ceci ne pose pas de difficulté ici puisque nous contrôlons par des variables qui reflètent ce capital parental.

taille de la fratrie constitue donc une variable instrumentale appropriée. C'est cette source de variation qui va nous permettre d'identifier un effet causal de la donation.

Linéarisation du modèle

Instrumenter un modèle de durée pose plusieurs problèmes. En particulier, ici, il s'agit d'instrumenter une variable dichotomique (le fait de recevoir un don) par une variable positive, discrète et à support fini. À notre connaissance, dans une telle situation, il n'existe pas de solutions. Dans un souci de simplicité et de transparence, nous avons donc décidé de linéariser le modèle afin d'instrumenter la forme linéaire obtenue. Le modèle que l'on instrumente est alors :

$$A_{i,t} = \delta.D_{i,t} + \gamma.X_{i,t} + \sum_{j=1}^{T} \alpha_j.\mathbb{1}_{t=t_j} + u_{i,t} \tag{2.1}$$

où $A_{i,t}$ est la variable binaire qui indique la décision d'acheter d'un individu i lors d'une année t. De même que pour le modèle de durée précédent, $D_{i,t}$ vaut 1 lorsqu'une donation a déjà été reçue en t[25], $X_{i,t}$ désigne les variables de contrôle, $\mathbb{1}_{t=t_j}$ l'indicatrice d'âge qui vaut 1 si $t = t_j$ et $u_{i,t}$ est le terme d'erreur. Ce modèle sera estimé comme un modèle de données de panel (puisque l'on suit le même individu sur plusieurs années) avec effet aléatoire. L'instrumentation par une variable qui, pour chaque individu, est fixe à travers le temps, ne permet pas l'utilisation d'un modèle à effet fixe[26].

Un dernier point mérite d'être mentionné. Le modèle 2.1 est un modèle de probabilité linéaire. Les coefficients obtenus n'y ont pas la même interprétation que ceux obtenus dans un modèle de durée. Dans un modèle de probabilité linéaire, par exemple, le coefficient devant une variable binaire s'interprète comme l'écart entre la probabilité lorsque cette variable vaut 0 et la probabilité obtenue lorsque cette variable vaut 1. Afin de comparer nos résultats avec ceux obtenus précédemment, nous devons nous ramener à des grandeurs comparables. Ceci permettra notamment de

[25] C'est donc une variable qui vaut 0 tant qu'aucune donation n'a été reçue et qui vaut 1 à partir de l'année où une donation a été reçue.

[26] Le lecteur intéressé par le détail des hypothèses impliquées par le choix de ce modèle, pourra se référer par exemple à Wooldridge (2010).

s'assurer de la qualité de cette approximation linéaire. Pour cela, une fois obtenue l'estimation des différents coefficients (δ, γ et les α_j), il est nécessaire de calculer la probabilité instantanée d'acheter avec et sans donation. Ce calcul de probabilité peut se faire pour chaque âge (chaque valeur de t). Par souci de lisibilité, on présentera les résultats obtenus seulement pour les âges de 30, 40, 50 et 60 ans[27].

Pour s'assurer que l'estimation du modèle linéarisé (non instrumenté) aboutit à des conclusions identiques à celles du modèle de durée précédemment utilisé, on compare les résultats obtenus par ces deux modèles. Les estimations obtenues pour l'effet du don (Tableau 2.9.1) par le modèle non instrumenté sont très proches du coefficient obtenu dans le modèle de durée sans hétérogénéité (1,62, cf. tableau 2.6.1). La moyenne de tous les coefficients obtenus est de 1,48 (cf. tableau 2.F.1). L'approximation s'avère donc de bonne qualité et le modèle linéaire s'avère plus "conservateur" puisqu'il aboutit à des coefficients légèrement moins élevés. La comparaison des probabilités cumulées (Graphique 2.9.2) aboutit aux mêmes conclusions.

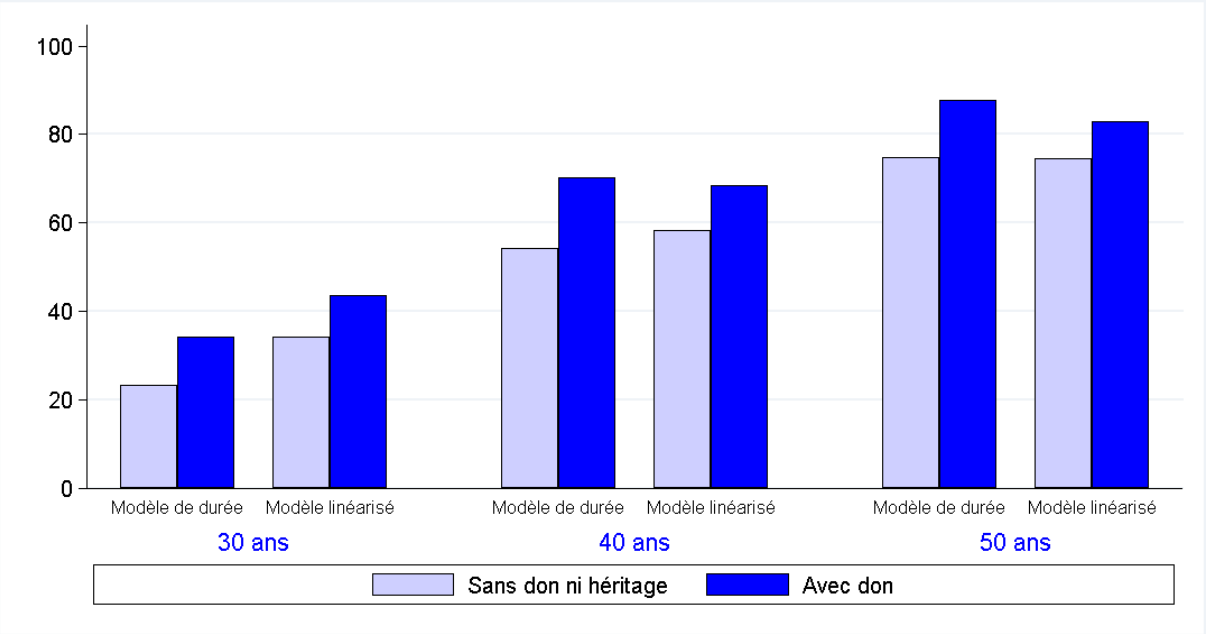
Instrumentation du modèle linéarisé

Pour le modèle instrumenté, la statistique de $1^{ère}$ étape est un indicateur de l'importance de la corrélation entre l'instrument (le nombre de frères et sœurs) et la variable instrumentée (le fait de recevoir une donation). La valeur observée ici (24,1, cf. Tableau 2.9.1) est suffisamment élevée pour nous confirmer qu'il ne s'agit pas d'un instrument faible.

Les résultats obtenus pour ce modèle sont près de 2 fois supérieurs à ceux obtenus précédemment (Tableau 2.9.1). La moyenne des coefficients obtenus est de 3,5 (Tableau 2.F.1). Ceci signifie qu'une donation a pour effet de multiplier par 3,5 la probabilité instantanée (annuelle) d'achat. Les probabilités cumulées d'achat avec don (probabilité d'acheter avant un âge donné) sont également plus élevées (Graphique 2.9.3). Si la personne de référence a reçu un don, la probabilité d'acheter avant 30 ans est multipliée par 2,2, celle d'acheter avant 40 ans par 1,6 et celle d'acheter avant 50 ans par 1,3. Pour rappel, les résultats obtenus pour le modèle de durée de base étaient

[27] La totalité des coefficients calculés est présentée dans le tableau 2.F.1 (annexe 2.F).

Graphique 2.9.2: Comparaison des probabilités cumulées d'achat pour le modèle de durée et le modèle linéarisé non instrumenté



Lecture : La probabilité d'acheter avant l'âge de 40 ans pour un ménage dont la personne de référence n'a reçu ni don ni héritage est estimé à 54 % par le modèle de durée et à 58 % par le modèle linéarisé. Si elle a reçu un don, la probabilité estimée est respectivement de 70% et 69%.

respectivement de 1,5, 1,3 et 1,2.

Tableau 2.9.1: Estimation de l'effet multiplicatif de la donation sur l'achat de la résidence principale

	Sans instrumentation	**Avec instrumentation**
Âge de la PR		(nombre de frères et soeurs)
30 ans	1,5 (***)	3,4 (***)
40 ans	1,4 (***)	3,2 (***)
50 ans	1,4 (***)	3,3 (***)
60 ans	1,4 (***)	3,2 (***)
Moyenne sur tous les âges	1,5 (***)	3,5 (***)
Statistique du test de $1^{ère}$ étape		24,1

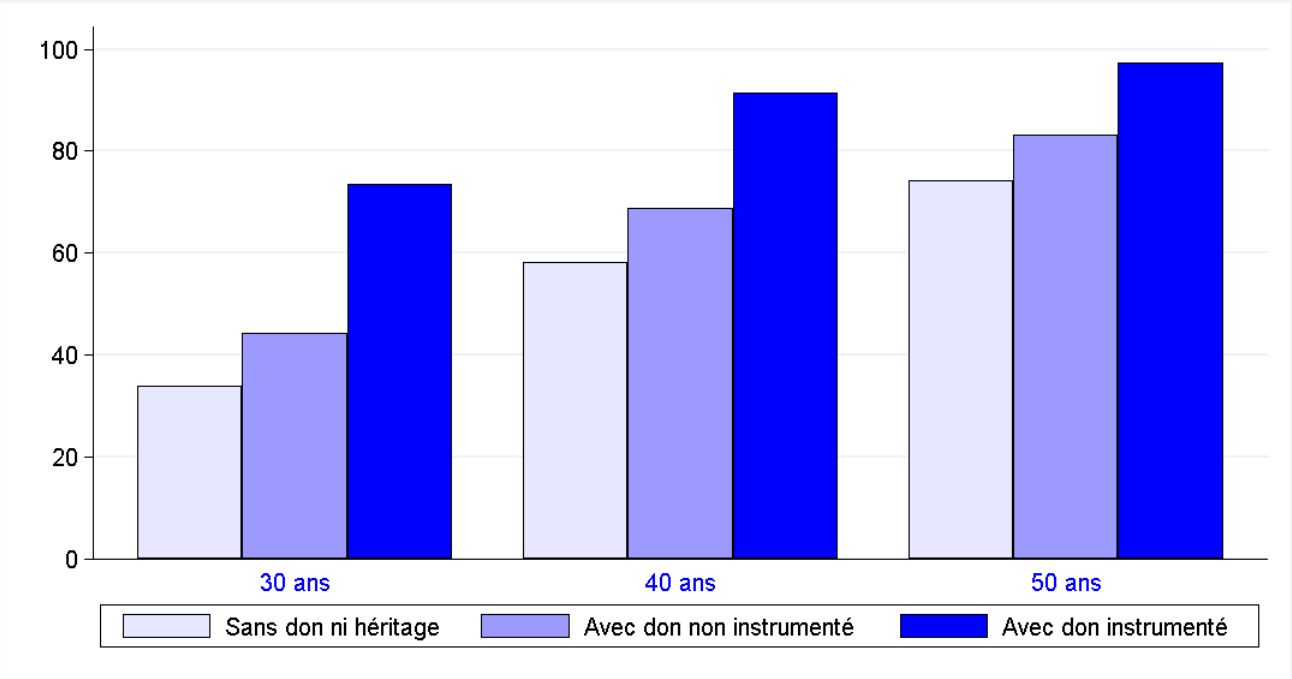
Échantillon : Ménages dont la personne de référence (PR) a au moins un frère ou une sœur

Lecture : Dans le modèle instrumenté, pour un ménage dont la PR est âgée de 30 ans la probabilité d'achat de la résidence principale est multipliée par 3,4 si la PR a reçu une donation.

La moyenne sur tous les âges est calculée à partir du tableau 2.F.1.

On peut s'interroger sur le fait que l'effet mis en évidence est deux fois supérieur à celui obtenu dans les modèles non-instrumentés. Notre explication est que nous avons

Graphique 2.9.3: Comparaison des probabilités cumulées d'achat pour modèle linéarisé avec et sans instrumentation



Lecture : La probabilité d'acheter avant l'âge de 40 ans pour un ménage dont la personne de référence n'a reçu ni don ni héritage est estimé à 58 %. Si elle a reçu un don, la probabilité estimée par le modèle non instrumenté est de 69 % et de 91 % pour le modèle instrumenté.

estimé, via l'instrumentation, un **effet local**, limité à une sous-population aisée. En effet, selon que les parents disposent ou non d'un patrimoine important, le nombre de frères et sœurs n'affecte pas de la même manière les donations effectuées. Si les parents ne disposent que de peu de patrimoine, quelle que soit la taille de la fratrie, il est très probable que les enfants ne percevront rien ou presque, ce qui ne sera pas suffisamment pour envisager un achat immobilier. En revanche, dans les familles plus aisées, le nombre de frères et sœeurs a un effet important tant sur la probabilité de recevoir un don (Graphique 2.9.4) que sur le montant perçu.

Dans une famille aisée, la présence d'un enfant supplémentaire diminuera considérablement la part de chaque enfant. Pour confirmer cette hypothèse nous avons effectué les régressions de $1^{ère}$ étape sur deux sous-populations : les ménages dont les parents de la personne de référence ont fait face à des difficultés financières durant sa jeunesse et les autres.

Graphique 2.9.4: Probabilité de recevoir un don en fonction du nombre de frères et soeurs et du patrimoine des parents

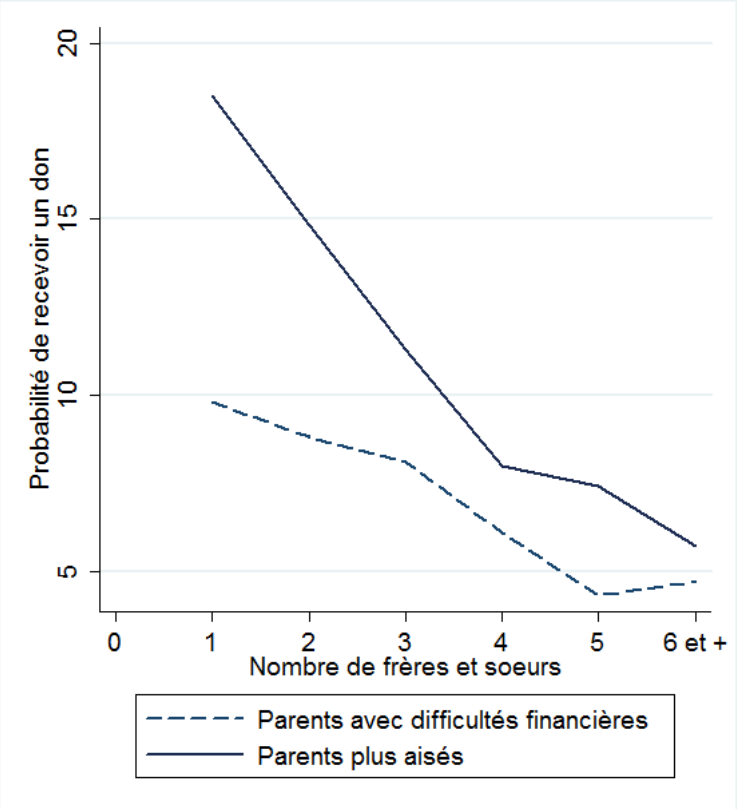


Tableau 2.9.2: Statistiques de test des régressions de $1^{ère}$ étape

Population	Statistique de test
Échantillon complet	24,1
Parents de la PR avec difficultés financières durant sa jeunesse	0,3
Parents de la PR sans difficultés financières durant sa jeunesse	27,6

La corrélation entre l'instrument et la variable de donation ne s'avère élevée que sur la sous-population des parents les plus aisés (Tableau 2.9.2), ce qui tend à confirmer notre interprétation en terme d'effet local.

La même technique a été utilisée pour la création et reprise d'entreprise. On constate également une hausse de l'effet de la donation mais, faute d'un nombre suffisamment important de créations et reprises d'entreprise, la précision des estimations n'est pas suffisante pour conclure à la significativité de l'effet observé.

2.10 Conclusion

Nos résultats montrent un lien significatif entre les transmissions (donations, héritages) et les investissements des ménages : acquisition du logement, création ou reprise d'entreprise. Ce lien s'avère plus fort pour la donation que pour l'héritage. Il est également plus prononcé chez les jeunes. Ces deux résultats peuvent s'expliquer par le "timing" des transmissions : les donations sont reçues plus tôt que les héritages, à une période de la vie où elles s'avèrent plus utiles pour réaliser des projets immobiliers ou professionnels du fait notamment des contraintes de liquidité ou d'emprunt. Depuis les années 2000, en période haussière des prix de l'immobilier, le lien entre donation et achat immobilier s'est d'ailleurs renforcé : les donations faciliteraient la constitution de l'apport personnel.

S'agissant de l'achat de la résidence principale, l'effet causal de la donation que nous avons mis en évidence semble attester l'importance du logement dans les choix d'investissement des ménages : en dépit des risques affectant les biens immobiliers, placer dans "la pierre" tout ou partie d'une donation reçue apparaitrait aux yeux des épargnants français préférable à d'autres placements, par exemple financiers, qu'ils jugeraient risqués dans un contexte économique marqué par des crises financières successives plus ou moins prononcées.

Si les pouvoirs publics souhaitent encourager l'acquisition du logement par les jeunes ménages, la différence des effets observés entre la donation et l'héritage pourrait plaider pour une différenciation de la taxation de ces deux modes de transmission. Nos résultats laissent penser que ce type de différenciation pourrait également s'avérer favorable à la création ou à la reprise d'entreprises.

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Annexes

2.A Donations et successions : Un état des lieux

Un impôt profondément modifié au cours du $XX^{è}$ siècle

Taxation proportionnelle et taxation progressive

Jusqu'au début du $XX^{è}$ siècle, les donations et successions sont toutes deux imposées de manière proportionnelle, suivant un barème distinct. C'est avec la loi du **25 février 1901** que l'impôt sur les successions devient progressif. Il dépend de la "part successorale", c'est-à-dire de la part de l'héritage qui revient à chaque héritier. Il dépend également du lien de parenté qui unit héritier et défunt. Les donations, elles, restent soumises à une imposition proportionnelle dont le taux dépend à la fois du lien de parenté entre donataire et donateur et du type de donation effectuée (donation-partage, donation par contrat de mariage, ...).

Le rappel des donations antérieures

Au début des années 1940, une nouvelle disposition va profondément modifier la manière dont les donations sont prises en compte pour le calcul de l'impôt lors des successions. Jusqu'alors, lors d'un décès, l'administration fiscale ne demande pas que les donations précédemment effectuées par un défunt soient ajoutées au patrimoine restant lors du décès. Ce n'est qu'avec la loi du **14 mars 1942**[28] qu'est imposé le "rappel des donations antérieures" lors de l'ouverture d'une succession : les donations antérieurement transmises par le défunt sont alors réintégrées au patrimoine transmis lors du décès afin d'être prises en compte dans le calcul de l'impôt à acquitter. C'est également par cette loi que le régime d'imposition des donations et successions sera unifié. Dès lors, les règles applicables aux successions ont également été appliquées aux donations [29]. L'imposition des donations devient dès lors, elle aussi, progressive et s'effectue selon le même barème que celui des successions.

[28] Pour une perspective plus détaillée des évolutions des taux d'imposition des donations et successions tout au long du $XX^{è}$ siècle, on pourra se référer à l'Annexe J de Piketty (2001).

[29] La seule exception est le "don de sommes d'argent", cf. paragraphe suivant.

Le don de somme d'argent (ex-"donation Sarkozy")

Le "don de sommes d'argent" permet à des personnes sans descendance directe de transmettre 30 000 € nets d'impôt à leurs neveux ou nièces, ce qui est nettement au-dessus de l'abattement dont bénéficient les neveux et nièces en cas de succession. C'est la seule exception au fait que désormais les donations et successions sont taxées selon le même barême et bénéficient des mêmes abattements. Les personnes ayant des enfants ou petits-enfants peuvent leur transmettre ce montant. Le "don de sommes d'argent" ne concerne que les dons en numéraire (et en pleine propriété). Il est de plus soumis à des conditions d'âge : le donateur doit être âgé de moins de 80 ans et le donataire doit être majeur. Cette disposition dite "donation Sarkozy" lors de sa création ne devait initialement être que temporaire, du 1^{er} juin 2004 au 31 mai 2005. Il s'agissait d'une exonération totale d'imposition dans la limite de 20 000 € et cet abattement n'était pas renouvelable[30]. Cette disposition a été ensuite prolongée jusqu'au 31 décembre 2005 et l'abattement a été porté à 30 000 € [31]. Le "don de sommes d'argent" est prolongé pour une durée allant du 1^{er} janvier 2006 au 31 décembre 2010 par l'article 6 de la loi n°2005-882 du 2 août 2005 en faveur des petites et moyennes entreprises mais sous de nouvelles conditions décrites à l'article 790 A bis du code général des impôts. Il est notamment demandé que les fonds soient affectés sous 2 ans soit à la souscription au capital d'une PME, soit à l'achat de biens affectés à l'exploitation d'une PME. Finalement, l'article 8 de la loi n°2007-1223 du 21 août 2007 pérénnise le "don de sommes d'argent" en supprimant les conditions d'affectation des fonds et en ne conservant que les conditions d'âge. L'abattement de 30 000 € est désormais renouvelable (il bénéficie du délai de non-rappel des donations) et le montant est réactualisé chaque année (cf. Tableau 2.A.1).

La création d'abattements

La loi du **14 avril 1952** introduit la notion d'abattement dans le système fiscal lié aux successions [32]. Désormais, une partie du patrimoine transmis est net d'impôt. Au

[30] bulletins officiels des impôts 7-G-2-04 et 7 G-8-04

[31] B0I 7-G-4-05

[32] Cette disposition s'applique à partir du 15 octobre 1951 (Article 43, Loi 52-401 du 14 avril

moment de son instauration, cet abattement concerne la totalité de l'actif transmis. Il est majoré en fonction du nombre d'enfants et d'ascendants à charge du défunt ou du donateur. La loi du 28 décembre 1959, appliquée à partir de 1960[33], individualise cet abattement. C'est ce régime qui prévaut encore aujourd'hui : l'abattement est appliqué sur la part transmise (par donation ou succession) et dépend du lien de parenté. Depuis cette date, le montant de l'abattement a été plusieurs fois modifié. Ce point sera abordé plus en détail au sein du paragraphe 2.A.

Le délai de non-rappel des donations antérieures

Une dernière disposition, qui vise à encourager les donations, sera adoptée par la loi de finances pour l'année 1992[34]. À partir de cette date, les donations effectuées plus de 10 ans avant le décès du donateur ne seront pas rapportées à la succession de celui-ci. Concrètement cela signifie que si une donation a lieu plus de 10 ans avant un décès, le montant qui a été transmis n'est pas rajouté à l'actif successoral et l'abattement qui s'est déjà appliqué lors de la donation s'applique à nouveau lors de la succession. Cette disposition permet donc de bénéficier plusieurs fois des divers abattements. Ce délai de non-rappel, initialement fixé à 10 ans, sera lui aussi modifié plus tard. Contrairement aux montants des abattements, il est toutefois resté assez stable (Graphique 2.A.1) et n'a varié de sa durée initiale que deux fois : entre 2006 et 2011 où il est passé à 6 ans, puis à partir de 2012 : il est désormais fixé à 15 ans.

Abattements et taux d'imposition

Pour les donations et successions, il existe différents abattements qui varient en fonction des degrés de parenté. Ces abattements représentent les montants qui peuvent être transmis nets d'impôt. Par exemple, en 2012, un parent peut transmettre à l'un de ses enfants 100 000 € net d'impôt (Tableau 2.A.1).

Les montants des abattements ont été considérablement augmentés par la loi en faveur du Travail, de l'Emploi et du Pouvoir d'Achat ("loi TEPA") du 21 août 2007.

1952).

[33] Article 60, Loi 59-1472 du 28 décembre 1959.

[34] Article 15, Loi 91-1322 du 30 décembre 1991.

Graphique 2.A.1: Évolution du délai de non rappel des donations antérieures, 1942-2012

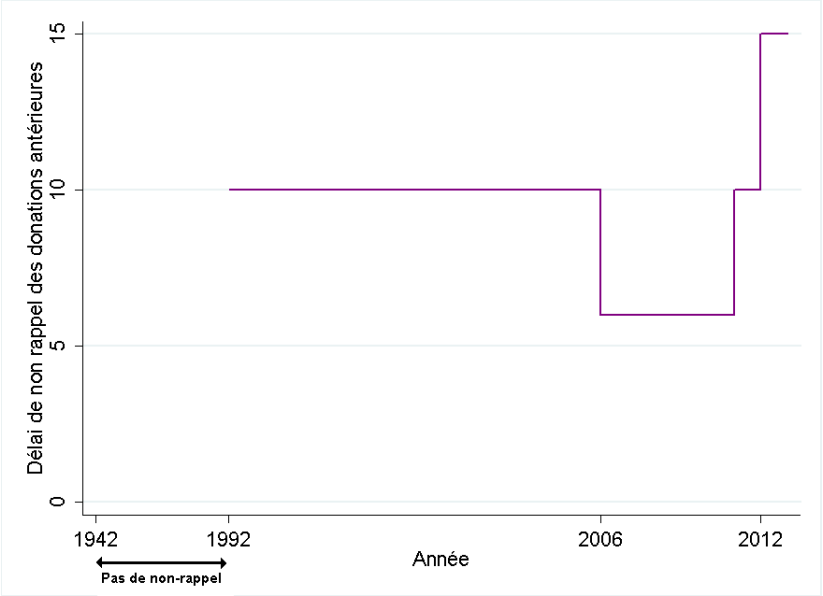


Tableau 2.A.1: Abattements en 2011 et 2012 (en €)

Lien de parenté	**Abattement 2011**	**Abattement 2012** (à compter du 18 août)
Enfant	159 325	100 000
Ascendant	159 325	100 000
Personne handicapée	159 325	159 325
Époux (marié ou PACS)	80 724	80 724
Petit-enfant	31 865	31 865
Frère / Sœur	15 932	15 932
Neveu / Nièce	7 967	7 967
Arrière petit-enfant	5 310	5 310
Tous les autres	1 594	1 594
Dons de sommes d'argent		
Si les donateurs ont moins de 80 ans et les donataires sont majeurs		
Enfant, petit-enfant, arrière-petit-enfant ou, à défaut d'une telle descendance, neveu ou nièce	31 865	31 865

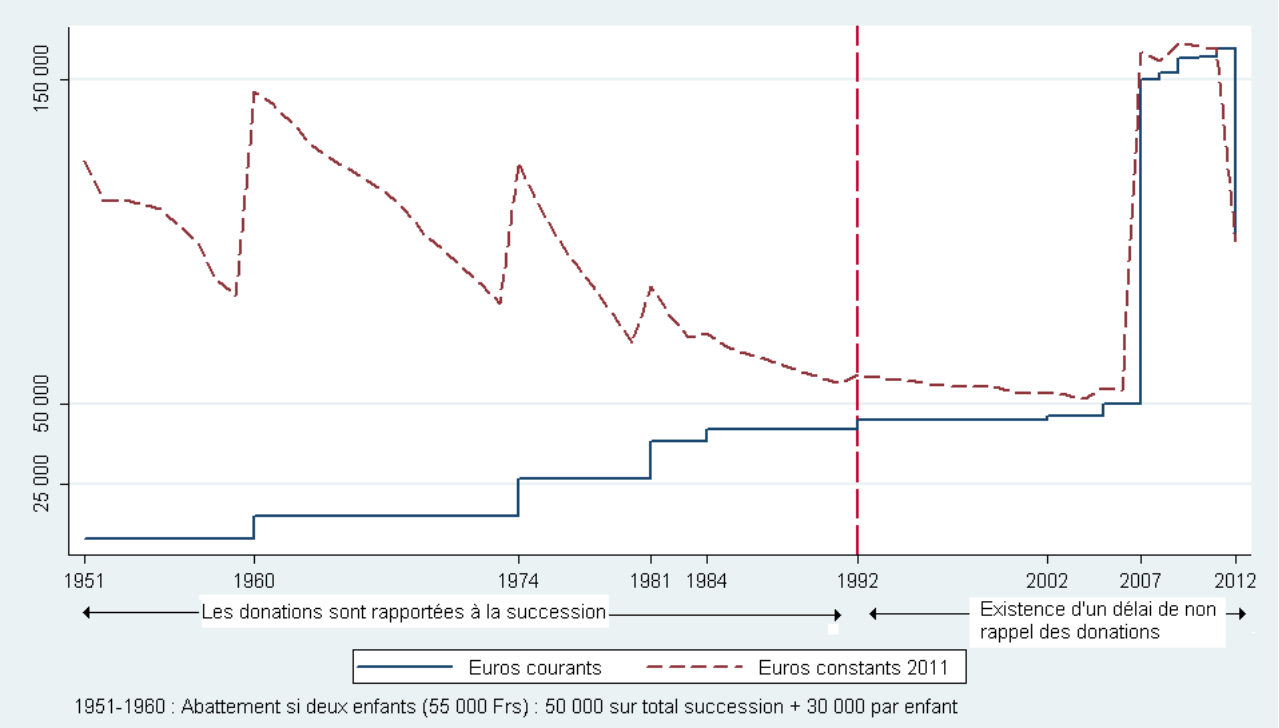
Cette loi a modifié de nombreuses dispositions relatives aux donations et successions. Elle a exonéré de droits de succession les conjoints survivants, qu'ils soient mariés ou pacsés, et a relevé les abattements qui existaient pour les donations et successions. L'un des relèvements les plus importants concernait les transmissions vers les enfants : l'abattement qui était jusqu'alors de 50 000 € (par enfant et par parent) fut multiplié

par trois et porté à 150 000 €. Depuis août 2012, il est de 100 000 €.

Tableau 2.A.2: Taux d'imposition des donations et successions en 2012

Fraction de la part nette taxable après abattement	Taux	Fraction de la part nette taxable après abattement	Taux
Ligne directe [35]		Donations entre époux et partenaires d'un PACS [36]	
$\leq$ 8 072	5 %	$\leq$ 8 072	5 %
entre 8 072 et 12 109	10 %	entre 8 072 et 15 932	10 %
entre 12 109 et 15 932	15 %	entre 15 932 et 31 865	15 %
entre 15 932 et 552 324	20 %	entre 31 865 et 552 324	20 %
entre 552 324 et 902 838	30 %	entre 552 324 et 902 838	30 %
entre 902 838 et 1 805 677	40 %	entre 902 838 et 1 805 677	40 %
$>$ 1 805 677	45 %	$>$ 1 805 677	45 %
Entre frères et soeurs		Autres	
$\leq$ 24 430	35 %	Entre parents jusqu'au 4ème degré inclusivement	55 %
$>$ 24 430	45 %	Entre parents au-delà du 4ème degré et personnes non-parentes	60 %

Graphique 2.A.2: Évolution de l'abattement pour les donations aux enfants, 1951-2012



2.B Modèle de durée : du temps continu au temps discret

Si l'on part d'un modèle sous-jacent continu pour lequel on observe les données de manière groupée (pour chaque âge de la personne de référence) sur un intervalle $]t_{j-1}, t_j]$, et si l'on note $X_{i(j)}$ la valeur prise par le vecteur de caractéristiques X_i sur cet intervalle[37], on a :

$$\begin{aligned} P(T \in]t_{j-1}, t_j] \mid T > t_{j-1}, X_i) &= \frac{P(T \in]t_{j-1}, t_j] \mid X_i)}{P(T > t_{j-1} \mid X_i)} \\ &= \frac{P(T > t_{j-1} \mid X_i) - P(T > t_j \mid X_i)}{P(T > t_{j-1} \mid X_i)} \\ &= 1 - \frac{P(T > t_j \mid X_i)}{P(T > t_{j-1} \mid X_i)} \end{aligned}$$

On a de plus [38] :

$$P(T > t_j \,|\, X_i) = exp[-\int_0^{t_j} \lambda(u \,|\, X_i) du]$$

Ce qui implique :

$$\begin{aligned} \frac{P(T > t_j \mid X_i)}{P(T > t_{j-1} \mid X_i)} &= exp[-\int_{t_{j-1}}^{t_j} \lambda(u \,|\, X_i) du] \\ &= exp[-\int_{t_{j-1}}^{t_j} \lambda_0(u) exp(X'_{i(j)}\beta) du] \\ &= exp[-exp(X'_{i(j)}\beta).\int_{t_{j-1}}^{t_j} \lambda_0(u) du] \\ &= exp[\int_{t_{j-1}}^{t_j} -\lambda_0(u) du]^{exp(X'_{i(j)}\beta)} \end{aligned}$$

[37] Ceci nous permet d'intégrer dans notre analyse des variables qui ne sont pas constantes au cours du temps. C'est le cas par exemple pour l'obtention d'une donation ou d'un héritage, le fait d'être en couple, d'avoir un ou plusieurs enfants, etc.

[38] En effet $\lambda(t) = \frac{f(t)}{S(t)}$ où $f(t) = \lim_{dt \to 0} \frac{P(t \leq T < t+dt)}{dt}$ et $S(t) = P(T > t)$. De plus, on peut facilement montrer que -$f(t)$ est la dérivée de $S(t)$. On peut donc écrire : $\lambda(t) = -\frac{\log}{dt} S(t)$. Une intégration permet alors d'obtenir le résultat voulu.

On a ainsi :

$$P(T \in]t_{j-1}, t_j] \mid T > t_{j-1}, X_i) \quad = \quad 1 - exp[-\int_{t_{j-1}}^{t_j} \lambda_0(u)du]^{exp(X'_{i(j)}\beta)} \qquad (2.2)$$

En définissant les probabilités discrètes par : $\lambda_j(x_i) = P(T \in]t_{j-1}, t_j] \mid T > t_{j-1}, X_i = x_i)$ (pour $j \geq 1$)

et en utilisant l'équation 2.2 : $\lambda_j(0) = 1 - exp[-\int_{t_{j-1}}^{t_j} \lambda_0(u)du]$

Il est alors possible de réécrire l'équation 2.2 :

$$\lambda_j(x_i) = \lambda_j(x_{i(j)}) = 1 - (1 - \lambda_j(0))^{exp(x'_{i(j)}\beta)}$$

Ce qui est équivalent à :

$$\log(-\log[1 - \lambda_j(x_{i(j)})]) \quad = \quad x'_{i(j)}\beta + \alpha_j$$

où $\alpha_j = \log(-\log[1 - \lambda_j(0)])$ représente la dépendance au temps.
La transformation $\log(-\log[.])$ est nommée "log log complémentaire" ce qui a donné son nom au modèle.

2.C Le "split model" en détail

Présentation du "*split model*"

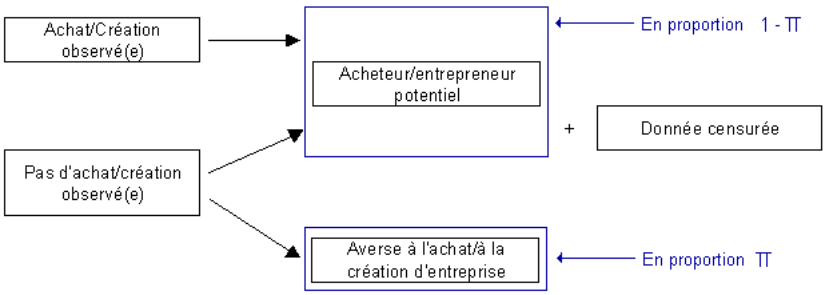
Pour comprendre la manière dont le "*split model*" fonctionne, on peut distinguer deux sous-cas en fonction de ce que l'on observe dans les données. On se restreindra, dans la discussion ci-dessous, au cas de l'achat de la résidence principale tout en sachant que pour la création d'entreprise le raisonnement est parfaitement identique.
Si l'on observe un achat, alors nécessairement il s'agit d'une personne ou d'un ménage qui faisait partie de la population potentiellement intéressée. Cette sous-population représente une proportion $1 - \pi$ de la population totale (cf. graphique 2.C.1).
Si au moment de l'enquête on n'observe pas d'achat, deux situations sont envisage-

ables :

- soit l'individu fait partie de la sous-population des "locataires à vie", c'est-à-dire de ceux qui sous aucun prétexte ne souhaitent acquérir leur logement. Ces individus représentent une proportion π de la population totale.
- soit l'individu fait partie de la sous-population de ceux qui sont potentiellement intéressés par l'achat de leur logement mais l'enquête est intervenue avant qu'il ne puisse acheter.

Ces différentes possibilités sont représentées dans le graphique 2.C.1.

Graphique 2.C.1: Une première description du "*split model* "



Écriture de la vraisemblance du modèle

Le modèle ainsi défini est estimé par maximisation de la vraisemblance. Pour écrire la vraisemblance, nous devons modéliser l'explication précédente. Pour cela, on introduit la variable R_i qui vaut 1 si l'individu fait partie de ceux potentiellement intéressés par l'achat de leur résidence principale. Elle vaut 0 sinon. On note T_i les différents âges auxquels un individu est observé avant qu'il n'achète son logement. f_r désignera alors la fonction de densité de la variable d'âge observée pour ces individus et S_r sa fonction de survie.

Afin de prendre en compte le fait que les données ne couvrent pas la totalité de la vie des individus étudiés (cf. 2.5.1), on introduit l'indicatrice δ_i qui vaut 1 lorsque

la variable T_i n'est pas "censurée" c'est-à-dire lorsque l'individu i est suivi jusqu'à ce qu'il achète son logement. Elle vaut 0 sinon.
Si l'on observe l'âge t_i auquel l'individu achète son logement (on a $T_i = t_i$), on est alors nécessairement dans le cas d'un individu qui était potentiellement intéressé par l'achat ($R_i = 1$) et pour lequel T_i n'est pas censurée ($\delta_i = 1$). Si l'on note C_i l'âge de l'individu au moment de l'enquête, puisque l'individu i a acheté son logement avant l'année de l'enquête on a $T_i \leq C_i$. La probabilité associée à cet événement est donc :

$$P(T_i = t_i, \delta_i = 1 \,|\, X_i) = P(T_i = t_i, T_i \leq C_i, R_i = 1 \,|\, X_i) \tag{2.3}$$

$$= \underbrace{P(R_i = 1)}_{(1-\pi)} \underbrace{P(T_i = t_i, T_i \leq C_i \,|\, R_i = 1, X_i)}_{f_r(t_i,\beta \,|\, X_i) G_c(t_i)} \tag{2.4}$$

où G_c désigne la fonction de répartition de la variable C[39] et β le vecteur des paramètres à estimer.

Si pour tout le passé de l'individu i et jusqu'à l'âge t_i où il est enquêté aucun achat n'a été observé, on retrouve les deux cas envisagés précédemment que l'on va à présent formaliser afin d'obtenir l'écriture de la vraisemblance du modèle.

- soit l'individu fait partie de la sous-population des "locataires à vie" et alors $R_i = 0$

- soit l'individu fait partie de la sous-population de ceux qui sont potentiellement intéressés par l'achat de leur logement ($R_i = 1$) mais l'enquête est intervenue avant qu'il ne puisse acheter : la variable T_i est donc "censurée" ($\delta_i = 0$ et $T_i > C_i$) et on observe uniquement l'âge de l'individu au moment de l'enquête, c'est-à-dire : $C_i = t_i$. Avec le même formalisme que précédemment et en introduisant g_c la fonction de densité de la variable C, on a alors la probabilité

[39] Puisque l'année de l'enquête (et donc l'âge C_i de la censure) intervient indépendamment du fait que l'individu ait acheté son logement, on peut considérer que la variable C est indépendante de la variable T et qu'elle n'apporte pas d'information sur les coefficients β.

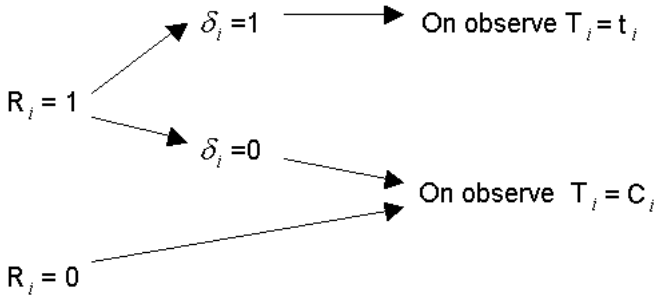
suivante :

$$P(T_i = t_i, \delta_i = 0 \,|\, X_i) = \underbrace{P(R_i = 0)}_{\pi} + \underbrace{P(C_i = t_i, T_i > C_i, R_i = 1 \,|\, X_i)}_{(1-\pi)S_r(t_i,\beta \,|\, X_i)g_c(t)} \tag{2.5}$$

$$\tag{2.6}$$

Ces différents sous-cas sont détaillés dans le graphique 2.C.2.

Graphique 2.C.2: Modélisation du "split model"



Tous les éléments sont alors réunis pour écrire la vraisemblance du modèle [40] :

$$\begin{aligned} L_i(T_i = t_i, \delta_i \,/\, \pi, \beta) &= [(1-\pi) f_r(t_i, \beta)]^{\delta_i} [\pi + (1-\pi) S_r(t_i, \beta)]^{1-\delta_i} \\ &= [(1-\pi)\lambda_r(t_i, \beta) S_r(t_i - 1, \beta)]^{\delta_i} [\pi + (1-\pi) S_r(t_i, \beta)]^{1-\delta_i} \\ &= [(1-\pi)\lambda_r(t_i, \beta) \prod_{t=1}^{t_i - 1} (1 - \lambda_r(t, \beta))]^{\delta_i} [\pi + (1-\pi) \prod_{t=1}^{t_i} (1 - \lambda_r(t, \beta))]^{1-\delta_i} \end{aligned}$$

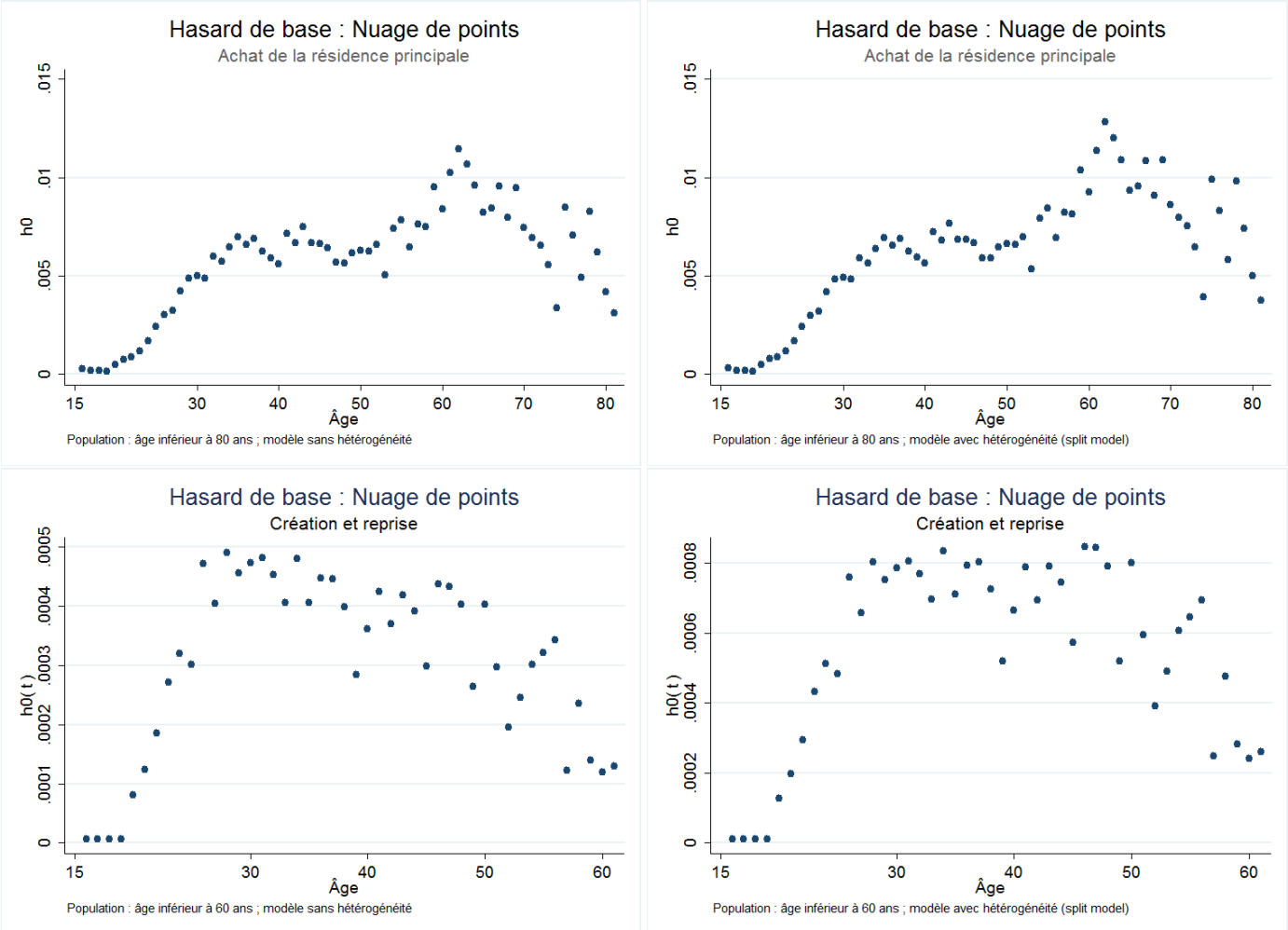
Dans le cadre du modèle à hasards proportionnels et temps discret dans lequel on se place, la paramétrisation de λ_r est immédiate : il s'agit de la fonction "log log complémentaire" (cf. 2.5.1).

Les estimations ont été réalisées à partir du logiciel Stata. Pour le "*split model* ", le package *spsurv*de Stephen Jenkins a été utilisé.

[40] La procédure d'estimation est une maximisation de la log-vraisemblance par rapport à β et les termes G_c et g_c sont constants (par rapport à β) : il est donc inutile de les conserver dans l'écriture de la vraisemblance.

2.D Lissage de la dépendance au temps

Nous avons estimé la dépendance au temps de manière non paramétrique. Notre estimation permet donc d'associer à chaque âge t de la personne de référence une probabilité instantanée de base ($\lambda_0(t)$). Pour certains âges, le nombre d'achat de résidence principale ou de création d'entreprise est plus faible que pour d'autres, ce qui explique que certains points sont estimés avec moins de précision que d'autres et que les estimations obtenues semblent à certains endroits "bruitées" (Graphique 2.D.1).



Graphique 2.D.1: Probabilités instantanées ("hasard") : nuage de points

Légende : Le hasard $h(t)$ représente la probabilité instantanée d'acheter sa résidence principale ou de créer son entreprise à l'âge t. Ceci peut s'interpréter comme une probabilité annuelle d'achat ou de création sachant que cet évènement n'a pas eu lieu précédemment.
Source : Échantillon Enquête Patrimoine 2009-2010.

Afin d'avoir une représentation graphique plus lisible, moins dépendante du manque de précision de l'estimation de certains points, nous avons lissé les résultats obtenus (Graphique 2.D.2). Le lissage effectué est un lissage classique. Il s'agit d'un lissage dit "lowess" pour **lo**cally **we**ighted **s**catterplot **s**moothing.
Le principe en est le suivant : On a n points estimés de coordonnées (x_i, y_i) $(i = 1, ...n)$. Le modèle sous-jacent est $E[y_i/x_i] = f(x_i)$. L'idée du lissage est d'approximer localement la fonction f. Pour cela, on se donne pour paramétrisation locale, autour du voisinage V de chaque point x_i :

$$\forall u \in V(x_i) : f(u) = a_0 + a_1.(x_i - u)$$

On estime alors les coefficients a_0 et a_1 dans un voisinage de x_i. On définit la taille de ce voisinage par une "fenêtre" (*bandwith*). Dans la mesure où chaque voisinage d'un point x_i contient plusieurs points u, on va pondérer ces u en fonction de leur proximité avec x_i afin de donner plus de poids aux points les plus proches de x_i.
Il est donc nécessaire de faire 2 choix : l'un concerne la taille de la "fenêtre" et l'autre concerne la manière dont on pondère les u. Nous avons choisi une "fenêtre" de 0,5 (ce qui revient à utiliser 50 % des points autour de x_i). Le choix de la fonction de pondération est un choix standard : la fonction retenue est la fonction tricube de Cleveland (1979).

Graphique 2.D.2: Probabilités instantanées ("hasard") d'achat de la résidence principale : lissage du nuage de points

Légende : Le hasard $h(t)$ représente la probabilité instantanée d'acheter sa résidence principale ou de créer une entreprise à l'âge t. Ceci peut s'interpréter comme une probabilité annuelle d'achat ou de création sachant que cet évènement n'a pas eu lieu précédemment.

Source : Échantillon Enquête Patrimoine 2009-2010.

2.E Robustesse au choix des résidences principales prises en compte

Les résultats présentés dans la table 2.E.1 reprennent la totalité des modèles concernant l'achat de la résidence principale qui ont été exposés dans les parties 2.6 et 2.8. Les effets mis en évidence ici sont plus forts que ceux précédemment présentés et l'écart entre donation et héritage perdure. Nos conclusions ne sont donc pas affectées.

Tableau 2.E.1: Déterminants de l'achat de la résidence principale (coefficients exponentialisés)

	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Reçus par la PR												
Don reçu	2,10***	2,21***	2,09***	2,20***								
Don reçu av 35 ans					2,75***	2,77***	2,78***	2,80***				
Don reçu ap 35 ans					1,81***	1,93***	1,79***	1,91***				
Don reçu av 2000									1,91***	2,00***	1,90***	1,99***
Don reçu ap 2000									3,21***	3,63***	3,23***	3,64***
Héritage reçu	1,70***	1,73***	1,70***	1,72***	1,70***	1,72***	1,69***	1,71***	1,71***	1,73***	1,70***	1,72***
Reçus par le CJ												
Don reçu	1,59***	1,68***	1,56***	1,65***	1,61***	1,69***	1,58***	1,65***	1,59***	1,70***	1,56***	1,66***
Héritage reçu	1,35***	1,37***	1,30***	1,32 ***	1,35***	1,36***	1,30***	1,32***	1,34***	1,36***	1,29***	1,31***
Décile rev.	Non	Non	Oui	Oui	Non	Non	Oui	Oui	Non	Non	Oui	Oui
Modèle (1) : modèle sans hétérogénéité (log log complémentaire), Modèle (2) : modèle avec hétérogénéité ("split model")												

2.F Coefficients multiplicateurs obtenus à partir du modèle linéarisé

On se réfèrera au paragraphe 2.9.2 pour une présentation du modèle linéarisé. Le lissage présenté ici est le même que celui détaillé en 2.D. Les résultats présentés dans le tableau 2.9.1 sont les résultats après lissage.

Tableau 2.F.1: Coefficients multiplicatifs obtenus à partir du modèle linéarisé

	Sans lissage		Avec lissage	
Age de la PR	**Sans instrumentation**	**Avec instrumentation**	**Sans instrumentation**	**Avec instrumentation**
15	1,65	4,03	1,69	4,18
16	1,67	4,12	1,7	4,22
17	1,67	4,09	1,7	4,23
18	1,68	4,18	1,69	4,21
19	1,68	4,19	1,68	4,17
20	1,69	4,21	1,66	4,12
21	1,71	4,33	1,64	4,05
22	1,73	4,4	1,62	3,97
23	1,71	4,36	1,6	3,89
24	1,68	4,22	1,58	3,82
25	1,63	4,01	1,57	3,74
26	1,61	3,97	1,55	3,67
27	1,54	3,64	1,53	3,61
28	1,49	3,4	1,52	3,55
29	1,48	3,35	1,5	3,5
30	1,49	3,44	1,49	3,44
31	1,43	3,16	1,48	3,4
32	1,44	3,23	1,47	3,35
33	1,42	3,11	1,46	3,31
34	1,38	2,93	1,45	3,28
35	1,41	3,08	1,44	3,25
36	1,39	2,97	1,44	3,23
37	1,42	3,14	1,43	3,22
38	1,45	3,3	1,43	3,21
39	1,46	3,39	1,43	3,21
40	1,38	2,99	1,42	3,21
41	1,41	3,15	1,42	3,22
42	1,38	3,02	1,42	3,23
43	1,43	3,26	1,42	3,24
44	1,41	3,19	1,42	3,25
45	1,42	3,26	1,42	3,26
46	1,47	3,55	1,42	3,27
47	1,47	3,55	1,42	3,28
48	1,43	3,35	1,42	3,28
49	1,42	3,3	1,42	3,28
50	1,48	3,62	1,42	3,27
51	1,42	3,31	1,41	3,26
52	1,5	3,79	1,41	3,25
53	1,39	3,13	1,41	3,24
54	1,39	3,17	1,41	3,24
55	1,44	3,48	1,4	3,23
56	1,4	3,22	1,4	3,22
57	1,4	3,26	1,4	3,22
58	1,36	3	1,4	3,21
59	1,38	3,13	1,4	3,21
60	1,35	2,95	1,4	3,22
61	1,31	2,73	1,4	3,23
62	1,34	2,92	1,4	3,24
63	1,39	3,21	1,4	3,25
64	1,41	3,35	1,4	3,27
65	1,39	3,17	1,41	3,29
66	1,39	3,19	1,41	3,32
67	1,43	3,47	1,42	3,35
68	1,4	3,29	1,42	3,39
69	1,43	3,5	1,43	3,44
70	1,45	3,59	1,44	3,49
71	1,47	3,72	1,45	3,54
72	1,51	4	1,45	3,61
73	1,56	4,36	1,46	3,67
74	1,41	3,34	1,47	3,73
75	1,44	3,54	1,48	3,79
76	1,54	4,13	1,49	3,85
77	1,44	3,53	1,5	3,9
78	1,48	3,75	1,51	3,95
79	1,59	4,48	1,52	3,99
80	1,54	4,05	1,53	4,03
Moyenne	1,48	3,52	1,48	3,50

Echantillon : Ménages dont la personne de référence (PR) a au moins un frère ou une sœur

Chapter 3

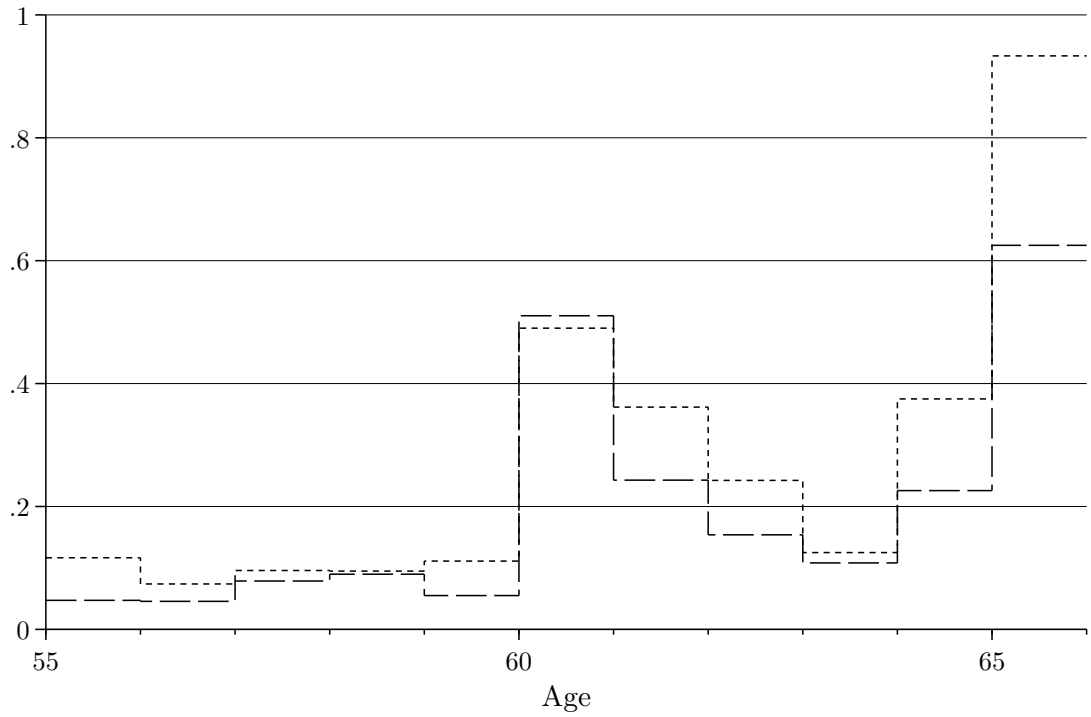
Time to smell the roses? Risk aversion, the timing of inheritance receipt, and retirement [1]

3.1 Abstract

Understanding when workers choose to retire is key for the design of public pensions and labor market policies. Private wealth may play a substantial role in retirement decisions, but little is still known on the link between the two, particularly when public pensions are important like in the French context. In this paper, we explore a new way to leverage the receipt of an inheritance as a plausible exogenous wealth shock, by relying on the precise timing of receipt. Using retrospective calendars from the French wealth survey, we find that, at any age between 55 and 65, chances of current labor market exit are 40% higher among individuals who inherit at that age than among those who inherit in the next few years. To go further in understanding the effect of inheritance receipt on labor force participation, we develop a model of retirement choice with risk aversion and an endogenous replacement rate and we test its predictions. We find that inheritance receipt triggers current labor force exit because risk averse individuals plan their retirement date not according to the expected

[1] This chapter is based on a joint work with Simon Georges-Kot.

value of their inheritance but but according to a lower value (referred as "certainty equivalent bequest").



3.2 Introduction

Understanding when people choose to retire is key for the design of public pensions and labor market policies. It has been the focus of an extensive literature investigating the effect of factors as diverse as health status, longevity, private and public pensions, or health insurance.[2] While there has been much theoretical work on the retirement effect of individual wealth, be it in the form of private assets or Social Security entitlements,[3] empirical work has often failed to provide causal evidence of this link, or found contradictory results.[4] Wealthy individuals typically have distinct preferences, for example regarding leisure or time, both of which can in turn influence labor market participation. Finding truly exogenous sources of variation of private wealth

[2]See among many others Bloom, Canning, Mansfield, and Moore (2007), Bloom, Canning, and Moore (2014), Burtless (1986), Gruber and Madrian (1995), Bloemen (2011).

[3]Examples include Kingston (2000) or Stock and Wise (1990).

[4]See for example Samwick (1998) for a survey of the literature on the effects of Social Security, and a re-examination of some of the evidence.

is difficult, particularly if one requires these variations to take place around ages where individuals might prefer to completely withdraw from the labor market rather than to make adjustments at the intensive margin. In this paper, we explore a new way to leverage the receipt of an inheritance as a plausible exogenous wealth shock, by relying on the precise timing of receipt. We build on the fact that, conditionally on receiving an inheritance within a few years, the exact moment of receipt is largely random.[5] Using retrospective calendars from the French Wealth Survey, we find that, for any age between 55 and 65, chances of current labor market exit are 40% higher among individuals who inherit at that age than among individuals who inherit in the next few years. To go further in understanding the effect of inheritance receipt on labor force participation, we develop a model of retirement choice with risk aversion and an endogenous replacement rate. We find that inheritance receipt triggers current labor force exit because risk averse individuals plan their retirement date not according to the expected value of their inheritance but according to a lower value (referred as "certainty equivalent bequest").

As in many countries, public pensions make up most of retirees' financial resources in France, providing them with 75% of their pre-retirement income on average (COR (2013)). In order to unlock their pension, individuals must work until the legal retirement age. In addition, they must contribute to the pension system for a given number of years in order to retire with full benefits. In case of early retirement, an individual's pension is scaled down in proportion of the number of missing years. Considering the importance of public pensions in France, we investigate whether the effect of inheritance receipt on retirement depends on an individual's pension entitlement status. We find that the increase in exit rates among individuals who happen to inherit before or after the legal retirement age is very comparable. This increase is also very similar among individuals who happen to inherit before or after having reached the necessary contribution length. The main effect of inheritance receipt seems to be instantaneous rather than delayed labor market exit, regardless

[5]There are some reasons to doubt that the receipt of an inheritance itself is completely exogenous and independent of workers' characteristics (see e.g. Hurst and Lusardi (2004)). Our strategy enables us to overcome the usual issue that inheritors and other individuals are not comparable due to unobservable characteristics (cf. section 3.3).

of whether individuals face a high cost of exit or not. This suggests that some individuals are willing to give up a substantial part of their benefits in order to exit the labor market a few years earlier, when they can afford to do so.

Previous work has highlighted the fact that, when individuals anticipate the receipt of an inheritance, adjustments of their labor force participation might have already occurred at the date of receipt. In this scenario, only inheritances representing a higher amount than expected can have an impact on current retirement probability. We explore an alternative interpretation of our results. Building on a simple model of retirement decision under uncertainty, we show that, when individuals are risk averse and bear the risk associated with their own inheritance, the receipt of an inheritance can have labor supply effects even when the amount received was perfectly anticipated. This is because individuals make their lifetime labor supply decisions with respect to the certainty equivalent of the inheritance rather than its expected value.[6] Using multiple measures of risk aversion available in our data, we are able to test the validity of this framework. Consistent with our model, we show that the receipt of an inheritance has a particularly large effect on current retirement rates for the most risk averse individuals.

Despite the existence of an important literature investigating the effects of private wealth on labor supply decisions, direct evidence of an impact on retirement behavior is still scarce. Kaplan (1987) and Imbens, Rubin, and Sacerdote (2001) studied lottery players, and both showed that lottery winners' labor earnings were significantly reduced, all the more so as they were close to the retirement age. Using the bull market of the 1990s, Coronado and Perozek (2003) and Sevak (2002) both found that households who benefited from unanticipated capital gains ended up retiring earlier than others. However, with the same strategy, Coile and Levine (2006) found no evidence of changes in labor supply due to variations in stock market. Earlier studies also leveraged the receipt of an inheritance as a credible exogenous wealth shock, but with similarly ambiguous conclusions. Holtz-Eakin, Joulfaian, and Rosen (1992) showed that a single person who inherits about $150,000 is four times more likely to leave the labor market than one who inherits less than $25,000. Joulfaian

[6]This was one of the interpretation suggested by Brown, Coile, and Weisbenner (2010).

(2006) and Bo, Halvorsen, and Thoresen (2013) also both found significant effects, but much smaller in magnitude. On the other hand, Joulfaian and Wilhelm (1994) found inconclusive results on older workers in the Panel Study of Income Dynamics. The papers closest to ours are Brown, Coile, and Weisbenner (2010) and Blau and Goodstein (2015), who concentrate exclusively on retirement decisions following the receipt of an inheritance. Using data from the Health and Retirement Survey (HRS), Brown, Coile, and Weisbenner (2010) show that individuals who inherit between two waves of the survey are also more likely to exit the labor market during that time. Using information on inheritance expectations, they are also able to test whether the effect is entirely concentrated on workers receiving more than they expected, but find effects of similar magnitudes for individuals receiving more than expected and exactly what they anticipated. While Brown, Coile, and Weisbenner (2010) study households behavior, Blau and Goodstein (2015) focus on married individuals. They show that the receipt of an inheritance has a negative effect on own labor force participation, but no effect on that of the spouse.

Our study differs from previous work in a number of ways. We explore a new source of randomness associated with inheritance by focusing on the precise timing of receipt among heirs, namely by comparing individuals who receive an inheritance at a given age with individuals who receive one in the next few years rather than with all individuals. We also clarify the theoretical status of risk aversion using a simple lifecycle model. Empirically, we find that individuals behave in a way that is consistent with our model, where the most risk averse individuals are also those for whom the labor market response of inheritance receipt is the strongest. This sheds new light on why workers might adjust their labor supply after the receipt of an inheritance, including in the case where they perfectly anticipated it. The rest of the paper is organized as follows. Section 3.3 describe our empirical strategy more in details, section 3.4 presents the data used in the analysis, sections 3.5 to 3.7 present our results, and section 3.8 concludes.

3.3 Empirical strategy

Multiple studies have used the receipt of an inheritance as a plausible exogenous wealth shock. However, there are some reasons to doubt that receiving an inheritance is actually a clear random event. Individuals who inherit may differ from those who do not, be it in their education, occupation, personal wealth, or other characteristics (sometimes unobservable and so hardly possible to control for), in particular because of important intergenerational correlations in all those variables. For instance, in their study of entrepreneurship, Hurst and Lusardi (2004) found that both past and future inheritances predict current business entry, suggesting that individuals who inherit at some point are just fundamentally different than those who do not.[7] In this paper, we attempt to go beyond this limit by leveraging the precise timing of inheritance receipt. Concentrating on individuals who do receive an inheritance over their life, we propose to use the timing of inheritance receipt as a more exogenous wealth shock. Specifically, at any age, we propose to compare individuals who receive an inheritance at that age with individuals who receive an inheritance in the next few years. The assumption behind this strategy is that, conditionally on inheriting within a restricted time range, the exact time at which individuals receive that inheritance is essentially random.

Econometrically, we build on the tools of duration analysis. We consider the standard Cox proportional hazard model:

$$h_i(t) = h_0(t) \exp(\alpha \text{Inh}_{it} + X_{it}\beta) \tag{3.1}$$

where $h_i(t)$ denotes the hazard rate for individual i at age t, i.e. the instantaneous retirement probability of i conditional on still being employed at t. Inh_{it} is a dummy with value 1 if i receives an inheritance at t, and 0 if i receives an inheritance in a given time interval after t, say $]t, t+T[$. If we denote t_i^b the time at which i inherits, Inh_{it} takes value 1 when $t = t_i^b$ and 0 when t is in $]t_i^b - T; t_i^b[$. X_{it} is a vector of individual and potentially time-varying covariates. In this model, the parameter of interest is α: the probability of labor market exit at t is multiplied by $\exp(\alpha)$ when

[7] They do not control for parents' characteristics.

an inheritance is received at t.

The estimation of model (3.1) requires information in continuous time, which is not available in our data. Instead, we observe events grouped in 1-year intervals. In this context, it can be shown that model (3.1) can be rewritten as a binary model with a complementary log-log link function to accommodate interval data.[8] We use this model to estimate the parameters α and β.

In practice, we estimate the parameters of model (3.1) using the following specification:

$$y_{it}^* = \mu_t + \alpha \text{Inh}_{it} + X_{it}\beta + \epsilon_{it} \tag{3.2}$$

where y_{it}^* is the latent variable such that $y_{it} = \mathbb{1}_{\{y_{it}^* \geq 0\}}$ with y_{it} a dummy indicating that individual i retired during interval $[t, t+1[$. μ_t is an age-specific effect,[9] and the error term ϵ_{it} follows a complementary extreme value type I distribution (specifically, $P(\epsilon > x) = 1 - \exp(-\exp(-x))$). Inh_{it} is a dummy with value 1 if individual i received an inheritance between $[t, t+1[$, and 0 if she receives an inheritance between $[t+1, t+T[$. The parameters α and β identified by model (3.2) are the same as those in model (3.1).

Before continuing, we should make it clear that, even though we use tools from duration analysis, our approach differs slightly from traditional survival models. In these models, all individuals are followed until they either retire, or exit the sample for possibly unknown reasons (censorship). Here, we do not follow individuals until their exit from the labor market as this would be fundamentally incompatible with our empirical strategy. We want to compare inheritors with similar characteristics who differ only by the timing of their inheritance. A natural way of doing so is to compare the behavior of the individuals who receive their inheritance between $[t, t+1[$ with the one of those who receive their inheritance slightly later. For this purpose, we only keep observations corresponding to individuals who either receive an inheritance between $[t, t+1[$ or do not receive their inheritance between $[t, t+1[$ but receive it between $[t+1, t+T[$. Had we used a standard survival model set up, all non-retired individuals would have been kept in the sample at every time t,

[8] See for example Garbinti (2014)

[9] The legal retirement age is constant over our period of analysis.

even when they have not received an inheritance between t and $t+T$. However, there is no reason why individuals who have already received an inheritance at $t_0 < t$ should be compared with people who have not yet received any inheritance. In a policy evaluation setup, the first group of individuals would be considered as already treated, and would thus not be eligible to be part of the control group.[10] In addition, those individuals are non-compliers since they stayed in the labor force even after having received the "treatment". Put differently, they probably constitute a selected subsample of the individuals who inherited at t_0. They potentially have a stronger attachment to the labor market. Including them in the control group at t would lead to an underestimation of the baseline retirement probability of individuals at t, and an overestimation of the effect of inheritance on retirement.[11] Therefore, for each age, we do not include observations corresponding to these situations. This approach is essentially similar to assuming a frailty model, except that we only care about obtaining unbiased estimates of the treatment variable, not about recovering the parameters associated with the frailty distribution.

3.4 Data

We use data from the *Enquête Patrimoine* (EP), the French wealth survey. The EP is conducted by the French statistical office every 6 years on a sample of about 15,000 households in which wealthier households are overrepresented. We pool data from the years 1998, 2004 and 2010. Those surveys provide detailed information on the main socio-economic characteristics of the households, and on the composition of their assets. For the 2004 and 2010 waves, a fraction of the individuals were also asked specific questions on their attitude towards risk. Specifically, individuals had to rank themselves on a scale from 0 (very careful) to 10 (likes to take risks), and were proposed a simple lottery detailed in Appendix 3.C. In all waves, respondents are asked to report their main career changes over their life, such as any interruption

[10] Later in the paper, we investigate the lagged effect of inheritance receipt. When we do so, we also keep observations corresponding to individuals who have received an inheritance in the previous few years, i.e. between $]t-T, t-1]$.

[11] We confirm this point in section 3.5.2.

of activity, change of labor force status (e.g. from employed to self-employed), or retirement decision, along with the year at which these changes occurred. Individuals are also asked whether they received any inheritance at some point in their lives. For each inheritance received, they are then asked the year at which they received it, as well as who they received it from (parents, distant relatives, ...), the amount and the nature of the inheritance (cash, real estate, ...).

From these retrospective calendars, we build a database containing one observation for each year lived by each individual (i.e. for each individual, years between the reported birth year and the year of the interview). This new database contains time-invariant variables (e.g. household socio-demographic variables at the time of the interview) as well as time-varying variables such as the labor force status of each individual at each year, a dummy variable indicating inheritance receipt in that year, and the number of years left to reach full pension rights.[12] Since most workers exit the labor market between 55 and 65, we concentrate on individuals aged within this bracket at the time of the interview. In line with our empirical strategy, for each age a between 55 and 65, we keep observations corresponding to individuals employed or actively looking for a job between $[a-1, a[$.[13] Active job seekers might be expected to respond to the receipt of an inheritance in much the same way as employed individuals. Receiving an inheritance might push them to exit the labor market completely rather than to keep looking for a job.[14] We consider that an individual has exited the labor market when she or he self-defines as either inactive or retired.[15] In the rest of the paper, we use the term *retirement* as a synonym for labor market exit.

[12] See Appendix 3.B for a description of French pension regulations and of how we build this variable.

[13] In particular, the self-employed are excluded from our sample.

[14] The unemployed make up slightly less than 10% of our sample. We tested that our results do not change much when they are excluded. The basic results are reported in Table 3.D.1 in appendix 3.D.

[15] In 2008, the possibility was introduced for employers and employees to mutually agree on a conventional termination of the work contract between them. For employees, this can be an alternative to submitting their resignation (which does not give rights to unemployment insurance), while for employers it is cheaper and easier than a normal layoff. As workers who benefit from such a contractual termination are entitled to unemployment insurance, it is unclear whether they would self-declare as unemployed, retired or inactive. This could be a source of bias if individuals choose this particular channel to exit the labor market after the receipt of an inheritance. To be sure, we tested that restricting our sample to observations made before 2008, when contractual termination was not possible, does not change our results.

3.5 Inheritance receipt and retirement

3.5.1 Graphical Evidence

Before moving on to the econometric analysis, we provide simple graphical evidence on the effect of inheritance receipt on labor market withdrawal. We compute for each age $a \in [55, 65]$ the proportion of individuals who leave the labor market at any time between $[a, a+1[$ among those still employed at a. Figure 3.8.1 reports this proportion computed separately for individuals who happen to receive an inheritance between $[a, a+1[$ (dotted line), and for individuals who have not yet received an inheritance but will receive one within the next two years, i.e. between $[a+1, a+3[$ (dashed line).

The figure first shows that the probability to leave the labor market varies significantly across ages. Individuals who are still employed at ages 60 and 65 have a 50% to 60% chance to retire at that age when no inheritance is received, whereas this conditional probability is quite stable outside those ages, around 10% between $[55, 60[$ and 20% between $]60, 65[$. As described in appendix 3.B, 60 is the age at which most workers can start to cash out their pension and 65 is the age at which discounts are canceled, and consequently, many individuals wait until those ages to retire. This pattern is roughly unchanged when the proportion of labor market exits is computed among those who receive an inheritance at the age under consideration.

Figure 3.8.1 also shows that at most ages a, the proportion of individuals who withdraw from the labor market is higher among those who receive an inheritance at exactly a than among those who have not yet received an inheritance. The degree to which this is the case varies substantially with age. For example, the probability to retire doubles when an inheritance is received at ages 55 and 64, but it is roughly unchanged at ages 58 and 60. Overall, these results are indicative that receiving an inheritance at any age between 55 and 65 is associated with an increase in the probability to retire at that age.

3.5.2 Econometric results

To go one step further, we turn to the econometric analysis described in section 3.3, which builds on the intuitions from Figure 3.8.1. The first two columns of Table 3.8.1 show the results of the estimation of model 3.2 on our sample. For any age a between 55 and 65, we detect a very significant impact of receiving an inheritance at that age on the instantaneous probability to retire. Specifically, column (1) reveals that individuals who receive an inheritance at a are 39% (exp(.326)) more likely to exit the labor market at a than those who have not yet received an inheritance, but who will receive one in the next 2 years. Column (2) of Table 3.8.1 shows that this estimate is virtually unchanged by the introduction of a full set of controls for individual characteristics, including socio-economic status, gender, and education. This suggests that timing of inheritance receipt over a short period of time is indeed only weakly correlated with workers' characteristics, including those affecting retirement age. In Table 3.8.3, we estimate the same model for several socio-demographic subgroups. We find that the effects are generally larger for individuals of lower SES or lower education.

Columns (3) and (4) of Table 3.8.1 report the results of the estimation of the same model as in columns (1) and (2), but comparing individuals who receive an inheritance at t with all other individuals employed at t. If inheritance receipt is correlated with unobserved workers' characteristics influencing retirement age, this strategy should yield biased results. Those results may then also depend on the extent to which individual heterogeneity can be accounted for in the model. When excluding all controls, we find that individuals who receive an inheritance at t are 32% more likely to retire that year than any other individual still employed at t. This figure is slightly less than the result from column (1). However, when controls are included, we find results that are very similar to the ones obtained with our previous strategy. Specifically, when controlling for basic socio-economic characteristics of the individuals, we find that workers who receive an inheritance at t are 38% (exp(.333)) more likely to retire that year than other workers. Overall, this indicates that comparing inheritors with other individuals may lead to a small downward bias in the estimation of the effect of inheritance receipt of retirement. It also suggests that this bias can

be largely eliminated by controlling for the basic socio-demographic characteristics of individuals.

These results are in line with those of previous American studies, although not directly comparable. Previous works have reported estimates based on logit or linear probability specifications, whereas our model directly estimates multiplicative effects. When we rescale our estimates taking into account the mean retirement probability in our sample, we get a marginal effect equivalent to a 5 percentage point decline in labor force participation following inheritance receipt.[16] This figure is slightly higher than Brown, Coile, and Weisbenner (2010) (2.3 percentage point decline) but clearly in line with Blau and Goodstein (2015), with effects ranging from a 3.8 to a 6.5 percentage point decline (depending on whether men or women are considered). The main difference with Blau and Goodstein (2015) turns out to be that they find a lower effect for women while our estimates are of the same order of magnitude whatever the gender.

As it has been pointed out by a number of studies (e.g. Brown, Coile, and Weisbenner (2010)), the results from Table 3.8.1 could be driven by the fact that the death of a relative has a direct effect on the labor market participation of an individual. For instance, some individuals might stop working after the death of one of their parents to have more time to take care of their surviving parent. In that case, our results would overestimate the effect of inheritance receipt on retirement. Since inheritance is by essence associated with the death of an individual, these two effects are hard to disentangle.[17] A way to shed some light on this issue is to explore whether the labor market response of individuals who inherit a given year varies whether they receive their inheritance from their parents or from more distant relatives or friends. Under the assumption that the death of a parent has a direct negative effect on labor market participation, we would expect inheritances received from parents to be associated with a higher probability to withdraw from the labor

[16] The mean retirement probability in our sample is 13%. We multiply our multiplicative effect (39%) by this sample mean in order to get closer to the way Blau and Goodstein (2015) compare results across studies. To take into account the fact that the probability of exit is increasing with age, our multiplicative effect is relative to the time changing baseline retirement probability of non-inheritors and not to the sample mean of the dependent variable. It explains an important part of the difference in the comparison.

[17] We do not have information on the death of parents in our data.

market. To test this, column (2) of Table 3.8.2 reports the results obtained for the estimation of model (3.2), distinguishing between bequests[18] received from parents or grand-parents and bequests received from other family members of friends. Those results first confirm that workers who inherit in a given year from a close parent are more likely to exit the labor force that year than individuals who inherit in the next couple of years. As it turns out, this effect is not less important and not statistically different when the inheritance comes from a more distant relative or from a friend. Overall this result is suggestive that labor market responses to the death of a parent cannot be entirely driving the estimates of Table 3.8.1.

A related concern is that some individuals might exit the labor force a few years *before* the death of a parent. This could happen for example when some individuals take time off work to care for a parent suffering from a severe illness. If this is the case, at any given age a, the retirement probability of individuals who will inherit in the next few years will overestimate the baseline retirement probability at a, and our results will be biased towards 0. A way to test whether these effects are substantial is to compare our results with those obtained when considering a control group composed of individuals who receive an inheritance over a longer time horizon. Workers who inherit at $a+5$ should be less likely to exit the labor market at a to take care of their parent than workers who inherit at $a+2$. If these effects are large, we should find that the impact of inheritance on current retirement increases when we consider an extended time horizon. In columns (3) to (5) of Table 3.8.2, we investigate how the results of Table 3.8.1 change when we consider inheritances received over a longer period of time. We estimate the same model as for column of Table 3.8.1, but this time comparing the retirement probability in a given year for individuals who inherit that year and for those who inherit in the next 3 years (column 3), in the next 5 years (column 4), or in the next 10 year (column 5). The estimates do not increase, and actually change very little when we extend the time horizon considered. Our results are not driven by our choice to consider inheritances received in a two-year window.

[18] To avoid repetitions, we use "bequest" as a synonym for "inheritance".

3.6 Retirement and the timing of inheritance

Receiving an inheritance at any age between 55 and 65 is associated with a substantial increase in the probability of retiring at that age. However, the costs of leaving the labor market vary significantly across those ages.[19] In order to get their full benefits, individuals must work until they reach the necessary contribution length. In addition, most workers need to wait until they turn 60 to be able to unlock their public pension. At this stage, it could well be that receiving an inheritance leads an individual to leave the labor market only when he has the possibility to do so at very little costs. The opposite would indicate that individuals are ready to sacrifice a substantial part of their pension to retire earlier when they can afford to do so, which could have deep implication for the design of public pensions.

To investigate this, Table 3.8.4 shows the results of estimating model (3.2) when the inheritance dummy is interacted with an indicator that the individual under consideration is older than 60 (column 1), or with an indicator that she has fulfilled the necessary contribution length (column 2). First, column (1) reveals that the effect of inheritance receipt on labor force participation is not lower when individuals happen to inherit before 60. Receiving an inheritance after 60 increases the probability of instantaneous labor market exit by about 22% with respect to receiving an inheritance in the following couple of years, but it is not significant. As it happens, this figure actually almost triples, to a 65% increase, when the inheritance is received before 60. This result suggests that the labor market impact of inheritance receipt is not lower when individuals cannot yet cash out their public pension. Column (2) of Table 3.8.4 then shows that this also holds true when considering pension rights rather than the possibility to unlock the pension. Specifically, individuals who happen to inherit when they have already reached their full contribution length, and have therefore earned their full benefits, are 44% more likely to exit the labor market at that point than those who receive their inheritance in the next couple of years. This effect is only slightly smaller (30%) when individuals happen to receive their inheritance when they have not yet worked enough to earn their full pension rights.

[19] French pensions are explained in more details in Appendix 3.B.

As described in Appendix 3.B, the entitlement cost of an early labor market exit can be quite large, even with just a few missing years of contribution. When workers are too far away from earning their full benefits, receiving an inheritance might not be enough to compensate the loss of pension money associated with an early exit, even if an individual has a strong disutility for work. To test this idea, we investigate whether the effect of inheritance receipt on retirement decreases when individuals are missing more than a certain number of years of contribution. Specifically, we estimate the same type of model as for column (2) of Table 3.8.4, but distinguishing whether individuals are missing more or less than 2 years of contribution. Column (3) reports the results of this estimation. As it turns out, individuals who have not yet earned their rights to full benefits but who are close to having done so are also those for whom receiving an inheritance is associated with the strongest probability to retire. When an individual happens to receive an inheritance while he is less than two years away from earning full retirement rights, his probability of exiting the labor market increases by 53%. By contrast, if he happens to receive an inheritance while being more than two years away from earning full benefits, he is not more likely to exit the labor market than a comparable individual who did not yet receive any inheritance. Some individuals suffer from a strong disutility from work. For them, receiving an inheritance is a way to finance their early retirement, as long as the cost of doing so is not too high.

So far we have only considered the possibility of instantaneous exit. The next question is whether the conclusions of this section hold true when also considering the possibility of delayed exit. It could very well be that some individuals who receive an inheritance when exit is costly wait until they have acquired their full rights to retire, or until they can unlock their pension. We therefore investigate whether inheritance receipt has a lagged effect on retirement. To do so, at any age a between 55 and 65, we compare the probability of labor market withdrawal for individuals who inherited in the last two years and for those who will inherit in the next two years. The results of this regression are reported in column (4) of Table 3.8.4. As it happens, among individuals still employed at a certain age, the likelihood of exiting the labor market is similar for those who inherited in the past couple of years and for those who have

not yet inherited. This suggests that inheritance receipt only has an instantaneous effect on retirement: if an individual chooses to keep on working during the year the inheritance is received, she will not be more likely to retire at any point in the future than if she had not received that inheritance. An interpretation of this could be that workers differ greatly in their attachment to the labor market. Some workers wish to cease their activity as soon as possible, and receiving an inheritance enables them to do so right away. Other workers have stronger ties to the labor market, and care little about whether they suddenly have the possibility to leave their job. A few year after the receipt of an inheritance, all workers of the first type have exited, leaving only workers of the second type in the sample.

3.7 Inheritance, retirement, and risk aversion

The previous sections have shown that the receipt of an inheritance has a substantial effect on labor market participation. At this stage, it is not entirely clear why that should be the case. Previous studies have highlighted the fact that, in a classical framework, inheritance receipt should have an impact on labor supply decisions only to the extent that inheritances are not anticipated. Intuitively, agents integrate the receipt of an inheritance in their intertemporal budget constraint, and choose their lifetime supply of labor, and in particular their date of retirement, accordingly. In the case where an individual receives exactly the amount that she expected to receive, her labor supply decisions should not be affected. In this context, only the part of an inheritance that exceeds individuals' expectations can be taken as an exogenous wealth shock, not the receipt of an inheritance in general.

However, in a related contribution, Brown, Coile, and Weisbenner (2010) found that this was not entirely true.[20] According to their estimates, individuals who receive an inheritance in line with their expectations are not less likely to exit the labor market than those who receive more than they expected. An interpretation of this result could be that individuals face some uncertainty about the amount that they will inherit, and therefore plan their lifetime labor supply according to the certainty

[20]This point was also confirmed by Blau and Goodstein (2015).

equivalent of their inheritance rather than according to their expectations.[21] In this section, we take this idea one step further by building on a simple model of intertemporal labor supply, where agents are risk averse and bear the risk associated with their own inheritance. We show that, in this context, the receipt of an inheritance can have an impact on their date of retirement, even in the case where individuals receive exactly the amount that they expected, and that this impact is all the more important as individuals are risk averse. We then test and confirm this prediction using multiple measures of risk aversion available in our data.

3.7.1 A model of lifetime labor supply with inheritance and risk aversion

We present here intuitions and main results from the model developed in Appendix 3.A. There exists several models that take into account optimal consumption and endogenous decision to withdraw from the labor market. Here, we introduce the dependence of the replacement rate of pension to the date of retirement to take into account the fact that pensions depend on the number of years of contribution. As far as we know, no theoretical model has been developed to analyze the effect of realized bequest (versus anticipated one) and how risk aversion shapes this effect on the decision of withdrawal. A model close to ours is Bloom, Canning, Mansfield, and Moore (2007) and Ljungqvist and Sargent (2012) (chapter 29, pp 1203-1208). We add pensions with an endogenous replacement rate, bequests, and we focus on the role of bequest and risk aversion.

The basic set up is the one of an agent who plans her optimal consumption path and withdrawal from the labor market. To do so, she maximizes her lifetime utility from the beginning of her working life t_0 to the age of death T:

$$\mathcal{U} = \int_{t_0}^{R} e^{-\delta(t-t_0)} u(c_t)dt + \int_{R}^{T} e^{-\delta(t-t_0)} v(c_t)dt$$

[21] Although this is mentioned by Brown, Coile, and Weisbenner (2010), it is not detailed in their paper.

under the budget constraint

$$\int_{t_0}^{T} e^{-r(t-t_0)} c_t dt = \int_{t_0}^{R} e^{-r(t-t_0)} w dt + \int_{R}^{T} e^{-r(t-t_0)} \lambda(R) w dt + \tilde{B} + W_{t_0} \tag{3.3}$$

u and v are instantaneous utility functions. They both depend on c_t, the level of consumption at time t. They differ to take into account the disutility of work while the agent is working (between t_0 and the date of retirement R), so the date of retirement plays a direct role not only because of the change in earnings occuring at retirement but also because of the disutility from working (cf. appendix 3.A). δ is the discount factor, r the interest rate, w is the wage and $\lambda(R)$ the replacement rate applied to wages to compute pensions. It depends on the age of retirement R. W_{t_0} stands for the non inherited assets at time t_0. $\tilde{B}$ is the actualized bequest that the agent expects to receive. It is uncertain because of uncertainty on the exact amount that will be received.[22] Since consumption and retirement date both depend on the uncertain amount of inheritance, the agent indeed maximizes $\mathbf{E}_{\tilde{B}}[\mathcal{U}(\tilde{B})]$.

We assume that the agent bears the risk of not receiving the exact expected amount. Risk aversion then plays an important role in the way she plans her future consumption path and retirement date. Facing uncertainty (and without liquidity constraints), risk-neutral agents base their budget constraint on the expected amount of bequest $\mathbf{E}(\tilde{B})$. Risk averse ones don't. Intuitively, the more risk averse an agent is, the smaller the amount taken into account in her budget constraint. Facing uncertainty in her budget constraint, the agent substitutes the uncertain amount $\tilde{B}$ by $\mathbf{E}(\tilde{B})$ - μ where μ directly depends on her level of risk aversion. For the sake of simplicity, we denote hereafter $\mathbf{E}(\tilde{B})$ - μ by "certainty equivalent value of expected bequest": B^{CE}. [23] In the extreme case of infinite risk aversion, an agent is expected to draw her plan as if she would not plan to receive any inheritance (ie $\mu = \mathbf{E}(\tilde{B})$).

[22] The uncertainty on the date of receipt may also play a role and be related to the uncertainty on amount. Several factors may be here at stake. If there are some liquidity constraints, an earlier bequest will unbind them and a later one maintain them longer than expected. The timing may also be related to the exact amount received: if parents consume their wealth, the sooner the date of receipt, the higher the amount received.

[23] By strict definition, B^{CE} is the guarantee value of bequest that equalizes the agent's utility with her utility under uncertainty (cf. for instance Laffont (1989)). The difference between $\mathcal{U}(\mathbf{E}(\tilde{B}))$ and $\mathcal{U}(B^{CE})$ depends on the level of risk aversion.

By contrast, the less risk averse and the more risk neutral the agent is, the closer to the expectation of bequest the amount taken into account in her budget constraint. Consequently, under uncertainty, the expected lifetime utility an agent can reach, is lower than the one she would have reached if she had received the guarantee bequest expectation $\mathbf{E}(\tilde{B})$).

Under uncertainty, the agent thus solves:

$$\max_{c,R} \mathcal{U}(B^{CE}) \tag{3.4}$$

Let's recall that, for a risk averse agent, $B^{CE} < \mathbf{E}(\tilde{B})$, which means that the budget constraint is lower with risk aversion than what it would be for risk neutral agents.[24] When the received bequest is higher than the certainty equivalent, we show in appendix 3.A that the agent adjusts her plan on consumption and labor force exit. Specifically, when the received amount is higher than the certainty equivalent, the agent decides to withdraw earlier than initially scheduled.

A first consequence of this simple set up concerns the receipt of the exact expected amount of bequest. Since for risk averse agents it is necessarily higher than the certainty equivalent amount, it will bring forward the date of retirement. This result may shed a light on results by Brown, Coile, and Weisbenner (2010) and Blau and Goodstein (2015). They find that the receipt of the exact expected amount of bequest has a non-significant but positive effect on retirement. Their point estimate, though imprecise, turns out to have the same order of magnitude (even a bit higher) than the one obtained for the effect of an amount higher than expected. Our model may explain both this effect and the imprecision. This imprecision may then come from the heterogeneity of answers due to non-risk averse agents. For risk-neutral agents, there would be no effect and for risk-lover ones, there would be a negative effect.

A second consequence is that the more risk averse an agent is, the later she forecasts her retirement date. This is due to the fact that the amount of bequest taken into account in her budget constraint is lower than the one of a less risk averse

[24] Furthermore, using a bequest in an intertemporal budget constraint may imply some liquidity constraints. In this case, the agent would borrow less then her certainty equivalent amount, and we would still have that the bequest amount taken into account in the budget constraint is lower than the bequest expectation.

agent (cf. appendix 3.A). A third consequence is that the effect of the receipt of a bequest whose amount differs from the certainty equivalent will be higher for the most risk averse agents. It means for instance that when they receive an amount of bequest higher than the certainty equivalent amount, all agents will retire earlier, but the most risk averse ones are those who will advance the most their retirement date. We test and confirm empirically these last two predictions in the next section.

3.7.2 Risk aversion and the impact of inheritance receipt on retirement

In the context of the model presented in section 3.7.1, the impact of inheritance on labor market withdrawal should be more important for agents who are more risk averse, assuming that agents are bearing the risk associated with their own inheritance. We now test this prediction using multiple measures of risk aversion. In the EP waves that took place in 2004 and 2010, about half of the individuals were asked questions about their attitude towards risk. Individuals had to position themselves on a scale from 0 (very carefull individual) to 10 (person who likes to take risks), and were also presented with a simple lottery that we detail in Appendix 3.C. These questions provide us with two measures of risk aversion, which we label respectively subjective risk aversion and lottery risk aversion. In addition, we use stock market participation as a third measure of risk aversion. We estimate a model similar to model (3.2), in which the inheritance indicator is interacted with an indicator of low or high risk aversion constructed from one of our three measures. The results of these estimations are reported in Table 3.8.5.

The Table first reveals that, for all three measures, inheritance receipt does not have a statistically significant impact on labor market exit for individuals with a low risk aversion. These individuals do not seem to be more likely to exit the labor market when they receive an inheritance than individuals who inherit in the next few years. In contrast, for individuals with a high risk aversion, the impact of inheritance receipt on labor market withdrawal is significant, at least for the lottery and stock market participation measures. For each of these measures respectively, those individuals

are about 68% and 73% more likely to exit the labor market when they receive an inheritance than individuals who will receive an inheritance in the next couple of years. Generally, for all three risk aversion measures, the point estimates reported in Table 3.8.5 are always lower for individuals with low risk aversion than for those with a high risk aversion.

A possible interpretation of these findings is that individuals plan their retirement according to the certainty equivalent of their inheritance rather than its expected value, as explained in section 3.7.1. In this context, the receipt of an inheritance is always associated with an exogenous wealth shock for risk averse individuals, even when they make perfect predictions on the size of their inheritance. This exogenous wealth shock leads individuals to exit the labor market earlier than they planed to.

3.8 Conclusion

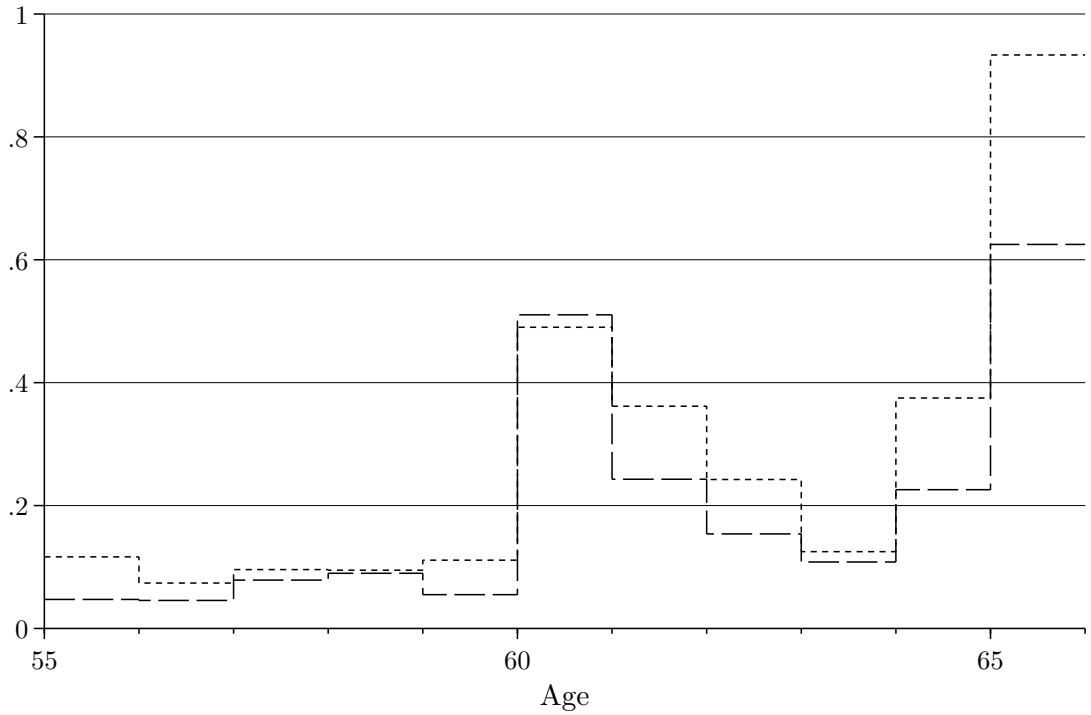
In this paper, we take advantage of the fact that the timing of inheritance receipt generates an exogenous shift of the intertemporal budget constraint of the recipient. Comparing individuals who inherit in a given year with those who inherit in the next couple of years, we find that the receipt of an inheritance is associated with a strong increase in the probability of current labor market exit. This increase is higher when an individual happens to inherit in the few years before reaching full pension entitlement, when an early labor market exit is moderately costly. This suggests that many agents have a strong disutility for work, and contemplate leaving the labor market as soon as they can afford to do so, even when it is costly. Social security reforms that modify pension wealth induce changes in workers' assets that are very similar to the variations we use in this paper. Our results suggest that reforms affecting social security wealth may quickly influence individuals' retirement decisions, although the magnitude of these shifts might not be similar to our estimates based on private wealth, as there is evidence that individuals are sensitive to the type of wealth they hold (see e.g. Blau (2015)).

The receipt of an inheritance may alleviate an individual's intertemporal budget constraint for multiple reasons. Agents may face liquidity constraints and might not

be able to borrow against a future inheritance, or they could be reluctant to draw future plans on their parents' death. An alternative explanation is that they face some uncertainty on when and how much they will inherit. We build on a simple model of intertemporal labor supply in which agents bear the risk associated with their own inheritance to explore this specific channel. Risk averse individuals plan their retirement according to the certainty equivalent of their inheritance rather than its expected value. As a result, the receipt of an inheritance can have an impact on individuals' date of retirement, even when they received exactly the anticipated amounts. We find support for this explanation in our data.

Figures and Tables

Figure 3.8.1: Retirement probability by age and inheritance receipt



Note: for each age $a \in [55, 65]$, the figure shows the proportion of individuals employed (or unemployed) between $[a-1, a[$ who exit the labor market between $[a, a+1[$. The dotted line shows this proportion computed among individuals who receive an inheritance between $[a, a+1[$, whereas the dashed line shows this proportion computed among individuals who receive an inheritance between $[a+1, a+3[$.
Source: Enquête Patrimoine, Insee, 1998-2010.

Table 3.8.1: Effect of inheritance receipt on instantaneous retirement

	2 years		With non heirs	
	(1)	(2)	(3)	(4)
Inheritance received at t	1.385***	1.389***	1.321***	1.394***
	(0.142)	(0.143)	(0.104)	(0.109)
Additional controls	No	Yes	No	Yes
Observations	2783	2783	72708	72708
Individuals	1225	1225	14337	14337

Note: the table shows the results of the estimation of a complementary log-log model, where a indicator of current labor force exit is regressed on an indicator of current inheritance receipt, and a full set of age dummies (11 levels, for ages 55 to 65). Controls in columns (2) and (4) include 3 SES levels, 3 relative diploma levels, a gender dummy, and an indicator of public / private sector. In columns (1) and (2), the sample is defined by keeping, at each age a, individuals who receive an inheritance between $[a, a+3[$. In columns (3) and (4), we keep all individuals. Standard errors clustered at the individual level are reported in parentheses. *, **, *** denote significance at the 10%, 5%, and 1% levels respectively.
Source: Enquête Patrimoine, Insee, 1998-2010.

Table 3.8.2: Effect of inheritance receipt on instantaneous retirement: some robustness checks

	2 years		Other control groups		
	(1)	(2)	(3) 3 years	(4) 5 years	(5) 10 years
Inheritance received at t	1.389***		1.332***	1.273***	1.315***
	(0.143)		(0.130)	(0.116)	(0.115)
Received from parents		1.304**			
		(0.146)			
Other		1.781**			
		(0.431)			
Additional controls	Yes	Yes	Yes	Yes	Yes
Observations	2783	2783	3538	4901	7236
Individuals	1225	1225	1321	1528	1796

Note: the table shows the results of the estimation of a complementary log-log model, where a indicator of current labor force exit is regressed on an indicator of current inheritance receipt (columns 1, 3, 4 and 5) or an indicator that the individual is receiving the inheritance from (i) his parents or (ii) other individuals (column 2). All regressions include a full set of age dummies (11 levels, for ages 55 to 65), and controls for 3 SES levels, 3 relative diploma levels, a gender dummy, and an indicator of public / private sector. We also control for individuals' net worth in column (2). In columns (1) and (2), the sample is defined by keeping, at each age a, individuals who either receive an inheritance between $[a, a+3[$. In columns (3), (4) and (5), we keep at each age individuals who receive and inheritance respectively between $[a, a+4[$,$[a, a+6[$, and $[a, a+11[$. Standard errors clustered at the individual level are reported in parentheses. *, **, *** denote significance at the 10%, 5%, and 1% levels respectively.
Source: Enquête Patrimoine, Insee, 1998-2010.

Table 3.8.3: Effect of inheritance receipt on instantaneous retirement for various demographic subgroups

	Sex		Education		SES	
	(1) Men	(2) Women	(3) Low	(4) High	(5) Low	(6) High
Inheritance received at t	1.411**	1.402**	1.729***	1.088	1.511***	1.191
	(0.199)	(0.214)	(0.238)	(0.178)	(0.195)	(0.219)
Additional controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1489	1294	1502	1281	1680	1103
Individuals	658	567	674	551	749	476

Note: the table shows the results of the same regression as in the column (2) of Table 3.8.1 for various demographic subgroups. Specifically, columns (1) and (2) respectively investigate individuals below and above the median relative diploma, and columnns (3) and (4) concentrate on men / women. Columns (5) and (6) study respectively blue collar to middle-level workers, and executives. Standard errors clustered at the individual level are reported in parentheses. *, **, *** denote significance at the 10%, 5%, and 1% levels respectively.
Source: Enquête Patrimoine, Insee, 1998-2010.

Table 3.8.4: Retirement rights and the effect of inheritance receipt

	(1)	(2)	(3)
*Inheritance * age at t*			
Below 60	1.652***		
	(0.259)		
60 or above	1.221		
	(0.168)		
*Inheritance * contribution duration at t*			
Incomplete		1.292	
		(0.218)	
More than 2 years missing			0.956
			(0.237)
Less than 2 years missing			1.527**
			(0.300)
Complete		1.445***	1.445***
		(0.190)	(0.191)
Additional controls	Yes	Yes	Yes
Observations	2783	2783	2783
Individuals	1225	1225	1225

Note: columns (1) to (3) estimate the same model as in column (2) of Table 3.8.1. In column (1), the inheritance indicator is replaced by two dummies indicating current inheritance receipt while an individual is aged below / above 60. In column (2), the inheritance dummy is replaced by two indicators of current inheritance receipt while having (resp. not having) earned full retirement benefits (see appendix 3.B for details). In column (3), the indicator for inheritance receipt while not having earned full benefits is further broken down in two separate indicators for current inheritance receipt while being more / less than two years away from full benefits. Colums (2) and (3) also include respectively 1 and 2 controls for contribution status. Column (4) reports the estimation of a similar model, where a retirement indicator is regressed on an indicator of inheritance receipt in the last two years (excluding the year of observation). For this regression, the sample comprises individuals who either inherited in the last two years, or in the next two years (but not in the year under consideration). Standard errors clustered at the individual level are reported in parentheses. *, **, *** denote significance at the 10%, 5%, and 1% levels respectively.
Source: Enquête Patrimoine, Insee, 1998-2010.

Table 3.8.5: Risk aversion and the effect of inheritance receipt on retirement

	(1) Subjective scale	(2) Lottery	(3) Owns stocks
*Inheritance * risk aversion*			
High	1.517	1.680**	1.727***
	(0.419)	(0.440)	(0.242)
Low	1.296	0.937	1.097
	(0.470)	(0.469)	(0.167)
Additional controls	Yes	Yes	Yes
Observations	635	597	2783
Individuals	276	262	1225

Note: the table shows the results of the estimation of the same model as in Table 3.8.1, where the inheritance indicator is replaced by two dummies indicating current inheritance receipt for individuals with high / low risk aversion. In column (1), risk aversion is defined using a subjective scale from 0 to 10, in column (2) it is defined using a simple lottery described in appendix 3.C, and in column (3) low risk aversion is proxied by an indicator for whether an individual own stocks. All regressions include a control for high risk aversion, and the individual's net worth. Standard errors clustered at the individual level are reported in parentheses. *, **, *** denote significance at the 10%, 5%, and 1% levels respectively.
Source: Enquête Patrimoine, Insee, 1998-2010.

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Appendix

3.A A model with endogenous retirement, inheritance and risk aversion

Here we develop a simple model with endogenous retirement, inheritance and risk aversion. Conclusions from this model directly derives from the fact that the more risk-averse the agent is, the less amount of inheritance she takes into account in her budget contraint (*cf. infra.*). For a risk averse agent, the amount taken into account is always lower than the expect value. It is all the lower as the agent is risk averse. A first result is then that the more risk averse an agent is, the later she forecasts her retirement date. A second result is that, once the inheritance received, the difference between what she receives and what she based her plan on, represents a windfall gain that modifies her budget contraint. This windfall gain is then all the larger as the agent is risk averse.

3.A.1 Set up

There exists several models that take into account optimal consumption and endogenous decision to withdraw for the labor market. We introduce the dependence of the replacement rate of pension to the date of retirement to take into account the fact that pensions depend on the number of years of contribution. Some models use a CRRA function but, as far a we know, none has been used to study the effect of realized bequest (versus anticipated one) and how risk aversion shapes this effect on the decision of withdrawal. A model close to ours is Bloom, Canning, Mansfield, and Moore (2007) and Ljungqvist and Sargent (2012) (chapter 29, pp 1203-1208). Computations for the Hamiltonian are directly derived from their models. We add pensions with an endogenous replacement rate, bequests and focus on the role of bequest and risk aversion. The agent utility fonction is given by:

$$\mathcal{U} = \int_{t_0}^{T} e^{-\delta(t-t_0)} u(c_t) dt \tag{3.5}$$

The beginning of the observation period is t_0. T stands for the age at death. We take into account disutility from work thanks to a constant term γ that does not depend on age. The instantaneous utility function is given by a standard CRRA utility function with $\alpha > 0$. I_t^w is an indicator whose value is 1 if the agent is working in time t and 0 otherwise (ie $I_t^w = \mathbb{1}_{(t<R)}$ where R stands for the time of withdrawal or retirement) .

$$u(c) = \frac{c^{1-\alpha}}{1-\alpha} - \gamma I_t^w$$

Such as

$$u(c) = \begin{cases} \frac{c^{1-\alpha}}{1-\alpha} - \gamma & \text{if she is working (with } \gamma > 0) \\ \frac{c^{1-\alpha}}{1-\alpha} & \text{if she is retired} \end{cases}$$

So:

$$\mathcal{U} = \int_{t_0}^{T} e^{-\delta(t-t_0)} (\frac{c_t^{1-\alpha}}{1-\alpha} - \gamma I_t^w) dt$$

Her budget constraint is:

$$\begin{aligned} \int_{t_0}^{T} e^{-r(t-t_0)} c_t dt &= \int_{t_0}^{T} e^{-r(t-t_0)} w_t dt + \tilde{B} + W_{t_0} \\ &= \int_{t_0}^{R} e^{-r(t-t_0)} w dt + \int_{R}^{T} e^{-r(t-t_0)} \lambda(R) w dt + \tilde{B} + W_{t_0} \end{aligned}$$

where W_{t_0} stands for the non inherited assets at time t_0, $w_t = w$ if the agent is working (w stands for the annual wage) while $w_t = \lambda(R)w$ if she is retired with $\lambda(R)$ is the replacement rate used to compute the pension. $\lambda(R)$ depends on the date when the retirement occurs.

$\tilde{B}$ is the present value of the expected bequest (inheritance). It is uncertain because of uncertainty on the exact amount that will be received[25]. Since consumption and

[25] If the date of receipt t_B and the amount B received were perfectly known, the budget constraint would be: $\int_{t_0}^{T} e^{-r(t-t_0)} c_t dt = \int_{t_0}^{T} e^{-r(t-t_0)} w_t dt + e^{-r(t_B-t_0)} B + W_{t_0}$. We note $\tilde{B}$ the present value of the uncertain amount that takes into account both uncertainty on date and on amount. The uncertainty on the date of receipt may play a role and be related to the uncertainty on amount. Several factors may be here at stake. If there are some liquidity constraints, an earlier bequest will unbind them and a later one maintain them longer than expected. The timing may also be related

retirement date both depend on the amount of bequest through the budget constraint, the agent maximizes indeed $\mathbf{E}_{\tilde{B}}[\mathcal{U}(\tilde{B})]$.

We assume that the agent bears the risk of not receiving the exact expected amount. Risk aversion plays then an important role in the way she plans her future consumption path and retirement date. Facing uncertainty (and without liquidity constraints), risk-neutral agents base their budget constraint on the expected amount of bequest $\mathbf{E}_{\tilde{B}}$. Risk averse ones don't. Intuitively, the more risk averse an agent is, the smaller the amount taken into account in her budget constraint. Facing uncertainty in her budget constraint, the agent substitutes the uncertain amount $\tilde{B}$ by $\mathbf{E}(\tilde{B})$ - μ where μ directly depends on her level of risk aversion. For the sake of simplicity, we denote hereafter $\mathbf{E}(\tilde{B})$ - μ by "certainty equivalent value of expected bequest": B^{CE}. [26] In the extreme case of infinite risk aversion, an agent is expected to draw her plan as if she would not plan to receive any inheritance (ie $\mu = \mathbf{E}(\tilde{B})$). By contrast, the less risk averse and the more risk neutral the agent is, the closer to the expectation of bequest the amount taken into account in her budget constraint. Consequently, under uncertainty, the expected lifetime utility an agent can reach, is lower than the one she would have reached if she had received the guarantee bequest expectation $\mathbf{E}(\tilde{B})$).

Under uncertainty, the agent thus solves:

$$\max_{c,R} \mathcal{U}(B^{CE}) \tag{3.6}$$

Let's recall that, for a risk averse agent, $B^{CE} < \mathbf{E}(\tilde{B})$, which means that the budget constraint is lower with risk aversion than what it would be for risk neutral agents

with the exact amount received: if parents consume their wealth, the sooner the date of receipt, the higher the amount received.

[26] By strict definition, B^{CE} is the guarantee value of bequest that equalizes the agent's utility with her utility under uncertainty (cf. for instance Laffont (1989)). The difference between $\mathcal{U}(\mathbf{E}(\tilde{B}))$ and $\mathcal{U}(B^{CE})$ depends on the level of risk aversion.

[27]. The budget constraint for this maximisation program thus writes:

$$\begin{aligned}
\int_{t_0}^{T} e^{-r(t-t_0)} c_t dt &= \int_{t_0}^{T} e^{-r(t-t_0)} w_t dt + \tilde{B} + W_{t_0} \\
&= \int_{t_0}^{R} e^{-r(t-t_0)} w dt + \int_{R}^{T} e^{-r(t-t_0)} \lambda(R) w dt + B^{CE} + W_{t_0} \quad (3.7) \\
&= \int_{t_0}^{R} e^{-r(t-t_0)} w dt + \int_{R}^{T} e^{-r(t-t_0)} \lambda(R) w dt + A_{t_0} \quad (3.8)
\end{aligned}$$

where A_t stands for assets at time t.

To write the Hamiltonian of the problem, we re-write the budget constraint as:

$$\begin{aligned}
\frac{dA_t}{dt} &= w_t + rA_t - c_t \\
&= I_t^w w + (1 - I_t^w)\lambda(R) w + rA_t - c_t \\
&= I_t^w w(1 - \lambda(R)) + \lambda(R) w + rA_t - c_t
\end{aligned}$$

The Hamiltonian writes:

$$\mathcal{H}_t = e^{-\delta(t-t_0)} [\frac{c_t^{1-\alpha}}{1-\alpha} - I_t^w \gamma] + \mu_t [I_t^w (1 - \lambda(R)) w + \lambda(R) w + rA_t - c_t]$$

The first order conditions are:

$$\begin{aligned}
\dot{\mu_t} &= -\frac{\partial \mathcal{H}_t}{\partial A} \\
&= -r\mu_t \\
\frac{\partial \mathcal{H}_t}{\partial c_t} &= e^{-\delta(t-t_0)} u'(c_t) - \mu_t \quad (3.9) \\
&= 0
\end{aligned}$$

[27] Furthermore, using a bequest in an intertemporal budget constraint may imply some liquidity constraints. In this case, the agent would borrow less then her certainty equivalent amount, and we would still have that the bequest amount taken into account in the budget constraint is lower than the bequest expectation.

$$-e^{-\delta(t-t_0)}\gamma + \mu_t(1-\lambda(R))w \begin{cases} > 0 \text{ if } I_t^w = 1 \\ = 0 \text{ if indifferent to } I_t^w \in \{0;1\} \\ -e^{-\delta(t-t_0)}\gamma + \mu_t(1-\lambda(R))w < 0 \text{ if } I_t^w = 0 \end{cases} \tag{3.10}$$

then we get the Euler equation[28]

$$\frac{\dot{c_t}}{c_t} = \frac{r-\delta}{\alpha}$$

To compute the level of consumption in c_t, we use the budget constraint 3.8.

$$\begin{aligned} \int_{t_0}^{T} e^{-r(t-t_0)}c_t dt &= \frac{w}{r}[1-e^{-r(R-t_0)}] + \lambda(R)\frac{w}{r}[e^{-r(R-t_0)} - e^{-r(T-t_0)}] + A_0 + B^{CE} \\ \frac{\alpha c_0}{r(1-\alpha)-\delta}[e^{\frac{r(1-\alpha)-\delta}{\alpha}(T-t_0)} - 1] &= \frac{w}{r}([1-e^{-r(R-t_0)}] + \lambda(R)[e^{-r(R-t_0)} - e^{-r(T-t_0)}]) + A_0 + B^{CE} \\ \frac{\alpha c_0}{r(1-\alpha)-\delta}[e^{\frac{r(1-\alpha)-\delta}{\alpha}(T-t_0)} - 1] &= \Phi(A_0, B^{CE}) \end{aligned}$$

with $\Phi(A_0, B^{CE}) = \frac{w}{r}([1-e^{-r(R-t_0)}] + \lambda(R)[e^{-r(R-t_0)} - e^{-r(T-t_0)}]) + A_0 + B^{CE}$.

Thus

$$c_0 = \frac{\delta - r(1-\alpha)}{\alpha[1-e^{\frac{r(1-\alpha)-\delta}{\alpha}(T-t_0)}]}\Phi(A_0, B^{CE}) \tag{3.11}$$

It then implies $\delta - r(1-\alpha) > 0$.

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$$\begin{aligned} \mu_t &= e^{-\delta(t-t_0)}u'(c_t) \\ \dot{\mu_t} &= -\delta\mu_t + \dot{c_t}e^{-\delta(t-t_0)}u''(c_t) \\ -r\mu_t &= -\delta\mu_t + \dot{c_t}e^{-\delta(t-t_0)}u''(c_t) \\ (\delta - r)\mu_t &= \dot{c_t}e^{-\delta(t-t_0)}u''(c_t) \\ (\delta - r)e^{-\delta(t-t_0)}u'(c_t) &= \dot{c_t}e^{-\delta(t-t_0)}u''(c_t) \\ (\delta - r)u'(c_t) &= \dot{c_t}u''(c_t) \\ \dot{c_t} &= (\delta - r)\frac{u'(c_t)}{u''(c_t)} \\ \dot{c_t} &= (\delta - r)\frac{c_t}{-\alpha} \end{aligned}$$

From equation 3.10, the optimal age of retirement R is given by:

$$\begin{aligned} e^{-\delta(R-t_0)}u'(c_R)[1-\lambda(R)]w &= \gamma e^{-r(R-t_0)} \\ u'(c_R)[1-\lambda(R)]w &= \gamma e^{(\delta-r)(R-t_0)} \\ c_R^{-\alpha}[1-\lambda(R)] &= \frac{\gamma}{w}e^{(\delta-r)(R-t_0)} \\ e^{(\delta-r)(R-t_0)}c_0^{-\alpha}[1-\lambda(R)] &= \frac{\gamma}{w}e^{(\delta-r)(R-t_0)} \\ c_0^{-\alpha}[1-\lambda(R)] &= \frac{\gamma}{w} \\ c_0 &= [\frac{1-\lambda(R)}{\frac{\gamma}{w}}]^{\frac{1}{\alpha}} \end{aligned} \tag{3.12}$$

And

$$c_t = e^{\frac{r-\delta}{\alpha}(t-t_0)}[\frac{1-\lambda(R)}{\frac{\gamma}{w}}]^{\frac{1}{\alpha}} \tag{3.13}$$

3.A.2 How risk aversion plays a role

For the sake of clarity, from now we assume $r = \delta$. It leads to $c_t = c_0 = [\frac{1-\lambda(R)}{\frac{\gamma}{w}}]^{\frac{1}{\alpha}}$ $\forall t \geq 0$. To get simple closed forms from our model, we set $r = 0$. At time t, equation 3.11 re-writes, using the superscript to explict the dependancy to B^{CE}:

$$(T-t)c_0^{CE} = w(R^{CE}-t)[1-\lambda(R^{CE})] + w(T-t)\lambda(R^{CE}) + A_t^{CE} \tag{3.14}$$

$$\begin{aligned} (T-t)c_0^{CE} &= w(R^{CE}-t)[1-\lambda(R^{CE})] + w(T-t)\lambda(R^{CE}) + W_t^{CE} + B^{CE} \\ B^{CE} &= (T-t)c_0^{CE} - w(R^{CE}-t)[1-\lambda(R^{CE})] - w(T-t)\lambda(R^{CE}) - W_t^{CE} \\ B^{CE} &= (T-t)[\frac{1-\lambda(R^{CE})}{\frac{\gamma}{w}}]^{\frac{1}{\alpha}} - w(R^{CE}-t)[1-\lambda(R^{CE})] - w(T-t)\lambda(R^{CE}) - W_t^{CE} \\ B^{CE} &= f(R^{CE}) \end{aligned}$$

The budget constraint above is the one consistent with a bequest B^{CE} and determines W_t^{CE}, the amount of non-inherited assets accumulated up to time t.

If at time t, the amount received turns out to be B, then the budget contraint moves

to:

$$
\begin{aligned}
(T-t)c_0^B &= w(R^B-t)[1-\lambda(R^B)] + w(T-t)\lambda(R^B) + A_t^{CE} \qquad (3.15)\\
(T-t)c_0^B &= w(R^B-t)[1-\lambda(R^B)] + w(T-t)\lambda(R^B) + W_t^{CE} + B\\
B &= (T-t)[\frac{1-\lambda(R^B)}{\frac{\gamma}{w}}]^{\frac{1}{\alpha}} - w(R^B-t)[1-\lambda(R^B)] - w(T-t)\lambda(R^B) - W_t^{CE}\\
B &= f(R^B)
\end{aligned}
$$

and the agent can modify her consumption and date of retirement according to the windfall gain (or loss) $B - B^{CE}$.

f is a strictly decreasing function[29] and so is f^{-1}. Then, for any $B \geq B^{CE}$, $f^{-1}(B) \leq f^{-1}(B^{CE})$. It means that for any bequest received higher than the certainty equivalent amount, the agent will decide to withdraw earlier from the labor market.

Taking into account risk aversion leads to interesting results. If agent 1 si more risk averse than agent 2, by definition, $\mathcal{U}_1(\tilde{B}) \leq \mathcal{U}_2(\tilde{B})$, thus $\mathbf{E}\mathcal{U}_1(\tilde{B}) \leq \mathbf{E}\mathcal{U}_2(\tilde{B})$and $B^1_{CE} \leq B^2_{CE}$. Using the fact that f is decreasing: $R^1_{CE} \geq R^2_{CE}$. This results has two strong implications. First, facing the same uncertainty, a risk averse agent will plan a later retirement. Second, since for any received bequest B, $R^1_{CE} - R^B \geq R^2_{CE} - R^B$. It means that the effect of a received inheritance will be higher for the most risk averse agents.

[29] We model $\lambda(R) = \dot{\lambda}(R - R_0) + \lambda_0$. It is consistent with the French retirement system described in appendix 3.B and with the fact that, in our age-window, individuals are old enough to be close to the age of retirement R_0 (generally 60) that enables to expect a replacement rate λ_0. $f'(R) = -\frac{w(T-t)\dot{\lambda}}{\alpha\gamma}[\frac{1-\lambda(R)}{\frac{\gamma}{w}}]^{\frac{1}{\alpha}-1} - w[1-\lambda(R)] - w\dot{\lambda}(T-R)$, so $f'(R) < 0$ because $\lambda(R) < 1$, $\dot{\lambda} > 0$ and $T \geq R$.

3.B Retirement in France

We describe here the main features of the French retirement system which we build on in the paper. In France, contributing to a public pension fund is mandatory, and in turn public pensions constitute most of the pension income of retired individuals.[30] For our period of analysis, the legal retirement age, that is the age at which it becomes possible for one to cash out her pension, is set at 60. The monthly pension for retired workers is then computed on the basis of both past wages and years contributed to the system. Specifically, it obeys the following formula:

$$
\begin{aligned}
p &= \bar{w} \times \tau \times \rho \\
\tau &= min(1, \frac{n}{n_0}) \\
\lambda &= \lambda_0 + d(n, n_0, a, a_0)
\end{aligned}
$$

where $\bar{w}$ represents the base wage, τ represents the *pro rata* coefficient, and λ is the replacement rate that encompasses possible discounts or premiums. n is the number of years contributed to the system, and n_0 is fixed by the law.[31] λ_0 is the base replacement rate applicable to the individual, which is usually 50% (75% for public sector employees). d is a discount or premium term that depends on how the number of contributed years n compares to the legally set threshold n_0, and also on how the age a of the individual compares to the legally fixed age threshold a_0. It is increasing in n, positive if $n \geq n_0$ and negative if $n \leq n_0$, but cannot be negative if $a \geq a_0$ (in other words, discounts do not apply after a_0, but potential premiums still apply). For example the current law specifies that $d(n, n_0) = 0.05 * (n - n_0)$ with $|d| \leq 0.25$, that is a 5% discount per year missing limited to 25% off, or a 5% premium per additional year limited to a 25% increase. This makes discounts and premiums far

[30] In addition, private sector employees must contribute to complementary pension funds, which rules are different from that of main public funds. However they follow the same patterns of premiums and discounts as public pensions, so that the conclusions of this paragraph still apply.

[31] The number of years contributed is technically different from the number of years worked. For example dispositions exist which enable women who stopped working to raise children to have a part of this time lapse counted as contribution years even though they were not working nor paying retirement contributions. Using all available information, we do our best to account for these special cases in the data.

from negligible, since retiring 5 years earlier than the legal threshold n_0 cuts one's pension by at least half. Of particular interest is the legal number of contribution years n_0, and in particular whether the number of contributed years n of an individual is above or below that threshold. When $n \geq n_0$, $\tau = 1$ so the pension gains of working one additional year only work through λ. On the other hand when $n \leq n_0$, the pension gains of working one additional year can be substantial because the additional year increases both τ and λ. Overall, an individual has more to lose if she retires before having completed the legal number of contribution years n_0.[32] In the data, we are able to reconstitute the number of years an individual has contributed to the pension system using retrospective calendars. The calendars contain information on periods of activity, as well as on periods of unemployment and military service, both of which are taken into account when computing the total number of contribution years.

[32]This all the more significant as the premium was only progressively introduced in 2003, and therefore only concerns a small part of our sample. Most of the time, there is very little incentive to work past the legal number of contribution years, whereas there are considerable incentives to work up to having contributed n_0 years.

3.C Measures of risk aversion

In the EP waves of 2004 and 2010, a fraction of the respondents were asked questions relative to their perception of risk. In particular, they were successively made to choose between to of the following contracts, ordered from safer to riskier:

- Contract A: yields w with certainty
- Contract B: yields $2w$ with a 50% chance, and $\frac{4}{5}w$ with a 50% chance
- Contract C: yields $2w$ with a 50% chance, and $\frac{2}{3}w$ with a 50% chance
- Contract D: yields $2w$ with a 50% chance, and $\frac{1}{2}w$ with a 50% chance

First, respondents were asked to choose between A and C. If they chose A, then they were asked to choose between A and B; otherwise, they were asked to choose between A and D. This experiment allows us to classify individuals among four levels of risk aversion, from most risk averse to least risk averse:

- A $\succ$ B: 70% of individuals
- B $\succ$ A $\succ$ C: 16% of individuals
- C $\succ$ A $\succ$ D: 9% of individuals
- D $\succ$ A: 5% of individuals

Individuals with a high risk aversion are those from the first category, and individuals with a low risk aversion are those from any of the other three categories.

3.D Further results

Table 3.D.1: Effect of inheritance receipt on instantaneous retirement, without the unemployed

	2 years		With non heirs
	(1)	(2)	(3)
High	0.417	0.519**	0.546***
	(0.276)	(0.262)	(0.140)
Low	0.259	-0.0655	0.0929
	(0.362)	(0.501)	(0.152)
Additional controls	Yes	Yes	Yes
Observations	635	597	2783
Individuals	276	262	1225

Note: the table replicates Table 3.8.1, but excluding unemployed individuals from the sample. Standard errors clustered at the individual level are reported in parentheses. *, **, *** denote significance at the 10%, 5%, and 1% levels respectively. Source: Enquête Patrimoine, Insee, 1998-2010.

Chapter 4

Gender Inequality after Divorce: The Flip Side of Marital Specialization[1]

4.1 Abstract

Divorce has large consequences on both ex-spouses, but its economic impact may be very different for each partner. It is well-documented that women generally experience a large decrease of their living standards after union dissolution, whereas men's living standards are often presented as stable or increase. By raising both poverty and gender inequality, divorce rises important issues: Is women's economic situation still more deteriorated than men after divorce? What is divorce responsible for? Which component of living standard plays the bigger role in the variations observed? Thanks to a very rich administrative dataset on French couples who break up their marriage or civil partnership in 2009, this article measures and analyses the variations in livings standards for men and women, the role of the different components and more specifically the labor market behavior. By matching divorcees to still married spouses who are identical to them on a large range of characteristics, and using a difference-in-differences approach, we are also able to further assess a causal effect of

[1]This chapter is based on a joint work with Carole Bonnet & Anne Solaz.

divorce on living standards and on labor market behavior of men and women after divorce.

Our findings show that both women and men support a loss in average, but still of larger magnitude (19%) for women than for men (2.5%). Contrary to the common belief, they also suggest that the number of children only plays a minor role in the explanations of women's impoverishment. The decrease in living standards is similar whatever the number of children, thanks to important family and welfare benefits targeted to lone parents and large families. Child support payments also play a role in mitigating the loss in living standards for mothers. Economic consequences of divorce are above all highly dependent on the share of couple's resources each spouse provides before divorce. If this share could be explained by preexisting differences in labor market incomes between men and women before marriage, marital specialization play a big role. The massive labor market reentry of women who were inactive during marriage is consistent with this explanation.

Keywords: Divorce, living standards, gender inequality, child support payment, alimony, lone parents, labor supply

JEL codes: J12, J16, K36, I38

4.2 Introduction

Divorce has large consequences on both ex-spouses, but its economic impact may be very different for each partner. It is well-documented that women generally experience a large decrease of their living standards, with a higher risk of entering poverty after union dissolution, whereas men's living standards are often presented as stable or higher on average. By raising both poverty and gender inequality, divorce carries important welfare issues.

These post-divorce gender inequalities are often explained by mothers being more likely the custodial parents. Having their children at home most of the time, the custodial parents generally bear more expenses and have less opportunity to return to or to maintain on the labor market on a full-time basis. However, living arrangements for children raised by divorced or separated parents have changed dramatically over last decades. In many countries, a growing share of separated parents adopts more equal arrangements such as shared custody. Could we expect this trend of a more equal share of children costs to reduce gender inequalities in living standards?

To answer this, we need to look deeper at the components of living standards of divorcees and how they change following divorce. Several factors play a significant role and might interact with the custodial parent status. Four main components can be distinguished. The first one is composed of earnings and replacement income. These labor market resources are related to both past and current situations. The marital specialization could have created or increased an unbalanced sharing of labor market incomes between partners. Women who withdrew from labor market or reduced significantly their working hours during marital life earn less than men at the moment of divorce. This marital specialization effect is possibly amplified by additional gender wage discriminations. After the divorce, women can decide to reenter the labor market or increase their working hours.

Secondly, public transfers (such as housing allowances, minimum welfare, lone parent allowance, family allowance...), that mostly benefit to poorest divorcees, can reduce the income loss shock due to divorce, and thus the risk of poverty. The third element

is private transfers between former spouses. Generally given by the non-custodial parent to the custodial one, the child support participates to balance the child(ren) expenses between the two parents. A spousal alimony could also partly compensate the unbalance sharing of incomes after divorce, which is due to different marital investments decided during the union.
Finally, the size of the household could also play a role. The number and age of children living in the household after the divorce and the time they spend with each parent could affect the living standards.

Why women are poorer than men after divorce? Which component of living standard plays the bigger role in the variation observed? What is divorce responsible for? Answering these questions is difficult because of the interrelationships of these four determinants in such a way that it is challenging to know which one might be the main responsible of women's poverty after divorce. Another difficulty arises as, generally, not all of them are simultaneously observed in data sources. More specifically there is a lack of data on private transfers between former partners. A last issue is to assess a causal effect of divorce, which requires to go beyond the classical but sometimes misleading before-after comparison of living standards. Thanks to a very rich administrative dataset on 92,000 couples who split from marriage or civil partnership in 2009, this article measures and analyses the variations in living standards for both spouses, the role of the different components and more specifically the labor market behavior. We focus on individuals who do not repartner or cohabit the year following divorce. By matching these divorcees to still married spouses who are identical to them on a large range of characteristics, and using a difference-in-differences approach, we are also able to further assess a causal effect of divorce on living standards and on labor market behavior of men and women after divorce.

Our findings confirm than French women still support larger losses on average than men after divorce (respectively -19% compared to -2.5%). Contrary to the common belief, they also suggest that the custodial status plays only a minor role in the explanations of the large women's impoverishment. The before-after divorce living

standard variations are similar whatever the number of children. The higher losses of large families are compensated by higher public transfers and welfare benefits in France. On the contrary, the differences in earnings between partners while married, partly due to the marital specialization process, are from far the major determinant of gender inequalities after divorce, only partially compensated by an increase in labor force participation.

4.3 Previous studies

The literature on the economic consequences of divorce is quite extensive. To sum it up in one sentence, it emphasizes the gendered economic consequences of union dissolution, showing generally a worsening of women's living standards after separation, whereas those of men remain stable or increase.

The first studies on the variation of living standards following divorce were done in the US. According to Duncan and Hoffman (1985), on the "Panel Study of Income Dynamics", women experience a decrease in their adjusted income by about 25% following divorce and men experience an increase by about 3%. Peterson (1996) concludes that women experience a decrease by 27% of their adjusted income while men experience an increase by 10%. But he highlights that for ten percent of women (and 9% of men), the decrease reaches 73% or more, emphasizing the necessity to look not only at the median or average variation but to consider also its distribution. Different assessments on American data agree upon a significant decrease in the living standard of women following divorce (table 4.A.1)). However, the magnitude of the variation in living standard they report differ. This ranges from 10% (Hoffman (1977) and Duncan and Hoffman (1985)) to 36% (Bianchi, Subaiya, and Kahn (1999)). Holden and Smock (1991) or McKeever and Wolfinger (2001) surveys report the same order of magnitude (from 10% to 40%).

Outside US, works on Canadian and European data come to the same range of conclusion. Regarding France, on the European Community Household Panel (ECHP) and the 1994-2000 period, Uunk (2004) reports one of the highest variation among European countries with a 30% decrease in women's adjusted median income following

divorce. Considering all couple dissolutions, not only divorces, and on more recent data (2003-2005, French part of SILC), Jauneau and Raynaud (2009) also report comparable figures with a median decrease in living standard following a separation of 31% for women remained alone after the separation.
For men, the interest in the economic consequences of divorce came later and the results so far are more ambiguous. The question is more about the sign of the variation than on the magnitude of the effect (table 4.A.1). Most studies found a significant improvement in living standard following divorce (Finnie (1993), Bianchi, Subaiya, and Kahn (1999), Smock (1993) and Smock (1994) who found particularly large variations ranging from +47 to +93%). Some studies conclude rather to a stability (Jarvis and Jenkins (1999), Poortman (2000), Kalmijn and Alessie (2008)) whereas few of them find a deterioration (Burkhauser, Duncan, Hauser, and Berntsen (1991), McManus and DiPrete (2001), Jauneau and Raynaud (2009)).

The difference in these results might come from factors of different nature.

First, of course both period and institutional aspects can participate to explain country-specific results. Welfare systems are more or less generous towards lone parents and public transfers differ from one country to another. This is the point highlighted by Uunk (2004) who focuses on the differences in European welfare systems. He reports that the economic consequences of divorce are lower in countries where social welfare and public childcare are the most important.
Furthermore, both the child alimony decisions and their recovery rate are very country-specific and might drive differences in private transfers. Regarding the definition of living standards, the role of private - in particular spousal and child support payments, and public transfers in balancing the negative consequences of divorce for women (or conversely in making the situation worse for men) has been rarely explored. There are only a few studies that compare income variations before and after taking private and public transfers into account. On German and American data, Burkhauser, Duncan, Hauser, and Berntsen (1991) show that following divorce, once private transfers included, women's living standards in the US decrease by 37% with-

out public transfers and by 24% with them, while in Germany the decrease reaches 44% including or not public transfers. On Dutch data, Poortman (2000) shows that the decrease in the living standard of women excluding private and public transfers is about 65% and 31% if these transfers are included (for men respectively -18% and +4%). Using data from the 1994-2000 ECHP survey, Uunk (2004) compares the short-term economic consequences of divorce for women across 14 Member States of the European Union. He shows that women in the European Union differ in the income changes they experience at divorce. The income decline is less important in countries with a high level of public childcare provision and higher social welfare payments, especially for lone parents. To our knowledge, the article from McManus and DiPrete (2001), focused on men, is the only one distinguishing the role of public and private transfers. They compare three income measures: total income before taxes and government transfers; household income including taxes and public transfers; household income after support payments and including taxes and public transfers and subtracting support payments. White men who contributed less than 60% to the former couple's household income experience an important living standard decline following separation (from 16% to 43% depending on the male share of pre-disruption income). The effects of taxes and transfers reduce their losses (the decrease then equals 12 to 34%). But this mitigating of the decrease by public transfers is offset by the negative effects of support payments. White men who contributed 80% or more to pre-disruption income -best representing the traditional male breadwinner model, experience a significant increase in their living standard (by about 22%). Including taxes and transfers reduces this gain by around a quarter. Finally deducting support payments from their income reduces their gain in standard living following separation to a statistically non-significant 1 percent.

Measurements of living standards might be also a crucial issue that might contribute to explain the heterogeneity of results even within the same country (and sometimes with the same database). The magnitude of the effects might depend on the definition of living standards. The sources of income included (private and public transfers), the choice of the equivalence scale, of the indicator used (variation in the mean/median

living standard, median/mean variation in the living standards, see table 4.A.1) or on the sub-population studied (for example Black/White in the US) differ according to the studies. Of course, for an event such as divorce, the difficulty to have the two partners in the survey sample and the little size of the sample may lead to inference issues (table 4.A.2).

The reliability of the before-after estimator is also of concern. These estimators are now well-known for being sensitive to the economic trend and to selection bias. Two recent works from Bedard and Deschênes (2005) and Ananat and Michaels (2008) have used intrumental variables to compute a causal effect of divorce. To deal with the problem of selection into divorce and separation, they use the sex of the first child as an instrument. The instrumentation stems from the following result: when the first-born is a girl, the couple is more likely to divorce. Bedard and Deschênes (2005) find a positive gain for women at separation. With the same dataset, Ananat and Michaels (2008) show evidence of a strong decrease in standards of living for women at the bottom of the distribution and a strong increase for those at the top. However, only a local interpretation can be made of these findings. The results hold for the "compliers" ie for the couples who break up when the first-born is a girl and who don't if it is a boy. Even though internal validity seems acquired, we face here the usual external validity problem. Another kind of method has been considered by Ongaro, Mazzuco, and Meggiolaro (2008) on Italian data and Aassve, Betti, Mazzuco, and Mencarini (2007a) on European data. They design a "control group" composed of couples who don't divorce and who have similar characteristics as the divorced couples before the separation. Though neither of these studies computes variation in living standards, they both conclude to a deterioration in women's economic situation.

4.4 Data

As mentioned above, the magnitude of the effects might depend on the definition of living standards. In particular, up to now, spousal and child support payments have received relatively scant attention in the economic and demographic literature,

doubtless for lack of suitable data. As rare studies conclude to, these private transfers may however represent a significant amount of household post-divorce income. Ignoring them could lead to an overstatement of the income decline of women, and symmetrically to an overstatement of income increase for men (Kalmijn and Alessie (2008)). Besides, when information on support payments is available in surveys, the custodial parent (in most cases the mother) more often declares the amount received than the non-custodial parent (the father) does. This could possibly lead to an unequal picture (Jarvis and Jenkins (1999)) when comparing men and women living standards.

Another explanation of the differences in the results regarding economic consequences of divorce in the literature could be the size of the samples used. Indeed, most studies rely on panel data and the relatively low occurrence of the event "divorce" or "separation" between two yearly waves of a panel survey induces a small sample size (Table 4.A.2). Besides, attrition is often important in survey panel data, because of the likelihood to move after the separation. These moves may not be random since the decision to move or not after a divorce might be linked to financial constraints.

New administrative data, recently available in France, enable us to overcome these three main difficulties. We use the exhaustive database of French income tax returns and local residence tax returns. Data coming from tax returns are supposed to be more reliable than data reported in surveys, in particular because part of them are directly filed by employers for example. Besides, the data set gives information about the paid amount for child and spouse support. These transfers being tax deductible, the incentive to report them on the tax return form is pretty high.

For the year 2009, from this income tax returns database of French residents, we extract a population composed of the divorcees and of partners who broke a Pacs[2] (the French civil union contract). We restrict our sample to the couples who do not have formed union in 2008 neither in 2009 in order to focus on couples who have

[2]For another reason than marriage or death of one partner.

lived together for at least one year.[3] Once excluded tax returns with missing data, we obtain a sample composed of 126,250 couples who were married (in 2008) and of 9,800 who were linked by a Pacs (in 2008)[4], for which we recover at least one of the former partner the year following the divorce. This sample size has to be compared with the comparable official statistics regarding the number of divorces and ends of Pacs in France in 2009 (table 4.B.1). Our sample covers at least 95% of the total of divorces and more than 55% of the ends of Pacs which took place in 2009 in France. We then match data before divorce (2008) with data one year after divorce (2010), which leads to a little loss of individuals (7.2%). Consequently we compute weights to take into account a potential differential attrition bias (see appendix 4.B for more details on the construction of the dataset and the computation of weights). This big sample size is one of the significant advantages of our database.

We then exclude from our sample individuals who either (re)marry, (re)pacs or cohabit (with at least another adult in 2010) the year after the break up. They represent roughly 30% of separated individuals. This choice has been made to observe only individual ressources, not biased from those that would bring a potential new partner in case of repartnering. Of course, it is also for the sake of simplicity, because the observable situations we observe with cohabitation after divorce covers very different situations. People could live in the same dwelling with either a new partner, a relative such as a parent, or a friend, and no information about income pooling. It is then very difficult to estimate living standards in case of new cohabitation. Finally, as we are interested in labor supply after divorce, we focus on individuals aged between 20 and 55 years old. The upper age limit has been set to 55 because in France, pre-retirement and retirement for some specific occupations can start at that age. Our final sample includes 56,500 men and 64,600 women who experienced either a divorce or a Pacs break-up in 2008 and for whom we get information from the income tax and the local tax residence returns in 2008 and 2010.

[3] Another reason is the difficulty to disentangle tax returns when several events occur the same year.

[4] Partner linked by a Pacs, the French civil partnership, have to fill a joint tax return as married couples do.

These income tax return do not collect data on family and welfare benefits as they are not taxable, but the rich information available on income, family and housing situation allows to calculate them, assuming that divorcees ask for their welfare benefits (see below). We compute them using information on family composition (number, age of household children, child(ren) custody arrangements) also available on the income tax file and information about the dwelling that is reported in the local tax returns. We compute four types of family benefits (allocations familiales, allocation de rentrée scolaire, complément familial, prestation d'accueil du jeune enfant (Paje)), housing allowances (allocation logement) for renters, and minimum income benefit (RMI in 2008 and RSA in 2010). Due to the lack of information[5], we do not compute Family Support Allowance (Allocation de Soutien Familial). We assume here a 100 % take-up of these social and welfare benefits. We know that non take-up can be important, especially for minimum income benefit (RMI/RSA), inducing an overestimation of some of these benefits[6] and also then of the living standards. However, the situation of divorce generally involves that people are more likely to meet and thus receive advices from the lawyers, the social worker or family mediators and to be informed about available public benefits especially when they have children. For this reason, we tend to believe that the take-up rate is probably high for this population. These benefits are especially important for single families.

Of course, and it is an intrinsic limit of such administrative datasets, no other information than those needed by the fiscal administration is available. We do not know anything about the education level for instance.

[5]The entitlement of this benefit is linked to the non-payment of child support. In our data, when no child support is received, it is not possible to distinguish between a non-payment or no child support decided in the divorce judgment.

[6]An important feature for the short-term consequences of separation is that welfare benefits could be a bit higher than the years after : the minimum income benefit is increased the year following separation and means-tested condition is assessed on the income of two years ago. That means for example that child support received the year following divorce is not included in the means-tested conditions but will be two years after.

4.5 Framework & methods

4.5.1 Measuring the effects of public and private transfers on standards of living

To compare standards of living before and after divorce, we use three definitions of living standards including components step by step to assess their possible balancing effects. First we calculate living standards before any transfer, then living standards with private transfers only and, lastly, total living standards (ie with all transfers).
All living standards correspond to incomes divided by the number of consumption units[7] to take into account the economies of scale resulting from the household size (see below). For the living standard before any transfer, the relevant income is the gross income. It includes labor market and replacement incomes (such as wage, self-employment income, unemployment benefits or public and private pensions[8]) and asset/capital incomes subject to tax. In the tax returns, these incomes are pre-tax and pre-transfer incomes.

To compute living standard with private transfers, we add to gross income the child support payments reported by both receiver (generally the custodial parent) and payer (generally the non-custodial parent). The receivers are required to report these transfers as income. For givers, these payments are deducted from taxable income, which gives a strong incentive to report them.
At last, to compute total living standard, we calculate disposal income. It corresponds to the sum of gross incomes, public transfers (net of taxes) and private transfers.

4.5.2 The loss of economies of scale is not the whole story: the role of income sharing

Family composition changes a lot after a marital disruption and depends on which spouse is awarded child(ren) custody. In most cases, mothers are more likely to be

[7] As a benchmark, we use the "OECD modified equivalence scale". We also test our results with other equivalence scales.

[8] very rare given the age range of the population we study.

the custodial parent, even if the percentage of shared custody has been recently increasing. Then to obtain comparable living standards for men and women, household composition (and more particularly whether post-divorce households include or not children) is taken into account using the "OCDE- modified equivalence scale". This scale assigns a value of 1 to the household head, 0.5 to each additional adult member or child aged 14 and over and 0.3 to each younger child. In case of shared custody, the child(ren) weights are simply divided between both parents. Other equivalence scales such as the square root household size scale have also been tested to check the sensitivity of our results to this choice.

Furthermore, divorce also involves a loss of economies of scale. Some common costs such as housing were shared before divorce and are not any more afterwards. While a lot of attention has been paid to this loss of economies of scale due to the change in family composition, less attention has been paid to the role of pre-divorce incomes and, more specifically, to the share of earnings provided by each spouse. It turns out to be a main determinant of the changes in living standard, however.

To better understand its role, let us present a simple theoretical framework in which we consider a couple with N children less than 14 years old and earnings R, the living standard of each married partner is R/(1.5+0.3N) according to the OECD modified equivalence scale. After divorce, living standard for a custodial mother will be (1-α)R/(1+0.3N) where α stands for the share of income earned by the husband before the divorce.[9] The living standard for the non-custodial parent will consequently be αR. We can then decompose the variation of living standards in the two following components: the change in living standard due to the end of family live, and the change of custodial status (from non-custodial to custodial).

[9]For the sake of simplicity, we assume here that there is no change in earnings before and after divorce, letting aside any variation in incomes or social benefits.

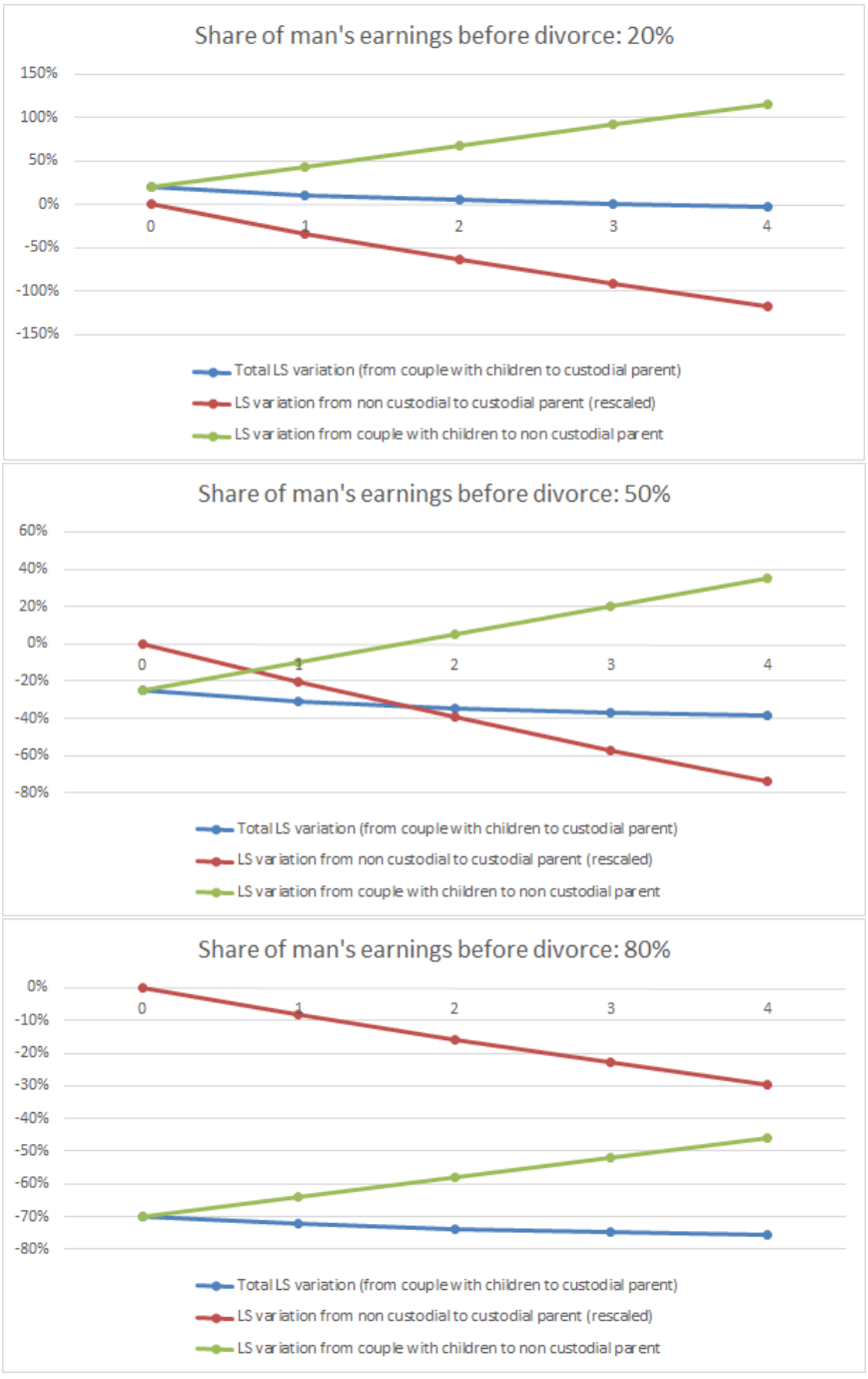
$$\underbrace{\frac{\frac{(1-\alpha)R}{1+0.3N}-\frac{R}{1.5+0.3N}}{\frac{R}{1.5+0.3N}}}_{\text{From couple with children To custodial parent .}}=\underbrace{\frac{\frac{(1-\alpha)R}{1+0.3N}-(1-\alpha)R}{\frac{R}{1.5+0.3N}}}_{\text{From non-custodial To custodial parent (rescaled)}}+\underbrace{\frac{(1-\alpha)R-\frac{R}{1.5+0.3N}}{\frac{R}{1.5+0.3N}}}_{\text{From couple with children To non-custodial parent}} \tag{4.1}$$

For a fixed share of income provided by the husband (hereafter called "income sharing"), the total variation in living standard appears to be little influenced by the number of children (see also figure 4.5.1). However, the comparison of the total variation in living standard with three different income sharings α shows the crucial importance of this parameter. While a woman who earns as much as her husband before the divorce (α=0.5) will face a decrease from -31% with one child to -39% with 4 children, a woman who earns less than 20% of the total income before divorce will face a decrease from -72% with one child to -75% with 4 children. On the contrary, if she was the first provider of income in the couple, the variation will go from 11% with one child to -2% with 4 children.

It is quite clear from this simple theoretical example that the magnitude of living standard variation due to family size is really weaker than the one due to the income sharing. The flat gradient for the number of children appears to be due to the fact that both large effects of being alone (from couple with children to non-custodial parent) and of being a custodial parent (from non-custodial parent to custodial parent) compensate each other.

This decomposition, though not taking into account variations nor in incomes neither in public and private transfers, highlights the fact that income sharing is a key parameter of any analysis of variation in living standard, relatively to family composition.

Figure 4.5.1: Variation in living standards according to the number of children for several man's share of earnings before divorce



4.5.3 The "pure" effect of divorce on living standards: a matching approach

The comparison of living standard before and after divorce describes the changes for divorcees but does not guaranty that these changes are due to the divorce. They might have occurred anyway for this population. In recent studies, a topic of interest is to go further and assess a proper effect of divorce on living standards. This question raised because divorcees may be a selected population (in terms of income, marital specialization, age, number of children, ...) and thus its specific characteristics have to be taken into account in order to evaluate the real effect or the "causal" effect of separation on living standard. This is the usual problem of selection, widely detailed in the public policy evaluation literature.

Why could we face this problem? For instance if people tend to divorce more when they are on a negative trend of income[10], then we could observe a decrease in the living standard and a part of the observed decrease would not be due to the divorce but would be the consequence of this negative trend. Another example is age: if divorce occurs more often for young people and if, compared to the rest of the population, young people face more difficulties on the job market, we could conclude that divorce leads to dramatically decrease living standard when those decreases are partly reflecting the difficulties young people encountered on the job market.

To deal with these possible selection problems, we use a matching approach. Initially developed by Rosenbaum and Rubin (1983), this method is now widely used in the public policy evaluation literature. Two recent studies used it on the field of divorce (Ongaro, Mazzuco, and Meggiolaro (2008), Aassve, Betti, Mazzuco, and Mencarini (2007b)). The idea of matching is the following: once taken into account a set of characteristics, the event studied (here: divorce) becomes randomly distributed among the populations whose characteristics are identical. In this population, some people will divorce (the "treated group" as called in the public policy evaluation literature) and some won't (the "control group"). This assumption is called the Con-

[10]Which is a plausible assumption since the effect of unemployment is generally negative for instance.

ditional Independence Assumption (CIA). Several matching methods exist and share all the same purpose: to create a control group (from a given population of "non treated" people) as close as possible to the treated one. As a matching method, we chose a "nearest-neighbor" approach.[11] It consists in selecting in the whole population of married people who don't divorce in 2009 couples with the same characteristics ("twins") as the divorce couples.[12]

The CIA assumption is of course more credible when treated and control groups are similar on an important range of characteristics but it remains a strong assumption because unobservable heterogeneity can remain. If unobservable characteristics are linked with the probability of divorcing, then estimators will be biased.[13] To overcome this issue, we use a difference in differences method applied to a matching method (DID-Matching approach). This two-step method has been widespread since Heckman, Ichimura, and Todd (1997) proposed it in order to relax the CIA assumption. This consists of computing for each group (treated and control) the difference between the outcomes in 2010 and 2008 and then substracting these differences. In this situation, if unobservable characteristics are time-invariant, they are ruled out and the estimator is not biased anymore. More precisely, we estimate

$$ln(Y_{i,t}) = X_{i,0}\beta_0 + \mathbb{1}_{\{t\geq 1\}} * X_{i,0}\gamma + T_{i,t} * X_{i,0}\beta + a_i + e_{i,t} \tag{4.2}$$

where $Y_{i,t}$ stands for the living standard in period t for individual i, $t = 0, 1$, t the period (0 for the year before divorce, 1 for the year following divorce), $X_{i,0}$ for the couple characteristics the year before divorce (number of children, share of income provided by man, quintile of income), $T_{i,t}$ the treatment status (equal to 1 in period 1 for the "treated" group - the divorcees, and 0 otherwise), a_i is a fixed effect corresponding to unobserved time-constant characteristics and $e_{i,t}$ is the idiosyncratic error term.

[11] Without replacement.

[12] To evaluate the difference between still-married couples and divorced one, we use a propensity score approach by computing for each couple a probability to divorce. Then, each divorced couple is matched with the married couple whose propensity score is the closest of his own. Propensity score is evaluated with a logit model.

[13] Since the treated and the control groups may then differ for these characteristics not taken into account.

In the DiD set up, thanks to the first difference, the unobserved characteristics are ruled out:

$$ln(Y_{i,1}) - ln(Y_{i,0}) = X_{i,0}\gamma + T_{i,1} * X_{i,0}\beta + (e_{i,1} - e_{i,0}) \tag{4.3}$$

It highlights the fact that if divorcees and married people differ in unobserved characteristics, it would not bias our result as long as those differences are constant between the two periods.

To assess mean changes in living standards (our main specification) we don't estimate directly equation (4.3) with an ordinary least squares regression. Had we run an OLS regression, we would have interpreted $exp(\hat{\beta}_{OLS}) - 1$ as the effect of the characteristics $X_{i,0}$ on the change in living standard. But it is an approximation.[14] To avoid this approximation, we run a non-linear regression model:

$$\frac{Y_{i,1}}{Y_{i,0}} = exp[X_{i,0}\gamma + T_{i,1} * X_{i,0}\beta + (e_{i,1} - e_{i,0})] \tag{4.4}$$

In this context, β corresponds to the vector of proportional changes.

To estimate median changes in living standard (presented in the robustness checks section 4.E), we use the log-specification since for each quantile τ : $Q_\tau(ln(X)) = ln(Q_\tau(X))$, and so this specification does not suffer from the same approximation problem.

The more characteristics are identical between the treated and the control groups, the more credible the assumption is that they have the same propensity to divorce. Since we are able to choose a twin in the whole population of married (thanks to exhaustive fiscal data), we can find a neighbor similar on a lot of characteristics available in the database. Regarding professional situations, we use the previous trends in income and the different kind of incomes each partner earns (wages, overtime work, unemployment benefits, pensions, self-employment profits, ...) that also enable us to take into account potential differences in behavior between occupations. We control for the residential area, ownership status and type of home. Regarding family characteristics,

[14] Since by Jensen's Inequality, $exp(E(ln(Y_1/Y_0)) \neq E(Y_1/Y_0)$.

the date of marriage is not available. We use the age of both partners and the number and age of children, these are expected to be a good proxy for the marriage duration. We make the divorcees and their still-married 'twins" similar on demographic characteristics (age of man and woman, age of their child(ren), number of children), housing situation (homeownership, kind of home: house or apartment) and living area (Paris, Parisian area "Ile de France", and elsewhere). They are also matched on similar economic and professional characteristics such as all incomes separately for man and woman (labor income, unemployment benefits, pensions, self-employment incomes), [15] whether they were unemployed for a long period (more than one year), previous man's and woman's earnings two and three years before.

Since we intend to assess changes in living standard for different subsamples, we follow the recommendation by Dehejia (2005) and match each subsamples separately in order to ensure our matching process is as accurate as possible. Our subsamples are defined by combining gender (man and woman), number of children (0, 1, 2, 3 or more) and share of individual earnings[16] provided by men relatively to total earnings of the couple, before divorce (3 shares: more than 60%, between 40 and 60% and less than 40%). So we match the divorced couples from each of these 24 subsamples with married couples who do not divorce in 2009.

In practice, this stratification offers two main advantages. First, it leads (by construction) to a perfect matching on the modality of the share of man, of the number of children for each gender, two determinants of our analysis. Second, since the empirical specification of the propensity may change for each subsample, it is then less parametric and takes better into account the heterogeneity of the behaviors than a global propensity score that would have been computed at a more aggregated level.

In order to assess the quality of the matching, we check the overlapping assumption and the balance of covariates. Some results and graphs presented in the appendix show that the overlapping assumption is very well verified and several methods (dif-

[15] Self-employment incomes are also detailed between profits from commercial and non-commercial occupations and farm profits.

[16] We then take into account labor and replacement incomes but not capital incomes since it is not possible to individualize them from the tax return.

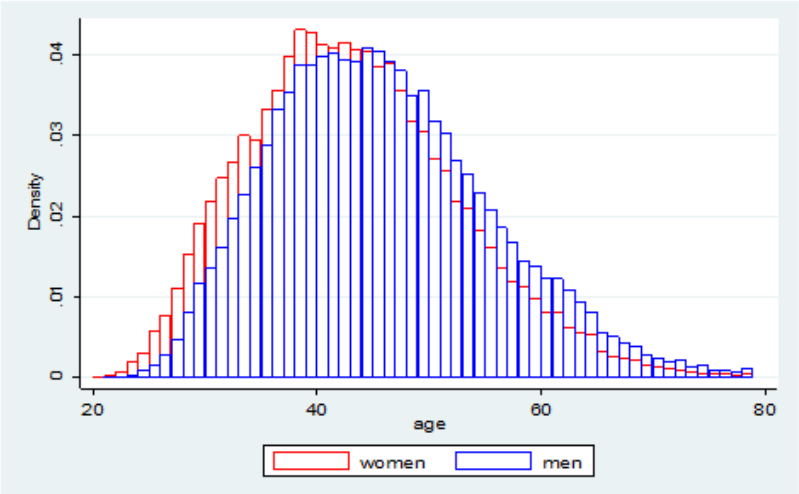
ferences in means, standardized differences and comparison of distribution) prove that the covariates are well balanced. Full results on the matching quality are available on request.

Eventually, to compute standard errors and knowing that bootstrap is not an available option in our DID-matching situation, we use the subsampling method (*cf.* for instance Politis, Romano, and M. (1999), Romano and Shaikh (2012)).

4.6 Sample description of 2009 divorcees

Divorced women are younger than men because of the traditional age gap between spouses, two years on average (figure 4.6.1). For women, the riskier ages range from 40 to 50 years old.

Figure 4.6.1: Age distribution of divorced women and men in 2009



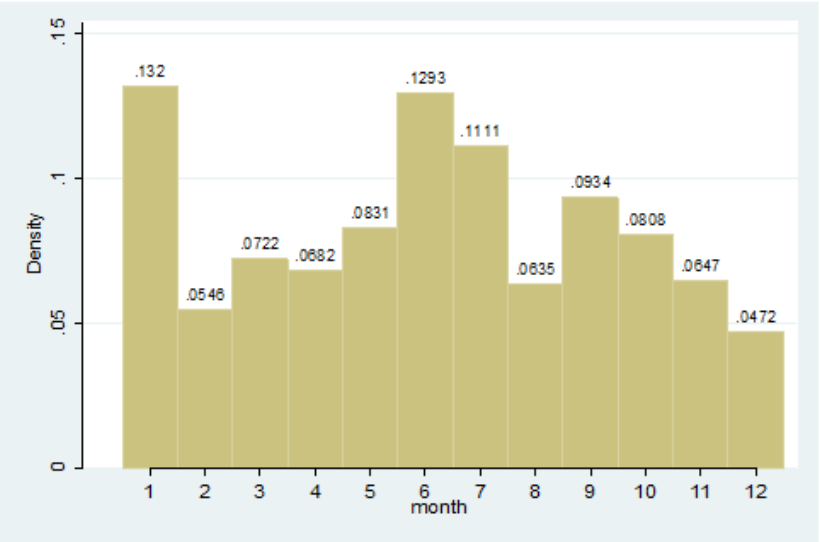
Source: French exhaustive income-tax returns database, 2009

We also observe seasonal effects for divorce (figure 4.6.2). This seasonality is well-known for marriages (or forming a new civil partnership). It results from both a preference for marrying in summer rather than in winter, and also from some fiscal incentives[17] for couples to marry at the middle of the calendar year (June and July) rather than at the beginning or at the end of the year (see Leturcq (2012) for instance for "Pacs couples"). Indeed, up to 2011, people could make three different tax returns the year they get married or divorced (one tax return for the income corresponding to their couple's life and two distinct tax returns for the period they were single/divorced). If their income is quite regular over the year, it is optimal, regarding minimizing tax paid, to marry/divorce around the middle of the year. It is very interesting to note that fiscal incentives are also at play for divorce. More divorces are also observed in January. Divorcees might be allowed by the fiscal administration to fill separate tax returns when the divorce procedure has begun but the court has

[17]These fiscal incentives exist in 2009 but have been suppressed in 2011.

not yet granted the judgment of divorce. In this case, the date of divorce is by default set to "the first of January" by the fiscal administration.

Figure 4.6.2: Seasonality of divorce: frequency by month, year 2009



Source: French exhaustive income-tax returns database, 2009

As shown in table 4.6.1, 29% of divorcees were childless couples, 26% have one child, 31% two children and 13% a larger family. Concerning the child's place of residence, the mother is the custodial parent in 73% of cases, the father in 15% of cases and around 10% of divorced parents chose equally shared custody.

Table 4.6.1: Households composition: number of children and child custody

	Frequency (%)
Number of children	
¡ 18 y.o. one year before divorce	
0	29
1	26
2	31
3	11
4	2
5+	0.5
Child(ren) residence	
(at child level)	
Primary the mother	76
Primary the father	9
Equally shared	15

For custodian mothers, the median monthly amount of alimony paid by the father

to the mother is 150 € per child. The first quartile is 100 € and the third quartile states at 250 €. It represents a significant share of mother's total income, roughly 13%.

4.7 Results

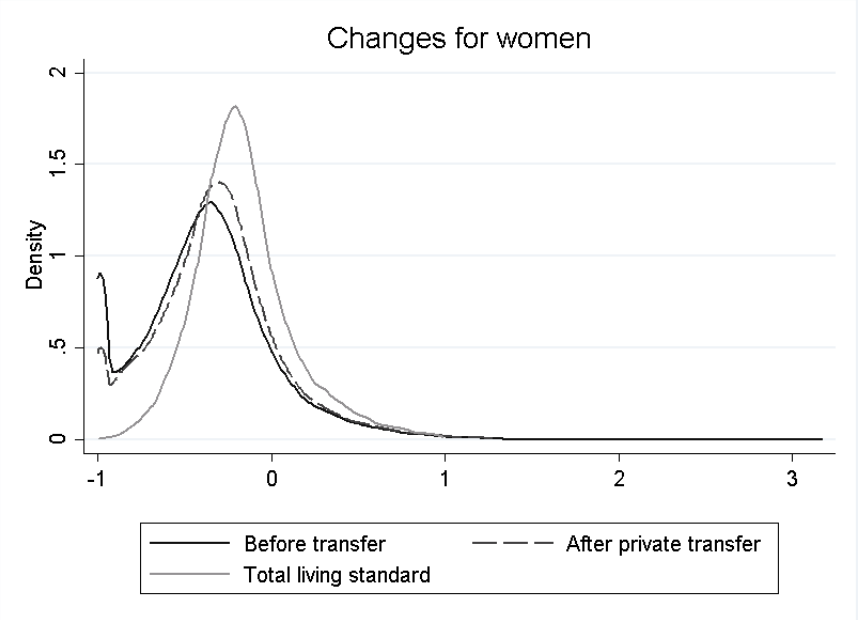
4.7.1 Changes in living standard by gender and number of children

To assess how divorce is related to changes in living standards, we compute the mean percentage change in living standard: $(Y_{i,t+1} - Y_{i,t-1})/Y_{i,t-1}$, where $Y_{i,t-1}$ is the living standard of individual i in $t-1$, the year before divorce, divorce occurs in t, and $t+1$ stands for the year after divorce. We will also use the word variations in the rest of the article to qualify these percentage changes in living standards.

Figures 4.7.1 and 4.7.2 describe the distributions of living standards variations after divorce respectively for women and men, considering the three income measures we defined previously. As noted above in the literature review, different indicators could lead to different results in the magnitude of the variations. For example, we could have used the percentage change of the mean in living standard $(\overline{Y}_{t+1} - \overline{Y}_{t-1})/\overline{Y}_{T-1}$. This choice would have led to less negative variations for women and to less positive ones for men. In theses figures, the black curve is the variation of living standards before any transfers. For women, the mass point at -100% (figure 4.7.1) reflects that a significant proportion of women do not earned any labor or capital income incomes at all after divorce (mainly those who opted for a traditional model of specialization and were housewives during marriage). As expected, the addition of private transfers shifts the distribution to the right (dotted curve). Custodial mothers receive a child support payment that increases their living standards. Public transfers play an even bigger role in reducing the negative effects of divorce on living standards (grey curve). Having custody of the children, few resources and being single result in women receiving family and welfare benefits (especially minimum income and housing allowances). After adding public transfers, no woman has a null income anymore

and the dispersion in the living standards changes has narrowed. However, 77% of women have a loss of their living standards with the mode of the distribution at -20%.

Figure 4.7.1: Pre and post-government transfers variations in living standards for women

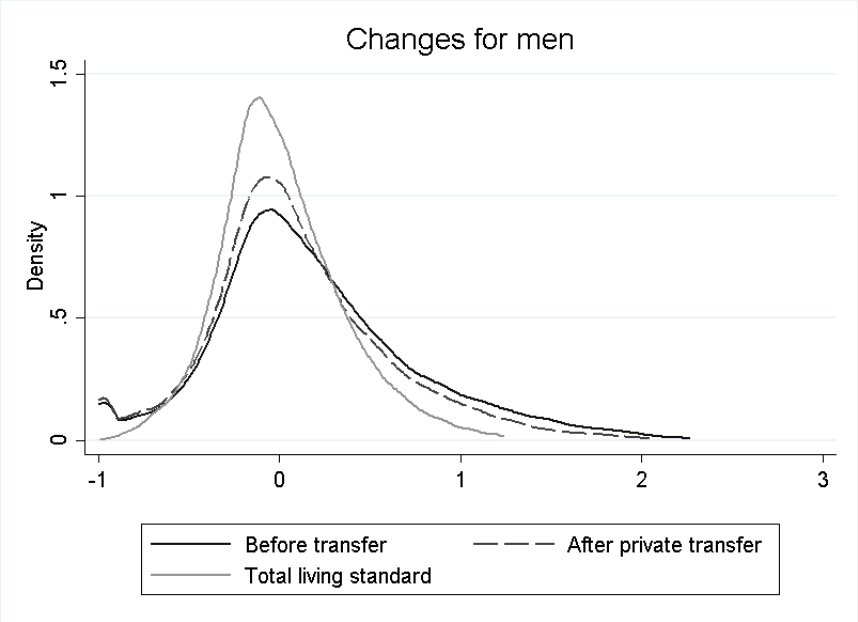


Lecture: Changes in living standards
Source: Divorced women sample from French exhaustive income-tax returns database, 2009

For men, the story is different. First of all, usually, as they are net payers of child support, the inclusion of private transfers involves a reduction of their income. The distribution of variations of living standards is shifted to the left (dotted curve, figure 4.7.2). Public transfers and more specifically tax income lead to another shift on the left: when not the custodial parents (the more frequent post-divorce arrangement is the primary custody to the mother), they do not benefit from any family benefits and from the tax deduction associated with the care of the children. So all in all, adding private and public transfers mitigates the negative economic consequences of divorce for women while for men, it reduces their livings standards variations. More than half of them (53%) face a loss in their living standards.

Looking at women and men distributions on the same graph is another way to highlight the effects of these transfers. Considering the first income measurement without any transfers, we observe that the distributions of changes in living standards for men

Figure 4.7.2: Pre and post-government transfers variations in living standards for men



Lecture: Changes in living standards
Source: Divorced men sample from French exhaustive income-tax returns database, 2009
Lecture: On the X-axis, 0 indicates that these individuals experience no variation in their living standards. -1 means a loss of all the income (100% of loss)

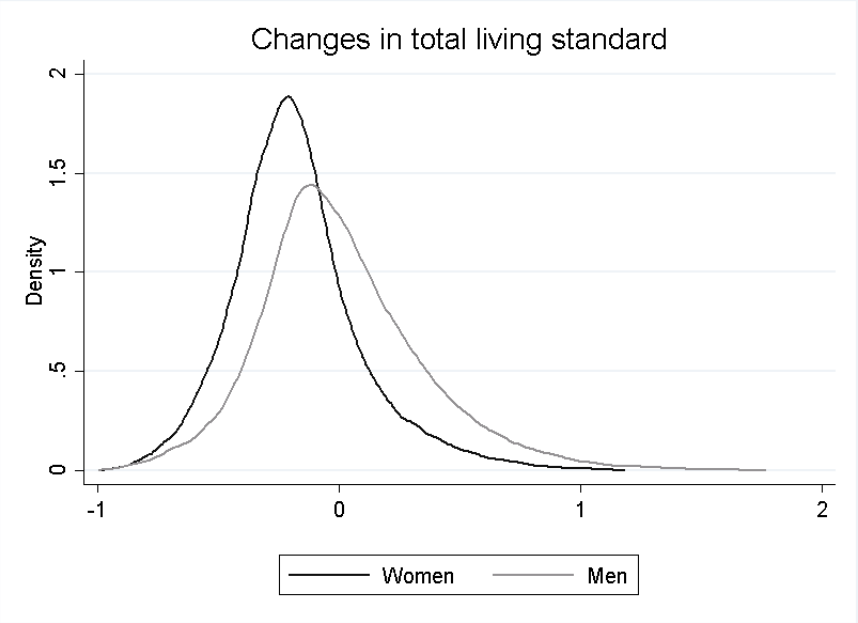
and women do not share a large common support (figure 4.7.3). Women's distribution is skewed to the left (meaning large living standards losses) while the men's curve is more symmetrically distributed around 0, reflecting almost as many losses than gains. Women seem to support the largest part of the loss in economies of scale. Once both public and private transfers are taken into account, the two distributions are getting closer and are "tighten" around the mode. Transfers seem to offset large magnitude variations (either negative or positive ones). The proportion of women experiencing an increase in their living standards after divorce is still clearly much lower than the men's one. The gender gap remains but is definitively less pronounced (figure 4.7.4).

Women experience on average a 35% decrease in their living standards when measured without any transfers, while men experience a 24% increase. Taking into account private transfers moderates the gender gap: the loss for women is -29% and the gain

Figure 4.7.3: Distribution of before-after living standard variations, according to gender - transfers excluded

Source: Divorcees sample from French exhaustive income-tax returns database, 2009

Figure 4.7.4: Distribution of before-after living standard variations, according to gender - transfers included



Source: Divorcees sample from French exhaustive income-tax returns database, 2009
Lecture: On the X-axis, 0 indicates that these individuals experience no variation in their living standards. -1 means a loss of all the income (100% of loss)

for men reduces to 15%. Finally after including public transfers and taxes, the mean loss of women reaches 14.5% and the changes in men's living standard of men is rather low: +3.5% (figure 4.7.5). For men, our results are close to previous results for France.[18] Our result for women is a less pronounced loss than the one found by Uunk (2004) and Jauneau and Raynaud (2009) (that were respectively - 32% and -31%). They also go in the same direction as those found in other developed countries. In France as elsewhere, women seem to support the main losses after divorce.

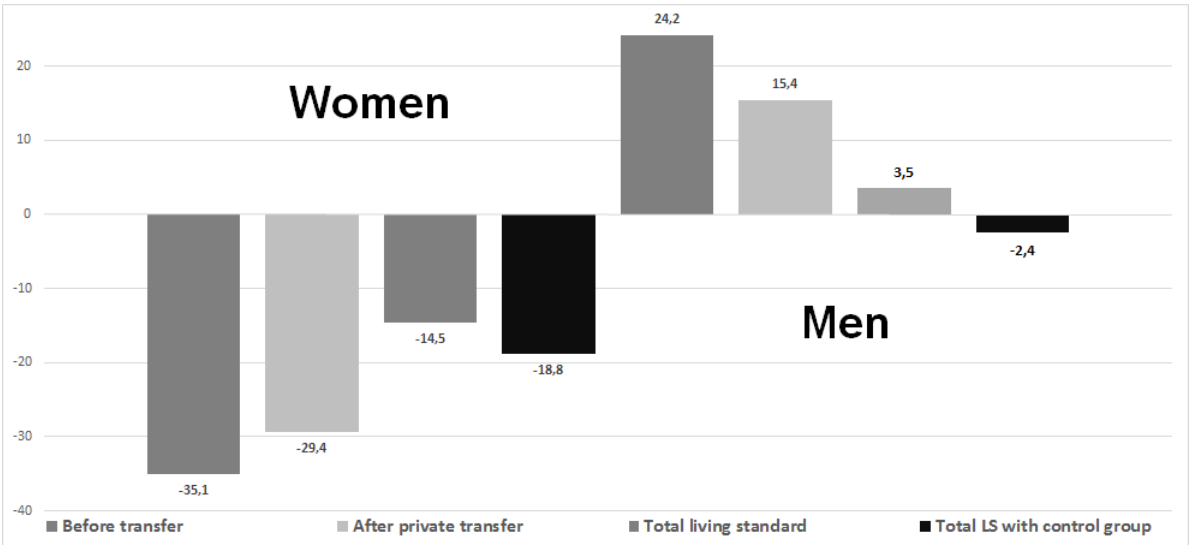
So far, we compared living standards for divorced people before and after divorce. But to assess the proper effect of divorce we should compute the difference between the living standards before divorce and the living standard the divorcees would have reached if they had remained married over the period. We do so by comparing their situation with still married couples with similar characteristics (cf. section 4.5.3). The situation for both women and men worsens. The loss in living standards for women decreases from -14.5% to -19%. It means that if divorced women had remained married, their income would have increased in the following two years and not just remained stable as it is assumed when computing the before-after estimator. For men, compared to the before after estimator, it leads to a sign change. Comparing divorced men with their still married counterparts, their living standards variation from positive becomes negative and states about -2.5%. In other words, during the divorce period, the still married men encountered an increase in their living standards that divorcees did not.

For women, the loss with private transfers (but before public transfers) is sharply rising with the number of children (figure 4.7.6). When public transfers are added, the picture changes. Public transfers offset the increasing loss with family size for women and changes in their total living standards do not depend on the number of children anymore.

For men, the picture is reversed. Before any transfers, an increasing gradient in gain appears with the number of children (figure 4.7.7). This increase is largely mechanical. Men are less likely to have children custody. So, after divorce (if we do not take into

[18] On more limited samples, Jauneau and Raynaud (2009) found a change of -6% whereas we find, after matching, that men's living standard decrease by 3%.

Figure 4.7.5: Pre and post-public transfers variations in living standards, by gender



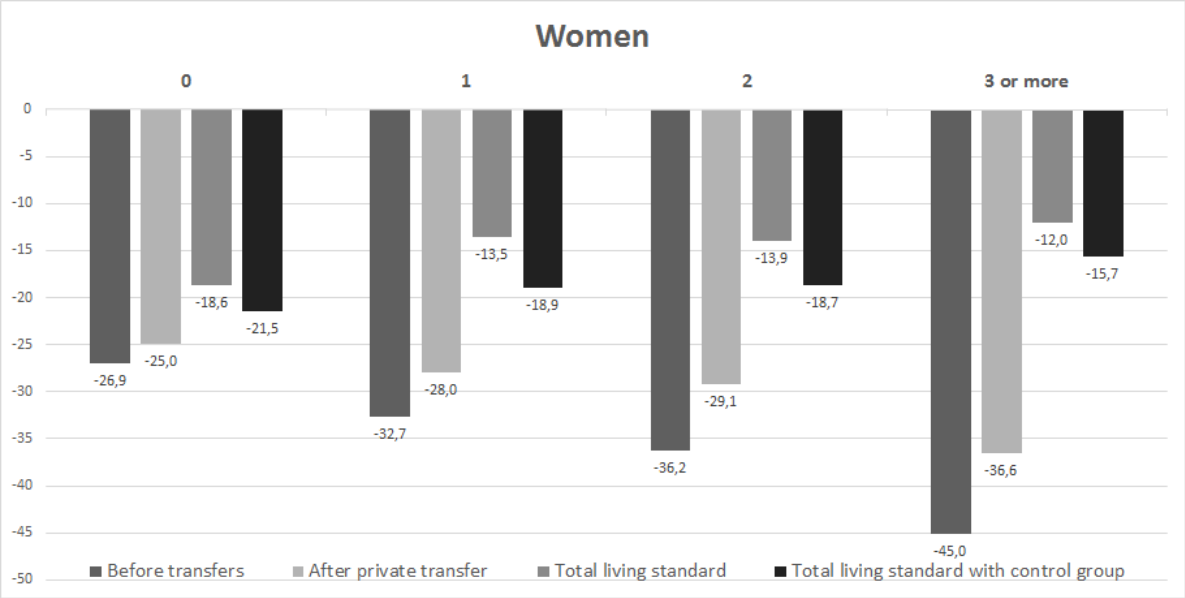
Source: Divorced women and men samples from French exhaustive income-tax returns database, 2009

account private transfers), they do not share their income anymore. Remind that living standards already take into account the current household composition, and whether the children stay with the mother or father after divorce.

Private transfers reduce notably the gain. Public transfers play an even bigger role through two channels. The mothers receives family benefits as soon as she has child custody. Divorced men are not going to benefit anymore from the tax deduction for children (quite important for three children and over) called "quotient familial". Indeed, after divorce, men have generally to pay more taxes since they do not have any dependent children at home anymore.

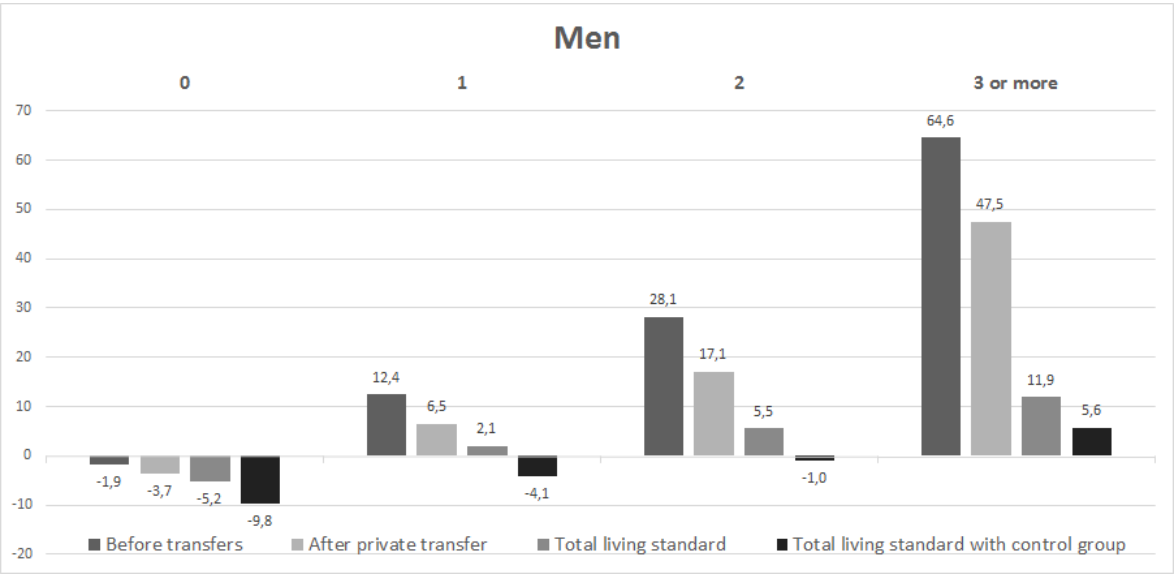
The conclusion about the effect of the number of children for women remains when compared with married "'twins": the loss in living standards is more pronounced but does not vary much with the number of children. For men with 1 or 2 children, what appears as an increase in living standards turns out to be a significant decrease (table 4.D.1, column (8)). Eventually, men appear to experience losses in living standard except when they have 3 children or more. But even in that case, the before-after gain of 12% is divided by 2.

Figure 4.7.6: Pre and post-public transfers variations in living standards for women, by number of children



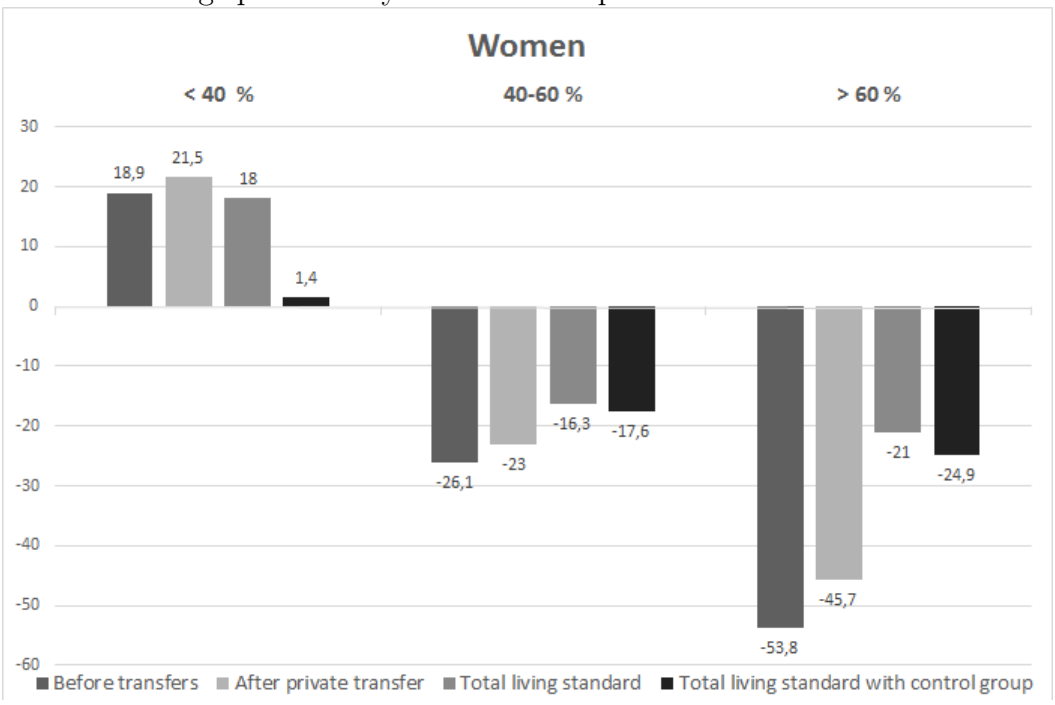
Source: Divorced women sample from French exhaustive income-tax returns database, 2009

Figure 4.7.7: Pre and post-public transfers variations in living standards for men, by number of children



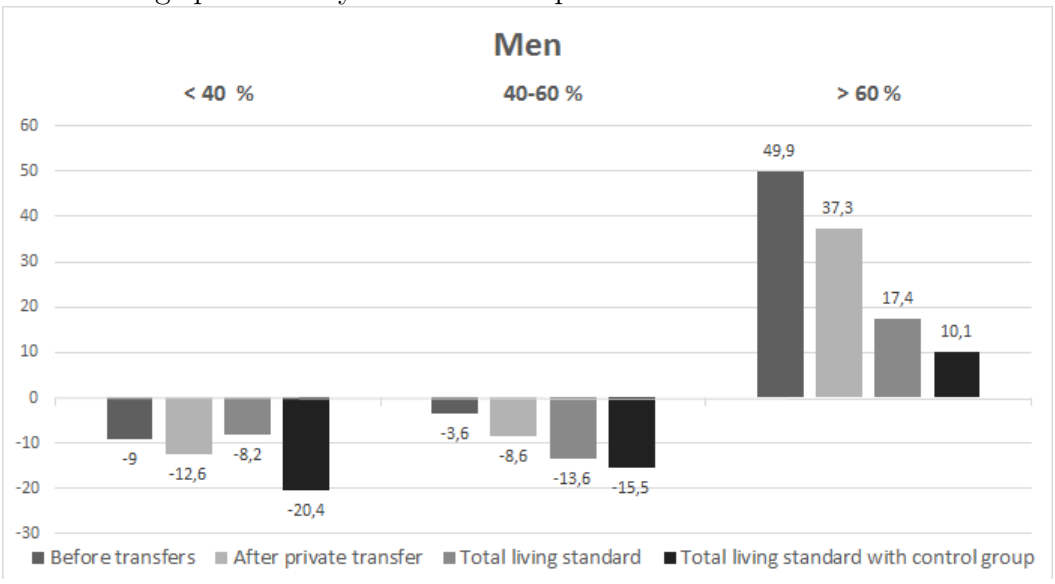
Source: Divorced men sample from French exhaustive income-tax returns database, 2009

Figure 4.7.8: Pre and post-public transfers variations in living standards for women, by share of earnings provided by man before separation



Source: Divorced women sample from French exhaustive income-tax returns database, 2009

Figure 4.7.9: Pre and post-public transfers variations in living standards for men, by share of earnings provided by man before separation



Source: Divorced men sample from French exhaustive income-tax returns database, 2009

4.7.2 The first order effect of marital specialization

Up to now, the literature has little focused on the share of income provided by each partner before the separation. To our knowledge, the sole exception is McManus and

DiPrete (2001) who focus exclusively on men and show that, when formerly second earner in the couple, they face a loss in their living standards after divorce. Here, we look both at women and men to assess the importance of the marital specialization. Of course, the whole difference in the share of income provided by each ex-partner does not result from marital specialization. The difference may pre-exist to the union, linked to differences in the level of education for example or to the age difference between partners. Furthermore, gender wage discrimination on the labor market can also explain gender wage gap between spouses: for the same education level or experience in the labor market, we could also observe that women earn less that men (Meurs and Pontieux (2015)). But an important part of the difference (or the widening of an existing difference) results from marital specialization: one partner (generally the woman) is investing less in the labor market and more in domestic work, especially in children's education (Meurs and Pontieux (2015)). In the family economics literature, specialization is seen as a way to increase the gains from marriage. But what is supposed to be an efficient allocation of time when married turns out to have different impacts when the couple dissolves. To assess more precisely the economic consequences of marital specialization and, more broadly, of gender inequality in partner's earnings, we distinguish three types of couples: the "traditional" one where the man is the first income provider (providing more than 60%), the "egalitarian" one where man and woman provide roughly the same amount of income, and those, much more scarce, where woman is the first provider of income.

When women and men earn quite similar incomes, they both lose in living standards on average 13.6% for men and 16.3% for women. It means that the loss in economics of scale due to the end of common life is borne almost equally between the partners. The comparison with the control group enlarges the losses but they remain of similar magnitude for men and women. When men or women are the first income providers, they generally experience a gain in their living standards (figures 4.7.8 & 4.7.9). This gain appears to be of similar magnitude before the comparison with the control group. When women provided more than 60% of the earnings before divorce, they experience an increase of 18% of their living standards. For men, this is a 17% increase. Once

taken into account of the control group, the gender differences are more pronounced with a gain almost null (1%) for women, and of 10% for men For the second earner, the loss is also much more pronounced for women (-21%) then for men (-8%). The larger losses or smaller gains for women in case of unequal income sharing, might be related to their situation on the labour market. The labour-market earnings and career advancement perspectives of women who earn more than her husband spouse are probably lower than those of men who earn more than his spouse, because of a possible glass ceiling for instance.

When compared to the evolution experienced by the still married "twins", the gain for women decreases from 18% to +1%. There is also a fall for men but of less importance and they end up with a 10% increase (instead of the 17% reported above). Whatever the type of couple, the comparison with the control group leads to more pronounced loss in living standards. The most striking is for second earner men: the difference between the before-after estimator and the causal effect of divorce is 12 percentage points, leading to a decrease of -20%. We will see further that the labor market behavior plays an important role in those variations (section 4.7.3).

It should be kept in mind that those shares are not uniformly distributed among the couples (table 4.7.1). Only in a minority of divorced households man was not the first income provider (13%), whereas the proportion of households with a traditional division of tasks (where man earned more than 60 % of couple's income) is 53%.

Table 4.7.1: Share of man's income in total labor income of the couple before separation

Man's share	>60%		40-60%	<40%	
% of couples	53		34	13	
Mean of man's share	81%		51.5%	21%	
Man's share	> 80%	60 - 80%	40 - 60%	20 - 40%	< 20%
% of couples	25	28	34	7.5	5.5
Mean of man's share	95%	68.5%	51.5%	33%	4.5%

Sample: separated couples with non-nul total labor income.

Notice that the number of children and the degree of specialization are related. The higher the number of children, the more likely is the man to earn relatively more than

Table 4.7.2: Share of earnings provided by men according to the number of children

Number of children	0	1	2	≥ 3
Mean of man's share	59%	61%	63%	71%

Lecture: In 2 children couples, the men earned in average 63% of the total income before divorce.

the woman (table 4.7.2). Moreover, the general level of wealth of previous household is also important and we introduce the quintile of the household income before separation. The regression in table 4.7.3 disentangles the effects of each of these three elements. It reinforces the previous results on the important role of specialization (table 4.D.2).

Once controlled for the share of income provided by the man and for the quintile of income before separation, the increase in living standards due to children is of low magnitude and similar for women and men (respectively 3.2 and 2.6 for couples with 2 children relatively to one child, 0.9 and 0.2 when 3 children or more relatively to one child). Comparing to the control group does not lead to alter the conclusion about the magnitude of the low effect of the number of children. Meanwhile, the variation associated with marital specialization is strikingly high. For women, a 20 percentage points decrease in the share of income provided by the man is associated with a variation of living standards by 14 to 20 percents higher. For men, the magnitude of the effect of specialization is also huge. Compared to their still-married "twins", men providing less than 40% of the earnings before divorce experience a loss from -16.9 to -27.6 percents with respect to those who provided between 60 and 80%.

4.7.3 Divorce & labor supply

Previous analysis relied on pre-divorce characteristics. However, a separation may increase the economic incentives to (re)enter the labor market or to work more hours in order to compensate the income loss due to this splitting. After divorce, labor market involvement may thus change. To assess what part of the observed variations is due to recent changes in labor supply, we look at men and women variations in labor market participation at the intensive and extensive margins.

Table 4.7.3: Regression estimates of living standard variation

	Women				Men			
	Before transfers	With private transfers	Total living standard	With control group	Before transfers	With private transfers	Total living standard	With control group
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of children								
0	$4,8^{***}$	$1,1^{(ns)}$	-8^{***}	$-4,9^{***}$	$-13,7^{***}$	$-10,8^{***}$	-8^{***}	-6^{***}
1	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
2	$-0,5^{(ns)}$	$2,3^{***}$	$3,2^{***}$	$3,3^{***}$	$12,3^{***}$	$8,8^{***}$	$2,6^{***}$	2^{***}
3 or more	$-7,2^{***}$	$-3,1^{***}$	$0,9^{**}$	$4,4^{***}$	29^{***}	$22,7^{***}$	$0,2^{(ns)}$	$2,6^{***}$
Share of income provided by man before separation								
$< 20\%$	$136,3^{***}$	$126,4^{***}$	$47,2^{***}$	$23,9^{***}$	$-21,9^{***}$	-21^{***}	$-3,2^{**}$	$-16,9^{***}$
20-40%	$79,7^{***}$	$67,4^{***}$	$33,3^{***}$	$29,2^{***}$	$-34,9^{***}$	$-33,2^{***}$	$-24,8^{***}$	$-27,6^{***}$
40-60%	$35,7^{***}$	$28,3^{***}$	$13,6^{***}$	$15,2^{***}$	$-21,9^{***}$	$-20,3^{***}$	$-17,9^{***}$	$-17,3^{***}$
60-80%	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
$> 80\%$	$-36,1^{***}$	$-24,5^{***}$	$-5,2^{***}$	-6^{***}	$25,7^{***}$	22^{***}	$14,8^{***}$	12^{***}
Quintile of income before separation								
1^{st}	$21,6^{***}$	16^{***}	$45,7^{***}$	$32,5^{***}$	$19,3^{***}$	$23,7^{***}$	18^{***}	$4,6^{***}$
2^{nd}	$1,5^{***}$	$0,6^{(ns)}$	$10,5^{***}$	$10,1^{***}$	$3,9^{***}$	$4,9^{***}$	4^{***}	3^{***}
3^{rd}	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
4^{th}	$0,5^{(ns)}$	$0,8^{*}$	$-4,6^{***}$	$-5,5^{***}$	$-0,5^{(ns)}$	$-1,2^{***}$	$0,2^{(ns)}$	-1^{**}
5^{th}	$-5,6^{***}$	$-4,1^{***}$	$-14,4^{***}$	$-14,3^{***}$	$-1,8^{***}$	$-3,2^{***}$	$0^{(ns)}$	$0,5^{(ns)}$
Cons.	$-45,9^{***}$	$-40,7^{***}$	$-26,2^{***}$	$-28,7^{***}$	$16,3^{***}$	$9,5^{***}$	$4,2^{***}$	$1,8^{***}$

*Note: Standard errors are computed by subsampling. *, **, *** denote significance at the 10%, 5%, and 1% levels respectively.*
Lecture: divorced women in the reference category face a 26.2% decrease in their living standard after divorce compared to the control group (column (4)). When men brought more than 80% of couple resources, women face a change in their living standard 6% lower than the women from couples where men provided between 60 and 80% (the reference category).
Source: Divorced women and men samples from French exhaustive income-tax returns database, 2009.

53% of women who were inactive[19] the year previous the divorce (re)enter the labor market the year following divorce. It is 29 percentage points higher than the percentage of women with identical characteristics who stayed married (table 4.D.3), results comparable to Bonnet, Solaz, and Algava (2010) showing, on a previous and smaller survey sample, that around 40% of divorced housewives entered the labor market after the separation in France. Obviously, the motherhood status and the size of the family play as constraints: women with 3 children or more have a lower

[19]We define inactivity as receiving none labor nor replacement income or receiving less than one month of minimum wage. For collinearity reasons, we do not enter the share of income provided by man before separation because 99% of these women provided less than 20% of the earnings.

probability to enter labor market while those with no child have a higher one. Women who belonged to poorest households are also less likely to reenter the labor force after divorce compared to those in the highest quintiles of income (column (2) in table 4.7.4), probably because of a lower human capital.[20]

For women previously working, there is no huge effect of divorce on the probability of being inactive after divorce. While the simple before-after estimator would conclude to a higher probability of being inactive (column (3) in table 4.7.4)), the causal effect of divorce turns out to be in the opposite direction: active women are less likely to become inactive after divorce (column (4) in table 4.7.4). However those effects are of little magnitude. The probability of withdrawing from the labor market for the divorcees is 3% lower than those of their married counterparts. In other words, divorce maintains more women on the labor market than marriage. The effect of the other factors are small. The maintaining on the labor market of divorcees is only little reduced for women with 2 children or more relatively to one-child mothers. It is also the case for childless woman probably because their inactivity might be linked to other reasons than family ones (health problems for instance) or because their children left home and they have been housewives for such a long time that it led to a depreciation of their human capital. The most notable fact is for women who provided less than 20% of the couple earnings and who are less likely (-5.1 percentage points) to become inactive after divorce. In other words, the divorce may change the reservation wage and thus avoids leaving the workforce because of a too low relative income.

When remaining in the labor market, divorced women can also modify their labor supply behavior, for example shifting their work schedule from part-time to full-time. We analyze the extensive margin of labor supply using the variations in labor income for previously working divorcees. The working hours are not available. A change is thus not necessarily an increase in working hours but may also correspond to a per hour wage increase over the period around divorce. At the extensive margin, divorce

[20]Unfortunately, our administrative database does not include education or labor market experience but belonging to a lowest quintile is probably associated with lower human capital.

appears to have a positive effect on labor income for women[21] (column (6) in table 4.7.4). The highest effect is for women who had a positive earning but provided less than 20% of the couple earnings: compared to women who provided between 60 to 80% they increase their labor market earnings by 27.8%. The more children women have, the less likely they are to increase their labor supply, though the effect is not huge (from -2.4% to 1.6%).

For men, as expected since they are scarcely the custodial parents, whatever the outcome considered in table 4.7.5, the effect of the number of children turns out to be either non significant or of very low magnitude. As observed for women, men who were previously inactive[22] are more likely to enter or re-enter the labor market though the probability is less than twice the one of women. Not being in the labor force is less frequent for males than for women and linked to different reasons. Men who are not in the labor force have generally specific characteristics and are different from women who are not working. Women often withdrew from the labor market for family reasons while this phenomenon is for men more linked to health problems or long-term unemployment. This might explain the lower probability of return on the labor market of men. This could also explain that the probability for working men to become inactive is not altered by other factors, except for those who where providing less than 20% of the couple earnings who are significantly less likely to become inactive (column (4) table 4.7.5)).
At the extensive margin, we find again a huge effect for the second provider of income (+19.7%, column (6) table 4.7.5). For those who were the first providers of income, while the before-after estimator show no effect, we find a low but significant negative causal impact of divorce, worsened for men who were previously in the poorest couples. It could mean that divorce reduces wages of divorcees relatively to their married counterparts. The underlying mechanisms might be they are less promoted at this moment of the career during which, because of this dramatic change in their personal

[21] Change in labor and UI income are computed for women who were previously considered as active (cf. previous footnote for definition of activity).
[22] As for women, for collinearity reasons, we do not enter the share of income provided by man before separation because 95% of these men provided less than 20% of the couple's earnings.

life, divorcees might be less involved in work and a higher probability of unemployment after divorce, associated to reduced earnings. Indeed, men who divorce turn out to have a probability of experiencing unemployment 40% higher than similar married men. Those who had a non-zero income and no unemployment benefit before divorce are 8.4% to have unemployment benefits after divorce while still married men with identical characteristics are 6% (table 4.D.4).

Table 4.7.4: Changes in women's labor supply

	Women					
	Increase in participation		Decrease in participation		Change in labor and UI income	
	Divorcees	Divorcees with ctrl gp	Divorcees	Divorcees with ctrl gp	Divorcees	Divorcees with ctrl gp
	(1)	(2)	(3)	(4)	(5)	(6)
Number of children						
0	4^{**}	$7,4^{***}$	$-0,9^{***}$	$1,3^{***}$	$3,6^{***}$	$1,6^{***}$
1	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
2	$7,6^{***}$	$0,4^{(ns)}$	$0^{(ns)}$	$1,1^{***}$	$2,5^{***}$	$-2,4^{***}$
3 or more	$0,4^{(ns)}$	$-4,8^{***}$	$1,7^{***}$	$1,2^{***}$	$1,8^{(ns)}$	$-2,4^{***}$
Share of income provided by man before separation						
$< 20\%$			$-3,7^{***}$	$-0,3^{***}$	$-14,7^{***}$	$-4,7^{***}$
20-40%			$-3,2^{***}$	$0,9^{***}$	$-14,3^{***}$	$-7,2^{***}$
40-60%			$-1,8^{***}$	$1,1^{***}$	$-11,7^{***}$	$-5,9^{***}$
60-80%			Ref.	Ref.	Ref.	Ref.
$> 80\%$			$5,3^{***}$	$-5,1^{***}$	$87,1^{***}$	$27,8^{***}$
Quintile of income before separation						
1^{st}	$-12,6^{***}$	$-7,2^{***}$	$9,8^{***}$	$-0,9^{***}$	18^{***}	$3,2^{***}$
2^{nd}	$0,2^{(ns)}$	$-2,8^{***}$	$3,1^{***}$	$-0,5^{***}$	$3,8^{***}$	$1,6^{***}$
3^{rd}	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
4^{th}	$1,2^{(ns)}$	$-1,4^{(ns)}$	$-0,7^{***}$	$0,6^{***}$	$-1,8^{***}$	$-1,3^{***}$
5^{th}	$-5,2^{**}$	$4,8^{***}$	$-1,4^{***}$	$0,8^{***}$	$-7,1^{***}$	-1^{***}
Cons.	$57,4^{***}$	$33,4^{***}$	$2,7^{***}$	$-2,8^{***}$	$17,1^{***}$	$11,3^{***}$

Note: columns (1) and (2): Women who had a null income in 2008. columns (3) to (6): Women who had a non null income in 2008. Columns (1) to (4): Linear probability model, columns (5) and (6): Model 4.4.
*Standard errors are computed by subsampling. *, **, *** denote significance at the 10%, 5%, and 1% levels respectively.*
Lecture: the probability of (re)entering the labor market after divorce for mothers of 3 children or more who had no income before divorce is 4.8 percentage points lower than the probability of mothers with one child (column (2)). The labor force exit for mothers of 2 children is 1.1 percentage points higher than the probability of one child mothers (column (4)). After divorce, childless women increase their earnings by 1.6% compared to one child mothers.
Source: Divorced women sample from French exhaustive income-tax returns database, 2009.

Table 4.7.5: Changes in men's labor supply

	Men					
	Increase in participation		Decrease in participation		Change in labor and UI income	
	Divorcees	Divorcees with ctrl gp	Divorcees	Divorcees with ctrl gp	Divorcees	Divorcees with ctrl gp
	(1)	(2)	(3)	(4)	(5)	(6)
Number of children						
0	$-5,6^{(ns)}$	$-4,1^{(ns)}$	$0,4^{(ns)}$	$0,6^{***}$	$1^{(ns)}$	$-0,1^{(ns)}$
1	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
2	$1,7^{(ns)}$	$3,6^{(ns)}$	$-0,1^{(ns)}$	$0,1^{***}$	$0,2^{(ns)}$	$-0,1^{(ns)}$
3 or more	$-3,6^{(ns)}$	$0,6^{(ns)}$	$-0,2^{(ns)}$	$0,02^{*}$	$-1,2^{*}$	$-1,1^{***}$
Share of income provided by man before separation						
$< 20\%$			$10,4^{***}$	$-6,5^{***}$	$114,6^{***}$	$19,7^{***}$
20-40%			$4,1^{***}$	$-0,6^{***}$	28^{***}	$4,6^{***}$
40-60%			$0,7^{***}$	$0,2^{***}$	$2,8^{***}$	$0^{(ns)}$
60-80%			Ref.	Ref.	Ref.	Ref.
$> 80\%$			$-0,1^{(ns)}$	$0,03^{*}$	$-6,4^{***}$	$-2,3^{***}$
Quintile of income before separation						
1^{st}	$18,1^{***}$	$0,2^{(ns)}$	$5,5^{***}$	$-0,1^{*}$	$11,5^{***}$	$-2,7^{***}$
2^{nd}	$13,3^{**}$	$1,2^{(ns)}$	$0,8^{***}$	$-0,1^{(ns)}$	$2,8^{***}$	$-0,4^{**}$
3^{rd}	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
4^{th}	$2,6^{(ns)}$	$-0,2^{(ns)}$	$-0,3^{*}$	$-0,2^{***}$	$-0,2^{(ns)}$	$0,4^{**}$
5^{th}	$-0,5^{(ns)}$	$3,6^{(ns)}$	$-0,2^{*}$	$-0,2^{***}$	$-1,1^{**}$	$0,1^{(ns)}$
Cons.	$42,1^{***}$	$13,9^{***}$	$0,5^{***}$	$-0,1^{(ns)}$	$0^{(ns)}$	$-1,7^{***}$

Note: columns (1) and (2): Men who had a null income in 2008. columns (3) to (6): Men who had a non null income in 2008. Columns (1) to (4): Linear probability model, columns (5) and (6): Model 4.4.
*Standard errors are computed by subsampling. *, **, *** denote significance at the 10%, 5%, and 1% levels respectively.*
Lecture: the probability of (re)entering the labor market after divorce for men with no child who had no income before divorce is 4.1 percentage points lower (not significant) than the probability of men with one child (column (2)). The labor force exit for fathers of 2 children is 0.1 percentage points higher than the probability of one child fathers (column (4)). After divorce, men with 3 children or more decrease their earnings by 1.1% compared to one child fathers.
Source: Divorced men sample from French exhaustive income-tax returns database, 2009.

4.7.4 Robustness checks

The choice of an equivalence scale is a current topic of debate. In the case of lone parent families in particular, it raises two main questions. First of all, the usually "OECD-modified scale" does not consider the specific expenditures of a single parent family. It considers indeed that the economies of scale in a lone-parent family with one child under 14 years old are bigger than in a childless couple (number of consumption units equals 1.3 vs 1.5). Yet it could not be the case. For example, living with

one child means in general having two bedrooms instead of one when living in a childless couple. The other equivalence scale commonly used is the square root of the household size. In that case the equivalence scale is higher for the first child and for single families ($\sqrt{2}$ instead of 1.3). In France, we observe some other practices, the administration adding 0.2 to the total number of consumption units they compute as soon as they deal with single families. We introduce this variant qualified as "Lone parent variant".

The second critic that could be addressed to the usual equivalence scale is to ignore the expenditures the non-custodial parent could also bear if (s)he is used to welcoming their child. We propose here a variant by giving a fraction of consumption unit to the non-custodial parent. Very few studies compute this extra expenditures for non-custodial parents (Henman and Mitchell (2001), Martin and Périvier (2015)). We assume this fraction reflects the time spent at each parent's home. When shared custody is not chosen, we suppose that the non-custodial parent sees his child once every two week ends and half of the school holidays. This corresponds roughly to 25% of the time. So, in this variant we give a quarter of the "OECD-modified scale" consumption unit to the non-custodial parent (for example, for a child under 14 years old, it means 0.25×0.3).

The square root equivalence scale assumes that the economies of scales are larger. For example, a couple will need 41%[23] of extra income to maintain this living standard while with the OECD modified scale, it needs 50%[24]. As divorce means the loss of economies of scale, the decrease in living standard is all the larger as these economies are supposed to be higher. The variation of living standards is more negative for women and for men (column (2) in table 4.7.6 and in table 4.7.7). In the lone parent variant, we assume that having the child custody is more costly than in the "OECD modified scale". The negative consequences of divorce are reinforced for women (column 3 in table 4.7.6). It also plays a role in the same direction but the effect is lower, men not often being the custodial parent. Finally, in the non-custodial parent variant, we assume that the non custodial parent gets a fraction of consump-

[23] It comes from $\sqrt{2} = 1.41$.
[24] it corresponds to $1 + 0.5$.

Table 4.7.6: Regression estimates of living standard variation for different equivalence scales, for women

	Women							
	Divorcees				Divorcees with control group			
	OECD	Square root variant	Loneparent variant	Non custodial parent variant	OECD	Square root variant	Loneparent variant	Non custodial parent variant
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of children								
0	-8^{***}	$-3,9^{***}$	2^{***}	-7^{***}	$-4,9^{***}$	$-0,6^{***}$	$5,5^{***}$	$-3,9^{***}$
1	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
2	$3,2^{***}$	$2,5^{***}$	$3,4^{***}$	$3,5^{***}$	$3,3^{***}$	$1,8^{***}$	$3,6^{***}$	$3,7^{***}$
3 or more	$0,9^{**}$	$0,5^{(ns)}$	3^{***}	$1,2^{***}$	$4,4^{***}$	3^{***}	$6,5^{***}$	$4,7^{***}$
Share of income provided by man before separation								
< 20%	$47,2^{***}$	$47,8^{***}$	$47,7^{***}$	$47,1^{***}$	$23,9^{***}$	$24,9^{***}$	$24,4^{***}$	$23,9^{***}$
20-40%	$33,3^{***}$	$33,5^{***}$	$33,3^{***}$	$33,7^{***}$	$29,2^{***}$	$29,5^{***}$	$29,2^{***}$	$29,6^{***}$
40-60%	$13,6^{***}$	$13,6^{***}$	$13,3^{***}$	$13,9^{***}$	$15,2^{***}$	$15,2^{***}$	$14,9^{***}$	$15,6^{***}$
60-80%	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
> 80%	$-5,2^{***}$	$-5,2^{***}$	$-4,8^{***}$	$-5,3^{***}$	-6^{***}	-6^{***}	$-5,7^{***}$	$-6,2^{***}$
Quintile of income before separation								
1^{st}	$45,7^{***}$	$45,7^{***}$	$45,2^{***}$	$46,2^{***}$	$32,5^{***}$	$32,2^{***}$	32^{***}	$32,9^{***}$
2^{nd}	$10,5^{***}$	$10,5^{***}$	$10,4^{***}$	$10,5^{***}$	$10,1^{***}$	$9,9^{***}$	10^{***}	$10,1^{***}$
3^{rd}	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
4^{th}	$-4,6^{***}$	$-4,6^{***}$	$-4,4^{***}$	$-4,7^{***}$	$-5,5^{***}$	$-5,4^{***}$	$-5,3^{***}$	$-5,6^{***}$
5^{th}	$-14,4^{***}$	$-14,7^{***}$	$-14,1^{***}$	$-14,7^{***}$	$-14,3^{***}$	$-14,5^{***}$	-14^{***}	$-14,5^{***}$
Cons.	$-26,2^{***}$	$-33,6^{***}$	$-34,2^{***}$	$-27,2^{***}$	$-28,7^{***}$	$-35,7^{***}$	$-36,4^{***}$	$-29,6^{***}$

*Note: Standard errors are computed by subsampling. *, **, *** denote significance at the 10%, 5%, and 1% levels respectively.*
Lecture: The living standard of women with 1 child, whose husbands provided between 60 and 80% of couple earnings before divorce and who were in couple from the 3^{rd} quintile of income (reference category), decreases by -28.7%, compared to the control group, when OECD equivalence scale is used (column (5)), by -35.7% when computed with the square root equivalence scale (column (6)), by -36.4% when computed according to the "loneparent variant"(column (7)) and by -29.6% when computed according to the "non custodial parent variant" (column (8)) (cf. main text for explanations about these variants).
Source: Divorced women sample from French exhaustive income-tax returns database, 2009.

tion unit for the child(ren) not living with them. In this variant, the effect is more important for men, being more in this position (column (4) in table 4.7.7) and thus the situation of men is worsened.

Even if we exclude the 0.5% of the bottom of the distribution of living standard variation, big variations could have an influence on the means. We then run median regressions to test the sensitivity of the effects to the extreme value. The results are largely the same (table 4.E.1 and table 4.E.2). One exception, the coefficients for the income share ¡20% and 20-40% are lower for men in the median regression, suggesting that huge positive variations occur in that population sub-group. This is not surprising considering the variation in labor supply we previously observed.

Table 4.7.7: Regression estimates of living standard variation for different equivalence scales, for men

	Men							
	Divorcees				Divorcees with control group			
	OECD	Square root variant	Loneparent variant	Non custodial parent variant	OECD	Square root variant	Loneparent variant	Non custodial parent variant
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of children								
0	-8^{***}	$-6,1^{***}$	$-4,5^{***}$	$-2,9^{***}$	-6^{***}	$-3,7^{***}$	$-2,3^{***}$	$-0,7^{***}$
1	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
2	$2,6^{***}$	$0,5^{(ns)}$	2^{***}	$-1,2^{***}$	2^{***}	-1^{***}	$1,4^{***}$	$-1,8^{***}$
3 or more	$0,2^{(ns)}$	-6^{***}	$0,1^{(ns)}$	$-8,5^{***}$	$2,6^{***}$	$-4,8^{***}$	$2,5^{***}$	$-6,3^{***}$
Share of income provided by man before separation								
$< 20\%$	$-3,2^{**}$	$-3,7^{***}$	$-2,5^{*}$	$-4,1^{***}$	$-16,9^{***}$	$-17,2^{***}$	$-16,4^{***}$	$-17,8^{***}$
20-40%	$-24,8^{***}$	-25^{***}	$-24,3^{***}$	$-25,4^{***}$	$-27,6^{***}$	$-27,6^{***}$	$-27,1^{***}$	$-28,1^{***}$
40-60%	$-17,9^{***}$	-18^{***}	-18^{***}	$-17,9^{***}$	$-17,3^{***}$	$-17,3^{***}$	$-17,4^{***}$	$-17,2^{***}$
60-80%	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
$> 80\%$	$14,8^{***}$	$15,3^{***}$	$15,3^{***}$	$14,4^{***}$	12^{***}	$12,5^{***}$	$12,5^{***}$	$11,6^{***}$
Quintile of income before separation								
1^{st}	18^{***}	$18,6^{***}$	$18,8^{***}$	$17,1^{***}$	$4,6^{***}$	5^{***}	$5,4^{***}$	$3,9^{***}$
2^{nd}	4^{***}	$4,2^{***}$	$4,3^{***}$	$3,5^{***}$	3^{***}	$3,2^{***}$	$3,4^{***}$	$2,6^{***}$
3^{rd}	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
4^{th}	$0,2^{(ns)}$	$-0,2^{(ns)}$	$-0,2^{(ns)}$	$0,3^{(ns)}$	-1^{***}	$-1,3^{***}$	$-1,3^{***}$	$-0,8^{***}$
5^{th}	$0^{(ns)}$	$-0,7^{*}$	$-0,5^{(ns)}$	$0,6^{(ns)}$	$0,5^{***}$	$-0,3^{**}$	$0^{(ns)}$	1^{***}
Cons.	$4,2^{***}$	$-3,9^{***}$	$-0,3^{(ns)}$	$-1,3^{***}$	$1,8^{***}$	$-6,1^{***}$	$-2,6^{***}$	$-3,6^{***}$

*Note: Standard errors are computed by subsampling. *, **, *** denote significance at the 10%, 5%, and 1% levels respectively.*
Lecture: The living standard of men with 1 child, who provided between 60 and 80% of the couple earnings before divorce and who were in couple from the 3^{rd} quintile of income, increases by +1.8% when the OECD equivalence scale is used (column (5)), decreases by -6.1% when computed with the square root equivalence scale (column (6)), by -2.6% when computed according to the "loneparent variant"(column (7)) and by -3.6% when computed according to the "non custodial parent variant" (column (8)) (cf. main text for explanations about these variants).
Source: Divorced men sample from French exhaustive income-tax returns database, 2009.

4.8 Conclusion & Discussion

If "the formation of a couple is often efficient from the pure economic perspective" (Browning, Chiappori, and Weiss (2014)) because marital gains arises from the presence of public consumption and marital specialization process, couple breakdown has opposite consequences, revealing the flip side of marital specialization.

The loss of economies of scale following the divorce is well-known. Some costs, for example dwelling and child education expenses, shared between partners during marriage have to be borne separately after the divorce. Previous empirical works showed that this loss of economies of scale involves a decrease in living standards that is mainly supported by women. This gender disparity is often explained by the greater cost of child custody women more often have.

Taking advantage of a huge sample size of couples observed one year before and one year after their divorce from a French fiscal database, we are able to evaluate a causal effect of divorce and to distinguish different components of living standards. In line with the literature, we confirm in this article that women experience a decrease in total living standards after divorce, by roughly 19% on average whereas for men living standards remain globally stable (with a decrease of 2.5%). If family composition and child custody play a role in women's loss, we also show that economic consequences of divorce are highly more dependent on the share of couple' resources each spouse provides before divorce resulting mainly from marital specialization choices. Note that the gender gap in earnings observed at the moment of divorce may come also from pre-marital differences in spouses' wages, from different career advancement from marriage that we are not able to control for. This focus on income share leads to some interesting results. We especially highlight huge heterogeneity in living standard variations for men. When, in most cases, men are the main earnings providers (before divorce), they experience a gain in their living standards. But when they are the secondary earner, they also experience losses as most women in the same situation, and the loss is all the more important as their earnings represent a small fraction of the before-divorce earnings of the couple. Rather than a gender inequality or a custodial parent story, the losses after divorce have to be mainly related to the marital specialization choices and the wage gap between partners at the time of the divorce.

In this article, we also investigate the role of public and private transfers. We document the fact that public transfers (family and welfare benefits) partially offset the negative economic consequences of divorce, especially for the poor and large families. Some childless women (and to a lesser extent also childless men) could thus experience larger losses in living standards than mothers with a large family [25], helped by generous French family policies. Private transfers - i.e. child alimony - mitigate the decrease (the increase) in the living standard of women (men) after divorce by about 7 percentage points. Finally our results on labor supply after divorce show that for

[25] this result is also found by Manting and Bouman (2006) on Dutch Data.

women working before divorce, there is no huge effect of divorce on the probability of being inactive after divorce whereas for housewives, we observe a quite massive return on the labor market, constrained however by the family size, and the household poverty (capturing probably indirectly low human capital). For men, no much change is observed for working status, except an increase in labor market incomes for those who were in second earner provider position.

Some limitations to our study have to be mentioned. In spite of their reliability and huge sample size, the administrative data we used only concern the effect of divorce, that is to say legal separation of marital unions (divorces and civil partnerships) while unmarried couples, a quite common marital status in France, are set aside. However, with the widespread of cohabitation, these unmarried couples are more similar to married ones in sociodemographic characteristics, once controlled for income sharing, number of children and household income as we did. Tach and Eads (2015), analysing US dissolution trends, recently found that the economic consequences of cohabitation dissolution and divorce became similar over time. This result is partly driven by the extension of lone parenthood allowances (reserved to lone mothers) to divorced mothers. However, US unmarried couples still differ from unmarried European. In a more comparable context on Dutch data, Manting and Bouman (2006) find that non-married women short-term losses are less important than married women losses but also point that this result is not driven by the marital status "per se" but by compositional differences: unmarried couples have less children and are more likely to have equal earnings before divorce for instance. As we control for these characteristics, we would have probably reached the same conclusions if we could have had included unmarried couples in the analysis.

A second limitation is the restriction of our sample to divorcees who live alone the year following divorce, that is to say, who are not yet repartnered. Previous studies showed that repartnering may be a way to overcome financial difficulties after divorce especially for poor women (Dewilde and Uunk (2008)). Manting and Bouman (2006) show that gender disparities tend to disappear after five years in case of repartnering.

A last limitation is that we are here able to identify only short-term effects, one year

after the divorce, probably the worse period since many works show that there is a catch-up effect up to the level of pre-divorce living standards due to repartnering and labor market behavior adjustements. But still, the foregone incomes relatively to comparable couples who remained married are not taken into account.

But, on the other way, poor recently divorced women are not the most suitable on the marriage market and can encounter difficulties, so that the direction of the selection effect is undetermined. Lastly, our measure of private transfers only take into account child support whereas spousal payment can also constitute a big financial resource (and charge). But as spousal payments are more often paid as a lump sum (and not as an annuity), it was difficult to add them to post-divorce living standards. We should have chosen an arbitrary payment period to smooth this one-shot payment. Spousal supports only concern one out of eight divorces (Roumiguières (2004)), in particular older couples than those observed in this study, a long marriage duration being a main determinant of the grant of this spousal payments. However, it remains possible that the living standards losses of women and the stability of men are over-estimated by not taking into account such transfers. However the huge effect we observed makes us confident that inclusion of spousal support, if possible, could not have balanced the inequalities created by marital specialization.

Lastly, one frequent criticism addressed to living standards analyses is that the OECD unit consumption scale (or any other scale), even intensively used in research, is arbitrary and may not reflect the real child cost, for instance for a lone parent. This choice of an equivalence scale could then drive the results regarding changes in living standards. It is not the case. We first theoretically showed that family size or the custodial status is far from being the whole story. Secondly, we replicate our analysis using different equivalence scales and all our conclusions remain. The income sharing before divorce is a stronger determinant than family structure captured by the number of consumption units.

We document an increase in labor force participation for second earners and especially

for women. This tends to support the idea that marital specialization process is the main responsible for the gender inequality in living standards after divorce . In spite of this, couples continue to do so because it is a short-term efficient solution or they are probably not prepared to the risk of divorce. In terms of public policy, our study also shows that divorce constitutes a public cost because of large public transfers to single parents and poor people. However, for dual earners or when divorcees reenter the labor market, this cost is largely reduced.

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Appendix

4.A Tables for the literature review

Table 4.A.1: Living standards variations (before-after divorce) (%)

Article	**Unadjusted household income** Women	Men	**Adjusted household income** Women	Men	Type of of variation	Type income ajustment
American data						
Hoffman (1977)	-29	-19	-7	+17	Change in mean	(a)
Corcoran (1979)	-44		-18		Mean of changes	(a)
Duncan and Hoffman (1985)	-28 (W) -46(B)	-9 (W) +2(B)	-11 (W) -29 (B)	+10 (W) +40 (B)	Mean of changes	(b)
Burkhauser*& al.* (1991)			-24	-6	Median of changes	(c)
Smock (1993)	-46 to -43 (W) -51 to -45 (B)	-8 to +7 (W) -29 to -13 (B)	-22 to -21 (W) -44 to -35 (B)	+61 to +93 (W) +47 to +80 (B)	Median of changes	(d)
Smock (1994)			-20(B)	+61(W)	Mean of changes	(d)
Peterson (1996)			-27	+10	Changes in mean	(e)
Bianchi *& al.* (1999)			-36	+28	Median of changes	(c)
McKeever and Wolfinger (2001)	-45		-14		Median of changes	(d)
McManus and DiPrete (2001)		-42 to -40 (B) -58 à -41 (N)		-20 to -14 (B) -12 to -11 (B) +29 to +34 (B) -27 to -3(ns) (N) -30 to -3(ns) (N) +30(ns) to +68 (N)	Mean of changes	(b) (f) (d) (b) (f) (d)
Bedard and Deschênes (2005)			Increase		Mean of changes (Instrumentation for all ever divorced women. Local effect)	(j)
Ananat and Michaels (2008)			Increase and decrease		Quantile treatment effect (Instrumentation for all ever divorced women. Local effect)	(c), (j)
Canadian data						
Finnie (1993)	-30 (-49)	-11 (-25)	-14 (-33)	+32 (+11)	Mean (Median) of changes	(c)
UK Data						
Jarvis and Jenkins (1999)			-18	2 (ns)	Median of changes	(h)
Uunk (2004)			-36		Changes in median	(i)
Andreß *& al.* (2006)			-28	1	Median of changes	(k)
Dutch data						
Poortman (2000)	-46	-31	-31	+4	Changes in mean	(g)
Uunk (2004)			-19		Changes in median	(i)
Kalmijn and Alessie (2008)			-38	ns	Mean of changes	(i)
German data						
Burkhauser*et al.*(1991)			-44	-7	Median of changes	(c)
Uunk (2004)			-25		Changes in median	
Andreß *& al.* (2006)			-33	-2	Median of changes	(k)
Norvegian data						
Bratberg and Tjotta (2002)	-4 (C) -32 (NC)	+36 (C) -1 (NC)			Median of changes	
Italian data						
Andreß *& al.* (2006)			-32	+5	Median of changes	(k)
Uunk (2004)			-3		Changes in median	(i)
Ongaro*& al.* (1991)	-23	+25			Mean of changes (compared to control group)	(i)
French data						
Uunk (2004)			-32		Changes in median	(i)
Jauneau and Raynaud (2009)			-30	-6	Median of changes	(i)
European data						
Uunk (2004)			-36 to -3 (according to country)		Changes in median	(i)

Results for non-repartenered women after their divorce.

For US data: (B): estimation for Black people, (W) for White. For Bratberg and Tjotta (2002): (C): Estimation for custodial parents, (NC) non-custodial.

Method of adjustment: (a): This measure of needs uses the Department of Agriculture's "Low-Cost Food Budget"; (b): This measure of needs uses "official US Department poverty standard"; (c): Division by a poverty threshold (depending on the family size); (d): "per capita" (division by the number of people in the household); (e): This measure of needs uses the Bureau of Labor Statistics' Lower Standard Budget; (f): ELES : "Expended Linear Extension System" by Merz, Garner, Smeeding, Faik, and Johnson (1994); (g): Schiepers' equivalence scale (1993); (h): McClements "Before Housing Costs" equivalence scale; (i): modified OECD equivalence scale; (j): Census Bureau equivalence scale: $(\text{nb adults} + 0.7 * \text{nb children})^{0.7}$; (k): square root equivalence scale.
Remark: See table 4.A.3 for a detail of equivalence scales used in the studies.

Table 4.A.2: Sample sizes

Article	**Data**	**Number of observations**
Hoffman (1977)	PSID	182 Women & 110 Men
Corcoran (1979)	PSID	56 Women
Duncan and Hoffman (1985)	PSID	349 Women & 250 Men
Poortman (2000)	SEP	359
Peterson (1996)	PSID	161
Burkhauser *and al.*(1991)	PSID GSEP	301 Women & 239 Men 56 Women & 45 Men
Finnie (1993)	LAD	2125 Women & 2375 Men
Smock (1993)	NLSY, NLSYW & NLSYM	Women : 133 to 430 Men : 67 to 312
Smock (1994)	NLSY & NLSYM	Women : 84 to 258 Men : 43 to 167
Jarvis and Jenkins (1999)	BHPS	148 Women & 105 Men
Bianchi, Subaiya, and Kahn (1999)	SIPP	199 couples
McKeever and Wolfinger (2001)	NSFH	472 Women
Bratberg and Tjotta (2002)	KIRUT	Women : 538 to 2038 Men : entre 600 et 1881
Uunk (2004)	ECHP	29 to 157

SEP : Dutch Socioeconomic Panel, PSID : Panel Study of Income Dynamics, GSEP: German Socio-Economic Panel

NLSY : National Longitudinal Surveys of Youth, NLSYW : National Longitudinal Surveys of Young Women

NLSYM : National Longitudinal Surveys of Young Men

KIRUT : base longitudinale norvégienne

NSFH : National Survey of Family and Households

LAD : Longitudinal Administrative Database

BHPS : British Household Panel Survey

ECHP : European Community Household Panel

SIPP : Survey of Income and Program Participation

Table 4.A.3: Some equivalence scales used

Échelle	1^{st} pers.	2^{nd} pers.	3^{rd} pers.	4^{th} pers.
"Per capital"	1	1	1	1
Square root	1	$\sqrt{2}$	$\sqrt{3}$	2
OECDE (original)	1	0.7	0.5	0.5
OCDE (modified)	1	0.7	0.5 (if + 14 y.o) 0.3 (if - 14 y.o)	0.5 (if + 14 y.o) 0.3 (if - 14 y.o)
Buhmann (1988)				
For $\theta = 0.5$ (classical case)	1	0.41	0,32	0.27
For $\theta = 0.25$	1	0.19	0.13	0.10
For $\theta = 0.75$	1	0.68	0.60	0.55
McClements "Before Housing Costs"				
	0,61	0,39 (partner) 0,46 (non-partner adult) 0,32 (children + 14 y.o) 0,20 (children - 14 y.o)	0.42 (non-partner adult) 0.32 (children + 14 y.o) 0.20 (children - 14 y.o)	0.36 (non-partner adult) 0.32 (children + 14 y.o) 0.20 (children - 14 y.o)
Schiepers (1993)				
1 adult & all children $\leq$ 5 y.o	1	0.3	0.24	0.19
1 adult & older child from 6 to 11 y.o	1	0.32	0.22	0.20
1 adult & older child from 12 to 18 y.o	1	0.35	0.24	0.20
2 adults & all children $\leq$	1	0,38	0.28	0.16
2 adults & older child from 6 to 11 y.o	1	0.38	0.31	0.16
2 adults & older child from 12 to 18 y.o	1	0.38	0.34	0.17

4.B Creation of dataset and computation of weights

4.B.1 Dataset

In 2009, the official statistics report 130,601 divorces in France. 164 divorces are for marriages that last less than one year, 1,700 for ones that last one year and 3,926 two years. So, the number of divorces in 2009 for people who marry before 2008 ranges then between 124,807 and 128,733. Our sample size belongs to this interval. We thus have information about 2008 earnings for at least 98% of the divorced couples who didn't married neither in 2008 nor in 2009. For "pacsed" people, the number of dissolutions reported in official statistics is 17,186 without any clue about the duration of the contract that has been disrupted. In our sample, we found 9,760 pacsed-couples. Then we have information about 2008 earnings for at least 57% of the couples who broke their Pacs in 2009 and probably more if we take into account that we kept only those who do sign their contract before 2008 (whereas the denominator include all Pacs dissolution whatever the year of pacs formation) We call the global sample with information about 2008 earnings for all ex-married and ex-pacsed couples we recovered : the "sample 1" (cf. table 4.B.1).

In order to have information about the dwelling in 2008 we then match our data with the local residence tax ("taxe d'habitation"). This leads to a little loss and we get 122,939 formerly married couples and 9,442 formerly pacsed couples. We thus have information about dwelling (homeownership, house or flat, ...) for at least 95% of divorcees and 55% for those who were pacsed. We call this sample with all ex-married and ex-pacsed couples for which we have information about 2008 earnings and 2008 local residence tax the "sample 2".

From that point we then need to match with tax return for the 2010 earnings (one year after divorce) and the local residence tax for the same year.

Table 4.B.1: Information about dataset creation

	Official statistics		Sample 1	Sample 2	Sample 3	Sample 4
	All	Married before 2008				
Divorced	130,601	124,807 to 128,733	126,250	122,939	113,794	91,732
%			At least 98%	At least 95%		
End of "Pacs"	17,186	?	9,760	9,442	9,007 (7,932 heterosexual)	5,557
%			At least 57%	At least 55%		
Available information according to sample						
Income tax 2008			X	X	X	X
Local residence tax 2008				X	X	X
Income tax 2010					X	X
Local residence 2010					X	X
Selection						
Married or pacsed before 2008			X	X	X	X
Heterosexual						X
Not cohabitating with other adult 2010						X

"Pacs" is the French civil union contract.

4.B.2 Weights and attrition correction

The fact that we are using all the available information from the fiscal databases for the year 2010 leads to lose some individuals who do not appear in these databases the year after their conjugal separation. After matching with the 2010 datasets (tax return & local tax residence) we get 113,794 ex-married (ie a loss of 7.5%) and 9,007 ex-pacsed couples (loss of 4.5%) that we call "sample 3". For 74% of these couples, we recovered the two partners.

In some cases, we do not recover the man's tax return, in other cases the woman's one. To take into account a possible attrition bias, we compute weights such that the weighted recovered population of men and women is representative of all the divorces and Pacs dissolutions that occurred in 2009 that we had formerly recovered (ie representative of our sample 1).

To do so, we stratify between couples who were married and those who were "Pacsed" in 2008. Weights are then calibrated for men and women separately in order to keep 2008 couples for which only one spouse was recovered. Since our main approach is to compare women's living standards on one hand and men's ones on the other hand, this approach appears as the most relevant one. Weights are computed us-

ing the "MACRO CALMAR" developed and freely provided by the French National Stastitics and Studies Institute (Insee). The margins used are those from the sample 1 for the margins related with the 2008 earnings and from the sample 2 for information related with dwellings.

Since we study gender gap and alimonies, we finally exclude same sex couples and then get 7,932 ex-pacsed-couples.

The last exclusion is the one of individuals who either (re)marry, (re)pacs or cohabit (with at least another adult) the year after the break up in 2010. This choice has been made for the sake of simplicity , because cohabitation after divorce could be with a new partner, a relative or a friend. Finally, as we are interested in labor supply after divorce, we focus on individuals aged between 20 and 55 years old. The upper age limit has been set to 55 because in France, withdrawals from the labor market may begin at an early ages.

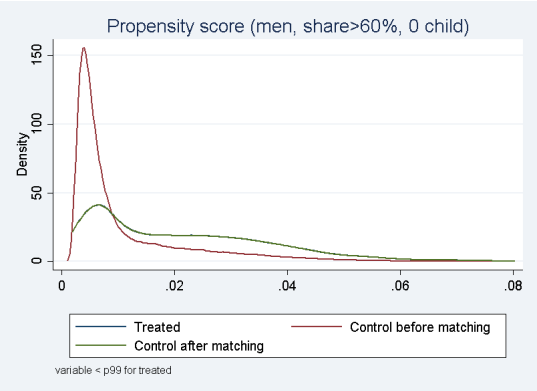
Finally in sample 4, we have 97,289 couples: 91,732 ex-married couples and 5,557 ex pacsed -couples for which we recover at least one partner who didn't marry / pacs / cohabit in 2010. It represents 132,094 individuals who were formerly married and 8,039 formerly pacsed.

4.C Assessing the quality of matching

4.C.1 Overlapping assumption

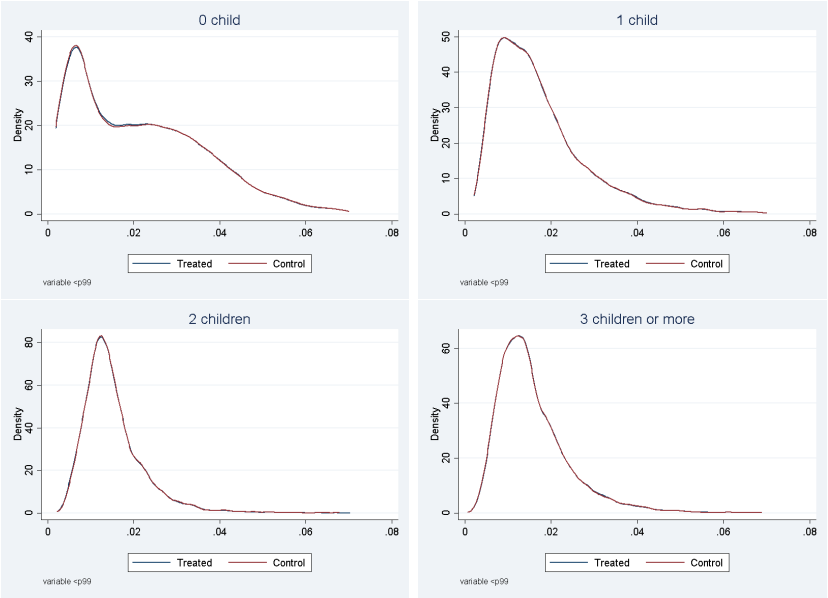
The first one concerns the "overlapping assumption". This assumption states that for each observation in the treated group, one observation with similar characteristics can be found, in order to be matched with. This assumption is generally verified presenting graph of the propensity score matching for treated and for the group where the "control group" is extracted. Since we extract our control group from a quasi-exhaustive dataset of married couples, the probability to find a "twin" for each of our divorced couples is high. It turns out that for each of our 24 subsamples of our divorced couples, we have no problem finding a nearest-neighbor. We present in graphs 4.C.1 and 4.C.2 the propensity score matching by number of chidren in the subsample of men whose share in total income was above 60% (before divorce). As we can notice, the propensity score matching for the divorced couples is "overlapped" by the one of the non-divorced ones and then it is possible to find a nearest-neighbor for each divorced couple without been compelled to reduce the range of the estimation to a subsample of them. It is also noticeable that the propensity score of the nearest-neighbor chosen (the "control group") perfectly fit the divorced one. This is not so surprising since the number of married couples used to find a nearest-neighbor is above 10 million which represents more than 100 times the number of divorced couples to match with: the probability to find a close neighbor is then high. We have similar results whatever the subsample of matching is.

Figure 4.C.1: Propensity score matching (men, man's share in total income > 60%, 0 child)



Source: French exhaustive income-tax returns database, 2009

Figure 4.C.2: Propensity score matching by number of children (men sample, man's share in total income > 60%)



Source: French exhaustive income-tax returns database, 2009

4.C.2 Balance of covariates

The second point of concern is to know is the matching leads to balance properly the covariate in the sample. Our purpose is to balance numerous characteristics of the couple in 2008 (that is before the divorced couples split): age of each ex-partner, regions of living, homeownership, married (vs pacs), house (vs apartment), ...), number and age of child(ren), number of dependent persons, and a wide range of earnings for both men and women (labor income, unemployment benefits, pensions, self-employment incomes (details in profits from commercial and non-commercial occupations and farm profits), earnings from previous year and for 2 years before. To assess the balancing, we provide in tables X1 to X3 the several means for the treated (the divorced couples) and the control group. All differences in mean have been tested with a t-test and turn out to be non significant to a 10% threshold. In the kind of subsample we have (with a large number of observations) the t-test is reputed to be generally too demanding because the large number of observations leads to conclude that little differences in means are significant. Another method of testing the equality between the means is to compute "standardized differences".They are presented in appendix, tables X4 to X6. Standardized differences turn out to be very small, always besides 0.1 and it then confirms our former statement about differences in means.

As often, means are not enough. It is also of concern to know is the matching lead to similar distributions of covariates in the treated and the control group.

We show in graphs Y1 that proceeding by matching greatly improve the fitting of the distribution: after matching the distributions for treated and control group are so similar that they are often impossible to distinguish separately. Off course, this last point could be due to a "scale effect" and to check the similarity of the distribution, it is probably better to just compare the 2 distributions of treated and control group without taking into account the distribution of the non-treated-non-control group whose introduction in the graph tend to dramatically change the scale. We provide in graphs Y2 to Y5 evidences that the difference between the covariates distribution are definitively small and that those distribution are often impossible to disentangle. Those graphics concern all the income quartiles of the subsample for men whose share

in total income was higher than 60%. Findings for the other subsamples are similar and none subsample present distinctive feature.

Figure 4.C.3: Age head of men and women (Sample: man's share > 60% & no child

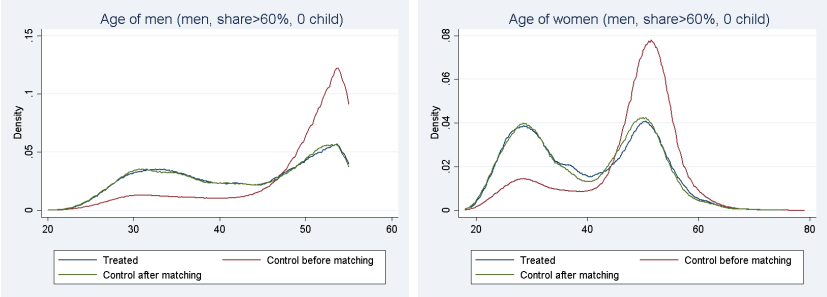
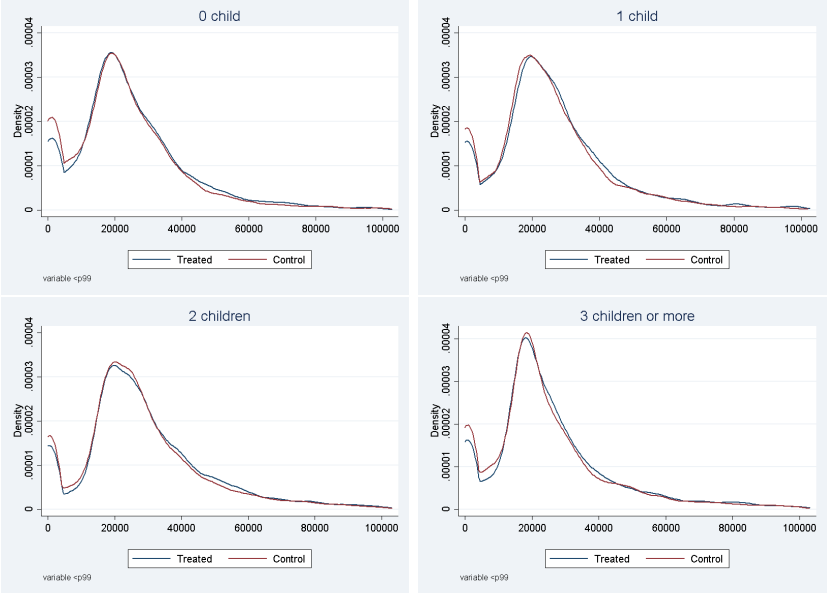
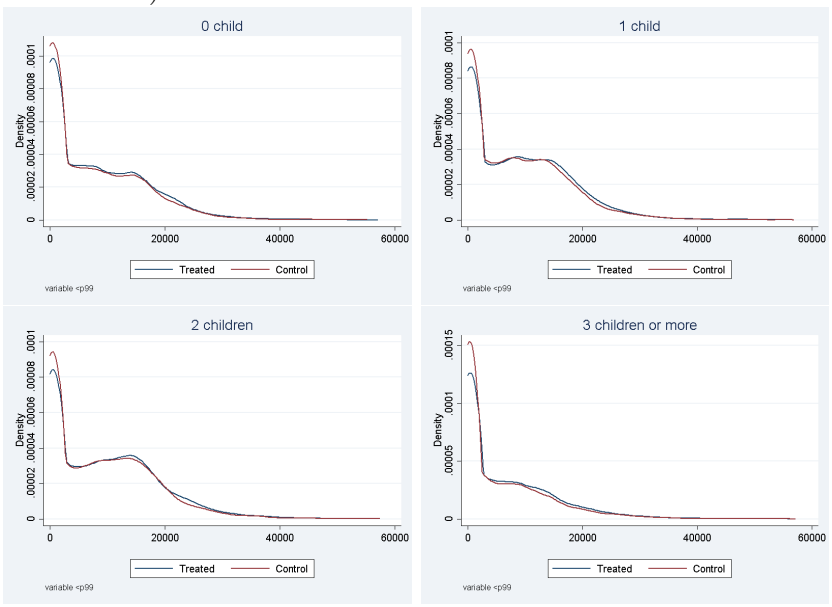


Figure 4.C.4: Man Labor Income 1 year before divorce (men sample, man's share in total income > 60%)



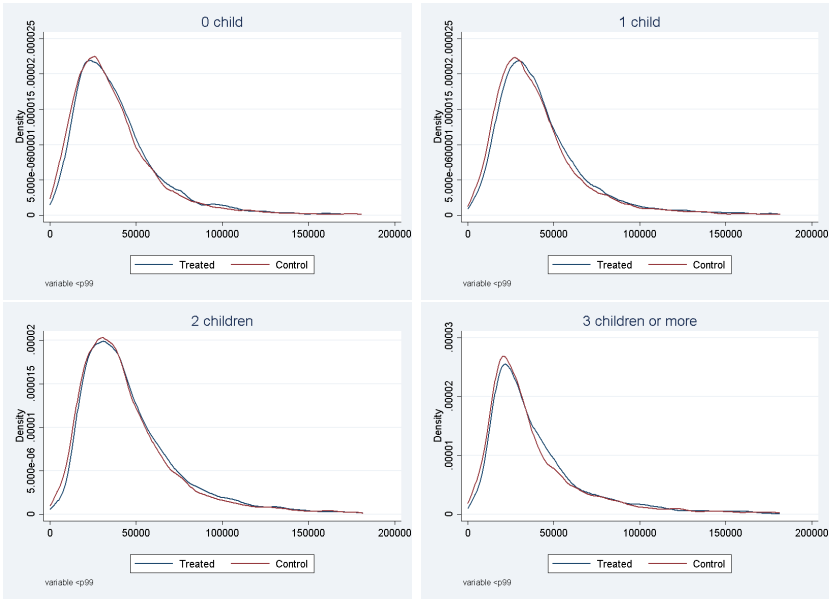
Source: French exhaustive income-tax returns database, 2009

Figure 4.C.5: Woman Labor Income 1 year before divorce (men sample, man's share in total income > 60%)



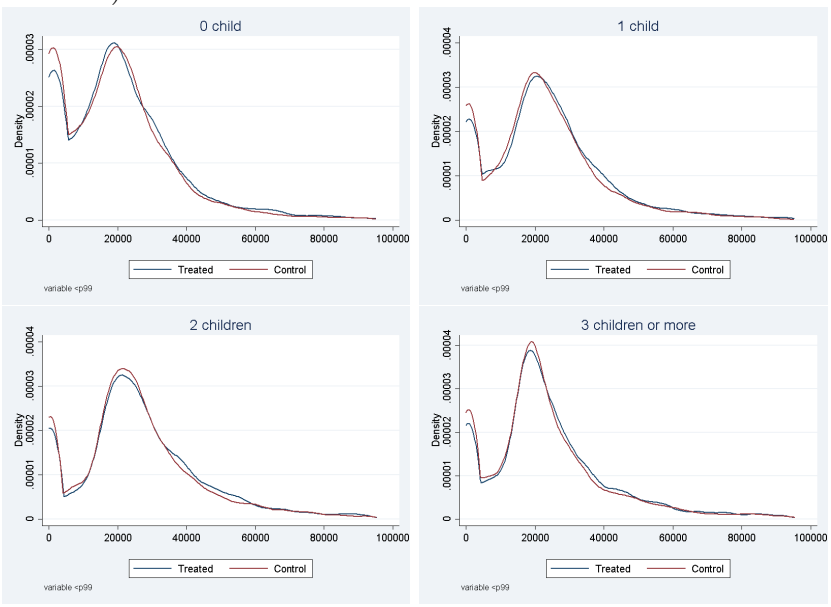
Source: French exhaustive income-tax returns database, 2009

Figure 4.C.6: Total declared income 1 year before divorce (men sample, man's share in total income > 60%)



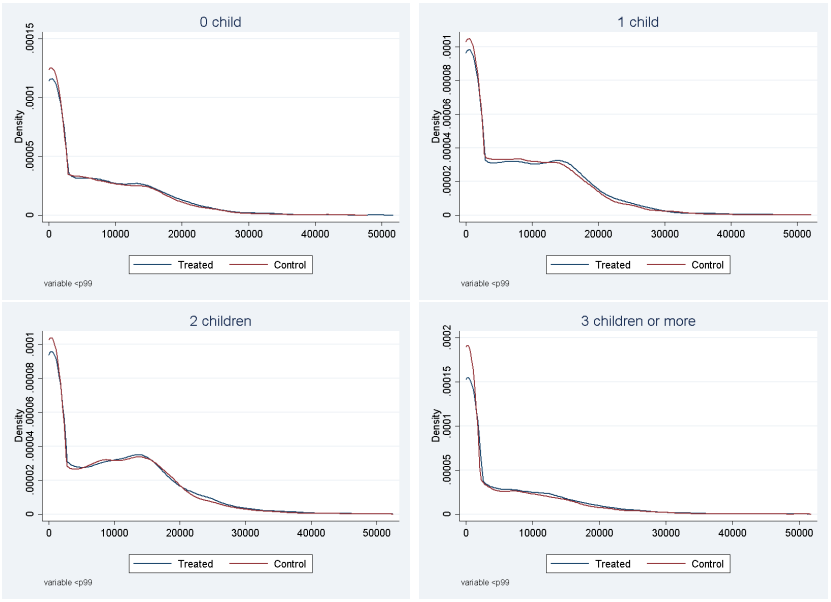
Source: French exhaustive income-tax returns database, 2009

Figure 4.C.7: Man Labor Income 2 years before divorce (men sample, man's share in total income > 60%)



Source: French exhaustive income-tax returns database, 2009

Figure 4.C.8: Woman Labor Income 2 years before divorce (men sample, man's share in total income > 60%)



Source: French exhaustive income-tax returns database, 2009

Table 4.C.1: Means of covariates and standardized differences (Men sample, Share : > 60%, 0 & 1 child)

	0 child			**1 child**		
	Divorcees	Control group	Standardized differences	Divorcees	Control group	Standardized differences
Share of man earnings in total earnings	0,8	0,8	-0,002	0,8	0,8	0,002
maried	0,9	0,9	-0,002	0,9	0,9	0,006
Paris	0,1	0,0	0,026	0,0	0,0	-0,003
Ile-de-France (excepted Paris)	0,2	0,2	-0,017	0,1	0,1	-0,025
Age (men)	41,8	41,6	0,015	42,1	41,9	0,019
Age (women)	39,4	39,3	0,011	39,2	39,2	0,008
Total Declared Income (1 year before divorce)	41222,5	41306,1	-0,002	45926,8	45141,8	0,017
Men Labor Income (1 year before divorce)	25408,7	25639,5	-0,008	27971,3	27635,1	0,011
Women Labor Income (1 year before divorce)	7247,9	7280,7	-0,004	8288,2	8167,6	0,014
Homeowner	0,4	0,4	-0,002	0,5	0,5	0,020
Living in a House	0,5	0,5	0,000	0,6	0,6	0,008
At least one 1 y.o. child	0,0	0,0	0,000	0,0	0,0	0,010
At least one 2 y.o. child	0,0	0,0	0,000	0,1	0,1	-0,001
At least one 3 y.o. child	0,0	0,0	0,000	0,1	0,1	-0,002
At least one 4 to 6 y.o. child	0,0	0,0	0,000	0,2	0,2	0,005
At least one 7 to 9 y.o. child	0,0	0,0	0,000	0,1	0,1	0,006
At least one 10 to 14 y.o. child	0,0	0,0	0,000	0,2	0,2	0,014
At least one 15 to 17 y.o. child	0,0	0,0	0,000	0,2	0,2	-0,016
At least one 18 to 25 y.o. child	0,0	0,0	0,000	0,2	0,2	-0,012
At least one more than 26 y.o. child	0,0	0,0	0,000	0,0	0,0	-0,007
Women Earnings (2 years before divorce)	6422,5	6410,1	0,001	7630,4	7693,9	-0,007
Men Earnings (2 years before divorce)	20918,0	21449,1	-0,021	24753,3	24537,2	0,007
Women Earnings (3 years before divorce)	5066,8	5166,4	-0,013	6530,2	6713,1	-0,022
Men Earnings (3 years before divorce)	18589,1	19116,1	-0,024	22226,2	21944,8	0,011
Tax payed	2749,7	2781,1	-0,003	2472,1	2277,0	0,020
Number of children	0,0	0,0	0,000	1,0	1,0	0,000
Long term unemployment (Men)	0,0	0,0	0,014	0,0	0,0	-0,004
Overtime work (Men)	618,0	656,1	-0,026	674,3	698,1	-0,016
Pensions (Men)	548,4	554,4	-0,002	406,3	395,5	0,004
Unemployment and pre-retirement benefit (Men)	779,1	799,5	-0,006	736,2	736,7	0,000
Long term unemployment (Women)	0,0	0,0	0,020	0,0	0,0	0,002
Overtime work (Women)	115,2	108,2	0,016	109,1	104,7	0,011
Pensions (Women)	383,9	382,4	0,001	227,3	199,7	0,018
Unemployment and pre-retirement benefit (Women)	734,7	770,4	-0,016	783,6	786,7	-0,001
Self-employment earnings	3277,1	3449,2	-0,009	3935,8	4034,9	-0,005
Profits from non-commercial occupations (Men)	1738,9	1763,9	-0,002	1912,6	2208,9	-0,017
Profits from non-commercial occupations (Women)	166,5	168,8	-0,001	218,0	236,3	-0,006
Profits from commercial occupations (Men)	1293,1	1384,0	-0,010	1745,8	1570,8	0,017
Profits from commercial occupations (Women)	56,8	67,5	-0,011	148,7	166,4	-0,008
Farm profits (Men)	188,0	262,9	-0,024	246,6	240,9	0,002
Farm profits (Women)	1,7	4,3	-0,009	20,5	14,9	0,010
No activity (Men)	0,0	0,0	-0,003	0,0	0,0	0,002
No activity (Women)	0,3	0,3	-0,010	0,3	0,3	0,005
Standard of living before divorce	24658,7	24704,8	-0,002	22630,7	22331,9	0,015
UC OECD	1,5	1,5	0,000	1,9	1,9	-0,021
UC square root	1,4	1,4	0,000	1,7	1,7	0,010

Table 4.C.2: Means of covariates and standardized differences (Men sample, Share : > 60%, 2 & 3 children or more)

	2 children			**3 children or more**		
	Divorcees	Control group	Standardized differences	Divorcees	Control group	Standardized differences
Share of man earnings in total earnings	0,8	0,8	-0,003	0,9	0,9	0,006
maried	1,0	1,0	-0,001	1,0	1,0	0,010
Paris	0,0	0,0	0,003	0,0	0,0	0,005
Ile-de-France (excepted Paris)	0,1	0,1	-0,003	0,1	0,1	-0,001
Age (men)	41,6	41,6	0,008	41,9	41,8	0,022
Age (women)	38,9	38,9	0,002	39,0	38,9	0,008
Total Declared Income (1 year before divorce)	49636,4	49298,4	0,007	41524,3	40952,1	0,012
Men Labor Income (1 year before divorce)	30322,9	30286,3	0,001	26434,7	26249,5	0,006
Women Labor Income (1 year before divorce)	8961,9	8781,4	0,019	5629,5	5574,0	0,007
Homeowner	0,6	0,6	0,009	0,5	0,5	0,003
Living in a House	0,7	0,7	0,003	0,7	0,7	0,006
At least one 1 y.o. child	0,0	0,0	-0,001	0,1	0,1	-0,007
At least one 2 y.o. child	0,1	0,1	-0,009	0,1	0,1	0,008
At least one 3 y.o. child	0,1	0,1	0,002	0,1	0,1	-0,019
At least one 4 to 6 y.o. child	0,3	0,3	0,007	0,4	0,4	-0,015
At least one 7 to 9 y.o. child	0,4	0,4	-0,013	0,5	0,5	-0,009
At least one 10 to 14 y.o. child	0,5	0,5	-0,003	0,7	0,7	0,004
At least one 15 to 17 y.o. child	0,3	0,3	-0,004	0,4	0,4	0,007
At least one 18 to 25 y.o. child	0,2	0,2	0,003	0,3	0,3	0,017
At least one more than 26 y.o. child	0,0	0,0	0,011	0,0	0,0	0,027
Women Earnings (2 years before divorce)	8388,1	8310,3	0,008	5015,2	4925,6	0,011
Men Earnings (2 years before divorce)	27684,4	27676,3	0,000	24441,9	24437,4	0,000
Women Earnings (3 years before divorce)	7616,0	7605,3	0,001	4445,3	4252,9	0,024
Men Earnings (3 years before divorce)	25200,4	25284,5	-0,003	22247,9	22353,8	-0,004
Tax payed	2407,1	2302,6	0,009	1333,0	1215,6	0,012
Number of children	2,0	2,0	0,000	3,0	3,0	0,000
Long term unemployment (Men)	0,0	0,0	0,004	0,0	0,0	0,004
Overtime work (Men)	667,5	660,7	0,005	654,8	650,1	0,004
Pensions (Men)	302,3	276,3	0,011	305,1	269,9	0,018
Unemployment and pre-retirement benefit (Men)	609,3	575,0	0,011	765,8	752,0	0,005
Long term unemployment (Women)	0,0	0,0	0,017	0,0	0,0	-0,001
Overtime work (Women)	106,0	101,9	0,010	75,8	73,2	0,007
Pensions (Women)	119,5	120,2	-0,001	160,0	183,3	-0,018
Unemployment and pre-retirement benefit (Women)	667,2	694,7	-0,013	531,4	538,0	-0,004
Self-employment earnings	4725,4	4759,8	-0,001	4419,1	4334,8	0,004
Profits from non-commercial occupations (Men)	2564,9	2689,8	-0,005	2621,2	2652,6	-0,001
Profits from non-commercial occupations (Women)	239,0	260,9	-0,007	238,6	281,9	-0,012
Profits from commercial occupations (Men)	1837,0	1794,3	0,004	1515,7	1335,8	0,019
Profits from commercial occupations (Women)	175,2	174,4	0,000	74,7	92,4	-0,015
Farm profits (Men)	310,6	262,8	0,014	267,8	334,4	-0,016
Farm profits (Women)	13,6	15,2	-0,003	19,5	28,8	-0,011
No activity (Men)	0,0	0,0	-0,023	0,0	0,0	0,000
No activity (Women)	0,3	0,3	-0,018	0,4	0,4	0,003
Standard of living before divorce	21769,8	21677,9	0,005	17650,6	17505,5	0,011
UC OECD	2,2	2,2	-0,005	2,7	2,7	0,008
UC square root	2,0	2,0	0,000	2,3	2,3	-0,002

4.D Other tables of results

Variations of living standards, by number of children and by share of earnings provided by man before separation

Table 4.D.1: Variations of living standards, by number of children

	Women				Men			
	Before transfers	With private transfers	Total living standard	With control group	Before transfers	With private transfers	Total living standard	With control group
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
All	-35.1^{***}	-29.4^{***}	-14.4^{***}	-18.8^{***}	24.2^{***}	15.4^{***}	3.5^{***}	-2.4^{***}
0	$-26,9^{***}$	-25^{***}	$-18,6^{***}$	-21.5^{***}	$-1,9^{***}$	$-3,7^{***}$	$-5,2^{***}$	-9.8^{***}
1	$-32,7^{***}$	-28^{***}	$-13,5^{***}$	-18.9^{***}	$12,4^{***}$	6.5^{***}	$2,1^{***}$	$-4,1^{***}$
2	$-36,2^{***}$	$-29,1^{***}$	$-13,9^{***}$	-18.7^{***}	$28,1^{***}$	17.1^{***}	$5,5^{***}$	$-1,0^{***}$
≥ 3	-45^{***}	$-36,6^{***}$	-12^{***}	-15.7^{***}	$64,6^{***}$	$47,5^{***}$	$11,9^{***}$	$5,6^{***}$

Lecture: Means of changes.

Table 4.D.2: Variations of living standards, by share of earnings provided by man before separation

	Women				Men			
	Before transfers	With private transfers	Total living standard	With control group	Before transfers	With private transfers	Total living standard	With control group
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
All	-35.1^{***}	-29.4^{***}	-14.4^{***}	-18.8^{***}	24.2^{***}	15.4^{***}	3.5^{***}	-2.4^{***}
<40 %	18.9^{***}	21.5^{***}	18^{***}	1.4^{***}	-9^{***}	-12.6^{***}	-8.2^{***}	-20.4^{***}
40-60 %	-26.1^{***}	-23^{***}	-16.3^{***}	-17.6^{***}	-3.6^{***}	-8.6^{***}	-13.6^{***}	-15.5^{***}
>60 %	-53.8^{***}	-45.7^{***}	-21^{***}	-24.9^{***}	49.9^{***}	37.3^{***}	17.4^{***}	10.1^{***}

Lecture: Means of changes.

Increase in participation & unemployment benefits

Table 4.D.3: Increase in participation for women & men

	Women		**Men**	
	Divorcees	Divorcees with ctrl gp	Divorcees	Divorcees with ctrl gp
	(1)	(2)	(3)	(4)
Treated		28.8***		14.5***
Cons.	52.8***	24.0***	54.7***	40.2***

Sample: individuals who had no income or a yearly income lower than the minimum mensual wage before divorce. They are considered to have increase their participation when,after divorce,their yearly income is higher than the minimum mensual wage.
Lecture: Linear probability models.

Table 4.D.4: Presence of unemployemt benefits after divorce when none before, women & men

	Women		**Men**	
	Divorcees	Divorcees with ctrl gp	Divorcees	Divorcees with ctrl gp
	(1)	(2)	(3)	(4)
Treated		3.0***		2.4***
Cons.	9.7***	6.7***	8.4***	6.0***

Sample: individuals who had no unemployment benefits and a non-zero individual income before divorce.
Lecture: Linear probability models.

4.E Tables of quantile regressions

Table 4.E.1: Median regressions : Changes in living standards and changes in labor and UI income for women

	Women			
	Changes in living standards		Changes in labor and UI income	
	Divorcees	Divorcees with ctrl gp	Divorcees	Divorcees with ctrl gp
	(1)	(2)	(3)	(4)
Number of children				
0	$-8,4^{***}$	$-6,8^{***}$	$-0,2^{*}$	$0,3^{***}$
1	Ref.	Ref.	Ref.	Ref.
2	5^{***}	$4,4^{***}$	$1,2^{***}$	$-0,4^{***}$
3 or more	$4,5^{***}$	$6,3^{***}$	$1,2^{***}$	$-0,5^{***}$
Share of income provided by man before separation				
$< 20\%$	$47,7^{***}$	$32,6^{***}$	$-5,8^{***}$	$-4,5^{***}$
20-40%	$36,9^{***}$	$34,8^{***}$	$-4,2^{***}$	$-3,1^{***}$
40-60%	$16,4^{***}$	$16,8^{***}$	$-2,7^{***}$	$-2,3^{***}$
60-80%	Ref.	Ref.	Ref.	Ref.
$> 80\%$	$-9,3^{***}$	$-9,8^{***}$	$31,5^{***}$	$31,9^{***}$
Quintile of income before separation				
1^{st}	$40,8^{***}$	34^{***}	$6,1^{***}$	$3,9^{***}$
2^{nd}	9^{***}	$9,1^{***}$	$1,1^{***}$	$1,1^{***}$
3^{rd}	Ref.	Ref.	Ref.	Ref.
4^{th}	$-4,9^{***}$	$-5,5^{***}$	$-0,5^{***}$	$0^{(ns)}$
5^{th}	$-13,6^{***}$	$-13,7^{***}$	$-1,6^{***}$	$-0,7^{***}$
Cons.	$-28,8^{***}$	$-30,2^{***}$	$7,6^{***}$	$4,1^{***}$

*Note: Median regressions. Standard errors are computed by subsampling. *, **, *** denote significance at the 10%, 5%, and 1% levels respectively.*
Lecture: The living standard of women with 1 child, whose husbands provided between 60 and 80% of couple earnings before divorce and who were in couple from the 3^{rd} quintile of income (the reference category), decreases by -30.2% compared to control group (column (2)). Their labor and UI income increases by $+4.1\%$.
Source: Divorced women sample from French exhaustive income-tax returns database, 2009.

Table 4.E.2: Median regressions : Changes in living standards and changes in labor and UI income for men

	Men			
	Changes in living standards		Changes in labor and UI income	
	Divorcees	Divorcees with ctrl gp	Divorcees	Divorcees with ctrl gp
	(1)	(2)	(3)	(4)
Number of children				
0	$-7,3^{***}$	$-6,3^{***}$	$0,2^{(ns)}$	$0,5^{***}$
1	Ref.	Ref.	Ref.	Ref.
2	$2,3^{***}$	$1,3^{***}$	$0^{(ns)}$	$-0,1^{***}$
3 or more	$0,2^{(ns)}$	1^{***}	$-0,4^{***}$	$-0,7^{***}$
Share of income provided by man before separation				
$< 20\%$	$-12,5^{***}$	$-20,2^{***}$	$73,7^{***}$	$12,2^{***}$
20-40%	$-31,6^{***}$	$-32,5^{***}$	$6,2^{***}$	$2,1^{***}$
40-60%	$-17,6^{***}$	$-17,4^{***}$	$1,4^{***}$	$0,3^{***}$
60-80%	Ref.	Ref.	Ref.	Ref.
$> 80\%$	$16,9^{***}$	15^{***}	$-1,8^{***}$	$-0,9^{***}$
Quintile of income before separation				
1^{st}	$12,8^{***}$	$6,2^{***}$	$2,6^{***}$	$-0,1^{*}$
2^{nd}	$3,1^{***}$	$2,6^{***}$	$0,9^{***}$	$0,2^{***}$
3^{rd}	Ref.	Ref.	Ref.	Ref.
4^{th}	$0,2^{(ns)}$	$-0,9^{***}$	$0^{(ns)}$	$0,3^{***}$
5^{th}	$0,3^{(ns)}$	$0,4^{***}$	$-0,5^{***}$	$0,3^{***}$
Cons.	3^{***}	$1,8^{***}$	$3,4^{***}$	$-0,9^{***}$

*Note: Median regressions. Standard errors are computed by subsampling. *, **, *** denote significance at the 10%, 5%, and 1% levels respectively.*
Lecture: The living standard of men with 1 child, who provided between 60 and 80% of the couple earnings before divorce and who were in couple from the 3^{rd} quintile of income (the reference category), increases by $+1.8\%$ compared to control group (column (2)). Their labor and UI income decreases by -0.9%.
Source: Divorced men sample from French exhaustive income-tax returns database, 2009.

Table 4.E.3: Median regressions: Variations of living standards, by number of children

	Women				**Men**			
	Before transfers	With private transfers	Total living standard	With control group	Before transfers	With private transfers	Total living standard	With control group
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
All	$-37,9^{***}$	$-32,5^{***}$	-19^{***}	$-21,8^{***}$	$11,9^{***}$	5^{***}	$-2,2^{***}$	$-5,1^{***}$
0	$-30,6^{***}$	$-29,3^{***}$	$-24,8^{***}$	$-26,5^{***}$	$-8,3^{***}$	$-9,5^{***}$	$-11,6^{***}$	$-13,4^{***}$
1	$-35,6^{***}$	$-31,3^{***}$	$-19,3^{***}$	$-22,4^{***}$	$5,6^{***}$	$0,2^{(ns)}$	$-4,3^{***}$	$-6,8^{***}$
2	$-38,6^{***}$	$-31,6^{***}$	$-17,7^{***}$	$-21,2^{***}$	$18,9^{***}$	$8,7^{***}$	$0,1^{(ns)}$	$-3,3^{***}$
≥ 3	-50^{***}	$-40,6^{***}$	$-15,5^{***}$	$-17,6^{***}$	51^{***}	$34,9^{***}$	$8,1^{***}$	5^{***}

Lecture: Medians of changes.

Table 4.E.4: Median regressions: Variations of living standards, by share of earnings provided by man before separation.

	Women				**Men**			
	Before transfers	With private transfers	Total living standard	With control group	Before transfers	With private transfers	Total living standard	With control group
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
All	$-37,9^{***}$	$-32,5^{***}$	-19^{***}	$-21,8^{***}$	$11,9^{***}$	5^{***}	$-2,2^{***}$	$-5,1^{***}$
< 40 %	$5,6^{***}$	$7,4^{***}$	$9,1^{***}$	$1,6^{***}$	$-27,4^{***}$	-30^{***}	$-22,5^{***}$	$-27,2^{***}$
40-60 %	$-27,1^{***}$	$-23,5^{***}$	$-17,8^{***}$	$-19,5^{***}$	$-7,1^{***}$	$-10,6^{***}$	$-15,1^{***}$	$-16,5^{***}$
> 60 %	$-56,1^{***}$	-48^{***}	-26^{***}	$-28,9^{***}$	$38,1^{***}$	$27,2^{***}$	13^{***}	$9,3^{***}$

Lecture: Medians of changes.

Table 4.E.5: Median regressions: Changes in living standards for different equivalence scales, for women.

	Women							
	Divorcees				**Divorcees with control group**			
	OECD	Square root variant	Loneparent variant	Non custodial parent variant	OECD	Square root variant	Loneparent variant	Non custodial parent variant
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of children								
0	$-8,4^{***}$	$-4,7^{***}$	$3,1^{***}$	$-7,7^{***}$	$-6,8^{***}$	$-2,2^{***}$	5^{***}	-6^{***}
1	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
2	5^{***}	$4,2^{***}$	$6,3^{***}$	$5,2^{***}$	$4,4^{***}$	3^{***}	$5,7^{***}$	$4,7^{***}$
3 or more	$4,5^{***}$	$4,5^{***}$	8^{***}	$4,7^{***}$	$6,3^{***}$	$5,1^{***}$	$9,9^{***}$	$6,5^{***}$
Share of income provided by man before separation								
$< 20\%$	$47,7^{***}$	$49,1^{***}$	48^{***}	$48,2^{***}$	$32,6^{***}$	$34,4^{***}$	$32,9^{***}$	33^{***}
20-40%	$36,9^{***}$	$37,3^{***}$	$36,2^{***}$	$37,7^{***}$	$34,8^{***}$	$35,5^{***}$	$34,1^{***}$	$35,6^{***}$
40-60%	$16,4^{***}$	$16,4^{***}$	$15,9^{***}$	$16,8^{***}$	$16,8^{***}$	$16,7^{***}$	$16,3^{***}$	$17,3^{***}$
60-80%	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
$> 80\%$	$-9,3^{***}$	$-9,2^{***}$	-9^{***}	$-9,3^{***}$	$-9,8^{***}$	$-9,9^{***}$	$-9,6^{***}$	$-9,9^{***}$
Quintile of income before separation								
1^{st}	$40,8^{***}$	41^{***}	$41,1^{***}$	$41,3^{***}$	34^{***}	$34,7^{***}$	$34,3^{***}$	$34,5^{***}$
2^{nd}	9^{***}	$9,3^{***}$	$9,4^{***}$	$9,2^{***}$	$9,1^{***}$	$9,3^{***}$	$9,4^{***}$	$9,3^{***}$
3^{rd}	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
4^{th}	$-4,9^{***}$	$-4,6^{***}$	$-4,8^{***}$	-5^{***}	$-5,5^{***}$	$-5,3^{***}$	$-5,4^{***}$	$-5,5^{***}$
5^{th}	$-13,6^{***}$	$-13,3^{***}$	$-13,4^{***}$	$-13,7^{***}$	$-13,7^{***}$	$-13,6^{***}$	$-13,5^{***}$	$-13,8^{***}$
Cons.	$-28,8^{***}$	$-35,9^{***}$	$-37,3^{***}$	$-29,6^{***}$	$-30,2^{***}$	$-37,6^{***}$	$-38,6^{***}$	-31^{***}

*Note: Median regressions. Standard errors are computed by subsampling. *, **, *** denote significance at the 10%, 5%, and 1% levels respectively.*

Lecture: The living standard of women with 1 child, whose husbands provided between 60 and 80% of couple earnings before divorce and who were in couple from the 3^{rd} quintile of income (the reference category), decreases by -30.2%, compared to the control group, when OECD equivalence scale is used (column (5)), by -37.6% when computed with the square root equivalence scale (column (6)), by -38.6% when computed according to the "loneparent variant"(column (7)) and by -31% when computed according to the "non custodial parent variant" (column (8)) (cf. main text for explanations about these variants).

Source: Divorced women sample from French exhaustive income-tax returns database, 2009.

Table 4.E.6: Median regressions: Changes in living standards for different equivalence scales, for men.

	Men							
	Divorcees				**Divorcees with control group**			
	OECD	Square root variant	Loneparent variant	Non custodial parent variant	OECD	Square root variant	Loneparent variant	Non custodial parent variant
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of children								
0	$-7,3^{***}$	$-5,5^{***}$	$-2,5^{***}$	$-2,6^{***}$	$-6,3^{***}$	$-3,5^{***}$	$-1,5^{***}$	$-1,5^{***}$
1	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
2	$2,3^{***}$	$0,1^{(ns)}$	$0,9^{**}$	$-0,5^{*}$	$1,3^{***}$	$-1,5^{***}$	$-0,1^{(ns)}$	$-1,5^{***}$
3 or more	$0,2^{(ns)}$	$-5,3^{***}$	$0^{(ns)}$	$-7,1^{***}$	1^{***}	$-5,5^{***}$	$0,8^{***}$	$-6,4^{***}$
Share of income provided by man before separation								
$< 20\%$	$-12,5^{***}$	$-12,6^{***}$	$-11,9^{***}$	$-13,3^{***}$	$-20,2^{***}$	$-19,6^{***}$	$-19,6^{***}$	$-20,9^{***}$
20-40%	$-31,6^{***}$	$-31,9^{***}$	$-30,4^{***}$	$-32,6^{***}$	$-32,5^{***}$	$-32,7^{***}$	$-31,4^{***}$	$-33,6^{***}$
40-60%	$-17,6^{***}$	$-17,6^{***}$	$-17,8^{***}$	$-17,6^{***}$	$-17,4^{***}$	$-17,5^{***}$	$-17,7^{***}$	$-17,5^{***}$
60-80%	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
$> 80\%$	$16,9^{***}$	$17,1^{***}$	$16,8^{***}$	$16,8^{***}$	15^{***}	$15,3^{***}$	$14,8^{***}$	$14,9^{***}$
Quintile of income before separation								
1^{st}	$12,8^{***}$	$13,1^{***}$	$14,5^{***}$	$10,8^{***}$	$6,2^{***}$	$6,9^{***}$	$7,8^{***}$	$4,3^{***}$
2^{nd}	$3,1^{***}$	$3,4^{***}$	$3,7^{***}$	$2,6^{***}$	$2,6^{***}$	3^{***}	$3,2^{***}$	$2,1^{***}$
3^{rd}	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
4^{th}	$0,2^{(ns)}$	$-0,2^{(ns)}$	$-0,6^{(ns)}$	$0,2^{(ns)}$	$-0,9^{***}$	$-1,2^{***}$	$-1,7^{***}$	$-0,9^{***}$
5^{th}	$0,3^{(ns)}$	$-0,8^{**}$	$-0,9^{**}$	$0,2^{(ns)}$	$0,4^{***}$	-1^{***}	$-0,8^{***}$	$0,3^{**}$
Cons.	3^{***}	$-4,6^{***}$	$-2,1^{***}$	$-1,7^{***}$	$1,8^{***}$	$-6,6^{***}$	$-3,3^{***}$	$-2,9^{***}$

*Note: Median regressions. Standard errors are computed by subsampling. *, **, *** denote significance at the 10%, 5%, and 1% levels respectively.*

Lecture: The living standard of men with 1 child, who provided between 60 and 80% of the couple earnings before divorce and who were in couple from the 3^{rd} quintile of income (the reference category), increases by +1.8% when the OECD equivalence scale is used (column (5)), decreases by −6.6% when computed with the square root equivalence scale (column (6)), by −3.3% when computed according to the "loneparent variant"(column (7)) and by -2.9% when computed according to the "non custodial parent variant" (column (8)) (cf. main text for explanations about these variants).

Source: Divorced men sample from French exhaustive income-tax returns database, 2009.