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The gendered economic consequences of union dissolution after 50

Léa Cimelli

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UNIVERSITÉ PARIS I PANTHÉON SORBONNE
ED d'économie
Laboratoire de rattachement : INED (UR9)

THÈSE
Pour l'obtention du titre de Docteur en économie
Présentée et soutenue publiquement
le 22 Novembre 2023 par
Léa CIMELLI

*The gendered economic consequences of union dissolution
after 50*

**Les conséquences économiques genrées des dissolutions d'union après 50
ans**

Sous la direction de Mme Carole Bonnet et Mme Anne Solaz, directrices de recherche
à l'INED.

Membres du Jury :

- Mme. Cécile Bourreau-Dubois, professeure, Université de Lorraine
- M. Clément Carbonnier, professeur, Université Paris 8 Vincennes-Saint-Denis
- M. Bertrand Garbinti, chercheur, CREST-ENSAE
- M. Mathieu Lefebvre, professeur, Aix-Marseille School of Economics
- Mme. Muriel Roger, professeure, Université Paris 1 Panthéon-Sorbonne (présidente
du jury)

À ma mère,

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Abstract

English abstract

This dissertation investigates the economic consequences of union dissolutions involving individuals over the age of 50 in France. It focuses on marriage dissolutions through divorce or widowhood.

This research is inspired by an important demographic trend: an increase in the share of the divorced and a drop in the share of the widowed in the over-50 population. Union dissolution is a gendered economic shock, making women more economically vulnerable than men. France is an interesting framework for analysis, because of its policies managing the economic consequences of union dissolutions, which are highly segmented between divorce and widowhood. Against the backdrop of an ageing population, the demographic shift between divorcees and widows in France raises concerns about the increased economic vulnerability of older women in the future.

The chapters that compose this thesis use administrative panel data recently made available to research. They use tax return data for the period 2010 to 2019 from the permanent demographic sample (*échantillon démographique permanent*, EDP), a representative sample of 4.4% of the French population. To measure the effect of union dissolutions

on living standards and other income variables, we use a difference-in-differences framework with event study and staggered treatment. This model is estimated using two-way fixed effects and more recent methods (interacted estimator by Sun and Abraham (2021)), which are part of a movement in econometrics to re-examine these models.

The first chapter measures the effect of grey divorce (divorce happening after 50 years old) on men’s and women’s living standards. It highlights the equalizing power of public and private transfers with regard to the gender gap in the variation in living standards due to divorce, as well as its limits. The second article quantifies the impact of widowhood on living standards of retired men and women aged 55 years old and older. It assesses the main pillar of French economic protection against widowhood, the survivor’s pension system, against the goal of maintaining living standards around spouse’s death. The final article examines individual strategies for mitigating the economic consequences of grey divorce by measuring its impact on retirement behavior. In particular, it tests whether the response in terms of delaying retirement is proportionate to the shock in living standards incurred at the time of divorce.

Keywords:

Divorce - Living standards - Public transfers - Private transfers - Alimony - Grey divorce - Ageing - Elderly - Widowhood - Gender inequalities - Survivor’s pension - Retirement - Remarriage - Marital specialization - Older workers - Inactive

Résumé français

Cette thèse porte sur les conséquences économiques des dissolutions d’union impliquant des individus de plus de 50 ans en France. Elle se focalise sur les dissolutions de mariage

par le divorce ou le veuvage.

Cette recherche est inspirée par une évolution démographique importante : une croissance de la part des divorcés et une baisse de la part des veuves dans la population des plus de 50 ans. Les dissolutions d’union représentent des chocs économiques genrés, fragilisant plus les femmes que les hommes. La France est un cadre d’analyse intéressant, à cause de son système de prise en charge des conséquences économiques des dissolutions d’union très segmenté entre divorce et veuvage. Dans un contexte de vieillissement de la population, le glissement démographique entre divorcés et veufs, pousse en France à s’inquiéter d’une vulnérabilité économique accrue des femmes âgées à l’avenir.

Les articles qui composent cette thèse utilisent des données de panel administratives récemment mises à disposition de la recherche. Nous exploitons, les données des déclarations fiscales, sur la période 2010 à 2019, issues l’échantillon démographique permanent (EDP), un échantillon représentatif de 4.4% de la population française. Pour mesurer l’effet des dissolutions d’union sur le niveau de vie et d’autres variables de revenu nous utilisons un modèle de type différence-de-différences avec analyse d’événements et traitement échelonné. Ce modèle est estimé par modèles à double effets fixes et des méthodes plus récentes (Sun and Abraham (2021)) qui participent d’un mouvement de ré-examen de ces modèles en économétrie.

Le premier article mesure l’effet du divorce sur le niveau de vie des hommes et des femmes de plus de 50 ans, devenant ainsi un des premiers articles à documenter le versant économique des divorces gris. Il met en valeur le pouvoir égalisateur des transferts publics et privés vis-à-vis des inégalités femmes-hommes, ainsi que ses limites. Le second article s’emploie à quantifier l’impact du veuvage sur le niveau de vie des retraités de plus de 55 ans. Il évalue le pilier de la protection française contre les conséquences économiques du veuvage, la réversion, à l’aune de l’objectif de maintien du niveau de vie. Le dernier arti-

cle, questionne les stratégies individuelles d'atténuation des conséquences du divorce gris en mesurant l'impact de ce dernier sur les comportements de départ en retraite. Il teste en particulier si la réponse en termes de retardement du départ en retraite est proportionnée au choc de niveau de vie encouru lors du divorce.

Mots-clefs:

Divorce - Niveau de vie - Transfert public - Transfert privé - Prestation compensatoire - Divorce gris - Vieillesse - Inégalité de genre - Veuvage - Pension de réversion - Retraite - Remariage - Spécialisation conjugale - Emploi des séniors - Inactifs

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Chapter 1

General introduction

This PhD dissertation focuses on the economic consequences of union dissolution in the second part of the life cycle, for people aged 50 years old and older. Unions under consideration are formal unions, and more specifically marriage of heterosexual couples. This type of union can end with the separation of spouses (divorce) or the death of one of them (widowhood). The present dissertation deals with both types of dissolution.

First, this introduction presents the demographic trend that inspired this dissertation: the increasing weight of the divorced and the decreasing weight of the widowed in the population over 50. I present these two types of union dissolution as potential economic shocks affecting women and men unequally. In the second part, I explain the rationale behind state intervention in the management of the economic consequences of union dissolutions. The French public policy context is described, which is characterized by segmentation between the treatment of the consequences of divorce and widowhood. Finally, I introduce the research questions structuring this dissertation:

- What are the causal effects of divorce and widowhood on the living standards of men

and women over 50?

- To what extent do state-supported public and private transfers limit the magnitude of the dissolution's shock and the resulting gender differentials?
- Are the over-50s using the labour market to adapt to their new marital environment?

The last part introduce the data and methods used to answer these questions. The research articles that are the core of this dissertation are summarized.

1.1 Demographic changes spark economic questions

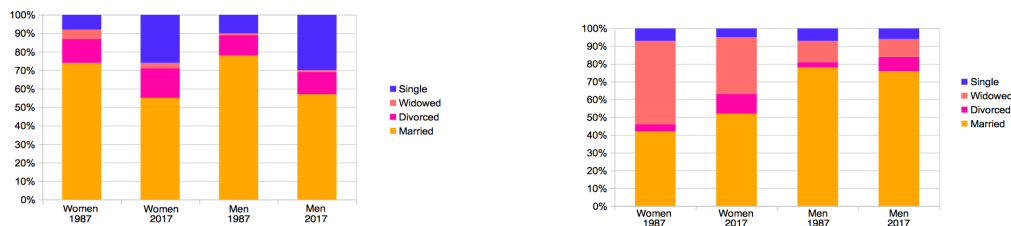
1.1.1 Marital status after 50: more divorcees, less widows

Ageing in European societies has lead to increased interest in the matrimonial lives of the elder. It has been found that the marital statuses of the over-50s have changed significantly since the 1980s. In France, between 1987 and 2017, there has been a trend towards a diversification of marital statuses characterised by an increased prevalence of divorce and a reduced prevalence of widowhood.

France's register of birth, marriage and death show that marriage is the most common marital arrangement during the period (figure 1.1 and figure 1.2). When getting older, marriage is more prevalent for men than for women, as the latter are more affected by widowhood and remarry more rarely after a union has ended (Vespa [2012] ; Schimmele and Wu [2016]). At 50 years old, in 2017, 57% of men and 55% of women are married ; at 75 years old, 76% of men and only 52% of women are married. The proportion of divorced people over 50 is increasing. On average, it rises from 12% to 14% at 50, and

from 4% to 10% at 75 between 1987 and 2017. Conversely, the widowed's share is falling. This particularly affects women. Widows¹ share in the female population fell from 5% to 3% at 50 and from 47% to 32% at 75 between 1987 and 2017. The share of never-married people increases at 50, rising from 8% to 26% for women and from 10% to 30% for men, on the same period. These dynamics have an ambiguous effect on the married. Their share decreases at 50 as a result of the growing number of divorced and single people. Yet, in the wake of a reduction in widowhood, it increases at age 75 for women. At both ages, the composition of the population by marital status is more diverse in 2017 than it was in 1987.

Figure 1.1: Marital status of the 50 years old Figure 1.2: Marital status of the 75 years old



Source: INSEE, mainland France).

Between 1987 and 2017, the baby-boom generation joined the over-50s. In their youth, this generation experienced profound changes in unions and break-ups. As it ages, it seems to be encountering new ones in the timing of matrimonial event: informal union and divorce are spreading after 50 while becoming widowed shift towards older ages.

Cohabitation (also known as “informal union”) is now more prevalent after 50 than among previous generations. In the United-States, the number of people in cohabiting unions aged over 50 doubled from 1.2 million in 2000 to 2.75 million in 2010 (Brown et al.

¹National registers only consider as "widowed" the married people losing their partner's due to death.

[2012]). Compared with younger cohabitants, the over-50s are more likely to consider their union as "stable". It suggests that this form of union is a long-term alternative to marriage for them (King and Scott [2005]). In figure 1.1, the increased prevalence of informal unions contribute to the married's declining weight in the population. Indeed, people in informal unions are legally recorded as single, divorced or widowed. Informal unions lead to specific dissolution either through break-up or death of one of the partners. Unfortunately, most of the time french administrative data do not record informal union dissolution. Even when they can be identified, distinguishing between death and break-up is still a challenge.

Divorcing after the age of 50 is more common than before. The proportion of the population divorced at a given age, also known as the prevalence of divorce, conceals the age at which divorce occurs. The increase in divorce's prevalence after 50 is linked to two factors: the ageing of a large generation which experienced the democratisation of divorce and is already divorced by the age of 50, and an increase in the incidence of divorce after this age. This increase in the incidence, or rate, of divorce has been named the "grey divorce revolution" (Brown and Lin [2012]). It has been identified in several developed countries (Alderotti et al. [2020]). In the United-States, after a significant growth between 1990 and 2010, the divorce rate among the 50-64 year-olds is stabilising. The divorce rate is still rising for the over-65s (Brown and Lin [2022]), which has led to wonder about the unique nature of this revolution, which may be specific to the baby boomers (Raley and Sweeney [2020]). In France, divorce rates have been falling in the general population since the early 2000s. However, it continues to increase for the over 50s. Between 2005 and 2015, divorce rates have increased from 11.9 to 13.7² for men aged 50 to 55 years old and 9.7 to 11.7 for women. It has increased from 2.2 to 2.8 for men 60 and older, and 1.5 to 2 for

²The divorce rate is defined as the number of newly divorced age X for a 1000 married individuals aged X, a given year.

women (Solaz [2021]).

As a result of longer life expectancy, widowhood is occurring later in life (Dabergott [2022]). In France, between 2010 and 2020, among people widowed after 50 years old, the share of 75 years old and older rose from 63% to 75% for men and from 56% to 61% for women³. Gains in life expectancy are reflected in longer life spent as a couple (Pennec and Gaymu [2011]). The gendered gap in life expectancy is narrowing which contributes to a less unbalanced sex ratio of widowers to widows than previously. In France, between 2010 and 2020, the share of men among the newly widowed older than 50 has risen from 28% to 34%⁴. However, men appear to remain widowed for shorter periods than women. They remarry more or die earlier after their spouse than women.

Being a couple affects people’s living condition through ageing (Gaymu et al. [2008]). In particular, older people living alone (regardless of their marital status) tend to have a lower standard of living than coupled individuals of the same age (Arnold and Lelièvre [2015] ; COR [2019]). This goes hand in hand with a higher poverty rate. Women are particularly affected, which has led to warn of the “impoverishment of older women” (Nozay [2009]). This differential is worrying and raises questions. It may be linked to a selection effect. The people whose union dissolve may have distinct characteristics from continuously married couples, associated with less positive outcomes. The above-mentioned gap may also be a direct consequence of the union dissolution. This thesis attempts to assess the latter.

1.1.2 Union dissolution: an economic shock

Union dissolution can be a large economic shock for the people involved. There are immediate costs to dissolution such as legal fees, funeral expenses or moving expenses. These

³Those numbers are computed from INSEE’s population estimate. See general appendix.

⁴Idem.

short-term costs, which can be significant, are not the subject of this thesis. More important and more lasting, union dissolution also affects the household's income streams, its stock of assets and the economies of scale associated with its expenditure. Our analysis will focus on these consequences.

When a union falls apart, the ex-partner's earnings are no more available. Therefore, the shock is all the greater if the spouse contributed a large proportion of the household's resources. This explains why, on average, the effect of union dissolution on income is more negative for women than for men. Nowadays, men remain the main contributors to household income⁵. At the same time, union dissolution affects the household's net worth⁶. Ending a formal union, by divorce or death, usually implies liquidating assets' community. The liquidation process is determined by the matrimonial property regime chosen at the time of marriage. In France, the default marital property regime is based on limited assets community. All assets acquired during marriage are common, but assets owned before union are out of the community. To that kind of asset sharing may be added other asset transfers between spouses through inheritance in the case of widowhood or spousal alimony in the case of divorce.

When a household is dissolved, it shrinks and its expenses fall. However, living expenses usually fall less than proportionally with the size of a household. For a household shrinking from two persons to one, expenses will decline by less than half. This is due to the scale economies associated with the pooling of resources and expenditures. Living standard is a measure used to compare the economic situation of different-size households. It can also be used to compare an household over time following a change in its composition. Living

⁵In 2011, women between 18 and 59 years old contributed in average to 36% of their couple's aggregated income. Married women contribute only 34% and unmarried women to 41% (Morin [2014])

⁶The net worth of an household is the sum of its assets reduced by its debts.

standard is defined as aggregate household income adjusted for its size by an equivalence scale. Equivalence scales are used to quantify economies of scale. In particular, when a union is dissolved, two influences are exerted on living standard: aggregate income falls and so does expenditure, the latter is taken into account by the equivalence scale, which is an increasing function of the household's size. These two mechanisms have an ambiguous effect on living standards, one pushing them down, the other pushing them up. The dominant effect for an individual, and therefore the variation in living standards, will depend on the person's contribution to household income for a given equivalence scale. Figure 1.3 illustrates the particular case of the change in living standard for a person living alone after union dissolution, with a constant income, using the modified OECD equivalence scale⁷. If the person's pre-dissolution income contribution is less than 67%, the living standard falls between the coupled and uncoupled periods. The income effect dominates. For an income contribution more than 67%, the living standard increases. The expense reduction effect is dominant. Though union dissolution has a negative effect on everyone's aggregate income, it does not have a similarly universal negative effect on living standards. When one considers this measure of the economic situation of households, one showcases that union dissolution can create "winners" and "losers".

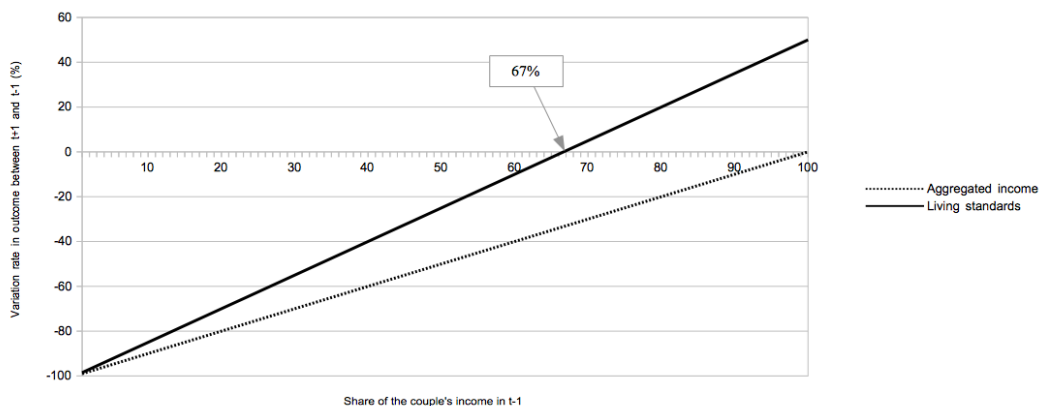
Individuals have a number of levers at their disposal to cushion this economic shock. They can be used before the end of the union, which is called an anticipation effect, or afterwards, an adaptation effect. There are three types of levers:

1. Market levers. Individuals can turn to markets to improve their economic situation.

The literature considers two main markets: the labour market and the marriage market. The drop in income caused by union dissolution can be partially or totally

⁷This 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 younger child.

Figure 1.3: variation in aggregated household income and living standards upon union dissolution according to past contribution to household income



Notes: the household is composed of a couple. Pre-union dissolution, according to the OECD modifier equivalence scale, consumption unit for that household is 1.5. At that time, each partner contributes to the household income. Contribution can go from 0% to 100%. Post-union dissolution, a person only has their personal income, which is fixed. Consumption unit is 1.

averted by substituting the former spouse's income with increased personal income (by increasing the labour supply on the intensive or extensive margin) or a new life partner's income.

2. Family solidarity levers. Individuals can receive support from their families through monetary transfers or transfers in kind. In the case of divorce, the law can organize that solidarity through mandatory private transfers (spousal alimony and children maintenance payments) between former spouses.
3. Social solidarity transfers. People going through union dissolution may be entitled to public transfers. These transfers may be targeted: widow's/widower's benefit, survivor's pension, single parent's benefits... Or they may be social transfers to which individuals gain access because of dissolution's negative effect on their income: family allowances, housing, minimum social benefits...

Union dissolution's economic consequences are likely to differ depending on its timing in the life cycle. Older couples have a specific economic situation, they tend to have more assets (Baclet [2006] ; Gleizes et al. [2018]). Their household has a different composition. Indeed, they are less likely to have dependent children, which entails no access to children specific transfers (single parent benefits, child maintenance payments). They are also more constrained in the activation of market levers. Adapting the labour supply is limited by retirement. For individuals in employment, retirement can be a secondary economic shock. For those who are inactive, unemployed or already retired, a return to the labour market may be more complicated than at younger ages (Beck et al. [2017]). Though more and more older worker are employed, a growing share is nor employed nor retired, and most often do not choose it (Castelain [2023]). The marriage market is also more unfavourable with ageing. This mainly concerns women. Because of the higher mortality rate among men and the age gap in heterosexual couples in favour of men, the number of potential partners is lower for older women. The literature shows that women remarry less than men at all ages following the end of a union. Yet the gap widens with age (Raley and Sweeney [2020]).

Divorce and widowhood have similar economic consequences as they both entail a change in household structure. However, there are significant differences between the two events. Social solidarity is different whether union ends in divorce or widowhood. In a changing demographic context, with more grey divorcees and fewer widows, these differences in the way public policy deals with the economic consequences of ending a union need to be examined.

1.2 State intervention: justification and motivations to be redefined in the light of social change

1.2.1 Justifications for state intervention in the economic consequences of union dissolutions

Union dissolution can cause an economic shock. It raises two problems in terms of gender equality that the State may take an interest in:

- A micro-economic problem: opportunism in the couple and its consequences in terms of equity and efficiency⁸. Unitary models of family economics consider that a couple chooses how to allocate its labor power, between domestic and labor market activities, in order to maximize its well-being. This choice generally gives rise to a degree of specialization, with one person in the couple doing more domestic work and the other more labor market work (Becker [1991] ; Landes [1978])). Constant exchanges between domestic work and income from labor market unfold inside couples. Labor market income should be positively impacted by specialization. Indeed, with specialization the person with the greater earning potential has reduced responsibilities in domestic work and can devote more time to his or her paid activities. When a union dissolves, through divorce or widowhood, this exchange comes to an end. The person who specialized in labor market work continues to benefit from the income generated by that investment. Income may be higher than if specialization had never taken place. It may make it possible to outsource further domestic work, or it may

⁸This economic problem is linked to gender inequalities in today's society, but it would also arise in a society in which an equal number of men and women was specialized in domestic work, but in which domestic work was not economically valued.

confer an advantageous position on the marriage market to create a new union. The person who specialized in domestic work faces a different situation. Without legal protection, they no longer benefit from their former spouse's income, and the higher labor market income their domestic work allowed for. The longer the union duration and specialization, the more difficult it may be to re-enter the labor market or a new union. That person bears alone the weight of the opportunity cost associated with specialization in domestic work. This asymmetric economic position of the former partners raises an equity issue. The literature describes the situation of specialized couples as one that can structurally give rise to opportunism (Bourreau-Dubois and Doriat-Duban [2012]). This is individual opportunism, which can lead the spouse who has invested in the labor market to monopolize the gains of marriage through divorce. An efficiency issue arises from this equity breach. The couple may opt for inefficient specialization to avoid the costs associated with union dissolution for the person specializing in domestic work. This may result in insufficient domestic and care work being supplied.

- A macro-economic problem: union dissolutions increase global gender inequality in living standards by bringing intra-couple gender inequality into light. When women are in a couple, the difference in wages between men and women does not imply a difference in living standards. This is because traditional measures of living standards assume an equal sharing of household resources, an assumption that is debated (Bourguignon et al. [1993] ; Ponthieux [2012]). When the couple dissolves, and women no longer benefit from the pooling of resources, the differences between men's and women's wages are translated into differences in living standards. Wage inequalities between men and women narrowed in the past decades thanks to an

increase in women's education and participation in the labour market. In 2000, in France, women wages were in average 28% smaller than men's, in 2019, it is still 22% less (Roussel [2022]). Yet, women continue to hold lower-paid jobs, work more part-time (Georges-Kot [2020]) and experience more episodes of inactivity during their careers (Beaufils [2022]). These factors contribute to a less favourable economic situation for women than for men. As retirement pensions are based on an individual's entire career⁹, labor market inequalities also result in a pension gap. According to Geraci and Lavigne [2016], in 2011, the gender gap in pensions for individuals 65 years old and older in France is 40%, it is 37% among retirees. These pension inequalities are not about to disappear (Bonnet et al. [2012]). Underlying those labor market gaps, housework is still shared in an unequal way (Champagne et al. [2015]). As a result, within couples, on average, women earn 42% less than their male partners (Morin [2014]).

Those issue could be fixed through private insurance. Couples could get an insurance against the negative economic effects of union dissolution. Yet, insuring might be limited on the demand side, by cognitive biases and negotiations within the couple, which would justify State intervention.

- Cognitive biases limit a couple's ability to anticipate dissolution. In the case of marriage, individuals often display unrealistic optimism about the solidity of their union. In the case of divorce, it has been shown that if individuals correctly assess the divorce rate in the population, they tend to consider their own probability of divorce to be lower than average (Baker and Emery [1993]). To my knowledge, no similar work exists for the probability of being widowed. However, the literature

⁹Pension rights in France also take into account children, which reduce the gap in pension between men and women.

shows that individuals tend to underestimate their own mortality at near ages and overestimate it at further ages (Wu et al. [2015]). This unrealistic optimism is difficult to correct. Moreover, correction is not necessarily desirable, as optimism about the future of one's union is probably one of the factors contributing to its longevity (Williams [2008]). A second cognitive bias put forward is myopia. Myopia refers to the tendency of individuals, when making decisions, to not value the future as much as they believe they should. Individual anticipation of the economic consequences of union dissolution, through savings or insurance, are based on giving up present consumption for higher consumption in the future if the risk is realised. The literature tends to equate the short-sightedness of couples with regard to widowhood with the short-sightedness of individuals with regard to their own retirement (James et al. [2009]), thus justifying social insurance. The difficulties that stand in the way of a rational and effective choice by individuals to anticipate the end of an union do not only concern the probability of the union ending. They also concern its consequences. The duration of widowhood, an essential piece of information in an insurance reasoning, is difficult for individuals to anticipate, as it depends not only on individual life expectancy but also on joint life expectancy (Tréguier [2022] ; AlFakhri and Compton [2023]). Individuals are also unfamiliar with public support mechanisms, which can lead them to be over-optimistic about the protection they will receive at the end of their union (Baker and Emery [1993] ; Bonnet and Destré [2011] ; Belleau [2015]).

- Beyond cognitive biases, the demand for private protection against the economic consequences of union dissolution may be inhibited by negotiations within the couple (Smith [2003] ; James et al. [2009]). Insurance choice at couple level would consist of

forgoing present consumption in order to ensure a certain level of future consumption for the party most disadvantaged by the separation. Inter-temporal issues with insuring in that context have already been addressed. However, an inter-personal problem arises. In heterosexual couples, men tend to contribute more to the couple's income than their wives. The latter are more likely to be the disadvantaged party at the time of divorce or widowhood. They are therefore more likely to benefit from the fruits of insurance, while the consumption foregone by the couple in the current period is a cost for both members of the couple. In a context where men have more bargaining power through income and little need for protection, with limited altruism, it is likely that household choices reflect their preference more than the needs of their partner. The literature tends to show that the member of the couple with the final say on economic decisions tends to be more protected against the risk of widowhood than the other (Friedberg and Webb [2006] ; Babiarz et al. [2012]). It also shows that there are points in time when bargaining power is changing such as when the husband retires. These periods can lead the couple to adopt behaviours closer to the wife's interests (Lundberg et al. [2003]).

For a State interested in the above mentioned micro and macro issues raised by union dissolutions and marriage specialization, failures to use private insurance represent a justification for action. Two types of policies exist (Bourreau-Dubois and Doriat-Duban [2016]):

- Ex-ante policies: the aim here is to take preventive action. It is about helping women become economically independent throughout their life. It can be achieved through marriage specific policies, through the legal framework of divorce. The economic literature shows that the introduction of unilateral divorce in the United States had an impact on female activity, savings and the distribution of resources within

the household (Voena [2015] ; Olivetti and Rotz [2017b] ;Gonzalez and de Quinto [2021]). Ex-ante policies also encompass every policy fostering gender equality and more specifically women activity. This can be done through social spending, for example by funding a childcare system that allows women to continue working after giving birth.

- Ex-post policies: involves alleviating the cost of union dissolution once it has happened, often through transfers (public or private). Ex-post policies consist of union-based policy but also the general safety net. Among union-based policy trying to alleviate the economic consequences of union dissolution, there are parental and conjugal transfers. Parental transfers are due to parents undergoing union dissolution (ex: child maintenance payment, orphan benefits). Conjugal transfers are due to partners because of their union only (alimony, survivor's pension). The magnitude of transfers to be under-taken depends on the policy maker's objectives (see section 1.2.2 for a discussion of those objective in the case of the french system).

Taken aside, each of these policies groups is an ambiguous tool in the fight against gender inequality. Ex-post policies protect women and thus limit the macro-economic inequalities generated by dissolution. They may, however, encourage the gendered specialization at the very root of the inequalities being fought. Recent economic articles show that reducing the generosity of ex-post policies can lead to an increase in women's participation in the labour market at the time of union dissolution (Böheim and Topf [2021] ; Giupponi [2019] ; Fernández-Kranz et al. [2022] ; Verma [2021])¹⁰. Traditional gender specialization can therefore be seen as "subsidized". The question then arises as to how this subsidy is to be

¹⁰All these articles use localized estimation methods to assess causal effects. However, they do not allow us to know whether the effects evaluated may be generalized outside the cohorts used for which the reform is a salient event.

financed, whether internalized within the couple or externalized and financed by society as a whole. Ex-ante policies also raise questions in that they make women bear the full burden of erasing gendered specialization. Until equality is achieved in the specialization between domestic and labor market work, in the absence of ex-post policies, women tend to lose out economically at the time of union dissolution, while men gain. There is no perfect tool, and as a consequence no tool alone can fight economic gender inequality.

The terms of the micro-economic problem that gives rise to macro-economic inequalities are as follows: despite historical developments, men and women continue to invest differently in domestic work and labor market work. When a union breaks up, the central problem is the structural disadvantage and lost investment of those who have invested more in domestic work and less in the labor market. The solution to this problem cannot be totally private. State intervention should enable the restitution of the investment made (Carbone and Brinig [1990]), allowing individuals to anticipate and mediating between spouses to avoid the pitfalls of inter-personal negotiation. The following section outlines the ways in which the French state currently intervenes, and discusses these in the light of the conclusions drawn above.

1.2.2 In France, an asymmetrical system for the ex-post treatment of divorce and widowhood

In France, not all union dissolutions are treated equally by the State. First, there is a line separating formal and informal unions. On the one hand, cohabitation and civil partnership do not give the former partners any specific rights (inheritance, survivor's pension, spousal alimony...). Public policy only intervenes through the treatment of children and the general safety net. Marriage, on the other hand, opens up specific rights to ex-spouses, to which can

be added access to more universal social transfers. Second, the type of union dissolution, through death or separation, will modify these specific rights.

In France, the economic consequences of divorce are dealt with mainly by notaries and the courts. The main provisions are child maintenance and spousal alimony.

- Child maintenance (*"pension alimentaire"*, or *"contribution à l'entretien et l'éducation des enfants"*) is an economic contribution by the non-custodial parent to the upkeep of the children. It is not associated with marriage but with parenthood. It is either set in a consensual way, or is the subject of a court decision. There are indicative maintenance guidelines. These take into account the cost of children, the resources of the creditor and those of the debtor. Since 2014, a social security institution (*Caisse d'Allocations Familiales*, CAF), has been an intermediary between parents for the payment of maintenance. It also guarantees against unpaid pensions. For divorces involving children, this novelty contributes to a new "inter-dependency" between the judicial handling of divorce and social security (Grivel [2022]). In 2012, mothers had sole custody of their children in 74% of divorce rulings and proceedings involving children born out of wedlock. In this setting, the judge decides on maintenance in 83% of cases. The parent liable to pay maintenance is almost always the father (97%). In the majority of cases, parents agree on the amount of maintenance (63%). Where there is agreement, median amount is 150 euros per month per child. In the event of disagreement, it is lower, at around 120 euros, with judges most often setting the contribution between supply and demand (Belmoktar [2016]).
- Spousal alimony (*"prestation compensatoire"*) in France is an indemnity, that can be either an annuity or lump-sum. It is paid by the better-off spouse to the worse-off spouse after divorce. Spousal alimony can only be requested by married couples. It is

determined in a consensual way with the help of lawyers for mutual consent divorce. It is the subject of a court decision for contentious divorces. There is no indicative scale for determining these benefits, but a set of criteria that may be considered by judges. These criteria relate to the characteristics of the union (length of marriage, consequences of professional choices in relation to marital investment) and of the ex-partners (health, assets, professional situation, retirement situation). The absence of a scale makes the amount of a spousal alimony very difficult to anticipate. Women seem to appear reluctant to ask for such alimony (Nozay [2009]). In 2016, only 30% of women divorced aged between 55 and 64 years old received a compensatory spousal alimony¹¹. In 2013, only 19% of divorces gave rise to an entitlement to compensatory allowance (Belmokhtar and Mansuy [2016]). Nine times out of 10, the beneficiary is the wife. Spousal alimony is now mainly paid in the form of a lump sum, averaging 25,000 euros. Only one spousal alimony in ten involves annuity. In the latter case, it amounts to around 500 euros a month, for a total value of 126,000 euros. In line with the criteria used by judges, spousal alimony is more likely to involve older couples. The average age of the debtor is 50.5 and that of the beneficiary 48.3, for an average marriage duration of 20 years. Spousal alimony in the form of life annuities concerns both even older individuals and even longer marriages.

In France, the economic consequences of widowhood are mainly covered by the social security system. The main policies are widowhood benefits and survivor's pension.

- The widowhood benefit (*"allocation veuvage"*) is a means-tested temporary benefit paid to people under 55 who have lost their spouse¹². The allowance may be received

¹¹Source: "Rapport du conseil de l'âge sur les femmes séniors", 2019, HCFEA.

¹²The deceased must have been affiliated to a retirement scheme during at least 3 month in the year preceding his death. Civil servants' surviving spouses are excluded from that benefit because they can claim survivor's pension irrespective of their age.

for 2 years¹³, and is 662.7 euros per month in 2023. Yet, it may be reduced if the sum of the widow's resources and the benefit exceeds the ceiling (828.375 euros per month in 2023, labor market income are discounted). The widowhood benefit is suspended if you remarry. That policy reaches a limited number of people, 7,500 in 2014¹⁴. Almost all recipients are women (97%). The majority of people benefiting from it are aged between 50 and 54 (58%).

- The survivor's pension (*"pension de réversion"*) is a lifelong pension paid to people who have lost a spouse. It is a fraction of the deceased spouse's retirement pension. Like widowhood benefits, the survivor's pension is administered by the retirement schemes, with different rules applying to each scheme. For example, there is an age limit in the general scheme for private-sector employees (55 years) and in the private-sector supplementary schemes (60 years). There is no minimum age in the civil servants' scheme. The survivor's pension rate, i.e. the part of the spouse's pension that is given back to the widow, is 54% in the first scheme, 60% in the second and 50% in the third. A means test applies in the general private sector scheme, but not in the other two. Means testing is becoming increasingly common in European survivors' pension schemes. The French means test is quite uncommon as it takes into account not only the survivor's own resources but also the resources of other members of the household. In the general private sector scheme, therefore, remarriage does not automatically suspend entitlement to survivor's pension. Conversely, it suspends entitlement under the civil servants' scheme, and removes entitlement permanently under the complementary private sector schemes. In 2017, 4.4 million people received

¹³If death happens after 50, the payment may be continued until the widow reaches the minimum age for survivor's pension.

¹⁴Source: "Minima sociaux et prestations sociales", édition 2016, DREES.

a survivor's pension under all schemes combined. Recipients are in average 79 years old. The majority (88%) are women¹⁵. On average, for women, survivor's pension weighs 23% of their total pension. Also in 2017, France was in the middle of the OECD countries in terms of the share of survivor's pension expenditure in its GDP (1.5%), in its share in pension expenditure (13%), the number of beneficiaries relative to pensioners (25%) and the average amount of survivor's pension in relation to the average retirement pension (50%) (OECD [2018]).

In France, public policies about union dissolutions' economic consequences differ greatly between divorce and widowhood. However, these policies share common motivations and objectives, defining the ideal level of transfer. More specifically, three similar objectives are attributed to survivor's pensions and spousal alimony ((Bonnet and Hourriez [2012a]; Sterdyniak [2019]; ApRoberts [2008]; Tréguier [2022] ; Bourreau-Dubois and Doriat-Duban [2012] ; Bourreau-Dubois et al. [2016] ; Dandoy et al. [2016]):

1. An assistance objective to protect against poverty. Transfers following the dissolution of a union must enable beneficiaries to avoid falling into poverty.

Survivor's pension's assistance goal can be identified since the foundation of modern social security in 1945, in France. As France opted for a pay-as-you-go retirement system, survivor's pensions were justified by widows' poverty (Tréguier [2022]). Indeed at a time when the male breadwinner model was prevalent, losing one's husband meant losing one's main and often only income source. Rules organizing survivor's pensions were drafted as to prove that beneficiaries were in need of assistance. Initially, in the private sector employees's scheme, only a married survivor without claim to a personal retirement pension could get a survivor's pension. That rule was

¹⁵Source: "Les retraités et les retraites", édition 2019, DREES.

changed over time to both a limit on the combination between a survivor's pension and personal pension, and a means test. Those rules limited survivor's pensions to dependent wives (ApRoberts [2008]). The age limit (65 years old, now 55 years old) also acts as a proof of economic vulnerability because self-insurance on the labor market is likely not possible for the widow either retired or inactive on the labor market and close to retirement age.

Spousal alimony has also an assistance goal. Indeed, when it was created in 1975, it took over directly from the spousal maintenance payments allocated to the spouse not at fault in divorce. Initially, it was an extension of the duty to help ("*devoir de secours*") established by marriage (Moreau et al. [2006] ; Bourreau-Dubois and Doriat-Duban [2012]). Like maintenance payments, spousal alimony is set according to the needs of the spouse to whom it is paid and the resources of the creditor (Dandoy et al. [2016]). Prior to the 2000s, alimony was mainly paid as annuities. With a 2000 reform, the use of annuities has been limited, but is particularly targeted at individuals who have been largely economically weakened by divorce. Life annuities are intended for those who, because of their age or health, can no longer support themselves. This is known as a "private solidarity mechanism" ((Bourreau-Dubois and Doriat-Duban [2012])). The existence of a universal safety net to alleviate poverty tends to invalidate the assistance motive in the contemporary debate around survivor's pensions (OECD [2018]). Indeed, with an efficient safety net, any additional protection associated with marriage seems undue. The same reasoning could as a consequence be applied to the assistance justification for alimony.

2. Maintaining (or smoothing) the standards of living. Transfers are like insurance, and must enable the standard of living to be maintained in full, or in part, at the time

of dissolution.

Survivor's pensions have been insurance mechanisms since the creation of modern social security in France. Survivor's pension is a policy managed by the same organisation as retirement pensions. The replacement rate seems to have been set to meet the "smooth living standards" target. Initially in the private sector employees' scheme, a widow with no personal income would earn 50% of her husband's pension. In an historical context with a lot of wives out of job, policy makers' rational was that 50% of husband's earning would be sufficient to sustain half of the couple. It changed when scale economies were considered and the replacement rate grew to 54% in the 1970s. Increasing the rate to 60% to perfectly smooth living standards for a stay at home wife was considered but abandoned due to budgetary reasons. The smoothing of living standards is considered to be survivor's pensions main goal nowadays (OECD [2018]). In 2019, the Delevoye report intended to provide governments with directions for the creation of a universal pension system. It also aimed at clarifying survivor's pension goals. It proposes a single rule for calculating survivor's pension, which would be a pension enabling the widowed to reach 70% of the couple's total pension entitlements. The report adopts an objective of smoothing the standard of living. Yet, it reduce the definition of the latter to retirement earnings, excluding transfers and wealth income.

Standards of living are explicitly taken into account when establishing spousal alimony. Spousal alimony is designed to avoid excessive disparities in the former spouses' living standards. To this end, criteria consulted by judges include the income of both spouses at the time of divorce, as well as the couple's standard of living prior to the divorce. In this respect, the literature considers that spousal alimony in

France also has insurance characteristics (Bourreau-Dubois and Doriat-Duban [2012] ; Dandoy et al. [2016]). It can be observed that the objective of maintaining living standards is not as generous in the case of divorce as it is in the case of widowhood. Widowhood is often associated with an objective of total maintenance of the pre-widowhood standards of living, although income sources included may vary. Divorce is associated with limited maintenance, to avoid "excessive" differences between ex-spouses. This distinction arises from the fact that two individuals remain after divorce, and that it is not possible to guarantee both the same standards of living as before divorce solely on the basis of private transfers. However, this difference also calls into question the objective of smoothing the standard of living for widows up to 100%, which may be too generous as it compensate for both the loss of the deceased income and scale economies based on contribution from the whole population including the un-married.

3. The aim is to share the gains from marriage. There are two possible interpretations of this patrimonial logic. In one case, the transfer can recognize and proceed to the restitution of the domestic work oriented spouse's contribution to the other partner's earnings in the labor market (ensuring a return on investment). In another case, it may compensate for the sacrifices made by the spouse in his or her own professional career (compensating for an opportunity cost).

Relative to survivor's pensions, patrimonial characteristics can be best identified in the public sector and private sector complementary schemes. In both those schemes, there is no means testing limiting survivor's pensions, no condition on direct and indirect retirement pensions' combination, no maximum pension. In the public sector scheme, a survivor gets 50% of the deceased partner's pension irrespective of the

survivor's age. In the private sector complementary scheme, the survivor gets a 60% replacement rate starting at 60 years old. Those schemes are not trying to target survivors facing poverty or a decline in living standards. Though they may have some other characteristics of assistance and insurance, one of their core principles seems patrimonial.

Spousal alimony can be seen as repayment for a damage associated with specialization ("*indemnité*"). Between 1975 and 2004, that rationale played an increasingly important role in parliamentary debates on spousal alimony (Bouabdallah and Sayn [2016]). The question of marital specialization enters directly into the criteria considered by the judge and has played a greater role with each reform. In 1975, the criteria mentioned the time already devoted or to be devoted to raising the children. In 2004, it includes "the consequences of the professional choices made by one of the spouses during their life together, for the education of the children and the time that will still have to be devoted to it, or to favour the previous career of his or her spouse to the detriment of his or her own" (Bouabdallah and Sayn [2016]). The 2010 reform adds the criterion of the respective situations of the spouses in terms of retirement pensions, the latter reflecting the differentiated investments between the labour market and the domestic sphere.

In the current French system, survivor's pension and spousal alimony are inspired by each of these objectives. Regular calls for clarification on the nation scene echo an international debate on the legitimacy and goals of these policies in a context of increasing female investment in the labor market and lower prevalence of marriage.

Divorce and widowhood share central issues in terms of gender equality within the

couple and in society, with individuals facing the same obstacles to privately insure (see section 1.2.1). The mechanisms underlying their economic consequences are similar (see section 1.1.2), and current demographic dynamics suggest a trend towards more divorcees and less widows after the age of 50 (see section 1.1.1). This raises the additional question of whether the social treatment of the economic consequences of divorce and widowhood should be completely separated in France.

Another avenue of convergence exists. It is pension splitting. This system enables spouses to share pension rights acquired during their life together. It exists in various forms in Germany, Canada and Switzerland. In Germany, in particular, it is used both to settle the economic consequences of divorce, and as an alternative to survivor's pension in the event of widowhood.

Such a system has the advantage of directly addressing the central problem emphasized in the patrimonial logic - that of a return on investment and an opportunity cost associated with marital specialization. It also makes it possible to internalize costs at the couple level, and can therefore solve the problem of unmarried people contributing to finance the lifestyle of married couples in the current survivor's pension system. The pension system acts as a mediator between the spouses, and help overcoming the lack of foresight. Pension splitting can be used at no additional cost to the pension system, while also allowing for a possible premium in the division of rights in the case of widows, for example (Bonnet and Hourriez [2012b]).

Pension splitting seems a particularly good way of dealing with the problems associated with the dissolution of unions as we have outlined them, especially in the context of a changing demography where more and more divorces are taking place close to, or after, retirement, and where widowhood is no longer the only kind of union dissolution in old age. However, this system is not without its drawbacks. While compensation is almost

immediate for those whose union ends after age of 50, it arrives late for those whose union ends earlier. This policy should not be the only one in place. It can also only restore part of the investment in the spouse's career and the associated opportunity costs. Only part of the investment in the spouse's career is restored. In fact, it is likely that career choices made even before the couple is formed will be guided by the future need for care and domestic work associated with the couple and the family (Bessière and Gollac [2016]). Synergy with other policies aimed at an equal sharing of these activities is necessary to achieve greater gender equality. In the absence of efforts in this direction, this policy, like many protective policies for care-givers, could reinforce traditional gender roles. It should be noted here, however, that the increased costs of a dependant wife in the event of divorce could also represent an incentive for men not to accept their spouse's withdrawal from the labour market. The total effect would therefore be ambiguous. The novelty of these policies means that we have no clear-cut evidence of these two mechanisms, and further research is called for.

1.3 Dissertation's structure

1.3.1 Data and empirical strategies

The present dissertation seeks to assess the effect of marital dissolutions on various economic variables (individual income and its various sources, living standards). Evaluating these economic consequences requires tracking individual trajectories across different marital status. The literature recommend the use of panel data. A panel is a data-set in which the same individual is observed at several dates. Comparing married, divorced or widowed individuals at the same point in time can be misleading. The difference in economic

outcomes observed between these groups is not necessarily caused by union dissolution. Individuals facing those events may have different characteristics from the continuously married even before dissolution. Observing an individual first married then divorced (or widowed) through the years helps overcoming this shortcoming. Thanks to panel data, within variation can be used to assess the individual effect of dissolution. When several years of post-dissolution data are available, it is possible to determine whether a recovery is underway or whether a deterioration is developing on the long run. This question is all the more important here, as we are wondering whether, after 50 years, mechanisms reducing the burden of union dissolution over time are available. For these reasons, only panel data are used in the present dissertation. More precisely, it uses administrative panel data. I work on a french data-set, the permanent demographic sample (*échantillon démographique permanent*, EDP). Due to its selection rule, EDP is representative of the national population¹⁶. The sample gathers information on 4.4% of the French population. Union dissolutions are rare events, which makes it difficult to study them and in particular to assess age heterogeneous effects in surveys. EDP's size implies that we are not faced with this limitation. The EDP brings together several sources of information (civil status, tax data, employer data, electoral rolls, etc.). In this dissertation, only tax data are exploited. Tax data is the EDP's source which provides the most detailed observation on union dissolution' timing¹⁷, which is paramount to our work. It has two more advantages. First, there are annual tax data from 2010 to 2019¹⁸. These ten years of data make it possible to observe numerous marital events and assess their consequences over the medium

¹⁶It follows all persons, residing in France, born on the first four days of October, April and July, as well as January the 2nd, the 3rd, the 4th and the 5th.

¹⁷See: Costemalle [2017] and the general appendix.

¹⁸Because of that observation window, most of our chapters' samples revolve around people already married in 2010. It *de facto* excludes homosexual couples as marriage was opened to them in 2013.

term. Those data are very recent, the papers using it contribute to updating the literature. Second and more importantly, administrative income data is generally more accurate and correct than survey data.

Measuring the causal effect of union dissolutions is assimilated here to estimating the effect of a treatment in a context where the latter cannot be subject to randomisation. The framework adopted is difference-in-differences (DID) with a staggered treatment. A treatment is staggered when treated units are treated on different time periods. In order to have enough events to analyse, it is necessary to make full use of the panel data available to us by including people divorcing or losing their spouse in different years. That's why treatment is staggered in our case. The literature on difference-in-differences with staggered treatment has evolved considerably during the years I have devoted to my dissertation, and is still ongoing. The various projects that it encompasses are representative of this fast evolution and of the desire to adapt to this new state of our econometric knowledge.

Estimating a treatment's causal effect raises the fundamental problem of causal inference. Schematically, with a 2 periods panel data-set, for a treated unit we only have information before treatment (in period 1, the unit is untreated) and after treatment (in period 2, the unit is treated). It is not possible to have information on the same individual in period 2 in an untreated state. Hence, the counterfactual needed to calculate the effect of treatment does not exist. The difference-in-differences introduce a way to find that counterfactual. To estimate the treatment's effect, one should find a control group such that the outcomes' trend of the treated and control groups would have been similar over time in the absence of treatment. It has been explained earlier that a before-and-after comparison for the treated group avoids mixing a causal effect of the treatment with pre-existing differences in the level of variables of interest between the treated and untreated groups. The second difference, between the before-and-after variation of the treated group

and the control group, makes it possible to avoid mistaking a causal effect of the treatment for pre-existing differences in the outcome trends between the treated and non-treated groups. This method's validity relies on the assumption of parallel trends: in the absence of treatment, the treated group and the control group would have the same trajectory in outcome. This assumption cannot be tested directly because of the fundamental problem of causal inference described above. It is necessary to choose the control group carefully to ensure the credibility of such an assumption. Several control groups are used in this dissertation:

- No control group. In chapter 3, no control group is used. This chapter deals with widowhood during retirement. Retirees' incomes hardly vary over time. A control group therefore did not seem necessary to take into account the treated's outcomes' trend. The method is *de facto* based on a first difference rather than a double difference.
- A control group composed of people who have not experienced marital dissolution (the "non-treated"). This group is used in the appendix to chapter 2 and in chapter 4. Continuously married people are likely to differ from people experiencing marital dissolution. In difference-in-differences, a difference in the level of outcomes is not a bias-generating. Yet bias may result from different trajectories. It is the reason why this control group is only used for comparison purposes with the main specification in chapter 2. In Chapter 4, it is used because the legal retirement age limit hampers distinctions in labour market withdrawal behaviour between continuously married and divorced individuals.
- A control group composed of people who will experience marital dissolution in the future (the "later treated"). This method is used in Chapter 2 and Chapter 3's

appendix. Such a control group is increasingly used following Fadlon and Nielsen [2021]. Marital events may be subject to selection processes, which casts doubt on the possibility of parallel trend between a treated group and a never-treated group. The “later treated” undergo the same selection process as the “earlier treated”. They are likely to follow a similar economic trajectory. These individuals will also have similar expectations of the future. In the absence of anticipation effects, it is possible to use their trajectory before the event as a counterfactual for what the trajectory of the “earlier treated” group would have had in the absence of treatment. This method is based on the assumption that event’s timing is random in the short term. The smaller the gap between the treatment date of the earlier and later groups, the more credible this hypothesis is, as the selection process is unlikely to have changed.

Throughout this dissertation, the effect analysed is that of a staggered treatment. The DID framework has usually been applied using a two-way fixed effect regression (TWFE). This regression takes its name from the two sets of fixed effects it uses: unit fixed effects (in our case individuals) and time fixed effects (years). This approach has been criticised. It has given rise to a rich econometric literature in recent years that analyses the validity of this deviation from the traditional DID approach without staggered treatment (Roth et al. [2023]). When the effect to estimate is dynamic (varies according to the number of periods since treatment for each unit), the literature uses event study modelling. Treatment is not coded by a single indicator aggregating all the post-treatment periods. It is modelled by several indicators identifying different periods in relation to the start of treatment. TWFE with event studies for the purpose of DID with staggered treatment has been criticised in particular by Sun and Abraham [2021]. In their article, the authors show that even if the central assumptions of DID are satisfied¹⁹ the TWFE coefficient x years into treatment may

¹⁹The assumptions considered are: the parallel trends assumption, the assumption of no-

be “contaminated” by other periods’ coefficients. It happens because the TWFE coefficient x periods from treatment is a weighted sum of the cohort-specific effects of treatment in period x and other periods. The weights for other periods may be non-zero and are not easy to interpret. The authors therefore propose an alternative calculation which estimates the average treatment on the treated for period x as a sum of cohort-specific average treatment effects weighted by the share of these cohorts in the sample at period x . This new method is used in chapter 4 and is also included in the appendices to chapters 2 and 3 to assess the estimates’ robustness that were produced before the release of these criticisms of TWFE.

1.3.2 Chapters: from measuring the variation in living standards, to assessing transfers and labor market adjustments

This dissertation attempts to answer three main questions:

- What are the causal effects of divorce and widowhood on the living standards of men and women over 50?
- To what extent do state-supported public and private transfers limit the magnitude of the dissolution’s shock and the resulting gender differentials?
- Are the over-50s using the labour market to adapt to their new marital environment?

anticipation effects (or at least, one should have data before the start of anticipation effects) and homogeneity of treatment across treatment cohort (the treatment effect x years from starting treatment should be identical regardless of the year in which treatment begun).

Chapter 2: “The gendered economic consequences of grey divorce in France”, with Carole Bonnet and Anne Solaz

This chapter is motivated by the grey divorce revolution: divorcing after the age of 50 is increasingly common. However, our knowledge of these late divorces is limited. The literature on the economic consequences of divorce tends to exclude them or make them invisible. This blind spot may be linked to technical considerations: as divorces become less common with advancing age, the numbers of grey divorcees in a survey may be too small to be statically exploited. It may also be theoretically motivated by the idea that late divorces are not very different in their consequences from divorces that occur earlier in the life cycle. In the chapter, this hypothesis is questioned by comparing the impact of divorce on men and women’s living standards for people divorcing between the ages of 30 and 49 and grey divorcees (aged 50-89). This study focuses on France, a context in which social protection is linked to age and the life cycle. With respect to private transfers, child maintenance payment is certainly less common among grey divorces due to the absence of dependent children, while spousal alimony is more likely to be granted. Regarding public transfers, grey divorcees may not be eligible for family allowances and instead claim specific benefits for the elderly. This change justifies to evaluate public policy’s protective power in the specific case of grey divorcees. As eligibility for transfers is sensitive to the economic position of individuals, a heterogeneous effect analysis is carried out by considering the effect of divorce and the compensatory weight of transfers according to the position of individuals in the distribution of living standards prior to divorce.

The database used is the EDP. The main sample is composed of people married in 2010 and divorcing between 2011 and 2018. It is split into four groups, by gender and then by age group. The main explained variable is living standards’ logarithm. Living

standards are defined as the aggregate household income adjusted for its size. The impact of divorce on living standards is estimated using a TWFE regression in event-studies where the control group is composed of later-treated individuals. The weight of transfers is established by evaluating similar regressions for a pre-transfer living standards. Grey divorces' heterogeneous effects according to the contribution to household income and the quantile of the distribution of living standards before dissolution are studied.

Our results show that, on average in France, divorce causes a fall in living standards, regardless of gender or age at divorce. The decline is less pronounced for men than for women at all ages. The age at which divorce occurs has little impact on the variation in men's standard of living. One year after divorce, men's living standards are 5% lower than one year before divorce. Age at divorce creates significant differences between divorced women. Younger divorcees' living standards fall by 18%, while grey divorcees face an average fall of around 24%. This means that the average gap between women's living standards and men's following a divorce is greater in the case of grey divorcees. Among the over-50s, public and private transfers tend to reduce men's living standards and increase women's. They play an equalising role, improving women's living standards by more than they worsen men's. The impact of transfers, private or public, on men's post-divorce living standards does not vary significantly according to their position in the living standards' distribution. On the contrary, in line with existing means tests, public transfers help women at the bottom of the distribution more than those at the top. Private transfers only have a significant impact on women's living standards in the highest quarter of the distribution, for whom public transfers do little to absorb divorce's impact. This is consistent with the redistributive nature of the french social protection system. At the top of the distribution, the safety net is replaced by the internalisation of the costs of divorce within the couple through private transfers.

This article contributes to the literature by proposing one of the first measures of the living standards' variation caused by grey divorces. It is the only one to my knowledge that directly compares this variation with that of younger divorcees. Within the framework of this manuscript, the first chapter establishes a sequenced analysis (measurement of the variation in living standards, measurement of the weight of transfers in this variation, heterogeneity of the effect by quantile of the living standards' distribution and by level of contribution to household income) which will be used in the case of widowhood to enable comparisons.

Chapter 3: "Are the widowed too much insured? Survivor's pensions and living standards upon widowhood in France"

This chapter is motivated by an historic decline in widows' poverty. This change raises questions, since widows' economic vulnerability was one of the traditional rational for survivor's pension systems existing. Survivors' pensions have been under increasingly sharp criticism. It points to a need to redefine this policy's goal in a context of reduced vulnerability of widows linked to increased education and participation in the labour market by women. Survivors' pensions are increasingly seen as an insurance mechanism aimed at smoothing the standard of living of people facing widowhood, whether men or women, around the loss of their spouse. The French survivor's pension system does not have a single objective, but this paper seeks to assess whether it achieves that smooth living standards target. To do this, widowhood's effect on men and women's living standards is measured. It is also of interest to know whether the French system over-compensates certain populations according to the smooth living standards implicit rule. For people who contribute highly to their couple's income, living standards can increase mechanically on a fixed personal income after union dissolution. The chapter uses information on past

contribution to couple's income to distinguish between cases of total overcompensation (a person receives survivor's pension when his or her living standards does not fall at the time of widowhood) and cases of partial overcompensation (the person does experience a fall in living standards but survivor's pension gives more than enough to smooth it out).

The database used is the EDP. The sample is composed of retired people aged over 55 who were confronted with the death of their spouse between 2011 and 2017. Men and women are treated independently. The impact of widowhood on living standards is assessed using a TWFE regression without a control group because of pensioners' incomes being mostly constant. Survivor's pensions' compensatory role is assessed using the same regressions considering living standards net of survivor's pension. Heterogeneous effects according to the contribution to household income and the quartile of the distribution of living standards before dissolution are studied.

The results show that widowhood does not, on average, lead to lower living standards among French retirees. Women's living standards increases significantly after widowhood, by around 5%, one year after spouse's death compared with the year before. Men's living standards rises more sharply, by around 22% between the year before and the year after. When living standards are net of survivor's pension, men's increase nonetheless. On average, survivor's pension adds 14 percentage points to this initial "gain". On the contrary, it fully compensates widows for their drop in living standards. The average compensation for women is 44 percentage points. In relative terms, survivor's pension compensates more in the lowest quartiles of the living standards' distribution, which is consistent with a redistributive system. More specifically, it enables widows in the bottom two quartiles to rise above the poverty line. This protection is associated with over-compensation but may be justified by the historical objective of poverty alleviation. However, there are other patterns of over-compensation in the system. More specifically, for both men and women,

there is total over-compensation among people who contributed more than 60% of their couple's income before widowhood, and partial over-compensation among widowers from "egalitarian" couples (who contributed between 40% and 60% of their couple's income). Only widowers who had contributed less than 40% of their household income were, on average, properly compensated and not over-compensated, according to the smooth living standards target.

This article contributes to the literature by updating the measurement of living standards' variation caused by widowhood in the French context and by proposing an analysis of over-compensation relative to the differentiated contributions to the couple's pre-widowhood income. Following a sequenced analysis similar to the first chapter, it allows to show that in the French case, the differentiated social management of union dissolution creates a significant gap between the economic consequences of grey divorce and widowhood. Widows and widowers are better protected against changes in living standards than divorced people.

Chapter 4: "Late divorce and delayed retirement, change in labor supply upon grey divorce"

This chapter stems from the observation that older women are increasingly active in the labour market. Against a backdrop of pressure on pension systems due to populations ageing, there is a need to understand the determinants of continued labour force participation at advanced ages. Grey divorce could be one of these determinants. Divorce is an economic shock. For individuals who are not yet retired at the time of divorce, retirement may be a second economic blow. Divorcees may try to postpone retirement. Prolonging working life can also increase one's future retirement pension. France is an interesting setting with that respect because of its retirement system. In the French system, individuals' pensions are

independent of their marital status, and depend almost exclusively on their personal career history. To improve their replacement rate at retirement, individuals are encouraged to remain in the labour market through “full rate” contribution period and “surcotes”. This context is favorable to assess the impact of divorce on retirement. The causality between divorce and labour market behaviour has been much debated in the literature. Fewer articles examine retirement, and there are virtually no articles dealing with grey divorces. In the case of divorces occurring earlier in life, the literature shows that divorce affects retirement for women but not for men. This result is consistent with the gendered impact of divorce on living standards. The paper assess that result in the french case, for grey divorce, and test that hypothetical mechanism.

The data-set used is the EDP. The sample is made up of men and women married in 2010 and at risk of divorce between 2011 and 2018. The men and women in the sample face divorce between the ages of 57 and 61. During the observation period, the legal retirement age was 62. We therefore observe people divorcing just before reaching the legal retirement age. Retirement is defined according to the share of pensions in the individual’s income (pension ratio). We consider several variables: pension ratio, indicator of being retired, indicator of combining income from work and pensions. To assess the impact of grey divorce on retirement behaviour, Sun and Abraham [2021]’s new alternative estimator to TWFE is used. To questions mechanisms, heterogeneous effects are analyzed according to distance to the labor market and level of contribution to the couple’s income pre-divorce.

Our results show that divorce affects the retirement behaviours of men and women. The fact that men’s retirement behaviour is affected by their marital status is a new finding in the literature. In the case of men, in the years following divorce the share of pensions to income decreases (-6.5 percentage points, 3 years after divorce compared with 2 years before), as does the probability of being retired (-0.07). The probability of combining

income from work and retirement falls temporarily. Women also experience a transitory fall in the share of pensions to their income (6 percentage points) and in the probability of being retired (-0.05). Interestingly, the result is stratified by labor market status before divorce. Among the women active before divorce, the postponement effect is more strongly negative. The probability to be retired falls by 0.1. Among the inactive not-retired before divorce, the probability to be retired increase in a similar magnitude. Analysis by pre-divorce contribution to couple's income, show that men's behavior is consistent with the fall in living standards mechanism articulating divorce and retirement. Women's behavior is only partially consistent with that hypothesis. Estrangement from the labor market may play a mitigating influence on the incentive provided by the fall in living standards incurred upon divorce.

This chapter contributes to the literature by proposing one of the first causal estimates of grey divorce's effect on retirement behaviours. It does so using a method that is new in this field of study. In the context of this dissertation, this chapter is part of the analysis of market levers and the specificity of their use when dissolution occurs late in life. The chapter also pinpoints the limits of self-insurance on the labor market in the case of women already detached from paid labor, raising concerns about their ability to alleviate the economic shock of grey divorce.

1.4 Concluding remark: why 50?

This dissertation seeks to better understand the impact of union dissolutions after age 50 on the economic situations of men and women. The study of union dissolutions at older ages is motivated by a demographic shift from the widowed to the divorced. Dissolution is an economic shock that especially tends to weaken women's economic situation and ex-

poses inequalities within the couple. Although the consequences of divorce and widowhood may be similar in terms of the economic mechanisms involved (reduced income, wealth, economies of scale), public policies do not treat them in the same way, which could create wide divergences between the economic consequences of grey divorce and widowhood. Thus, the demographic shift emphasised is unlikely to have an economically neutral effect on the situation of the ageing population, particularly women's. It needs to be better understood. To conclude this introduction, I would like to take a step back. If it seems legitimate to take an interest in union dissolutions as people get older, why define 50 as the lower bound of our analysis?

From a demographic point of view, the 50 age-limit may appear arbitrary. The grey divorce revolution is defined as an increase in divorce rate for the 50-years-old and older. However, the founding article that gave its name to the phenomenon does not precisely justify the choice of 50 (Brown and Lin [2012]). With regard to widowhood, the limit may also seem arbitrary. The french literature on widowhood defines "early widowhood" (Delaunay-Berdaï [2004]). I have not found any international literature about a similar concept. "Early widowhood" refers to people who lose their spouse under the age of 55. This definition does not appear to be motivated by mortality considerations. In fact, the French National Statistics Institute (*Institut National de la Statistique et des Etudes Economiques*, INSEE) defines early mortality as death before the age of 65, and early widowhood with the 55 years old threshold. As a conclusion though a threshold in the 50s is consistent with the demographic literature, the demographic ground in favour of that threshold are flimsy.

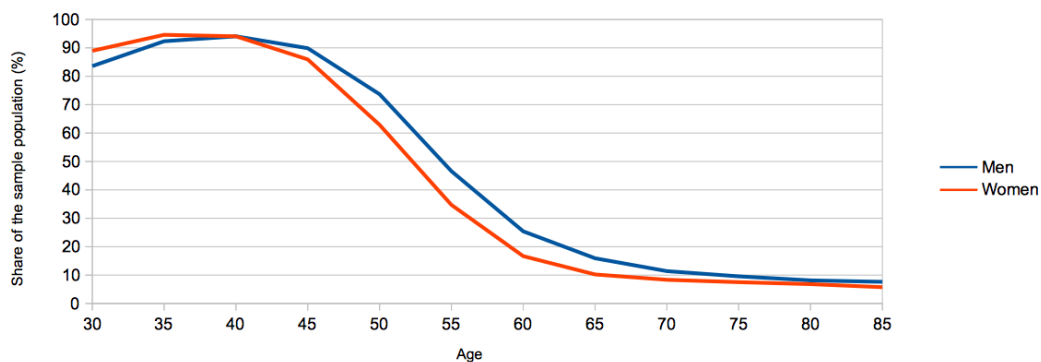
The consequences of union dissolution in the second half of the life cycle appeared as specific because of the context in which they take place: retirement and the departure of children from home. Would the age of 50 be more justified by the timing of these life cycle events? In France, the statutory minimum retirement age varies between 60

and 62 depending on generations. Leaving the labour market earlier is possible in special cases. In 2020, on average, men retire at 62 and women at 62.6 years old²⁰. This statistic seems to suggest one should shift the focus from people aged 50 to people aged 60 and more. However, to do so would be to consider the retirement process independently from marital trajectories. In fact, the retirement age itself could be an adjustment variable for people facing union dissolution, who could extend their working life by anticipation or adaptation. If retirement is part of the specificity of union dissolution in the second part of the life cycle, it seems necessary to include the retirement process in the analysis. The household structure changes through empty nest as people age. I was unable during my research to find the average age of parents when the nest becomes empty in France. In 2021, young French people leave the family home at around the age of 24²¹. This population was born in the second half of the 1990s. At that time, the average age at first birth was 27, and the average age for all births combined was 29 (Pison [2010]). Schematically, their parents would therefore have an empty nest between the ages of 51 and 53. A second hint consistent with that naive calculation comes from Bac et al. [2011]. The authors show that public expenditures associated with family benefits decreases significantly when one considers a head of household in his fifties relative to a head of household in his forties. However, some of these benefits are means-tested and may not give accurate information on the entire population. Last hint at the timing of the empty nest in the parents' life cycle: in the EDP, the proportion of households with children decreases rapidly between the ages of 50 and 60 (figure 31.4). These factors leads to believe that the fifties is a time of transition when couples may be acquiring the features that will characterise "later life" union dissolution.

²⁰Source: INSEE.

²¹Source: Eurostat.

Figure 1.4: share of household living with children according to age in 2010



Source: EDP 2019.

Notes: the sample is restricted to EDP individual, aged from 30 to 89, married in 2010.

The public policy environment governing the economic consequences of union dissolution also urges to keep people in their fifties within the scope of this analysis. Survivors' benefits are the major policy regulating widowhood's impact. The age limits for access to those pensions in France depends on different retirement schemes. There is no age limit in the civil servant scheme, an age limit of 60 for private complementary schemes and 55 for the general private sector scheme. The age limit for the basic scheme, which is the scheme covering the largest proportion of the population²², seems to be taken as a reference by INSEE to define "early widowhood". As a consequence it also defines "normal widowhood". Late divorces stand out from the point of view of public policy because of the compensatory spousal alimony. On average, these are paid to women aged 48 and by men aged 50 (Belmokhtar and Mansuy [2016]). Policies dealing with dissolutions' economic consequences seems to reach a turning point for people in their fifties.

In conclusion, I adopt the 50-year threshold for three reasons. First, because it is

²²In 2017, 82% of people perceiving a pension from a retirement scheme received it from the general private sector scheme. Source: "Les retraités et les retraites", édition 2019, DREES.

used in the demographic literature. Secondly, because it is consistent with the gradual establishment of the economic characteristics of the second half of the life cycle (retirement, empty nest...). Finally, because public policy creates multiple thresholds between the ages of 50 and 60, the crossing of which is likely to have an impact on the economic consequences of union dissolutions.

Chapter 2

The gendered economic
consequences of grey divorce in
France, with Carole Bonnet and
Anne Solaz

2.1 Introduction

After a sharp increase in the recent decades, the risk of divorce is now stabilizing in Northern European countries, and is even declining in some, including the United Kingdom and France (Bellamy [2016]). However, the number of divorces continues to increase at older ages, leading to the emergence of the “Grey Divorce Revolution” concept (Brown and Lin [2012] ; Kennedy and Ruggles [2014]). Among individuals divorcing in 2010 in the United States, more than a quarter are over the age of 50, compared to only 10% in 1990. This phenomenon partly results from the arrival of the large generation of baby boomers at these ages. Yet that is not the only explanation. The risk of divorce after 50 has also increased significantly. In the United States, the divorce rate has doubled in the last twenty years from 5 to 10 divorces per 1,000 married individuals aged 50 and over. In France, while the risk of divorce is still low at high ages, it is also at these ages that it has increased the most in the last 40 years (Prioux and Barbieri [2012]) and continues to increase (Solaz [2021]).

Such a strong increase in divorce at advanced ages leads to new research on its determinants and implications (Lin et al. [2018]). However, work on the economic consequences of divorce at these ages is still underdeveloped. The abundant literature devoted to the economic consequences of divorce mainly focuses on individuals of working age and imposes an upper age limit, which varies, depending on the authors, from 44 years old (Le Bourdais et al. [2016]) to 60 years old (Leopold [2018] ; Andreß et al. [2006]), more rarely 65 years old (Uunk [2004] ; McManus and DiPrete [2001]). Very few work tackles the 60 and older, the ones who do focus on American data (Lin et al. [2018] ; Lin and Brown [2020]). They use economic variables other than living standard, which does not allow comparison with results on younger cohorts.

The literature on the economic consequences of divorce on working age individuals

unanimously concludes that women’s living standard deteriorates after divorce. This decline ranges between 7% and 30% in the most recent works (Leopold [2018] ; Le Bourdais et al. [2016] ; Andreß et al. [2006] ; Bayaz-Ozturk et al. [2018]). For men, the results differ according to the studies. An increase in living standard is sometimes observed (Finnie [1993] ; Smock [1993] ; Smock [1994] ; Bianchi et al. [1999]), or a small decrease (Burkhauser et al. [1991] ; McManus and DiPrete [2001]). The difference in results between existing studies can be explained in different ways, differences in scope, data used, sample size, and indicators selected. However, when there is a drop in living standard for men, it is always smaller on average than that observed for women (McManus and DiPrete [2001]) and leads to strong gender inequalities.

Several reasons explain the limited literature on the economic consequences of divorce in later life. Until very recently, divorce in later life was a rare event. Therefore, from an empirical point of view, few data were available to analyse that rare phenomenon. Another reason may be the implicit assumption that the economic consequences for those aged 50 and over would be similar to those at younger ages. However, several factors lead us to believe that that hypothesis is not credible and that the consequences of divorce after age 50 might be more pronounced than those at younger ages, and ultimately generate more gender inequalities.

In this article, we therefore study the economic consequences of divorce after the age 50. This approach, the first in a European context, is made possible by a recently opened access to large administrative databases, such as the Permanent Demographic Sample (EDP) in France. It results from the matching of different data sets, in particular fiscal data. It makes it possible to measure the impact of divorce on a representative panel of 4.4% of the French population over a period of 9 years. We implement a two-way fixed-effect regression with a control group (composed of not yet divorced individuals) to assess causal effects.

Three main results stand out from our analysis. First, we find that women's living standards decrease after divorce, more for grey divorcees compared to younger ones. The average decrease reaches 24% one year after divorce for the older divorcees while it is less than 18% for the younger ones. Men also experience a decrease in living standards, but far less pronounced compared to women. Men's living standards slightly decrease one year after divorce and this decrease is of comparable magnitude for men of all ages (4.5% for young divorcees and 6% for grey divorcees). Economic inequalities between women and men are therefore greater following a late divorce compared to a divorce at younger ages. Second, we highlight the key role of public and private transfers in moderating the decline in women's living standards after a grey divorce. That decline would be much more pronounced (35% on average) for women without the existence of these transfers. Public transfers have a limited but significant negative impact on men. Third, the effects of divorce are heterogeneous along the distribution of living standards. The decline is more important for older divorcees belonging to wealthier households before divorce.

The paper is organized as follows. We describe the specificity of divorces after 50 years in France in Section 2.2. Then we present our database and our sample in Section 2.3. Empirical strategy is presented in Section 2.4 and empirical evidence in Section 2.5. Section 2.7 provides some discussion and conclusion.

2.2 Grey divorces' specific traits: some evidence for France

France is affected by the "grey divorce revolution". While the risk of divorce decreases with age, it is at advanced ages that that risk is now on the rise (Solaz [2021]) and has increased

the most in the last 40 years (Prioux and Barbieri [2012]).

2.2.1 A more pronounced marital specialization after age 50

The literature has highlighted the link between marital specialization within the couple, measured as the income gap between spouses, and the variation in living standard after divorce (Bonnet et al. [2021] ; McManus and DiPrete [2001]). The larger the income gap within the couple, the greatest the decline in living standards for women. The income gap within-couple tend to be more pronounced after the age of 50 than at younger ages (Morin [2014]), both because of the adoption of a more traditional model of conjugal specialization (generation effect) and of the longer marriage duration that characterizes these older couples (life-cycle effect). In fact, when the union lasts longer, marital specialisation is implemented for longer and is generally stronger, with greater consequences on career trajectories. It is especially the case for retired couples, as pensions reflect the entire career trajectory, both in terms of wages and labor market participation. A wide gap between men's and women's pensions reflects the gender wage gap during working life as well as the greater specialization of women in the domestic sphere (via exit from the labour market or a widespread use of part-time work) (Geraci and Lavigne [2016] ; Bonnet et al. [2015]). A higher specialization among older couples on the verge of divorce may also be found as Stancanelli [2014] highlights that the most traditional couples in their marital arrangements are those most at risk of late divorce. For all these reasons, it is therefore likely that the economic consequences are more pronounced for women after the age of 50.

2.2.2 Private and public transfers of different nature and magnitude

The economic consequences of divorce depend crucially on the institutional context (Uunk [2004]). However, after 50, the institutional landscape changes significantly, in particular the scale and nature of public and private transfers. Part of the public transfers received by a household are conditioned or depend on the presence of children or young dependent adults in the household. When couples separate late in life, they are more often without dependent children or with children living outside the home. In addition, part of the public transfers are conditional on a maximum age for counting these dependent children. It can be 20, 21 according to allowances or 25 years old if the children are still studying. It means that family allowances, which are very common transfers toward families, other benefits (such as social minima or housing allowances) or tax reductions, can be reduced. These subsidies are important financial resources for divorced women, who are more often the custodial parents of children. Those over 50 years old are less likely to benefit from these transfers (Bac et al. [2011]). On the other hand, some social minima benefits become more accessible or higher when the person is getting older ¹.

Regarding private transfers, divorce can lead to two types of transfers between former spouses in France. On the one hand, there is the payment of child support in the event of separation, from the non-custodial parent to the custodial parent. These transfers are used to compensate for the additional child cost borne by the custodial parent after divorce. 97% of the child maintenance debtors are men (Belmokhtar [2014]). These pensions thus tend to reduce mainly men's living standard after divorce (McManus and DiPrete [2001]), while they improve the situation of mothers, who are in most cases the custodial parent (Bonnet

¹For instance, ASPA (*allocation spécifique pour personnes âgées*) is a social benefit one can only apply to after 65 year olds

et al. [2021]). Because of a lower number of children among divorced people aged 50 and over, child support payments may contribute less to improve the divorced mother's living standard and symmetrically constitute a lower financial burden for the father. It could also be less important because, as children get older, the probability of shared physical custody or primary custody by the father increases, to the detriment of mothers' primary custody (Algava et al. [2019]).

A second type of private transfer is also more important after age 50: the spousal alimony. The latter is paid directly to the former spouse and is explicitly intended to compensate for excessive disparities in the living conditions between ex-spouses. It is therefore mainly paid by men and received by women. Length of marriage and age of the former spouses are factors explicitly considered by judges in obtaining it (Jeandidier et al. [2020] ; Bourreau-Dubois and Doriat-Duban [2012]), so that the average age of individuals in divorces with a spousal alimony transfer is higher than that of the general population of divorcees. In 2013, one out of five divorces implies spousal alimony (Belmokhtar and Mansuy [2016]) but 30% of divorces involving a woman aged 55-64 give rise to it². Spousal alimony thus aims and tends to reduce gender inequalities after divorce, particularly for late divorces.

2.2.3 Less effective recovery mechanisms after 50 years old?

The literature on the economic consequences of divorce at younger ages has highlighted the recovery mechanisms at work to compensate the negative economic shock of divorce. Re-partnering (Dewilde and Uunk [2008]) or an increase participation to the labour market are two mechanisms that can mitigate or even cancel out a decline in living standards.

²Source: "Rapport du conseil de l'age sur les femmes seniors", 2019, HCFEA.

Each of these two mechanisms may function differently after the age of 50. First, the chances of re-partnering decrease with age for both men and women. At all ages, divorced women are less likely than divorced men to be in a relationship again, and this gender gap increases with age. Thus, re-partnering as a possible means of recovery is less likely after divorce at older ages than after divorce at younger ages, especially for women who are in a more unfavorable position in the union market because of a biased sex-ratio (Solaz [2021]). Indeed, women are less likely to remarry or re-couple than men after a grey divorce (Brown et al. [2019]; Schimmele and Wu [2016]). Second, the role of the labour market is more ambiguous. On the one hand, the departure of children or their older age can relieve domestic and parental constraints and allow women to return to work or increase their working hours (Goldin and Mitchell [2017]). A positive effect of divorce on women's activity after the age of 50 has already been shown in the North American context (Olivetti and Rotz [2017a]). Such an effect has not yet been discovered for men. The positive effects on labour force participation may mitigate the decline in living standards following divorce (Couch et al. [2011] ; Bonnet et al. [2010]). However, on the other hand, late divorcees could face difficulties in returning to work after age 50 as retirement approaches (Beck et al. [2017]). Labour market could discriminate older workers and those who interrupted their career.

Finally, the particularity of the population aged 50 and over compared to younger ages is that they are able to retire. A large proportion of individuals in our sample can retire at a minimum age between 60 and 62 years old³, with people generally retiring up to the age of 65 (few individuals retire beyond that age in France). Divorce can affect retirement by delaying or bringing it forward. Finally, one can also mention a possible reverse causality,

³Following 2010 pension reform, the minimum legal retirement age gradually increased from 60 to 62 years old from birth cohorts 1951 to 1955.

if transition to retirement affects the probability of separating (Doorley and Stancanelli [2019]). For those already retired at the moment of divorce, the chances of recovering are much limited since working when retired is not very common in the French context.

Divorce has little direct impact on retirement pension in France. There is no division of pension rights between spouses. The pension of a person depends on his or her own trajectory in the labor market, a minimum pension mechanism, and the number of children raised, but not on the spouse's characteristics. The increase for raising children is related to parental status, not marital status. The latter affects the pension received only at the time of spouse's death, as it entitles to a survivor's pension. In the main retirement system⁴, divorce does not cause the loss of that right⁵.

Grey divorces thus presents many specific features that makes difficult to generalize the results obtained on the economic consequences of divorce at younger ages. In this article, we therefore study the consequences of divorce for people aged 50 and over. More specifically, this article aims to measure the variation in economic well-being induced by divorce for men and women. That variation in living standard results from the direct effects of divorce (linked to the end of the pooling of expenses and economies of scale characterizing married life) and indirect effects linked to institutional compensation via public transfers (social assistance and taxes) and private transfers between former spouses (child and spousal alimony).

⁴In France the retirement system is segregated by sector. The main retirement system is the one which gather private sector employees.

⁵When people divorce, they don't directly lose their right to a survivor's pension in the main pension scheme. Yet, that survivor pension is mean tested, and re-cohabiting which can occur after divorce change the survivor household's income and lead to the pension's suspension.

2.3 Data, outcome and variables

2.3.1 Data and sample

Although divorces after 50 are increasing, and affect in 2020 36% of divorces in France against 30% in 2010, it is still a "rare" event in the general population⁶. A large data-set is required to get enough events to analyse the consequences of divorce. We use the Permanent Demographic Sample (*Échantillon Démographique Permanent*, later in the paper called EDP) administrative database. It follows all persons, residing in France, born on the first four days of October, January⁷, April and July. The database includes 4.4% of the French population for whom various sources of administrative information (census, civil status, tax data, employer data ...) are gathered. Since the date of birth is random, the EDP forms a large database representative of the French population, ideal for studying the dissolution of unions in a sub-population such as the over-50s.

The socio-fiscal data of the EDP being available since 2010, we follow married individuals⁸ in 2010 (different-sex couples), divorcing over the observation period. Those data accurately describe individuals' income and their household's resources. Based on tax returns, those income data are considered more reliable than the ones collected in survey data. It is also possible to identify individuals' marital history and in particular divorce. Finally, the EDP provides information on the composition of the individual's household

⁶0.8% of married people aged 50 and over in 2015 divorce in 2016 (source: INSEE and Ministry of justice)

⁷For January, to avoid a "new year effect", sampled individuals are born on January 2nd, 3rd, 4th and 5th.

⁸There are two types of formal unions in France: civil union (*pacs*) and marriage. The present paper focuses on marriage. Two main points motivate that exclusion of civil partnerships. First, civil partnership and marriage differ by the policies framing the economic consequences of their disruption. Mainly, civil partners cannot claim spousal alimony. Second, civil partners are quite rare after 50, which implies small sample size of union disruption in the EDP.

(number and age of the children in the household)⁹.

To implement our empirical strategy (see Section 2.4), we focus on divorces between 2012 and 2014. Our initial sample of divorcees includes 7,824 men and 8,120 women aged between 30 and 49 years old¹⁰ and 4,177 men and 2,880 women aged between 50 and 89 years old¹¹¹². We do some more restrictions. To be able to follow living standards, we select individuals and households for whom the household income information is available in at least one of the three years before divorce for the treated group. The sample size includes respectively 7,533 men and 7,829 women aged between 30 and 49 years old and 3,937 men and 2,742 women aged more than 50 years old. Finally, when we introduce marital specialization, we need information on individual income of both spouses in 2010 and not only household income. This sub-sample includes 7,158 men and 7,475 women less than 50 years old, and 3,736 men and 2,631 women aged more than 50 years old (Table 3.1).

2.3.2 Variables of interest

Our main variable of interest is the living standard. It is defined as the household's disposable income divided by the number of consumption units in order to take into account

⁹The range of variables is limited however. Like many administrative databases, the EDP includes a large number of individuals but has a limited number of variables.

¹⁰Individuals are observed 5 years, individuals selected into the 30-49 group, are aged between 30 and 49 years old during the five years of observations.

¹¹In the rest of the article, for simplicity, we will qualify as "less than 50 years old" individuals aged between 30 and 49 years old and as "more than 50 years old" individuals aged between 50 and 89 years old

¹²There are less women grey divorcees than men grey divorcees because of the age gap and the age structure of grey divorcees. In heterosexual couples there is a 2.5 years age gap between men and women. So men grey divorcees tend to be married to younger women. As grey divorcees are less numerous when age increasing, a quite large group is aged close to the lower age limit of our sample. The numerous men close to that threshold may be married to younger women. This explains why there are less women and more men among grey divorcees.

the size of the household and the economies of scale generated by living together. We use the OECD modified equivalence scale¹³. The measure of the living standard and its components are adjusted for inflation, with incomes expressed in constant 2015 euros.

The household's disposable income includes: labor market or replacement income (wages, retirement pensions, unemployment benefits, income from self-employment (commercial, industrial and agricultural profits)), financial taxable asset income, as well as net public and net taxable private transfers. Net public transfers include family allowances, minimum benefits and housing allowances received by the household, from which taxes paid are deducted (income tax, housing tax). Private transfers include child support and spousal alimony. Net private transfers is the difference between private transfers received and private transfers paid. Only part of spousal alimony is captured by our data. Spousal alimony can be a lump sum transfer (one-shot or staggered for up to 8 years) or a pension (temporary or life-long). Nowadays lump-sum transfers are more prevalent than pensions¹⁴. Yet, pensions are more common with increasing age at divorce¹⁵. Spousal alimony that is settled in under 12 months does not show in fiscal returns. Only spousal alimony that is paid beyond a year after divorce appears. From a fiscal point view, the latter is amalgamated to child support. Spousal alimony paid in under a year is as result the paper's main blind-spot. Yet, it can be argued that those kind of transfers are more related to wealth than income. They impact living standards in a similar way as wealth which is not included in the scope of the present paper. Private transfers to young adults in the household are also taken into account because they can affect the living standards of the

¹³This 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.

¹⁴In 2013, 9 out of ten spousal alimony are lump-sums (Belmokhtar and Mansuy [2016]).

¹⁵Among new divorcees in 2013, the mean age of beneficiaries of lump-sum spousal alimony is 47.5 years old. Mean age of beneficiaries of pensions is 63 years old (Belmokhtar and Mansuy [2016]).

net payer parent, and create differences between parents according to which of the two pays the children's education costs.

We will use quartile of living standards in the last part of the results section to study heterogeneity. Quartile is measured pre-divorce with respect to the global distribution of living standards in the French society.

The year of separation is the legal year of divorce. Indeed, to declare a divorce to the tax authorities, divorce procedure must be completed or an authorization from the family court judge is necessary. The legal date of divorce (or judge authorization) is more relevant in our objective than the *de facto* separation (that could occur the same calendar year or the previous year) to study post-divorce private and public transfers. Indeed, private transfers begin to be paid following the divorce judgment. In particular, spousal alimony is not visible in private transfers until one year after divorce because of the tax rules. Public transfers can also be conditional on the legal and not *de facto* situation of the couple. Information on living standards is available for the years around divorce, as well as the year of divorce. The latter is, however, a bit peculiar, and its assessment of living standard must be taken with caution. Indeed, the year of divorce is considered as a year without a spouse from the point of view of the tax authorities (i.e. the individual's living standard is therefore based on his or her sole sources of income) for each of the former spouses regardless of the precise date of the divorce during the year. One part of the year may have been lived as a couple and the other part of the year alone, but that is an unlikely hypothesis, given the average time of divorce proceedings. Therefore, considering that people live alone for the entire calendar year of the divorce partly compensates for the fact that legal divorce is observed, necessarily later than *de facto* separation.

Table 2.1: Sample description by age group

	Men		Women	
	Less than 50	More than 50	Less than 50	More than 50
Age at divorce	39.5	58.3	38.9	57.4
Household with children (%)	89	57	92	45
Participation in labor market (%)	95	68	86	61
Retired (%)	1	33	1	29
Contribution to couple income (%)	64	66	38	36
Living standards (median - 2015 €)	19,968	22,303	19,947	22,995
Individual income (median - 2015 €)	23,632	23,537	16,950	14,339
<hr/>				
Marriage duration (%)				
0 to 4 years	27	11	22	9
5 to 9 years	22	8	22	7
10 years and more	51	81	56	84
<hr/>				
Sample size	7,533	3,937	7,829	2,742

Source: EDP individuals divorced between 2012 and 2014, EDP (2019 edition).

Note: each variable is measured in the baseline, one year before divorce, except contribution to couple's income which measured for 2010.

2.3.3 Sample description

We highlight in table 3.1 the differences between the characteristics of older and younger divorcees that illustrate the specificity of divorces after 50 years old (see section 2.2).

First, people who divorce after 50 tend to break marriages with higher duration than before 50 years old. Indeed, more than eight out of ten older divorcees divorce after more than 10 years of marriage, while it is only the case for 51%-58% of the younger divorcees. Longer marriage duration among older divorcees may result in higher levels of spousal alimony as suggested in section 2.2.2. In average, men provide two thirds of the household income. Specialization, measured as the contribution of individual income to the total household income is only slightly more pronounced among older divorcees. Our hypothesis of higher gendered specialization for older divorcee is only partially confirmed. Divorcees

older than 50 tend to have less children at home, resulting in less public transfers associated with their presence. Finally, as expected because of the possibility to retire (see section 2.2.3), older divorcees are less likely to participate in the labour market. Returning to the labour market may be more difficult for many of them. However, men are slightly more active in the labour market than women, which will probably reflect in increased gender inequalities following divorce. All these elements will have consequences on the magnitude of the living standard changes and the role of private and public transfers after divorce.

2.4 Empirical strategy

To assess the causal effect of divorce on living standards for men and women, we use a two-way fixed effect regression model with a control group.

2.4.1 Estimation of the causal effect of divorce

Estimating the effect of divorce generates two challenges. As any research looking into the causal effect of an event, the evolution of the divorcee's living standards can only be observed before and after divorce. The evolution of living standards after the date of divorce in the absence of break-up cannot be observed. In a difference-in-difference framework a control group is needed. Contrary to many difference-in-difference treatments, divorce is not a random event. It certainly results from a selection process that affects income trends. As a result the control group should be picked carefully to find individuals whose evolution in living standards depicts accurately what the divorced's would have been have they remained married. We follow Fadlon and Nielsen [2021] to choose the control group¹⁶.

¹⁶The literature on the economic consequences of divorces, very often uses as control group individuals who remain married over the period considered. We may have chosen the continuously

We create a control group composed of people who are going to divorce over the period considered, but have not divorced yet. Our treated group is made of men and women who divorce between 2012 and 2014. Our control group includes men and women who divorce in 2015 and 2016¹⁷. Our initial control group includes 4,978 men and 5,258 women aged less than 50 years old, and 2,390 men and 1,449 women aged more than 50 years old (Table 2.5).

Control and treated groups are separated by sex and age group. Both treated and control groups are observed five years. The treated group is observed two years before divorce and two years after divorce. The control group is observed in the five years preceding divorce. A maximum of four calendar years separate two cohorts of divorcees. To compare both groups in the beginning of their trajectories a baseline period is chosen. It is the third year of observation for both groups. The third year is the year before divorce for the treated. Treated and control groups are very similar (Table 2.5). Paramount to our estimation, they are aged the same at divorce. Living standards are a bit higher for the control groups among young divorcees. Yet differences are not significant or small, they amount to around 500 euros a year (around 2% or 3%). No such differences arise for individual income, except for women above 50 years old. There, the treated have a lower income by roughly 1500 euros.

married as an alternative control group. As a robustness check, we build this group over the period. Regarding their characteristics, continuously married are a bit more different compared to divorcees than the control group of future divorcees in the period. Moreover, they may have unobserved characteristics that differentiate them from divorcees. For these reasons, our preferred control group remains the future divorcees. Results using continuously married as control group in 2.9.1, show similar results however. Warning, inspiration is taken from Fadlon and Nielsen [2021] only with regards to the control group's choice. The present paper is not implementing matching, hence it is subject to the impossible comparison criticism levied at TWFE. A robustness check in appendix tackles that issue.

¹⁷We do not use the whole period available until 2018. Indeed, in 2017, a divorce reform was implemented that made consensual divorce quicker. It may have changed a composition of divorcees

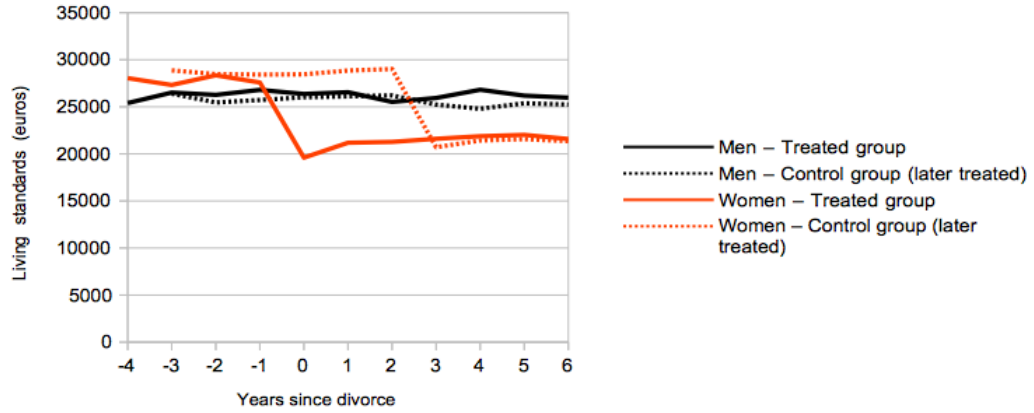
The comparison between the groups using a two-way fixed effect estimation is unbiased as long as the control group's evolution in living standards is similar to that of the treated group's, have they not divorced in the observation period. The main assumption is one of parallel trend. To ponder on the credibility of that assumption, most papers check whether trends in outcome are parallel (Huntington-Klein [2021] ; Roth et al. [2023]) between the treated and the control group before treatment. Figure 2.1 shows very similar evolution in living standards among treated and control groups for men and women aged 50 years old and over. If we assume that the divorce conditions have not changed between 2012 and 2016, we can compare both groups. From a theoretical point of view, both treated and controls are undertaking the same selection process. If the selection process impacts income and thus living standard's trend, both groups should be on the same path. One features of data might make that point invalid : anticipation effects. Our sample description does not show such anticipation as there is no systemic differences between both groups of divorcees. Trends in pre-divorce living standards between the treated and the control groups of future divorcees are very similar whatever the sex and age group. Graphic evidence does not show dissimilarities in trends before divorce's date. The figure 3.1 does not seem to display any anticipation effect at the household level.

2.4.2 Specification

We use a two-way fixed effect regression model, on four different groups, men and women, young and old.

$$\ln(Y_{it}) = a_i + \sum_{\substack{j=-2 \\ j \neq -1}}^2 (b^j \times B_{it}^j \times T_i) + c_t + d \times D_{it} + e_{it} \quad (2.1)$$

Figure 2.1: Descriptive trend of living standards among the 50 years old and older



Source: EDP individuals divorced between 2012 and 2016, EDP 2019 Note: mean living standards by year relative to divorce. An alternate divorce year is defined for the control group, which is three year before actual divorce date.

i identifies individuals while t identifies time (here years).

The outcome variable Y_{it} , expressed in log is the living standards in 2015 euros¹⁸. B_{it}^j are a set of indicators coding the distance to divorce (in years). T_i is a 0/1 variables which equals 1 if the individual belongs to the treated group, 0 otherwise. As divorce could be associated to the risk of unemployment and could affect the retirement behaviour, we control for these two variables D_{it} (two 0/1 variables indicating if the individual is unemployed and retired). The model also includes a_i , an individual fixed effect, and c_t , a year fixed effect, as well as e_{it} , the idiosyncratic error term.

For the treated, the reference year, is the year before divorce. Even if results for the year of divorce are displayed, they have to be taken with caution as explained earlier. Our analysis of the effects of divorce is short term and relies on two years post-divorce. The parameter of interest is b^j . Before divorce, b^j can be interpreted as an anticipation effect

¹⁸The analysis on public and private transfers use the pre-transfers living standards.

or a pre-trend. After divorce, $\exp(b^j) \times 100$ can be interpreted as the variation in living standards in percentage relative to one year before separation caused by divorce¹⁹.

2.5 Main results

2.5.1 A decline in living standards more pronounced for women over 50

Following divorce, both men and women experience a decline in their living standard, but the loss is much more pronounced for women than men, and among the former, for older women compared with younger ones. Young female divorcees' living standard decreases by 18% (that is to say $\exp(-0.198)$) one year after divorce compared to one year before. It falls by 24% ($\exp(-0.278)$) for the grey divorcees. Men's living standards decrease by 3% for the 30-49 group and by 6% for the 50 and over (Figure 2.2). We cannot conclude to a significant difference between the effect of divorce on men depending on age. The loss of women is roughly 5 times greater than that of men. Women loose between 4522 and 6761 euros of living standard annually, compared to the between 154 and 909 euros lost by men (Table 2.2). The recovery after divorce is thus slow. Two years after divorce, women's living standard is still 23% lower than before union dissolution for women grey divorcees. For men, the economic situation remains quasi unchanged the years after divorce. The inclusion of the control variables for retirement and unemployment indicators does not change the results (Table 3.4 and Table 2.7). Both variables play in the expected way. They are associated with negative coefficient as both imply a decrease in household living

¹⁹Both those interpretations of TWFE coefficients are currently being reassessed (Roth et al. [2023] ; Sun and Abraham [2021]), appendix 22.9.2 provides a robustness check in line with the current econometric literature.

Table 2.2: Gendered effect of divorce on living standards

	Men				Women			
	30-49 Variation	30-49 Euros	50-89 Variation	50-89 Euros	30-49 Variation	30-49 Euros	50-89 Variation	50-89 Euros
2 years before	-0.002 (0.619)	-121 (0.153)	-0.004 (0.379)	-173 (0.591)	-0.007** (0.032)	-58 (0.53)	-0.003 (0.633)	271 (0.363)
Year of divorce	-0.021*** (0.000)	27 (0.829)	-0.034*** (0.000)	-909* (0.051)	-0.297*** (0.000)	-5,913*** (0.000)	-0.368*** (0.000)	-8,436*** (0.000)
1 year after	-0.031*** (0.000)	-154 (0.271)	-0.058*** (0.000)	-849 (0.109)	-0.198*** (0.000)	-4,522*** (0.000)	-0.278*** (0.000)	-6,761*** (0.000)
2 years after	-0.023*** (0.001)	3 (0.984)	-0.056*** (0.000)	-2,434*** (0.000)	-0.173*** (0.000)	-4,134*** (0.000)	-0.259*** (0.000)	-6,245*** (0.000)
Retirement	-0.098*** (0.000)	-1,060 (0.133)	-0.087*** (0.000)	-1,858*** (0.005)	-0.114*** (0.000)	-4,148*** (0.000)	-0.006 (0.63)	-1,225** (0.033)
Unemployment	-0.076*** (0.000)	-1,705*** (0.000)	-0.071*** (0.000)	-2,012*** (0.007)	-0.023*** (0.006)	-501*** (0.002)	-0.008 (0.613)	-867 (0.19)
Observation	12,098	12,098	6,033	6,033	12,326	12,326	3,830	3,830
R-square within	0.0052	0.0046	0.0085	0.0016	0.1342	0.0718	0.1626	0.0585

*** p<0.01, ** p<0.05, * p<0.1

Source: EDP individuals divorced between 2012 and 2016, EDP 2019 edition. Sample sized with control variables is slightly smaller than sample sized without control variables. Indeed unemployment or retirement information are missing for a small number of individuals explaining which accounts for the difference.

Note: regression results. The reference year is one year before divorce.

standards.

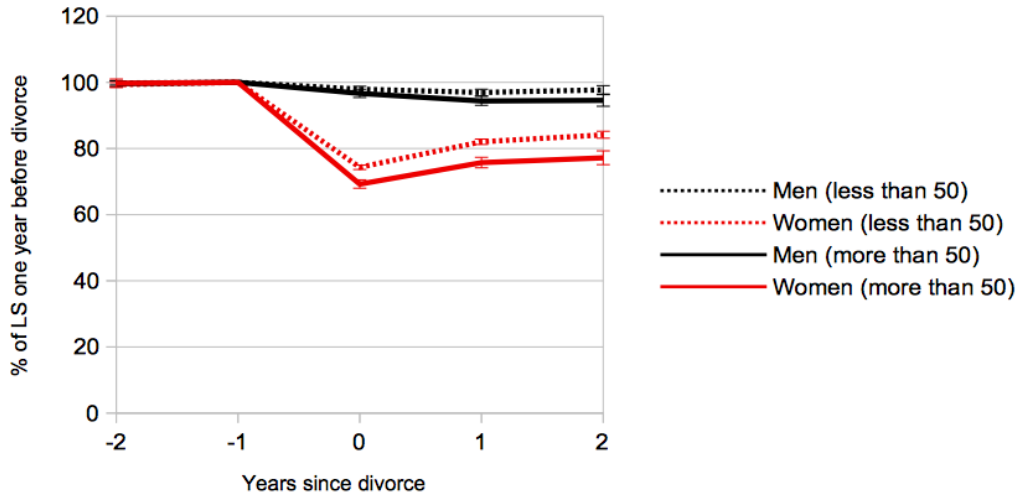
Thus, this more marked decline for women after age 50 than at younger ages, while the variations are fairly similar for men, leads to an increase in post-divorce inequalities between women and men at older ages. Divorcing after age 50 is thus resulting in slightly greater gender inequalities.

2.5.2 The role of private and public transfers

Effects of public transfers

We expect women, who tend to have lower income than men, to benefit more from public welfare (family allowance, housing allowance and social minima), thus limiting their post-divorce decline in living standards. Men, whose incomes tend to be higher, are expected to benefit less from these public transfers and possibly see their taxes increase because they

Figure 2.2: Effect of divorce on living standards relative to one year before divorce



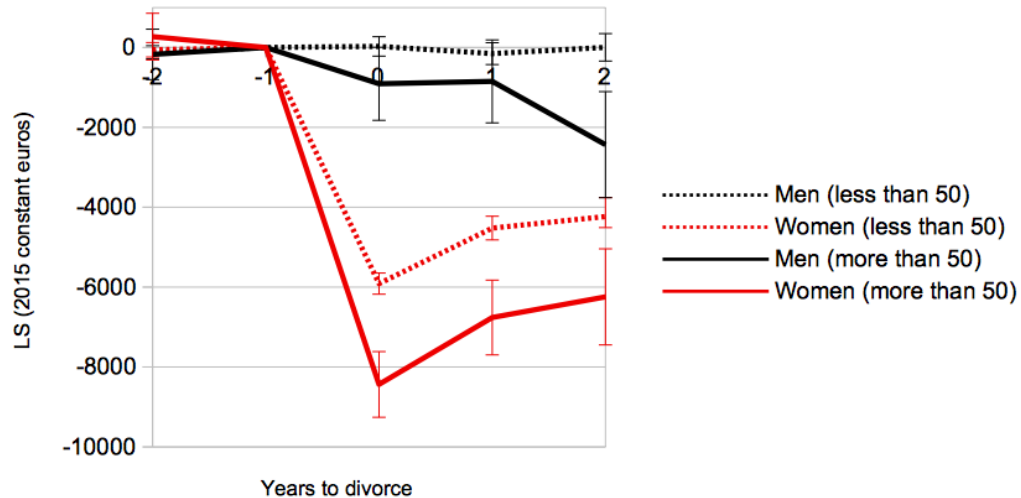
Source: EDP individuals divorced between 2012 and 2016, EDP (2019 edition). N = 12,098 for men less than 50 ; 6,033 for men over 50 ; 12,326 for women less than 50 ; 3,830 for women over 50.

Note: regression results. Confidence intervals are at the 95% level.

Lecture: one year after divorce, women over 50's living standards are 76% of what they were one year before divorce. Their living standards have decreased by 24% between the two periods.

no longer benefit from the couple's and parental positions. One year after divorce, 25% of men receive public transfers though they were 49% one year before divorce. About 43% of women receive public transfers before and 40% after divorce. The average amounts are larger after than before divorce for beneficiaries. We find that public transfers do play an important role for women in limiting the post-divorce decline in their living standards (Figure 2.5). Without public transfers, women's living standard decreases by 30% one year after their divorce. With public transfers, this decline is limited to 24%. Public transfers thus contribute to a significant improvement in women's living standards during the years following divorce. Social welfare benefits appear to play a larger role than family or housing benefits.

Figure 2.3: Effect of divorce on living standards



Source: EDP individuals divorced between 2012 and 2016, EDP (2019 edition). N = 12,098 for men less than 50 ; 6,033 for men over 50 ; 12,326 for women less than 50 ; 3,830 for women over 50.

Note: regression results. Confidence intervals are at the 95% level.

Lecture: one year after divorce, women over 50's living standards have decreased by an average of 6761 euros compared to the reference year, one year before divorce.

Public transfers play differently for men. From -6% without public transfers, the decline is -3% including them (Figure 2.4). There is a significant difference between those two coefficients one year after divorce only.

Effects of private transfers

Private transfers are also expected to limit the loss of women's living standard. Women are more likely to have custody of children after divorce, when they still have dependent children, and as a result to receive child support payments. They are also more often recipients of the spousal alimony because of their lower incomes. Symmetrically, private transfers are expected to degrade the living standards of men who are most often the net

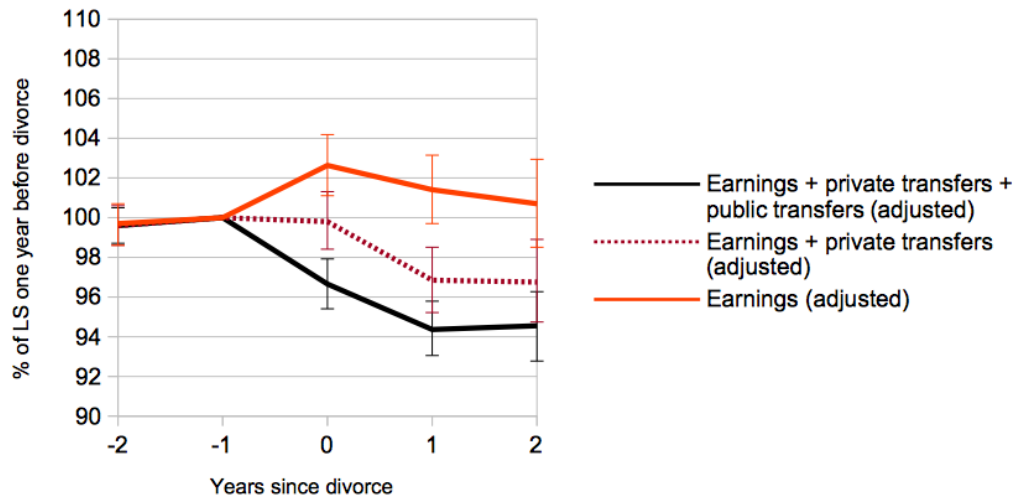
payers of post-divorce private transfers. In our treated sample, one year after divorce, 30% of men pay more private transfers than they receive, compared with 10% one year before divorce. One year after divorce, 34% of women receive more private transfers than they pay compared with none one year before divorce. Our hypotheses hold true for women (Figure 2.5). For them, private transfers reduce the decline in their living standard after divorce. Without any transfers (public and private), the average drop in women's living standard would be around 35% one year after divorce. With private transfers, this decline is limited to 30%. Without any transfers men's living standards are quite stable one year into divorce compared to one year before (Figure 2.4). As expected, transfers seem to slightly decrease their income position after divorce but the effect is not clearly significant.

Public and private transfers play an important role in moderating the decline in living standards following women's divorce. The decline they incurred without any transfers is reduced by 11 percentage points (from -35% to -24%). The role of these transfers is weaker for men and play the other way round. Transfers turn a stability in living standards for men into a moderate decline one year after divorce. All in all, transfers limit post-divorce inequalities between women and men, at a small cost for men compared to their pre-divorce living standards. Yet, these transfers may play a different role depending on the position in the distribution of income, since public transfers often act as a buffer against poverty.

2.5.3 Re-partnering as a recovery mechanism

Re-partnering is one way to moderate the divorce induced decline in living standards. It can be seen as a recovery mechanism. Re-partnering is defined as living as a couple in the same housing after divorce. Following divorce, more men than women re-partner. 30% of men aged 30-49 years old and 17% of men aged 50 years and over, who divorce

Figure 2.4: Effect of divorce on living standards, whether private and public transfers are included or not, men



Source: EDP men over 50, divorced between 2012 and 2016, EDP (2019 edition). N = 12,098 for men less than 50 ; 6,033 for men over 50 ; 12,326 for women less than 50 ; 3,830 for women over 50.

Note: regression results. Confidence intervals are at the 95% level.

Lecture: one year after divorce, men's living standards are 97% of what they were one year before divorce. Their pre-public transfers living standards are 97%, and their pre-transfers living standards are 101% of their reference period level.

in 2012, 2013 or 2014, re-partner within the observed years after the divorce. It concerns respectively 23% and 13% of divorced women of the same ages. Re-partnering among older divorcees is less frequent than among younger ones. It is likely that the difference between women and men reflects very heterogeneous situations in terms of choice of partner and the characteristics of women and men reforming a couple.

Divorced women who re-partner after divorce almost maintain the living standard they had when they were married, thus avoiding the large decline that they would have experienced if they had remained alone after the divorce (Figure 2.6). The compensatory effect of re-partnering is very large. For a women above 50 (resp. under 50), living alone after

Figure 2.5: Effect of divorce on living standards, whether private and public transfers are included or not, women



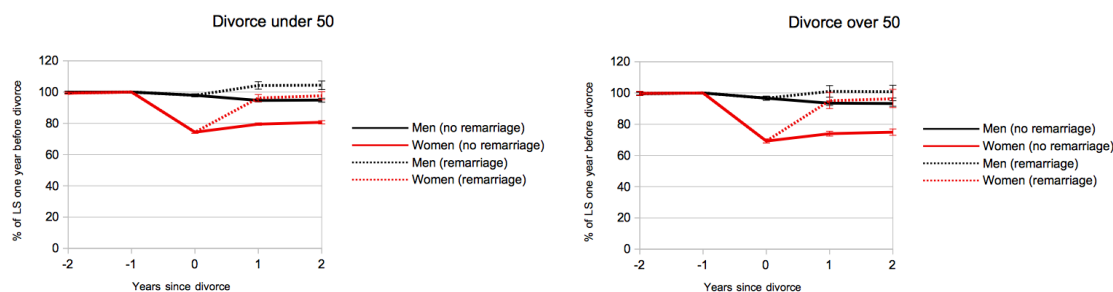
Source: EDP women over 50, divorced between 2012 and 2016, EDP (2019 edition). N = 12,098 for men less than 50 ; 6,033 for men over 50 ; 12,326 for women less than 50 ; 3,830 for women over 50.

Note: regression results. Confidence intervals are at the 95% level.

Lecture: one year after divorce, women's living standards are 76% of what they were one year before divorce. Their pre-public transfers living standards are 70%, and their pre-transfers living standards are 65% of their reference period level.

divorce, annual individual income needs to increase by 7,432 euros one year after divorce (resp. 4640 euros) for her living standards to be the same as if she remarried (Table 2.7). Children being present in her home, in the absence of remarriage, increase the rise in individual earning necessary to match the living standards in a remarried state. Re-partnering also has a positive effect on the living standard of divorced men compared to remaining alone, although to a much lesser extent. Re-partnering allows them to maintain their living standards (Figure 2.6). The coefficients associated with years following divorce are more negative when re-partnering is added as a control. Yet they are not significantly different from the coefficient without that added control.

Figure 2.6: Effect of divorce on living standards, compensatory effect of remarriage



Source: EDP individuals, divorced between 2012 and 2016, EDP (2019 edition). N = 12,098 for men less than 50 ; 6,033 for men over 50 ; 12,326 for women less than 50 ; 3,830 for women over 50.

Note: regression results. Confidence intervals are at the 95% level.

Lecture: one year after divorce, the living standard of the under 50 men's who did not remarry is 95% of what it was one year before divorce. The living standard of the men who remarried are 104% of what it was one year before divorce.

2.6 Results: Heterogeneity analysis

2.6.1 Heterogeneity according to the position in the income distribution

To study the heterogeneous effects of divorce depending on the position in the living standards distribution, we stratify our sample by living standards quartiles. We compute quartiles in the reference period over the whole population (one year before divorce for the treated group and four years before actual divorce for the control group) (table 2.3).

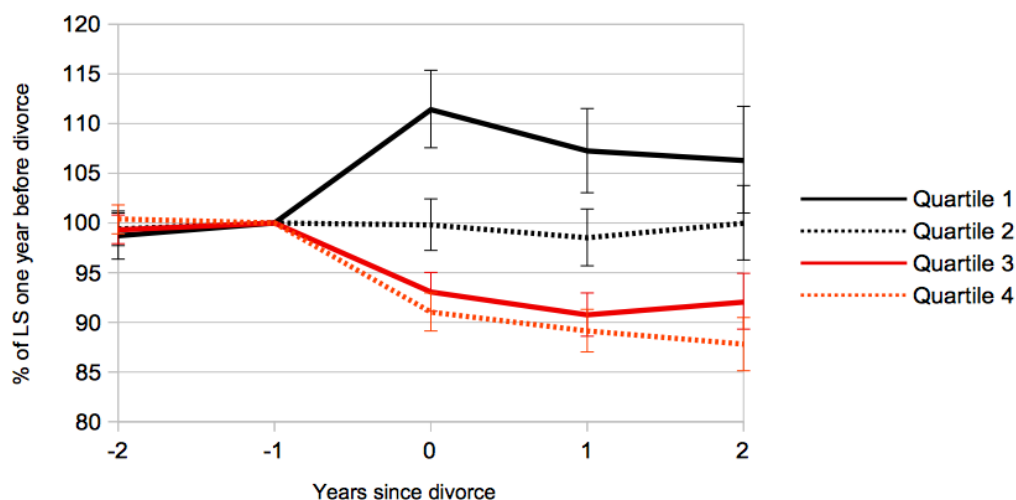
The variation in living standards is different for men depending on their position in the distribution of living standards. The living standard of the poorest men (in the bottom quartile of living standards) increases by about 7% one year after divorce (Figure 2.7). Living standards of men are stable in the second quartile. Men in the third and fourth quartiles experience a decline of their living standards by respectively 9% and 11%

Table 2.3: Sample size by quartile (individuals aged 50 years and over)

	Men		Women	
	Treated	Control	Treated	Control
First/bottom quartile	852	519	482	219
Second quartile	808	427	555	237
Third quartile	930	515	707	343
Fourth/top quartile	1,347	759	998	542
Total	3,937	2,220	2,742	1,341

Source: EDP individuals, divorced between 2012 and 2016, EDP 2019.

Figure 2.7: Effect of divorce on living standards, according to living standards before divorce, men



Source: EDP men over 50, divorced between 2012 and 2016, EDP (2019 edition). N = 1,286 in quartile 1 ; 1,216 in quartile 2 ; 1,435 in quartile 3 ; 2,096 in quartile 4.

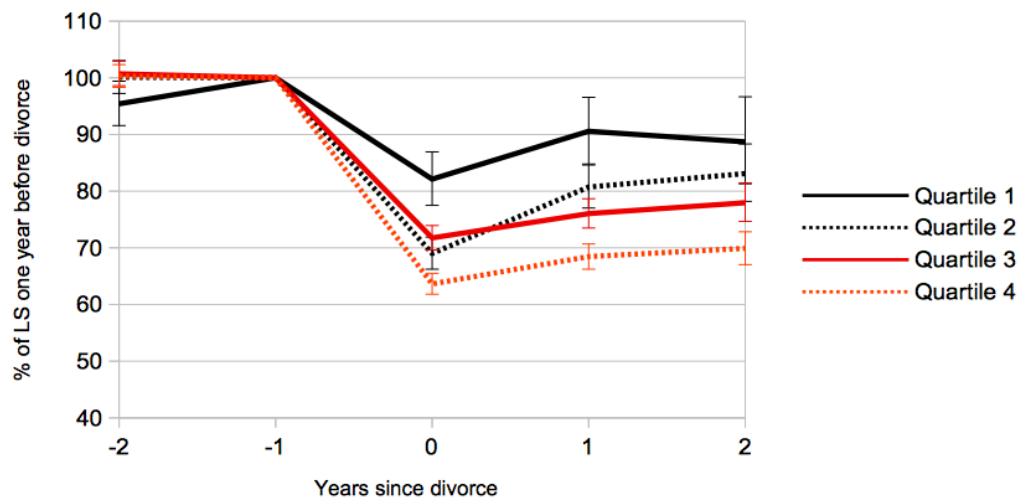
Note: regression results. Confidence intervals are at the 95% level.

Lecture: one year after divorce, men in the first quartile's (at the bottom of the living standards distribution pre-divorce) living standards are 107% of what they were one year before divorce. Their living standards increased by 7%.

A similar pattern emerges for women, but more pronounced along the living standards distribution. The higher the position in the income distribution before divorce, the greater

the fall in living standards. The living standards of the poorest women (first quartile) decreases by 9%, by 19% in the second quartile, by 24% in the third one and by 32% for women who were in the richest couples before divorce.

Figure 2.8: Effect of divorce on living standards, according to living standards before divorce, women



Source: EDP women over 50, divorced between 2012 and 2016, EDP (2019 edition). N = 560 in quartile 1 ; 740 in quartile 2 ; 1,027 in quartile 3 ; 1,503 in quartile 4.

Note: regression results. Confidence intervals are at the 95% level.

Lecture: one year after divorce, women in the first quartile's (at the bottom of the living standards distribution pre-divorce) living standards are 91% of what they were one year before divorce. Their living standards decreased by 9%.

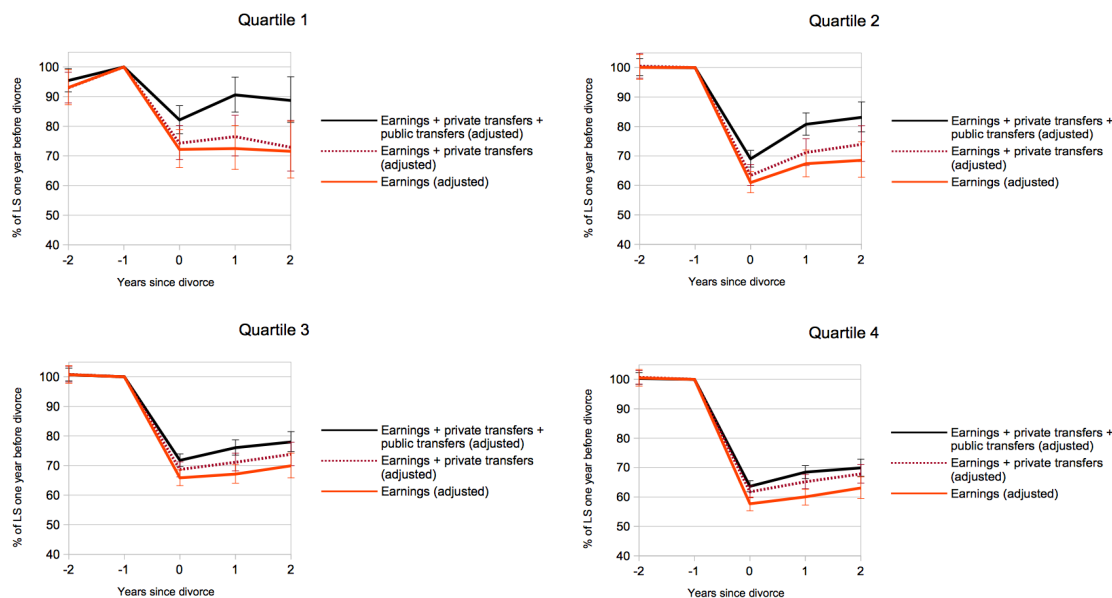
Figures 2.9 and 2.10 highlight the role played by private and public transfers along the living standards distribution. Without any transfers, the decrease in living standards ranges from 28% to 40%, looking from the women in the bottom of the distribution to women in the top. Transfers participate in the gradient we observed previously, with a fall in standard of living that is greater the higher up the standard of living distribution. From a decrease by 28% of their living standard without any transfers, the final decrease is 9%.

Public and private transfers reduced this dramatic decrease by almost two-third. Even if because of small sample sizes (see Table 2.3), we are not always able to distinguish significantly the role played by these two type of transfers along the income distribution, public transfers, mainly means-tested, play the bigger role, especially for poorest women. The role of public transfers diminishes as women move up the distribution of living standards. For the richest women, their role is fairly null. That role of public transfers is observed in other countries where the welfare state is important. For example, in the Netherlands, Hogendoorn [2022] highlights that "dissolution prompted income convergence, as women from high-income unions experienced sizeable losses yet women from low-income unions actually gained".

Private transfers also play a role, although to a lesser extent. Their effect on living standard is quite similar along the income distribution, except for the richest women before divorce for whom the effect of private transfers is a more pronounced and significant. Among them, the decline in living standard is reduced from 40% (if we do not take any transfers into account) to 37% with private transfers.

Among men, we do not observe significant effects of transfers on living standards, except for the richest men before divorce. Among them, without any transfers, the decrease in living standards would have reached 4%. As they more often pay private transfers and receive less often net public transfers (receiving less welfare benefits or paying more income taxes), including transfers worsen their situation. The decrease in living standards is accentuated by 7% extra percentage points, reaching 11%. Yet, the effect of public and private transfers on their income cannot be distinguished due to overlapping confidence intervals.

Figure 2.9: Effect of divorce on living standards, with and without transfers, according to income before divorce, women



Source: EDP women over 50, divorced between 2012 and 2016, EDP (2019 edition). N = 1,286 in quartile 1 ; 1,216 in quartile 2 ; 1,435 in quartile 3 ; 2,096 in quartile 4.

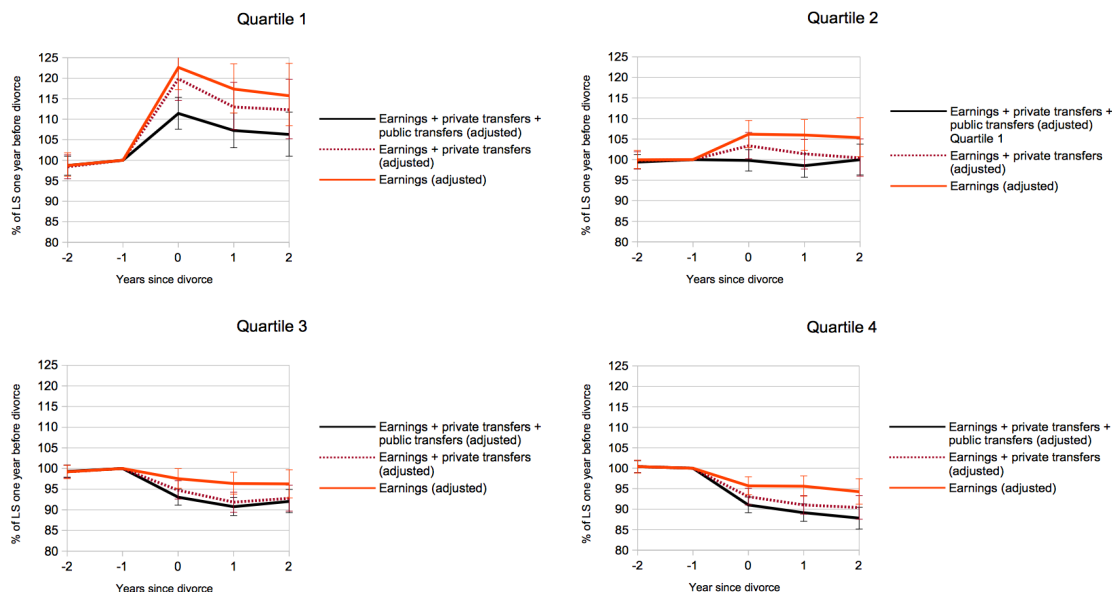
Note: regression results. Confidence intervals are at the 95% level.

Lecture: one year after divorce, first quartile women's living standards are 91% of what they were one year before divorce. Their pre-public transfers living standards are 76%, and their pre-transfers living standards are 72% of their reference period level.

2.6.2 Heterogeneity by marital specialization

Marital specialization, approximated by the share of household's resources that one spouse provides, plays a role in the variation in living standard following divorce. The literature (Bonnet et al. [2021] ; McManus and DiPrete [2001]) highlights a greater drop in living standards for the secondary provider of income within the couple. In order to study the role of this specialization, we stratify our sample into three groups according to the distribution of contributions to the couple's income. We define as "smaller contributors" (secondary provider) individuals who contribute less than 40% of the total couple's income,

Figure 2.10: Effect of divorce on living standards, with and without transfers, according to income before divorce, men



Source: EDP men over 50, divorced between 2012 and 2016, EDP (2019 edition). N = 560 in quartile 1 ; 740 in quartile 2 ; 1,027 in quartile 3 ; 1,503 in quartile 4.

Note: regression results. Confidence intervals are at the 95% level.

Lecture: one year after divorce, first quartile men's living standards are 107% of what they were one year before divorce. Their pre-public transfers living standards are 113%, and their pre-transfers living standards are 117% of their reference period level.

and "higher contributors" (main provider) those who contribute more than 60%. The rest of individuals are qualified as "egalitarian", with each member of the couple contributing between 40% and 60% of the couple's income.

Men are more often the main providers, "higher contributors" (about 58% among 50 years and over), while women are more often secondary providers, "smaller contributors" (about 55% of them). The male breadwinner model is still prevalent (Table 2.4).

In line with the existing literature, variations in living standards are closely linked to the economic position of the spouses within couple. While on average, the living standard

Table 2.4: Sample size by marital specialization (individuals aged 50 years and over)

	Men		Women	
	Treated	Control	Treated	Control
Sample size				
Smaller contributor	443	230	1,436	674
Egalitarian contributor	1,128	621	799	417
Higher contributor	2,165	1,234	396	192
Total	3,736	2,085	2,631	1,283
Composition (%)				
Smaller contributor	12	11	55	53
Egalitarian contributor	30	34	30	33
Higher contributor	58	59	15	15

Source: EDP individuals, divorced between 2012 and 2016, EDP (2019 edition). *Sample:* information on partner's income, which is necessary to evaluating contribution to couple income is not available for all individual. Analysis on the role of marital specialisation are then produced on a sub-sample of the sample previously used.

of all divorced men declines by about 6% in the year following divorce, the decline is much greater (27%) when they are the secondary providers/smaller contributors of resources (Figure 2.11), a loss that fades little with the years following the divorce. Conversely, the living standard of men who are the main providers of resources/higher contributors increases after divorce by 2%. The differences in the economic consequences of divorce according to the degree of marital specialization within the couple are even more marked for women. While on average, they experienced a 24% drop in their living standard in the year following divorce, this drop is much more significant, roughly 33%, when they are secondary providers/smaller contributors (Figure 2.12). Being the main provider/higher contributor of resources allows them to almost maintain their living standard after divorce (3% decrease one year after divorce). When an egalitarian contributor, the loss of living standard reaches 20% for women and 12% for men. Both men and women bear the cost of the loss of economies of scale due to divorce, although that cost appears a little more heavy for women. It should be noted that within this so-called "egalitarian" class, men are

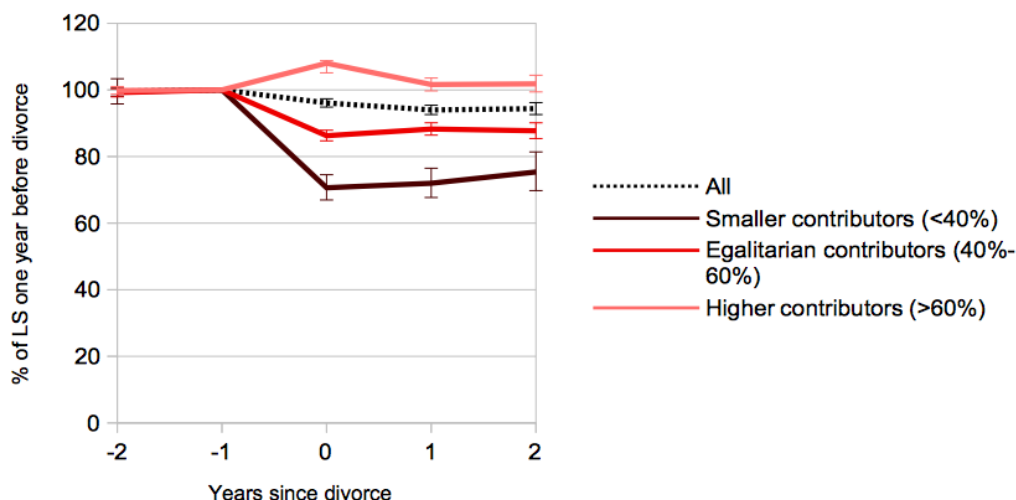
a little more likely to earn more²⁰.

Our results measure the difference in living standards between men and women across couples, not within couples²¹. Heterogeneity according to marital specialization can, however, shed some light on this subject. Indeed, we have created three levels of contribution to the couple's income: higher, egalitarian and smaller contributors. Although the analysis is still not intra-couple, we can deduce that "egalitarian" women are probably partnered with men similar to those in the "egalitarian" group. Similarly, a male higher contributor is probably partnered with a woman similar to those of the female smaller contributor group (and vice versa for female high contributors). As a result, it seems that among egalitarian contributors, the "across couple" gender gap in variation in living standards is smaller (9 percentage points) than in un-egalitarian couples composed of a higher contributor and a smaller contributor (25 percentage points when the woman is higher contributor and 35 percentage points when the man is higher contributor). These results by specialization can also inform us about the direction of evolution of this gender gap according to the mix between these different types of couples in society. A society with more egalitarian couples would be associated with an increase in divorce losses for men, a decrease in divorce losses for women and a smaller gender gap.

²⁰Women above 50 years old contribute on average to 18% when secondary providers, 49% when egalitarian providers, 78% when main providers. While men contribute on average to 23% when secondary providers, 51% when egalitarian providers and 82% when main providers.

²¹We have information on EDP individuals and their household members. When a non-EDP person leaves the household of an EDP individual, we lose track of him/her. We can only follow his or her trajectory during cohabitation. So, when an EDP individual is married to a non-EDP individual, we cannot measure the variation in living standards upon divorce within the couple. This is only possible for couples made up of two EDP people, i.e. a sample of 0.2% rather than 4.4% of the french population. In particular, our sample of female reduced to women whose spouse is also an EDP individual comprises just 572 women between the ages of 30 and 49, and 204 women between the ages of 50 and 89. These sample sizes are too small to draw any causal conclusions.

Figure 2.11: Effect of divorce according to the degree of marital specialization, men



Source: EDP men over 50, divorced between 2012 and 2016, EDP (2019 edition). N = 610 for smaller contributors ; 1,748 for egalitarian contributors ; 3,395 for higher contributors.

Note: regression results. Confidence intervals are at the 95% level.

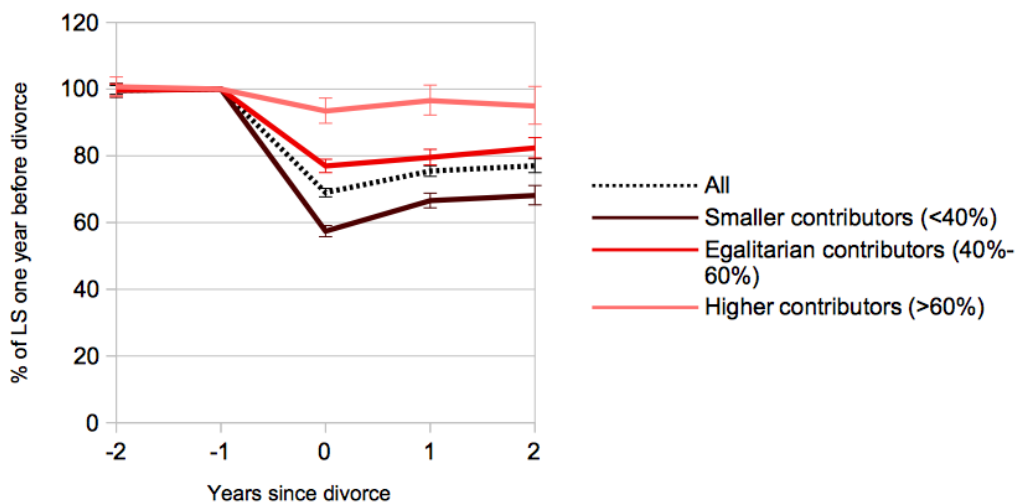
Lecture: one year after divorce, higher contributor men's living standards are 102% of what they were one year before divorce. Their living standards increased by 2%.

2.7 Conclusion

This article responds to the need to document the economic consequences of grey divorces, in a context where the oldest divorcees tend to be excluded by the existing literature and where late divorces are increasingly frequent.

Our first contribution is to measure the causal effect of divorce on the standard of living of people separating after age 50. We find that living standards of men divorcing after age 50 decline by an average of 6% between the year before divorce and the year after. The decline is more dramatic for women, at around 24%. Using a similar method on a sample of individuals divorcing before age 50, we observe that the magnitude of that negative effect is similar for men in both age groups. This is not the case for women, as grey divorcees'

Figure 2.12: Effect of divorce according to the degree of marital specialization, women



Source: EDP women over 50, divorced between 2012 and 2016, EDP (2019 edition). N = 1,911 for smaller contributors ; 1,214 for egalitarian contributors ; 588 for higher contributors.

Note: regression results. Confidence intervals are at the 95% level.

Lecture: one year after divorce, higher contributor women's living standards are 97% of what they were one year before divorce. Their living standards decreased by 3%.

living standards decrease more than young divorcees'. It results in a wider average gender gap in the variation of living standards for older divorcees than younger ones.

Second, we find that public and private transfers play a big role to moderate the negative economic consequences of divorce among the grey divorcees, especially for women. Public and private transfers reduce the loss by a third, about 11 percentage points (from 35% - in the absence of transfers - to 24%). For men, public transfers play a significantly negative role, moderately reducing their living standards. Private transfers have no significant impact.

The third contribution of our paper is to highlight the heterogeneity of the effect of divorce according to the position of individuals in the household income distribution be-

fore separation. We find that the impact of divorce on women and men's loss of living standard increases with their position in this distribution: greater at the top of the income distribution than at the bottom. Looking at the composition of this living standard, we find that transfers have no clear cut impact on men's living standard. For women, public transfers, on the contrary, appear to play a role to mitigate the loss of living standard in the two bottom quartiles, but their impact decreases as one moves up the income distribution. It is consistent with the fact that a large number of welfare benefits are means tested. Those results suggest that the divorce policy framework in France does moderate the decline in women's living standard after divorce. Yet, large differences remain between gender regarding their post-divorce economic standing, and private transfers seem of little to no impact in most quartiles, which suggests that the economic consequences of divorce on living standards are right now more socialized than internalized by couples. That analysis should be qualified by the fact that the present paper only imperfectly accounts from private transfers, especially part of spousal alimony evades us.

The present paper has two main limitations calling for more research.

Our study shows that the economic consequences of divorce do not have the same magnitude for younger divorcees and grey divorcees. Therefore it suggests that grey divorcees should not be excluded from the analysis of the economic cost of divorce. This raises the question of the mechanisms underlying this greater loss for women in particular. The present study is limited to the period 2010-2018. Our measure of a different intensity of living standards' variation according to age group therefore probably amalgamates a life-cycle effect and a generation effect. Our data do not have the historical depth needed to go beyond this limit by following a unique generation divorcing at different ages. More research is necessary to analyse mechanisms and disentangle life-cycle and generational effects.

Second, it deals only with current income and leaves aside the question of wealth, not available in our database. Divorce affects household's net worth. It is likely the case for those over 50 years old who have had more time to accumulate during their personal and marital lives as they have longer union duration than young divorced people. In France, the over-50 hold more assets than younger age groups (Gleizes et al. [2018]). The question of the consequences of divorce on the wealth of older divorcees is therefore important.

Our results should be read in conjunction with the results of the literature on the impact of divorce on household wealth. Kapelle and Baxter [2021] show in Germany that separation implies a decrease in wealth for both men and women mainly driven by housing. Men continue to have more wealth than women, but there is no clear gendered dynamic in the loss induced by divorce. On the contrary, Zilincikova and Schnor [2021] for Belgium show that women are more likely to retain ownership of the couple's home after a grey divorce. A decline in living standards does not cover the same economic reality whether or not one owns one's home and may lead to reconsidering differences in economic status between age groups (Baclet [2006]). This element can lead to both a nuanced reading of our results in terms of gender inequality and the dynamics of the economic consequences of divorce over the life cycle.

Future researches should include this dimension to give a broader picture of the economic consequences of grey divorces. Beyond the inclusion of changes in housing ownership after divorce, we may also think about including a measure of imputed rent in the calculation of the living standard. A better inclusion of wealth variables would also allow us to better understand how spousal alimony in the form of capital transfers plays a role in the living conditions of older divorcees.

2.8 Tables

Table 2.5: Sample description by age group

	Men				Women			
	30-49 years old		50-89 years old		30-49 years old		50-89 years old	
	Treated	Control	Treated	Control	Treated	Control	Treated	Control
Age at divorce	39.5	39.3	58.3	58.4	38.9	38.8	57.4	57.3
Household with children (%)	89	92	57	58	92	94	45	47
Participation in labor market (%)	95	96	68	66	86	84	61	63
Retired (%)	1	0	33	34	1	1	29	27
Contribution to couple income (%)	64	65	66	68	38	36	36	37
Living standards (median - 2015 €)	19968	20377	22303	21668	19947	20452	22995	23625
Individual income (median - 2015 €)	23632	23981	23537	22887	16950	16771	14339	15904
Marriage duration								
0 to 4 years	27	26	11	10	22	22	9	10
5 to 9 years	22	20	8	9	22	20	7	8
10 years and more	51	54	81	81	56	58	84	82
N								
Initial sample	7824	4978	4177	2390	8120	5258	2880	1449
Sample with information on income 1 to 3 years into observation	7533	4744	3937	2220	7829	5038	2742	1341
Sub-sample on breadwinner status	7158	4546	3736	2085	7475	4853	2631	1283

Source: EDP (2019 edition).

Note: Each variable is measured in the baseline year which is three years into the observation window. That is a year before divorce for the treated.

Table 2.6: The effect of divorce on living standard, men

	30-49						50-89					
	(1)	Variation (2)	(3)	(1)	Euros (2)	(3)	(1)	Variations (2)	(3)	(1)	Euros (2)	(3)
2 years before	0.001 (0.769)	-0.002 (0.619)	-0.001 (0.637)	-63 (0.482)	-121 (0.153)	-119 (0.157)	-0.003 (0.597)	-0.004 (0.379)	-0.004 (0.382)	-194 (0.528)	-173 (0.591)	-172 (0.593)
Year of divorce	-0.026*** (0.000)	-0.021*** (0.000)	-0.021*** (0.000)	36 (0.781)	26 (0.829)	28 (0.821)	-0.044*** (0.000)	-0.034*** (0.000)	-0.034*** (0.000)	-996** (0.026)	-909* (0.051)	-911* (0.051)
1 year after	-0.03*** (0.000)	-0.031*** (0.000)	-0.055*** (0.000)	-139 (0.345)	-154 (0.271)	-570*** (0.000)	-0.058*** (0.000)	-0.058*** (0.000)	-0.068*** (0.000)	-824 (0.104)	-849 (0.109)	-1113** (0.039)
2 years after	-0.021*** (0.006)	-0.023*** (0.001)	-0.053*** (0.000)	-60 (0.745)	3 (0.984)	-535*** (0.004)	-0.057*** (0.000)	-0.056*** (0.000)	-0.07*** (0.000)	-2451*** (0.000)	-2434*** (0.000)	-2784*** (0.000)
Retirement		-0.098*** (0.000)	-0.098*** (0.000)		-1060 (0.133)	-1069 (0.129)		-0.087*** (0.000)	-0.087*** (0.000)		-1858*** (0.005)	-1862*** (0.004)
Unemployment		-0.076*** (0.000)	-0.076*** (0.000)		-1706*** (0.000)	-1699*** (0.000)		-0.071*** (0.000)	-0.071* (0.000)		-2012*** (0.007)	-2019*** (0.007)
Re-partnered			0.096*** (0.000)			1709*** (0.000)			0.078*** (0.000)			1950** (0.011)
Observation	12,277	12,098	12,098	12,277	12,098	12,098	6,157	6,033	6,033	6,157	6,033	6,033
R-square within	0.001	0.0052	0.0103	0.0016	0.0046	0.0069	0.0028	0.0085	0.0108	0.0011	0.0016	0.0019

*** p<0.01, ** p<0.05, * p<0.1

Source: EDP men over 50, divorced between 2012 and 2016, EDP (2019 edition).

Note: regression results.

Table 2.7: The effect of divorce on living standard, women

	30-49						50-89					
	(1)	Variation (2)	(3)	(1)	Euros (2)	(3)	(1)	Variations (2)	(3)	(1)	Euros (2)	(3)
2 years before	-0.006*	-0.007**	-0.007**	-82	-58	-60	-0.006	-0.003	-0.003	381	271	279
	(0.072)	(0.032)	(0.029)	(0.357)	(0.53)	(0.517)	(0.436)	(0.633)	(0.658)	(0.309)	(0.363)	(0.348)
Year of divorce	-0.306***	-0.297***	-0.297***	-5760***	-5913***	-5918***	-0.403***	-0.368***	-0.368***	-8589***	-8436***	-8441***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
1 year after	-0.198***	-0.198***	-0.23***	-4371***	-4522***	-5299***	-0.292***	-0.278***	-0.302***	-7005***	-6761***	-7459***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
2 years after	-0.17***	-0.173***	-0.215***	-4018***	-4134***	-5162***	-0.275***	-0.273***	-0.280***	-6817***	-6245***	-7140***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Retirement		-0.114***	-0.116***		-4148***	-4202***		-0.006	-0.007		-1225**	-1251**
		(0.000)	(0.000)		(0.000)	(0.000)		(0.63)	(0.58)		(0.033)	(0.029)
Unemployment		-0.023***	-0.024***		-501***	-527***		-0.008	-0.006		-867	-822
		(0.000)	(0.000)		(0.002)	(0.001)		(0.613)	(0.684)		(0.19)	(0.212)
Re-partnered			0.191***			4640***			0.251***			7432***
			(0.000)			(0.000)			(0.000)			(0.000)
Observation	12,867	12,326	12,326	12,867	12,326	12,326	4,083	3,830	3,830	4,083	3,830	3,830
R-square within	0.1	0.1342	0.1494	0.0637	0.0718	0.0826	0.1305	0.1626	0.1757	0.0362	0.0585	0.0651

*** p<0.01, ** p<0.05, * p<0.1

Source: EDP women over 50, divorced between 2012 and 2016, EDP (2019 edition).

Note: regression results.

2.9 Appendix

2.9.1 Alternative control group

In this appendix we present our results when using an alternative control group. The literature often uses continuously married people as a control group for people undergoing a marital dissolution. In the wake of the literature, the continuously married ("never-treated"²²) are the alternative control group.

The control group is made of individuals married in 2010, that do not divorce or get widowed before the end of observation period. A counter-factual divorce date is created randomly. With that fictitious divorce year, the age condition defined for the divorced is applied. Moreover, we only keep individual whose fictive divorce year match that of our treated group: 2012, 2013 or 2014. The control group is observed five years: two years before "fake-divorce" and two years after. The sample size of the control groups is 39,430 for men aged between 30 and 49, 95,908 for those aged over 50. There are 43,886 women under-50 and 79,048 women over-50.

Treated and alternative control groups differ in many respect. A t-test comparison of means between treated and never-treated with a 0.05 p-value confirms that observation. In figure 2.8, an asterisks on the "control" column identifies the variable for which a significant difference in mean is found between treatment and control. There are more difference between the treated and never-treated than between the treated and later treated. This was to be expected and is one the reason that urged us to chose the later-treated as a main control group. Yet, figure 2.13 shows no clear difference in pre-trends between the treatment group and the never-treated.

²²Calling people continuously married during a specific time window "never-treated" is an approximation. Some of those people may get divorced in the year following observation.

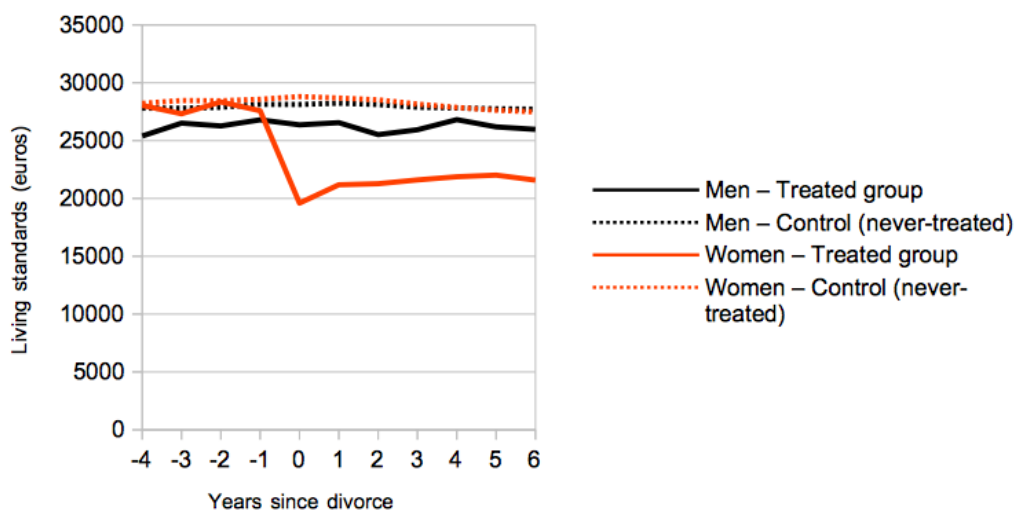
Table 2.8: Sample description by age group, divorced and married as a control group

	Men				Women			
	30-49 years old		50-89 years old		30-49 years old		50-89 years old	
	T	C	T	C	T	C	T	C
Age	39.5	39.7*	58.3	64.2*	38.9	39.3*	57.4	62.7*
Household with children (%)	89	94*	57	31*	92	94*	45	26*
Participation in labor market (%)	95	96*	68	42*	86	81*	61	37*
Retired (%)	1	0*	33	62*	1	1	29	55*
Contribution to couple income (%)	64	67*	66	68	38	33*	36	36
Living standards (median - 2015 €)	19,968	20,792*	22,303	23,493*	19,947	20,495	22,995	24,120*
Individual income (median - 2015 €)	23,632	25,422*	23,537	22,704*	16,950	16,520*	14,339	11,750*
Marriage duration (%)								
0 to 4 years	27	22	11	3	22	18	9	2
5 to 9 years	22	21	8	3	22	19	7	2
10 years and more	51	57	81	95	56	63	84	96
N								
Initial sample	7,824	40,877	4,177	98,860	8,120	45,544	2,880	81,038
Sample with information on income 1 to 3 years into observation	7,533	39,430	3,937	95,908	7,829	43,886	2,742	79,048
Sub-sample on breadwinner status	7,158	37,913	3,736	94,036	7,475	42,438	2,631	77,695

Source: EDP (2019 edition).

Note: each variable is measured in the baseline year which is three years into the observation window. That is a year before divorce for the treated. "T" stands for "treated group", "C" stands for "control group".

Figure 2.13: Descriptive trend of living standards among the 50 years old and older, divorcees and control group

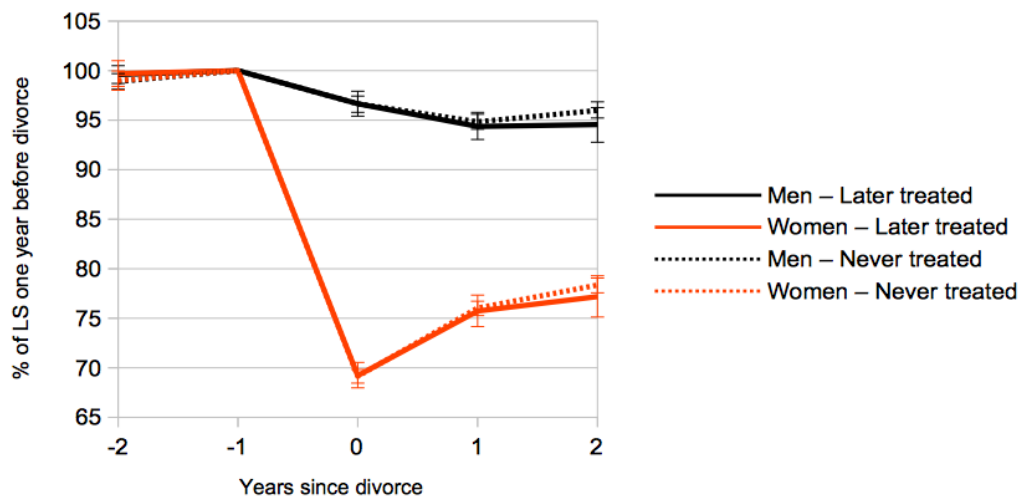


Source: EDP individuals, EDP 2019.

Note: mean living standards by year relative to divorce. An alternate divorce year is defined randomly for the control group.

Regression results are very similar when using the never-treated or the later-treated as control groups (figure 2.14). One year after divorce, regressions on the log of living standards with later treated as a control group and never-treated as control group show that living standards decrease with respect to the reference period by 3% for young men divorcees, 6% for men grey divorcees, 18% for young women divorcees and 24% for grey women divorcees.

Figure 2.14: Effect of divorce on living standards relative to one year before divorce



Source: EDP individuals, EDP (2019 edition). N = 6,033 for men and 3,830 for women, when the control group is made of later-treated. N = 98,918 for men and 74,504 for women, when the control group is made of never-treated.

Note: regression results. Confidence intervals are at the 95% level.

Lecture: one year after divorce, women over 50's living standards are 76% of what they were one year before divorce. Their living standards have decreased by 24% between the two periods.

2.9.2 Alternative method for treatment estimation

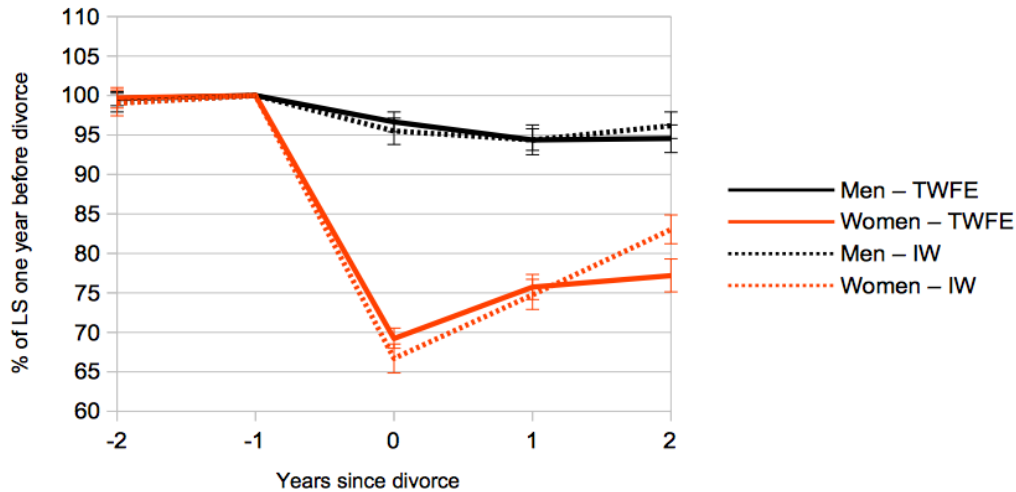
Two-way fixed effects regression have been widely used to estimate difference-in-differences designs with panel data. Yet the use of those models with a staggered treatment has been questioned in recent years (Roth et al. [2023]). Our sample is composed of individuals who divorce in different years, which mean that treatment is staggered. Our data include 5 treatment cohorts (one for each year of divorce between 2011 and 2016, through two of them act as control). In the case of specifications with event studies (with indicators coding time-periods relative to treatment), Sun and Abraham [2021] criticized the classical two-way fixed effects. First, their paper highlights the difficulty to interpret the TWFE coefficient as an average treatment effect because of the weights it use to aggregate cohort-specific treatment effects. Second, the paper shows that TWFE coefficients are at risk of being biased when the treatment effect homogeneity assumption is breached. Contamination arises between different period coefficients. To solve these problems they propose an alternative estimation method of treatment effect with DID design, event studies specification and staggered treatment. It relies on measuring cohort-specific average treatment effects and aggregating them with easily understandable weights: the cohorts' shares of the sample for the period in which effect is estimated.

In the present paper, divorce cohorts of 2017 and 2018 were excluded in order to strengthen the "effect homogeneity" assumption. Indeed, in 2017, a reform made it easier to divorce. This was likely to change the selection process into divorce. Yet, no further proof of homogeneity was given. We use Sun and Abraham's method as a robustness test for our TWFE regression.

Figure 2.15 shows results obtained by TWFE and Sun and Abraham's IW estimator when the control group is made of later treated²³. The Sun and Abraham average treatment

²³A similar comparison between TWFE and IW estimators when the control group is made of

Figure 2.15: TWFE and Sun-Abraham's estimators



Source: EDP individuals divorced between 2012 and 2016, EDP (2019 edition). N = 6,157 for men and 4,083 for women, with the TWFE estimator. N = 6,132 for men and 4,076 for women, with the IW estimator.

Note: regression results. Confidence intervals are at the 95% level. No control variables are used.

Lecture: one year after divorce, according to TWFE, women over 50's living standards are 76% of what they were one year before divorce. Their living standards have decreased by 24% between the two periods. According to Sun and Abraham's IW estimator, they living standards, one year into divorce, is 75% of what they were one year before divorce.

effect estimator is the same as with our TWFE's coefficient. This is consistent with the comparability we tried to established between control and treatment group with the 2017 exclusion. The Sun and Abraham estimator can act as a control of pre-treatment parallel trends, it confirms that no pre-trends is happening in the two year before the treatment groups' face divorce. Yet, it is too-small a temporal horizon to conclude that there is no pre-trend at all. The only difference between the two estimators appears two years after divorce. For women, the TWFE estimator seems to under-estimate the recovery effect.

never-treated, similar conclusion were reached.

Chapter 3

Are the widowed too much
insured? Survivor's pensions and
living standards upon widowhood
in France

3.1 Introduction

An increasing body of literature is finding an apparent link between an overall decrease in the poverty rate of widows¹ and increases in both the education and labour force participation of women, such as a 2018 demographic study of US widows between 1994 and 2014 (Munnell et al. [2020]), to name but one example. Those increases have contributed to a trend of women obtaining more individual retirement rights and thereby becoming less destitute upon the deaths of their husbands. Thus, the path to poverty for widows may continue to diminish in the future, a finding that is at odds with the common view of widows forming an economically vulnerable group in need of support. Therefore, it may be time to reassess the support policies aimed at them.

One such support policy is the survivor's pension. Generally obtained through marriage, this right rewards part of a deceased spouse's retirement pension to his or her survivor in order to offset the loss in household income upon their death. The policy has historically been justified by the specific risk of poverty faced by women when losing their husbands, which is indeed a peril in the context of a male breadwinner society, as women in such situations have limited access to the labour market and therefore have limited individual retirement rights. Thus, survivor's pensions were devised as a social insurance mechanism that extended the breadwinner's support beyond the grave and prevented widowed women from falling into destitution. Because the male-breadwinner model has declined in parallel with the poverty of widows, survivor's pensions have fallen under scrutiny in recent years. In 2018, for example, an OECD brief titled *Are survivor's pensions still needed?* questioned

¹This paper uses the terms widow and widower in reference to legal status and to describe, respectively, the male and female survivors from the formal union of marriage, specifically those whose spouses died before them.

not only the viability of survivor's pensions in light of changes in the socio-economic environment, but also the redistributive effects of taking money from the unmarried and from egalitarian couples in order to redistribute it to highly specialised married couples. The policy brief answers its own question by advocating for a continuation of survivor's pensions while changing the goal, namely by shifting the focus from poverty alleviation to the so-called living standards-smoothing target, which has long been linked to survivor's pensions. In essence, this objective seeks to compensate for a loss in living standards regardless of whether or not that loss might drive the widow into poverty; and it appears more consistent with contemporary economic and family realities. Despite a decrease having been identified in widows' poverty in the US, widowhood remains an economic shock for older people, as the death of a spouse cuts off the flow of the deceased's income. The variation in living standards obviously depends on the survivor's share of household income before death, given that the low earner in a couple will experience quite a large drop in living standards upon retirement unless some corrective measure is put in place. Despite all the socio-economic and labour market changes seen in recent decades, women remain the most likely low earners in married couples.

As the smoothing objective has become increasingly relevant, researchers have shifted from analysing poverty and replacement rates to studying the living standards of the widowed. By measuring the variation in living standards, policy-makers can thus better understand widowhood's economic impact and improve survivor's pensions in line with that compensation goal. Studies in Europe show that women tend to have stable living standards despite widowhood and that men's living standards increase after the spouse's death (Choi [2006]; van der Vaart et al. [2020]; Burkhauser et al. [2005]; Hanemann and Rausch [2020]). One recent development in the literature is the increasing interest in the level of compensation provided by survivor pension systems (Fadlon et al. [2019]; Hanemann and

Rausch [2020] ; Bonnet et al. [2020]). The smoothing target defines overcompensation in a survivor's pension as a rise in living standards for a beneficiary following widowhood. However, this definition can be improved upon by distinguishing between partial and total overcompensation. Total overcompensation, according to the smoothing target, occurs when every euro of a survivor's pension contributes to increasing the beneficiary's living standards above the pre-widowhood level. Because no drop in living standards needs to be compensated, in compliance with the smoothing target rationale, those people should not be eligible to survivor's pension. Partial overcompensation happens when a survivor's pension compensates for a drop in living standards but provides more than was needed and ultimately increases living standards relative to the reference period, thus making this an issue of compensation level and not eligibility. A key variable that distinguishes between partial and total overcompensation is the couple's pre-widowhood income distribution, which is often neglected because data-sets are incomplete. However, the data-set that I draw from allows me to tackle this issue and distinguish between the two types of overcompensation, which is highly relevant from a policy-making perspective.

This paper focuses on present-day France, which provides us with an interesting case for three main reasons. First, France is a country with little to none of the out-of-pocket medical expenses that constitute an important economic mechanism affecting widowhood in the American literature. Because these expenses are so much more minor in France, we can focus more clearly on other mechanisms at play in the variation of living standards, namely consumption units and intra-household gender income inequality. Second, survivor's pensions are a large public expense that are important at both the macro and micro levels. At the macro level, survivor pension expenditures amounted to 1.6% of GDP in 2020. At the micro level, survivor's pensions for women (who continue to be the main beneficiaries) amounted to 18% of their average retirement pension in 2020. What is more,

the survivor's pension constitutes a lifelong monthly income for the widowed. Third, and finally, France has so far not joined in any of the contemporary trends toward survivor pension reform. Indeed, the debates on survivor's pensions have already led to some countries changing their policies in two very different ways. On the one hand, some countries have made the survivor's pension available to unmarried couples while, on the other, other countries have cancelled or rolled back their survivor pension programs. France has seen no public debates on modifying the current system since the 2019 Delevoye Report, whose first main recommendation was to unify France's 42 pension schemes into one universal system. Another was to pursue a simplified smoothing objective, as French survivor's pensions were originally devised to achieve different goals based on various rules. The latter update complies with OECD recommendations to consider how current systems can achieve the goal of compensation by smoothing living standards.

This paper answers the following questions. First, what is widowhood's impact on the living standards of retired men and women relative to their position in the income distribution in modern-day France? This constitutes the present paper's first contribution to the literature, as it updates past assessments of widowhood's impact on living standards in France and reports the novel findings that, on average, the living standards of both men and women have presently increased upon widowhood, although they have risen more for men than for women. For greater insights into these developments, I look at redistribution within the French system by analysing how the role played by survivor's pensions varies across the pre-widowhood living standard distribution. The second and third questions constitute this paper's main and most compelling contributions. Do survivor's pensions contribute to smoothing living standards following a spouse's death? Which people does the system undercompensate or overcompensate according to the smoothing target? In answering these questions, this is the first paper, to my knowledge, that uses real-world

data to look at under- and overcompensation in France. Furthermore, it is also the only paper to assess these issues on the basis of breadwinner status, by which I find that some total overcompensation takes place in the current system because survivor's pensions do not exclude main breadwinners. And, partial overcompensation occurs among survivors of egalitarian couples. Moreover, this work provides some perspective on the future of survivor's pensions. Even though it is expected that heterosexual couples will experience a more egalitarian income distribution, I show that present-day survivors of egalitarian couples face a drop in living standards of about 24% to 30% relative to their pre-widowhood situations. However, that drop is offset by the current survivor pension system. This research program has been implemented using event studies, basing it on a French administrative dataset known as the Permanent Demographic Sample (commonly referred to as EDP for its French name *échantillon Démographique permanent*). That data-set contains two essential features. First, it is a panel that allows me to follow a person's income sources and marital status between 2010 and 2017. Second, the EDP follows 4% of the French population, which is a substantial enough observation for working on a large sample of widows and widowers relative to the sample sizes most commonly found in the literature. This second feature is paramount to studying the heterogeneous effects of widowhood. The article is organised as follows. First, I present the literature on survivor's pensions while simultaneously defining some of the French system's objectives concerning survivor's pensions (Section 3.2). Next I presents some recent results regarding widowhood's impact on living standards, which is then followed by an introduction to my data-set and the strategy used for illuminating widowhood's impact on living standards (Section 3.3). The next section show my results separately for women and men, and categorized according to sub-samples based on pre-widowhood distributions in living standards and breadwinner status (Section 3.4). Finally, this paper concludes by highlighting the limits of the results, discussing

the concept of overcompensation and offering suggestions for prospective research paths (Section 3.5).

3.2 Literature review

3.2.1 Survivor's pensions and their goals

Why survivor's pensions are needed?

The need for survivor's pensions stems from a particularly serious problem following the death of one's spouse, which is, namely, that one's household income and living standards tend to fall. For the lowest earner in the couple, this can result in quite a large drop, which could be privately avoided through life insurance or self-insurance through the labour market. Nevertheless, the state often involves itself with the economic consequences of widowhood, which is justified by the fact that couples are ill-equipped to properly insure against lost income due to a partner's death. Indeed, from a public economics point of view, the state is motivated to act because of market failures on the demand side. At the individual level, insuring against widowhood is both an inter-temporal and interpersonal issue (James et al. [2009]), whereby a worker may take a myopic inter-temporal view that limits their ability to efficiently insure against widowhood because most individuals are unable to correctly estimate the outcomes of negative events like death (Findley and Caliendo [2008]). From an interpersonal angle, the dynamics of bargaining power within the couple may hinder decisions to take up insurance. On the one hand, women tend to survive their husbands and are likely to be the beneficiaries of insurance against widowhood.² On

²In 2019, there were 77,512 new widowers and 146,926 new widows in France, all of whom were 50 years old and older. Widowhood continues to be experienced primarily by women. Source: INSEE, état civil.

the other hand, though the male breadwinner model is less prevalent than before, men still tend to earn more in heterosexual relationships (Morin [2014]). From a traditional man's perspective, paying an insurance policy in the present means decreasing current consumption in order to increase the wife's future consumption, and, since as higher earners they hold greater bargaining power, the level of insurance may match the man's preferences rather than the needs of his future widow. To fight myopia and the inherent imbalances in bargaining power, the state thus takes a justified stance in becoming involved with the economic consequences of widowhood. This, however, gives rise to a new question: To what extent should the state compensate lost income due to widowhood?

The philosophy behind the compensation level of retirement pensions

To better calibrate compensation through survivor's pensions, the literature introduces three targets for determining both eligibility and level of compensation (Bonnet and Hourriez [2012a]; Sterdyniak [2019]; ApRoberts [2008]; Tréguier [2022]). These targets are as follows.

1. The assistance target. This makes the survivor's pension a poverty alleviation policy. When the drop in income following the death of a spouse is so severe that the survivor is at risk of poverty, compensation should be provided in order to elevate widows above the poverty threshold.
2. The smoothing target. When the drop in income following the death of one's husband diminishes one's living standards, survivor's pensions should provide compensation that smooths those living standards around the time of death.
3. The patrimonial target. The rationale behind the patrimonial target is that a survivor has contributed to the deceased's retirement rights through household produc-

tion. Therefore, the survivor should be compensated with any pension rights held by the deceased, regardless of any variations in living standards or poverty risk. Because this level of compensation is independent of living standards and poverty risk, it is generally determined as a fixed share of the deceased's pension, which may sometimes depend on the length of marriage but is most often set at 50%.

The assistance and smoothing objectives can be traced back to the foundation of France's modern social security system. In most systems abroad, the main goal for survivor's pensions is currently generally considered to be the smoothing objective.³ As women's personal pension rights have increased over recent decades (Bonnet et al. [2012]; Albouy et al. [2012]), old age poverty risk seems to be less specific to widowhood as French society experiences a rise in single and divorced retirees (Arnold and Lelièvre [2015]). Still, a decrease in living standards can still be expected without survivor's pensions, due to continuing gender inequalities and the mere existence of scale economies. Though the gender gap in pay has been decreasing, it is now expected to stagnate (Albouy et al. [2012]; Gadrey and Gadrey [2017]). What is more, the gender pay gap has been calculated to be higher within couples than in the general population (Morin [2014]); and, to make matters worse, the gender pension gap remains higher than the gender wage gap (Bonnet et al. [2012]; Geraci and Lavigne [2016]). This situation is unlikely to change, considering that retirement pension reforms increasingly link contributions to benefits and that women are still more likely than men to put their careers on pause (Collet and Rioux [2017]; Meurs et al. [2010]). For all these reasons, a future drop in living standards can still be anticipated upon the death of one's spouse, and the drop is likely to be higher for women than men. Thus, survivor's pensions take on the added burden of serving as a potent safeguard against gendered income inequality in old age.

³See: "Are the survivor's pensions still needed?", OECD Policy Brief on Pensions (2018).

The French survivor pension system

The intricacies of the French system are the result of it having drawn inspiration from all three of the targets mentioned above. Survivor's pensions in France form part of the social security system and they are called "derived rights", meaning that a person's contributions to the system generate both personal pension rights and a survivor's pension rights for that person's married partner after death. Hence, survivor's pensions are managed by retirement schemes,⁴ to which one's affiliation is determined by their sector of activity. Although the main scheme is for private sector employees, these employees can also rely on a complementary scheme. Another important scheme is the public sector scheme,⁵ whose rules differ not only for regulating retirement, but also for survivor benefits. In each case, one's survivor's pension is determined by the retirement scheme of their partner, which is subject to various rules and though the three targets are theoretically distinct, they may actually overlap in practice.

Three types of rules regulate eligibility and compensation level:

1. Rules relating to the deceased, mainly duration of contribution.
2. Rules relating to union. Survivor's pensions in France are limited to married couples.
3. Rules relating to the survivor.

Regarding the third type of rules, those relating to the survivor are numerous. The most important ones focus on age, post-bereavement matrimonial trajectory, and the survivor's

⁴France has 42 distinct retirement schemes.

⁵In 2019, 83% of retirees received a personal retirement pension from the private sector employees' scheme. 71% received a retirement pension from the private sector complementary scheme. 9% received a pension from the public sector scheme. Proportions do not add up to 100% because some retirees receive pensions from several schemes. Source: Panorama des retraités, DREES 2021.

income stream, as detailed below.

- Most retirement schemes have a minimum age requirement, based on the underlying principle that survivor's pensions should help women at ages that impede their access to self-insurance in the labour market. In the private sector scheme, the minimum age to claim a survivor's pension is 55 years old. Before that age, widows can claim widowhood benefits.⁶ After exhausting their widowhood benefits, most widows claim survivor's pensions on their 55th birthday. The private sector complementary pension scheme has a minimum age of 60 years. The civil servant scheme has no minimum age requirement.
- Most retirement schemes have a kind of no-remarriage rule, based on the underlying principle that the survivor's drop in living standards upon bereavement may reverse upon forming a new union. In the private sector scheme, a strict no remarriage rule has been suppressed by a 2004 reform by which new unions are still taken into account through a means test that includes the new partner's income. In 2022, the means tested yearly income threshold for a couple is 35,176.96 euros. Survivor's pensions can either be suspended or partially paid, depending on the means test. In the private sector complementary pension scheme, a new marriage annuls the previous pension rights of the survivor, while civil partnerships or informal unions do not. In the civil servant scheme, both informal and formal new unions suspend survivor's pensions.
- Replacement rates differ between schemes. A replacement rate is the ratio of the derived pension right (the widow's survivor's pension) and the original right it stems

⁶Widowhood benefits are temporary benefits aimed at the young widows of contributors to the private sector scheme. This is a means tested monthly payment that can last up to two years after the spouse's death.

from (the deceased's pension). The private sector scheme offers a 54% replacement rate, although survivor's pensions can be inferior to 54% of the deceased's pension because of the means test. In 2022, the means tested income threshold for one person is 21,985.60 euros a year, which is around 1,832 euros per month. In that scheme, the survivor's pension is a differential pension. Above 1,832 euros per month, no survivor's pension is paid; while, below that amount, a survivor's pension is paid until reaching either 54% of the deceased's pension or the 1,832-euro threshold. The means test is implemented at the time of claiming the pension. If the pension is claimed before the survivor begins receiving his or her own retirement pension, then a second means test takes place upon claiming their personal pension. No means test occurs for either the private sector complementary pension scheme or the civil servant scheme. The replacement rates are still different, being 60% in the former and 50% in the latter.

Through those rules, the private sector scheme tends to draw more from the smoothing and assistance targets, while the two other schemes are oriented more towards the patrimonial target. No schemes are based solely on only one target.

3.2.2 The economic consequences of widowhood

Widowhood's theoretical impact on living standards

When one's spouse dies, the decrease in household income matches the lost earnings of the deceased. However, because the household expenses also decrease, the global effect on living standards can be rather obscure and is perhaps best understood by looking at consumption unit value and the earnings ratio of the deceased and survivor.

Living standards are aggregated household incomes divided by consumption units. Con-

sumption units are used to compare different household sizes and take into account scale economies. The equivalence scale used in the present paper is the OECD-modified equivalence scale,⁷ which is based on the hypothesis that income and consumption are equally divided within a household. That assumption, however, cannot be tested here because our data provide information on income and not on consumption.

Let us schematise the impact of widowhood on the survivor's living standards, beginning with a couple living together and no other individuals in the household. To simplify, I will consider only the personal incomes of both members of the couple, which are mainly pensions when we are dealing with older people. At time t , one of them dies. The living standards one year before are:

$$LS_{t-1} = \frac{I_{t-1}^d + I_{t-1}^s}{UC_{t-1}} \quad (3.1)$$

- I_{t-1}^d : the deceased's income, one year before spouse's death
- I_{t-1}^s : the survivor's income, one year before spouse's death
- UC_{t-1} : consumption units, one year before spouse's death

If the survivor continues to live alone, the living standards one year into widowhood

⁷Because the OECD-modified equivalence scale is widely used, it has the advantage of allowing for comparisons with other research works. The scale associates 1 consumption unit to the first adult in the household and 0.5 to the second adult, by which an adult couple needs 1.5 times a single person's income to maintain the same consumption level. This measure of consumption units has been criticised in relation to widowhood because the widowed are often old persons who may have a different consumption structure than the general population. Hence, they should have different scale economies. After having tested that criticism, it was shown that the OECD-modified equivalence scale in fact matches the consumption structure of older people quite well. Nevertheless, scale economies may be underestimated in the specific cases of widows not moving out of the house upon bereavement (Bonnet and Hourriez [2008b]). I use that alternative equivalence scale by Hourriez and Olier [1998] as a robustness test in Appendix 2.

are:

$$LS_{t+1} = \frac{I_{t+1}^s}{UC_{t-1}} \quad (3.2)$$

- I_{t+1}^s : the survivor's income, one year after spouse's death
- UC_{t+1} : consumption units, one year after spouse's death

Upon widowhood, three major changes occur:

1. The partner's income disappears, which will negatively affect the survivor's living standards. The negative effect will be larger if the deceased contributed greatly to the couple's income.
2. The survivor's individual income can vary, for example the survivor's pension is added to the initial pension, which tends to have a positive effect.
3. The consumption unit varies. In the OECD-modified equivalence scale, it goes from 1.5 to 1, which has a positive effect on the survivor's living standards.

This simplified framework can be used to calculate the necessary level of income for achieving a constant living standard upon widowhood. With the survivor's personal income being constant:

$$\frac{I_{t+1}^s}{I_{t-1}^d + I_{t-1}^s} = \frac{2}{3} \quad (3.3)$$

Where $\frac{I_{t+1}^s}{I_{t-1}^d + I_{t-1}^s}$ is the survivor's share of the couple's pre-widowhood income.

Using the OECD-modified equivalence scale gives the result that a survivor must earn 67% (2/3) of the couple's combined pensions in order to maintain a constant living standard upon widowhood. Survivors earning less than 67% percent of the household income will face a drop in living standards. The consequences of this are twofold. First, this means that even couples who contribute equally to the household income will experience a 25% fall in living standards upon widowhood. Second, in order to reach the insurance target, a survivor's pension should bring the survivor's income to 67% of the couple's pre-widowhood aggregated income.

In this simplified framework, survivors who consistently earn more than 67% of the household income will experience an increase in living standards, an automatic rise that is called a unit consumption effect. In the context of an insurance target, those individuals should not be eligible for survivor's pensions from the smoothing target point of view. What is more, this framework explains the differences often observed in widowhood's economic impact on men and women, showing that men indeed often earn more than 67% of the couple's income while women mainly earn less than 67%⁸.

Widowhood's empirical impact on living standards

I will now focus on the consumption-smoothing objective, which is a compensation level that is often studied through living standards. The literature's results on the variation in income and living standards caused by widowhood can be divided by geographical areas.

One can distinguish Northern-American and European results. The review will then shed

⁸This small model seems to provide a simple rule of thumb for calculating the level of pension needed to fully compensate for the drop in living standards following widowhood. However, the model is limited by its assumptions, and cannot be used to guide public policy choices. As a reminder, assumptions are as follows: individual incomes are assumed to be constant, only income from work and retirement is considered (this excludes household income, such as public and private transfers and wealth income), household size is set at two persons before widowhood and one after (this excludes cases of inter-generational cohabitation)

some light on past French estimations.

North American results looking at variation in income have shown that widowhood negatively impacts women and not men (Streeter [2020]; Hungerford [2001]; LaRochelle-Côté et al. [2012]; Gillen and Kim [2009]; Li [2004]; Fadlon et al. [2019]). Streeter [2020] shows that women’s living standards in the U.S. fall by 22% percent after their spouse’s death while men experience a briefer and smaller drop. In Canada, LaRochelle-Côté et al. [2012] looked at the labour market income replacement rate during retirement and found that widowhood causes the replacement rate to decrease for women and increase for men. Neither women’s nor men’s living standards are smooth around widowhood, though the sign of variation is more ambiguous for men.

European results paint a different picture. In most European cases, the living standards of women remain stable despite widowhood while they increase for men after their spouse’s death (Choi [2006]; Burkhauser et al. [2005]; Hanemann and Rausch [2020]). In the Netherlands, van der Vaart et al. [2020] show that, three years after widowhood begins, the living standards of women decrease by 1.5% and increase for men by 8%. Overall, women’s living standards appear to be smooth around widowhood while this is not the case for men, who experience an increase. In France, Bonnet and Hourriez [2008a] show that women’s living standards decrease by 3% after widowhood while men see an increase of 14% to 22%. Although the authors of this paper predicted that women’s losses in living standards would disappear and in fact increase in the near future, those results are now over 10 years old and should be updated.

A part of the differences in results can be explained by the different sample sizes and definitions. To begin, age is especially important, as papers looking at younger widows find harsher consequences of widowhood⁹ (van der Vaart et al. [2020]; Fadlon et al. [2019]).

⁹Survivor pensions often impose minimum age requirements in order to increase younger women’s

Second, selection into widowhood is a key factor, as shown by Holden and Brand [2017], who find that more selection into widowhood occurs in the U.S. than in Germany or the U.K., with widows in the U.S. more often being from deprived households than those in the two studied European countries. Lastly, outcomes can differ because some papers use living standards and others use per capita household income. Because of the prevalence of out-of-pocket medical expenses in the U.S., most American papers subtract those expenses from household earnings. Nevertheless, the main differences between the North American and European results can be ascribed to institutional differences regarding retirement and survivor's pensions.

Survivor's pensions are an important compensation mechanism studied in the literature. With regards to assistance targets, the literature shows that survivor's pensions limit transitions to poverty after a spouse's death (Sevak et al. [2003]; Gillen and Kim [2009]). Choi [2006] finds a positive link between the generosity of survivor's pensions and poverty prevention in OECD countries.

The research mainly explores insurance targets by measuring the offset of drops in living standards due to survivor's pensions,¹⁰ an issue that can only be addressed by distinguishing between different income sources. These papers show how much survivor's pensions contribute to the smoothing of living standards (Burkhauser et al. [2005]; van der Vaart et al. [2020]). Fadlon et al. [2019] use U.S. data to show that insurance mechanisms offset women's decrease in per capita income by 70%, with 38% of that insurance offset being due to survivor's pensions. The authors also find through regression discontinuity

incentives to participate in the labour market and generate their own pension benefits. Moreover, a young widow's deceased husband may also have been young and unable to fulfil the minimum contribution requirements to social security.

¹⁰Another approach to compensation compares post-widowhood income to pre-widowhood consumption needs Hanemann and Rausch [2020].

analysis that widows who receive a survivor’s pension experience a drop in household income compatible with constant living standards (34%), while women who are ineligible for a survivor’s pension face a higher loss (41%) and thus a reduction in living standards. The literature shows a growing interest in the degree of compensation as well as mapping patterns of under- and overcompensation. Bonnet et al. [2020] used micro-simulation to find zones of undercompensation and overcompensation in the french survivor pension system, namely by cross-referencing survivors’ retirement schemes and personal pension levels. They show that undercompensation in the public sector scheme happens at the tail of the pension distribution, while overcompensation occurs at the top. No such pattern occurs in the private sector employees’ scheme because of means testing. In most papers, under and overcompensation are measured comparing pre-widowhood and post-widowhood living standards for survivor’s pension beneficiaries. Yet, an increase in living standards can still result from a unit consumption effect or an increase in other income sources. The former is a case of total overcompensation, in line with the smoothing target that survivor should be ineligible to survivor’s pension. Identifying such cases requires data on the deceased’s contribution to household income prior to widowhood. To my knowledge, no papers to date have identified under- and overcompensation based on real-world data, nor have any considered pre-widowhood income distribution within the household.

3.3 Data and empirical strategy

3.3.1 Data

My empirical work draws on a French administrative panel called the Continuous Demographic Sample (*Échantillon Démographique Permanent*, EDP). The EDP is a represen-

tative sample that covers 4% of the French population chosen in a quasi-random way,¹¹ and it collects their administrative information since birth. Not only does such a large dataset provide a larger sample of widowed persons than the datasets used by most other papers,¹² but it also allows taking into account heterogeneous effects and stratifying the sample accordingly. This paper relies on a specific section of the EDP, namely data on individual and household tax returns filed annually from 2010 to 2017. The EDP's fiscal records contain information on matrimonial status, demographics, and income. Matrimonial status is used to track the beginning of widowhood each year, while the panel's other characteristics are essential to this paper's interest in following the evolution of widowed people's living standards. The fact that the data are administrative provide a significant advantage in that the income information is more reliable than survey data. Another advantage is that the dataset has very low attrition, which is caused mainly by death and institutionalisation. Attrition is addressed in Appendix 3.7.1.

3.3.2 Sample

The final sample contains 9,882 men and 23,670 women, with 72,412 individual/year male observations and 178,927 individual/year female observations. These samples are relatively large compared to other papers in the literature.

These EDP individuals were already married in 2010 and their spouses died between 2011 and 2016, and thus these people entered and experienced widowhood during the observation period. Only the treatment on the treated effect is estimated. There are

¹¹A person's birth date determines their inclusion in the EDP, which gathers information on people born the four first days of April, July, and October, and on January 2nd, 3rd, 4th and 5th.

¹²The previously cited papers are based on the following sample sizes of widowed: 5,799 women (Gillen and Kim [2009]); 1,402 men and 3,744 women (Streeter [2020]); 1,681 individuals (Hanemann and Rausch [2020]); 2,504 women and 851 men older than 65 years (van der Vaart et al. [2020]).

initially 20,396 men and 49,339 women matching that initial condition.

For individuals to be included in the final sample, I also set the following other conditions, which allow calculating the survivor's pension.

- The widowed must be retired at least one year before widowhood. Being retired is defined as a retirement pension representing one's main source of income, a condition that allows distinguishing the survivor's pension from the personal pension. Our sample now comprises 16,532 men and 35,859 women.
- The sample is limited to widows and widowers 55 years old and older. This is not unusual, as the literature considers younger survivors to be going through "premature widowhood" and usually excludes them due to the particular features of their situation. I also exclude younger survivors because 55 years is the minimum age to claim a survivor's pension in the private sector employees scheme. This condition changes our sample size very little, as retiring before 55 years of age is uncommon in France. We now have 16,506 men and 35,780 women.
- Household and individual income information must be available for one year before entering widowhood and the first year following the spouse's death, two conditions that are paramount for identifying the survivor's pension. From our initial sample, 9,902 men and 23,690 women now remain.
- Finally, in order to study heterogeneous effects, the sample must include information on quartile of living standards and share of the couple's pre-widowhood income. Our final sample thus comprises 9,882 men and 23,670 women.

3.3.3 Variables

The main variable of interest is household living standards, which is calculated on the basis of aggregated household income (labour market income, retirement pension, public transfer, taxes, private transfer, and patrimonial income) and the OECD-modified equivalence scale. A robustness check was conducted by means of an alternative equivalence scale, which is presented in Appendix 3.7.2. Living standards are measured in 2015 euros. The second main variable is living standard without a survivor's pension, and this variable must be calculated by isolating the survivor's pension.

Table 3.1 shows that the average yearly living standards of men and women are similar at, respectively, 24,119 euros and 23,549 euros. Annual individual income comprises mainly the retirement pension, which is noticeably much higher for men (22,810 euros) than for women (10,295 euros). This is consistent with the enduringly large societal pension gap,¹³ which is linked to men and women contributing to household income in strikingly different magnitudes prior to widowhood. On average, men contribute 73% of the couple's aggregated income and women 33%¹⁴ which likely influences on variations in living standards after a spouse's death, as explained earlier.

Because the survivor's pension is mixed with other retirement pensions indicated in the tax returns' pension section, I isolate it by calculating the difference between retirement pensions one year after widowhood and one year before widowhood, thereby creating a fixed differential survivor's pension. My measure of the survivor's pension relies on the hypothesis that the above-mentioned difference is not influenced by anything other than widowhood

¹³The 2014 gender pension gap in France was around 42%, after excluding derived rights. Source: "Femmes et Hommes, l'égalité en question", Insee Référence (2017).

¹⁴The two figures do not add up to 100% because the men observed are not the husbands of the women observed. Both groups are indeed widowed.

and the survivor's pension. The conditions for creating this sample give credibility to this hypothesis because, first, two years' worth of income information allows calculating the survivor's pension; and, second, the widows in this sample are already retired and therefore cannot simultaneously enter retirement and widowhood. Thus, any large changes in their retirement pensions can be attributed to the survivor's pension. Although pensions are usually revised once a year in order to follow consumer price indicators, this is not an issue for this study as our differential survivor's pension is measured in 2015-euros. Pensions can also be revised following wage trend indicators, though this is rare. Nevertheless, I take this into account and associate a survivor's pension only to an increase of more than 100 euros a year.

Table 3.1 provides some descriptive statistics on the survivor's pensions in our sample, which contains more women than men due to the fact that widowhood is more likely for women than men. Although widowers are slightly older than widows, both tend to lose their spouses in their late seventies. Widows also represent a larger share of survivor's pension beneficiaries than widowers, which is consistent with the means test implemented in some retirement schemes,¹⁵ by which men tend to be excluded *de facto* due to their higher personal income. The share of women among all beneficiaries is 75%, which is lower than the 88% share calculated by the French administration for the 2019 stock of widows.¹⁶ This gap may be explained, on the one hand, by the fact that we are dealing with new widows from 2011 to 2016 and not the general stock of existing widows. On the other hand, by imposing the condition of a pre-widowhood retirement pension income, the sample excludes women receiving no retirement pension because they have no labour market activity prior to reaching the age of retirement. Though uncommon, those women

¹⁵In the private sector employees scheme, the means test for a single person in 2015 is 1,665.70 euros a month and 2,665.20 euros for a couple.

¹⁶Source: Panorama des retraités, DREES (2021).

Table 3.1: Descriptive statistics

	Men	Women
Mean yearly living standards (euros)	24,119	23,549
Mean annual individual income (euros)	22,810	10,295
Contribution to household income (%)	73%	33%
Age at widowhood	78	77
Share of survivor's pension beneficiaries (%)	79%	98%
Mean monthly survivor's pension (euros) per beneficiaries	369	23,944
Observations	9,882	23,670

Sample: retired widows and widowers, 55 years old and older, EDP (2019 edition).

Note: means are calculated one year before spouse's death, except for outcomes relating to survivor's pension, which are measured one year following spouse's death.

are more likely to be eligible for a survivor's pension.¹⁷ The monthly value of a survivor's pension is higher for women than for men, which might be explained by both means testing and the fact that the pensions of deceased women are smaller than those of deceased men. The amounts are slightly higher for men and significantly higher for women than the mean monthly survivor's pensions reported for the 2016 stock of widowed people by the French administration, which is 345 euros for men and 775 euros for women.

To create sub-samples, I use two variables (see Table 3.2) :

- Quartiles of the distribution of living standards one year before the spouse's death,

¹⁷Among people becoming widowed between 2011 and 2016, there are 373 women and 291 men who are not retired and have no income from the labour market or unemployment.

Table 3.2: Sample size with stratification

	Men	Women
Quartile 1	1,738	3,954
Quartile 2	2,931	7,406
Quartile 3	2,554	6,468
Quartile 4	2,659	5,842
Higher contributors	289	15,028
Egalitarian contributors	2,499	7,454
Smaller contributors	7,094	1,188

Sample: retired widows and widowers, 55 years old and older, EDP (2019 edition).

Note: headcount by quartile is different because quartile are not based on the sample's distribution of living standards but on the distribution in living standards in the general french population.

which are based on the global French population's distribution of living standards.

The first quartile is at the bottom of the distribution, the fourth at the top.

- Breadwinner status. This is the ratio of the survivor's income to the aggregated incomes of the survivor and deceased one year before death. This categorical variable determines breadwinner status and distinguishes three groups of people: those earning less than 40% of aggregate couple income (smaller contributors); those earning between 40% and 60% (egalitarian contributors); and those earning more than 60% (larger contributors). This variable can be considered a proxy for couple specialisation.

3.3.4 Empirical strategy

The goal of this research is to estimate widowhood's effect on living standards and evaluate the survivor pension's impact on smoothing those living standards. In order to do so, the explained variables will be living standards pre- and post-survivor's pension. Living standards pre-survivor's pension (without survivor's pension) are not a counterfactual for a world without survivor pensions. In such a world, smaller contributors would have to adapt their labour market participation before retirement; private insurance might be more prominent; and a person's public transfers would be different because means testing usually takes into account the survivor's pension. By assessing living standards without this pension, we gain insight into how the survivor's pension presently contributes to smoothing living standards.

One issue that arises when considering causality between living standards and widowhood is that the two may be influenced by some unobserved confounding variables creating a bias. For instance, a spouse's past work history can influence living standards and widowhood because it determines retirement pension. What is more, past work history has also been shown to be correlated with mortality (Blanpain [2016]), because harder and more physical jobs tend to increase the risk of early death, thus increasing the risk of widowhood for the spouses of such laborers. Birth cohorts are also a confounding factor, as women in older cohorts are more likely to be widowed and have smaller retirement pensions than women in younger cohorts.

I solve this issue by using an event studies model, which is based on fixed effects regressions. In a fixed effects regression model, the OLS outcome is the difference between the living standards of a given individual at time t and the mean of those standards for the entire time period. It is a within estimation that uses variations in widowhood status

each year. As a result, all time-constant confounders are excluded and cannot bias the correlation between living standard and widowhood.

A fixed effects regression model can estimate widowhood's causal impact on living standards in the absence of any unobserved time variant variables that may influence both widowhood and living standards. Because the income of retirees is very stable thanks to retirement pensions and most of our sample is composed of retired couples, there is little reason for any individual time-changing variable to impact both living standards and widowhood. On a macro level, survivor's pensions were not subject to any reforms affecting those who were already retired between 2010 and 2017. Nevertheless, to take into account any macro-economic changes that could impact the flow of wealth and income, year fixed effects have been added.

$$Y_{it} = a_i + \sum_{j=-6}^{-2} (b^j \times B_{it}^j) + \sum_{j=0}^6 (b^j \times B_{it}^j) + c_t + e_{it} \quad (3.4)$$

i identifies individuals; *t* identifies years

- Y_{it} : living standards (with or without survivor's pension) in 2015 euros
- B_{it}^j : distance in year to spouse death
- a_i : individual fixed effect
- c_t : year fixed effect
- e_{it} : idiosyncratic error term

Year of death is often excluded in the literature and it is unclear in our data-set how living standards are calculated for that year. For those two reasons, I do not report the

results for the year of death, even though it is included in the estimate. The reference year is the year preceding widowhood. The parameter of interest is b^j . Before widowhood, b^j can be interpreted as an anticipation effect or a pre-trend. After widowhood, b^j can be interpreted as a living standard variation induced by widowhood relative to mean living standard one year before widowhood¹⁸. To take into account intra-individual observations auto-correlation, standard-errors are corrected using individual level clusters.

3.4 Results

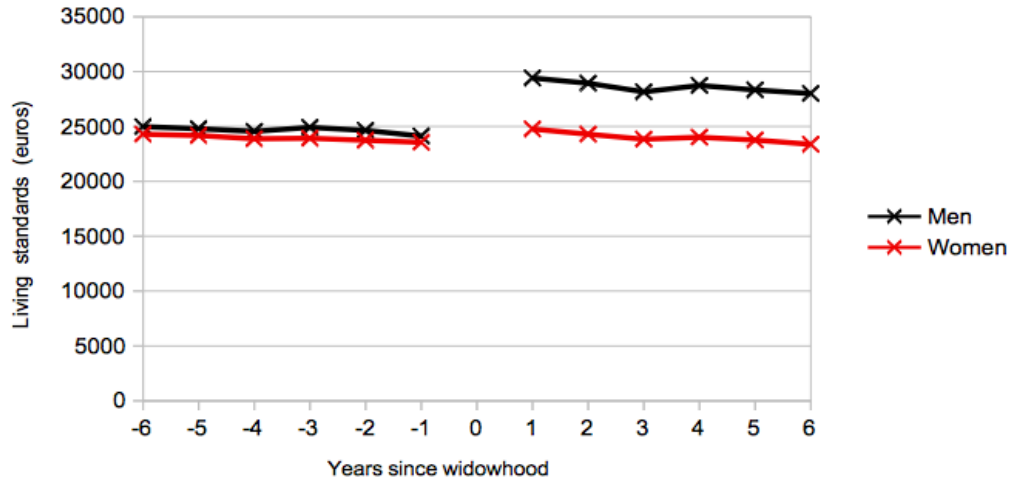
3.4.1 Descriptive results

Figure 3.1 shows that living standards before widowhood are quasi-constant at a mean of, respectively, 24,119 euros and 23,549 euros for men and women one year before their spouse's death. This supports my hypothesis that time varying confounders are unlikely. There are no signs of any specific changes in the year preceding widowhood, which implies no anticipatory behaviour and, therefore, the year preceding widowhood can serve as an accurate benchmark of pre-widowhood living standards. The literature often finds anticipation effects or pre-trends that are caused by out-of-pocket medical expenses, which are deducted from income and tend to increase up to the point of death. The absence of pre-trends underscores the fact that in France few out-of-pocket medical expenses are incurred before death. These descriptive results suggest that living standards increase for both men and women following the spouse's death, indicating that Bonnet and Hourriez's 2008 hypothesis may be correct about women's living standards quickly rising upon enter-

¹⁸Both those interpretations of TWFE coefficients are currently being reassessed (Roth et al. [2023] ; Sun and Abraham [2021]), appendix 23.7.3 provides a robustness check in line with the current econometric literature.

ing widowhood.

Figure 3.1: Evolution of mean living standards, by gender



Sample: retired widows and widowers, 55 years old and older. N = 9,882 men and 23,670 women. EDP (2019 edition).

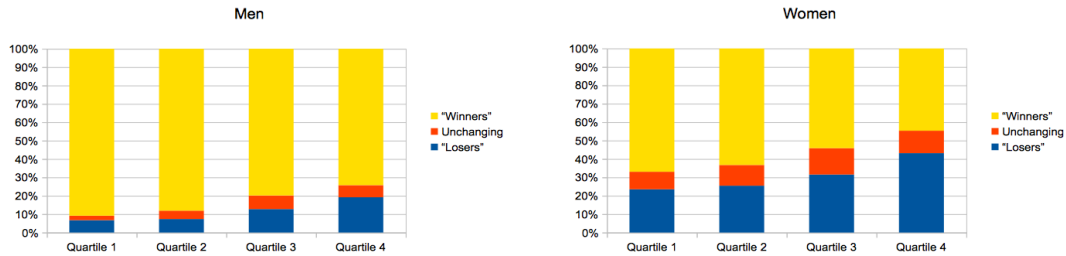
Although the descriptive results show a mean increase in living standards after the spouse's death, this mean may be hiding some winners and losers. To disentangle those individuals, I divide my sample into three groups that are defined by variations in living standards occurring between one year before and one year after the spouse's death.

- The *winners* are those whose living standards increase by more than 2.5% upon entering widowhood. This group contains 8,174 men and 13,446 women.
- The *unchanging* are those whose living standards vary between -2.5% and +2.5% relative to pre-widowhood. This category has 540 men and 2,849 women.
- The *losers* see their living standards decrease by more than 2.5%. Here, we have

1,168 men and 7,375 women.

After calculating the share of individuals in each group according to the pre-widowhood quartile distribution of living standards (Figure 3.2), I find that a majority of people belong to the winner and unchanging groups, with a higher share of men being winners and a higher share of women in the unchanged group. When considering the initial quartile in the distribution of living standards, a similar pattern emerges for men and women, with a higher share of both being winners in the bottom quartiles rather than in the top quartiles. This may be explained by means testing for survivor's pensions or by the top quartiles having more egalitarian contribution to household income.

Figure 3.2: Types of variation in living standards following widowhood

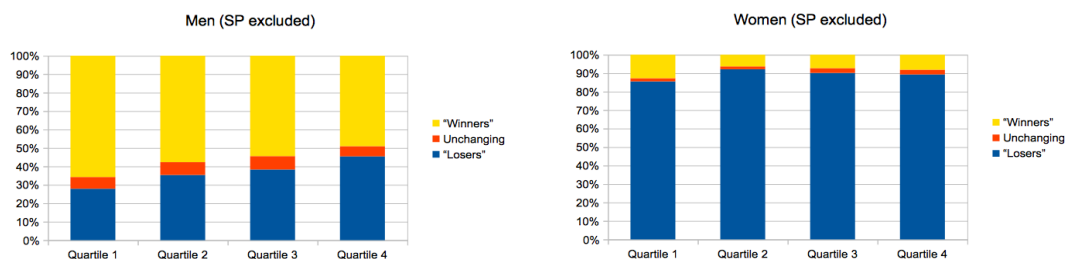


Sample: retired widows and widowers, 55 years old and older. N = 9,882 men and 23,670 women. EDP (2019 edition)

Figure 3.3 shows that the share of losers increases for both men and women when we exclude the survivor's pensions from the groups in Figure 3.2, with 30% of men in the first quartile becoming losers upon widowhood and 45% in the fourth quartile. The change is even greater for women, as 80% to 90% experience a loss in living standards when not taking into account the survivor's pension.

One question arises: Are the winners overcompensated by their survivor's pension? Not all those who were winners in Figure 3.2 are winners in Figure 3.3. So, to answer the

Figure 3.3: Types of variation in living standards following widowhood (excluding survivor's pensions)



Sample: retired widows and widowers, 55 years old and older. N = 9,882 men and 23,670 women. EDP (2019 edition).

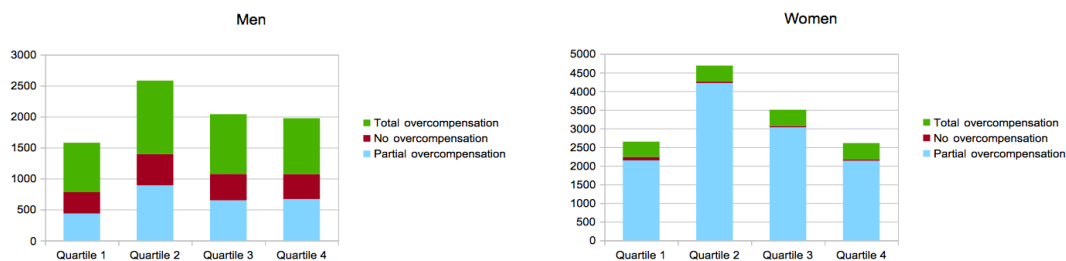
question, one should take into account the fact that the winners fall into three categories when taking into account the survivor's pension:

- Group 1 – partial overcompensation: These people experience an increase in living standard upon widowhood only because the survivor's pension increases their income. From the smoothing target point of view, these survivors are partially overcompensated.
- Group 2 – no overcompensation: These people experience an increase in living standard upon widowhood but receive no survivor's pension. Thus, they are not overcompensated by the survivor's pension because it does not cover them at all.
- Group 3 – total overcompensation: These people receive a survivor's pension but would experience an increase in living standard upon widowhood even without the pension. From the smoothing target perspective, the survivor's pension compensates them unnecessarily and this is a total overcompensation related to a failure in eligibility criteria.

Figure 3.4 presents the breakdown of these three groups who were winners in figure 3.2.

Among men, 20% of the winners are not beneficiaries of the survivor’s pension; 50% are beneficiaries even though their living standards would increase without taking the survivor’s pension; and only 30% are partially overcompensated. Among women, most of the winners are overcompensated, but they become losers when not taking into account their survivor’s pension. They constitute between 80% and 95%, depending on the initial quartile. Another 10% to 15% receive a survivor’s pension though it could be deemed unnecessary, and a minority are winners that receive no survivor’s pensions. Thus, according to the smoothing objective, membership in the winners’ category appears to be linked mainly to partial overcompensation for women and to overall poor targeting of the survivor’s pension for men.

Figure 3.4: Types of winners after widowhood (headcount)



Sample: retired widows and widowers, 55 years old and older, who belong to the winner category after widowhood. N = 8,174 men and 13,446 women. EDP (2019 edition).

3.4.2 Regression results

Regression with heterogeneity from position in the living standard’s distribution

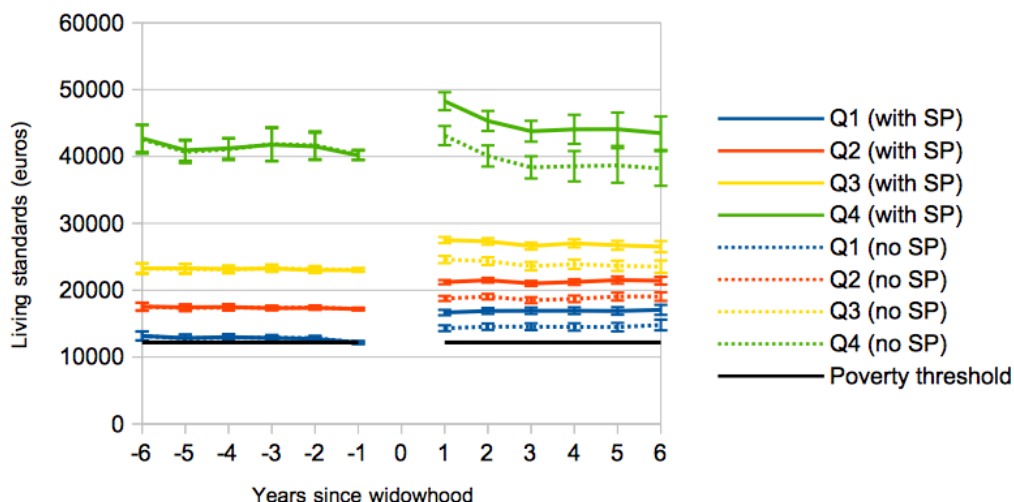
Although men’s living standards increase after spousal death in all quartiles (Figure 3.5), the greatest relative increase occurs at the bottom of the living standard distribution, at

37% of pre-widowhood living standards in the first quartile compared to 23% in the second and 20% in the third and fourth. After widowhood, living standards remain constant over time, except at the top of the distribution. Men in the fourth quartile see a small continuous decrease in living standards in the six years following spousal death, a trend that seems to be linked with wealth income. In our sample, wealth income decreases from the beginning of the observation period to the end, which is consistent with the de-accumulation of wealth in old-age.

The smoothing target is exceeded in the case of men. Is this due to the survivor's pension or just a consequence of the unit consumption effect? To understand this, Figure 3.5 also plots the evolution of living standards when excluding the survivor's pension, showing that men experience higher living standards upon widowhood even considering only pre-survivor's pension living standards. The rise ranges from 7% in the fourth quartile to 18% in the first. This may be attributed to the unit consumption effect and the fact that men are more often the main earners in couples. The men in my sample contributed an average of 73% to the couple's pre-widowhood income. Although survivor's pensions are not the main driver of men becoming winners upon widowhood, it certainly adds to it by increasing the rise by 19 percentage points in the first quartile and 13 percentage points in the last.

Women's living standards increase moderately after spousal death, except in the fourth quartile (Figure 3.6). Relative to pre-widowhood living standards, one year into widowhood women's living standards increase by 16% in the first quartile, 8% in the second, 5% in the third, and remaining constant in the fourth quartile. Looking at women in the fourth quartile, their living standards tend to trend backward in the year following spousal death, which, again, may be linked to wealth income. Living standards remain mostly constant in the other quartiles over the six years for which I can observe individuals.

Figure 3.5: Evolution in men's living standards by quartile upon widowhood



Source: EDP men widowed between 2011 and 2016, EDP (2019 edition). N = 1,738 in quartile 1; 2,931 in quartile 2; 2,554 in quartile 3; and 2,659 in quartile 4.

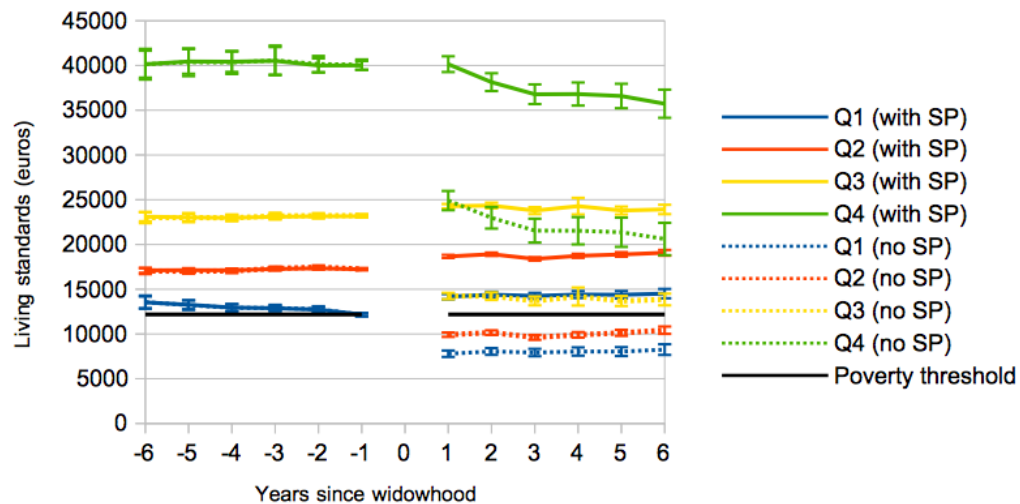
Note: the figure plots the regression coefficients and model intercept at 95% confidence intervals. The poverty threshold is set at 60% of the mean living standard in 2015 (source: INSEE).

Lecture: one year into widowhood, quartile 1 men's living standards are 4,480 euros more annually than their level one year before bereavement. When survivor's pension are excluded from the measure of living standards, their living standards increase by 2,141 euros.

The smoothing target is met in the first three quartiles, and temporarily in the last one. Overcompensation occurs since living standards are not constant but increase in the three bottom quartiles. To what extent does the survivor's pension contribute to that result? Figure 3.6 answers that question by showing that women experience a large decrease in living standards in all four quartiles when not taking into account their survivor's pension. Relative to one year before spousal death, the drop one year after is 36% in the first quartile, 42% in the second, and 39% in the third and fourth. The average effects by quartile show that the survivor's pension prevents a drop in living standards due to losing one spouse's earnings. This corrects women's living standards by 52 percentage points in

the first quartile, 50 in the second, 43 in the third, and 36 in the fourth. Though the top of the distribution is compensated less as a percentage of past living standards, its survivor's pensions are far higher in value than in other quartiles, at about 15,000 euros a year in the fourth quartile, and between 6,000 and 10,000 euros a year in the other quartiles. Thus, the system has an ambiguous character in terms of redistribution, whereby overcompensation occurs in the lower quartiles while more money is spent in the upper ones. Survivor's pension schemes have been criticised for redistributing wealth by taking it from single people and giving it to the married. We can see here that, in relative terms, redistribution indeed occurs in the upper quartiles for married couples.

Figure 3.6: Evolution in women's living standards by quartile upon widowhood



Source: EDP women widowed between 2011 and 2016, EDP (2019 edition). N = 3,954 in quartile 1; 7,406 in quartile 2; 6,468 in quartile 3; and 5,842 in quartile 4.

Note: the figure plots the regression coefficients and model intercept at 95% confidence intervals. The poverty threshold is set at 60% of the mean living standard in 2015 (source: INSEE).

Lecture: one year into widowhood, quartile 1 women's living standards are 1,984 euros more annually than their level one year before bereavement. When survivor's pension are excluded from the measure of living standards, their living standards decrease by 4,345 euros.

Between 2011 and 2016 in France, average living standards appear to be smoothed or increased upon widowhood in all four quartiles for men and women. This is consistent with other European results, which find that women tend to see a moderate rise in living standards upon widowhood. Another important result here concerns the assistance target. Figures 3.5 and 3.6 show a convergence in the smoothing and assistance targets. When excluding the survivor's pension, men's living standards remain above the poverty threshold while women fall under it in the two bottom quartiles. Thus, the survivor's pensions allow women, on average, to rise back above the poverty threshold and thereby satisfy both the insurance and assistance objectives.

Regression with heterogeneity from breadwinner status

Breadwinner status is determined by the ratio of the survivor's income to the couple's income¹⁹ one year before widowhood. It can be viewed as a proxy for marital specialisation, whereby the person specialising less in labour market activity will tend to have a lower ratio. Figures 7 and 8 show that the variation in living standards upon widowhood is similar for men and women when accounting for breadwinner status. The smaller contributors group remains stable one year after spousal death. The egalitarian contributors experience an increase of 11% and 9% in living standards for, respectively, men and women one year after widowhood. Men and women in the larger contributors group also see a rise of, respectively, 27% and 19%, which is higher than the rise for egalitarian individuals. Clearly, men still tend to fare better than women across all breadwinner statuses, likely because their average contribution to household income is higher than women in the same

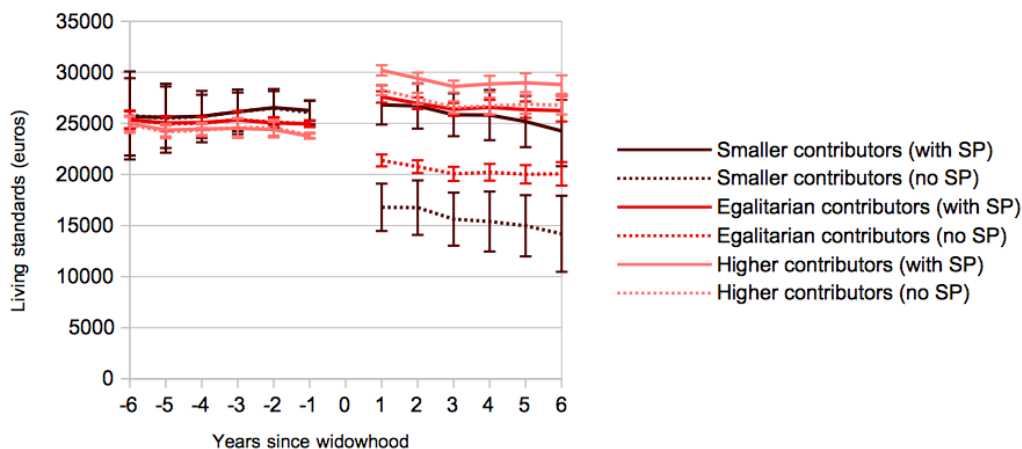
¹⁹"Couple income" is the sum of each member of the couple's individual income. Individual income encompasses labor market income, unemployment benefits, retirement pensions, private transfers received.

category.²⁰

Figures 3.7 and 3.8 emphasise the impact of survivor's pensions. In all groups, the survivor's pension contributes to increasing living standards. Without taking into account the survivor's pension, the variation in living standards is clearly linked to breadwinner status, that is, pre-widowhood contribution to household earnings. It is only the larger contributors who experience an increase in living standards (of 19% for men and 5% for women), while egalitarian couples and smaller contributors experience a drop in living standards. The greatest drop occurs for the smaller contributors group, where the decreases are 36% for men and 52% for women. The egalitarian group's living standards drop by 24% for men and by 31% for women. All of these results are consistent with my analysis of the underlying mechanisms driving the variation in living standards upon widowhood. When not taking into account corrective factors, the variation is determined mainly by past contribution to household income. How does the survivor's pension impact the initial situation when the spouse dies? For smaller contributors, survivor's pensions enable a smoothing of living standards around the time of spousal death, which thereby achieves the smoothing target. For egalitarian contributors, survivor's pensions slightly overcompensate both men and women on average, which thus qualifies as partial overcompensation. In the case of higher contributors, the survivor's pension increases their initial standard of living and thus qualifies as total overcompensation. These results show that even though survivor's pensions achieve their objective, they could be calculated better for egalitarian couples and reduced for larger contributors.

²⁰ Among higher contributors, men's average share of the couple income is 82%, while women's is 76%. Among egalitarian contributors and smaller contributors, the figures are respectively 53% and 27% for men and 47% and 22% for women.

Figure 3.7: Evolution in men’s living standards by breadwinner status upon widowhood



Source: EDP men widowed between 2011 and 2016, EDP (2019 edition). N = 289 smaller contributors; 2,499 egalitarian contributors; and 7,094 larger contributors.

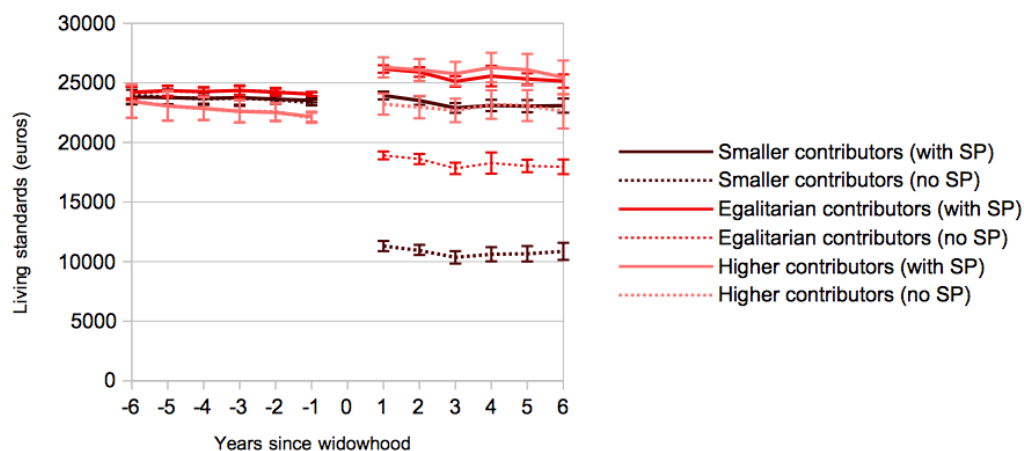
Note: the figure plots the regression coefficients and model intercept at 95% confidence intervals.

Lecture: one year into widowhood, smaller contributors men’s living standards are 553 euros more annually than their level one year before bereavement. When survivor’s pension are excluded from the measure of living standards, their living standards decrease by 9,282 euros.

3.5 Conclusion and limitations

The two main contributions of this paper are as follows. First, in quantifying the economic consequences of spousal death across the income distribution in France between 2011 and 2016, I find that living standards increase on average for both men and women. The increase is greater in average for men than women (17% v. 2%). The average increase is negatively linked to the pre-widowhood quartile. Even after excluding survivor’s pensions from the measure, my results show that living standards still increase for men while they decrease for women, although this decrease for women disappears when taking into account survivor’s pensions. The French system achieves the smoothing objective while also alleviating poverty. Absent any other changes in sources of income, this implies that the increase

Figure 3.8: Evolution in women’s living standards by breadwinner status upon widowhood



Source: EDP women widowed between 2011 and 2016, EDP (2019 edition). N = 15,028 smaller contributors; 7,454 egalitarian contributors; and 1,188 larger contributors.

Note: the figure plots the regression coefficients and model intercept at 95% confidence intervals.

Lecture: one year into widowhood, smaller contributors women’s living standards are 413 euros more annually than their level one year before bereavement. When survivor’s pension are excluded from the measure of living standards, their living standards decrease by 12,030 euros.

in men’s living standards is first due to a unit consumption effect, an interpretation that is supported by descriptive statistics and our evidence on breadwinner status. Survivor’s pensions tend to add to this effect.

My second main contribution lies in providing empirical evidence that the survivor’s pension exceeds the smoothing objective prioritized by the contemporaneous analysis on survivor’s pension. I show that over-compensation, defined by the smoothing target, is closely related to breadwinner status, as the secondary providers in couples are, on average, adequately compensated in accordance with the survivor pension smoothing objective; while, on the other hand, egalitarian contributors are partially overcompensated (by 11 and 9 percentage points for, respectively, men and women) and the primary providers are totally overcompensated (by 8 and 14 percentage points for, respectively, men and women).

One way to avoid such a pattern would be to take into account past contributions to the couple's income in order to more closely link compensation to anticipated variations in living standards upon the death of a partner.

All in all, between 94% and 80% of men are overcompensated (depending on the quartile), and between 83% and 60% of women. At 1.6% of GDP in 2020, survivor's pensions are such a large social security expenditure in France that the budgetary consequences of overcompensation are likely to be notable. The question naturally arises: in the interests of reforming the French retirement system, should survivor's pensions also be reformed?

In such a case, a cautious approach should be taken to minimising or eliminating overcompensation. The share of overcompensated widows and the monetary amounts are determined by how living standards are defined for assessing the smoothing objective. First, it depends on the consumption unit used to measure living standards. Using a robustness check based on an alternative equivalence scale (Hourriez and Olier [1998]), I still find that survivor's pension alleviates the shock of widowhood to a great degree. Yet, on average, women's living standards do not increase upon widowhood, which suggests that they are less overcompensated than the first results indicate. Second, smoothing living standards has different meaning depending on the kind of income included. In the present paper, standards of living include income derived from wealth. However, it is not obvious that the social system should compensate for the decline in this type of income. Excluding this income source would alter our results differently depending on the initial living standard quartile, and may change some conclusion on under- and overcompensation.

Another aspect to consider is that the level of compensation – which is defined through income and living standards – represents just one aspect of the economic welfare of the widowed. For similar income levels, the experience of widowhood is not the same for two people with different levels of wealth. Taking into account wealth and income, a more

holistic approach to the economic consequences widowhood, is all the more needed as older couple have more wealth than younger ones. Looking more closely at the de-accumulation and inheritance of wealth in old age may change our understanding of the economic welfare of widows, because focusing on such dynamics may confirm or elaborate on the common perception that the widowed are well off.

Eventually, overcompensation according to the smoothing objective is not necessarily a problem when the system has to cope with a redistributive imperative. My descriptive results find that redistribution indeed occurs and that undercompensation is more frequent among women who are higher up in the income distribution. More specifically, 27% of women in the bottom quartile are undercompensated, while this is the case for 45% of them in the top quartile. The regression results show that overcompensation is higher in the bottom quartile. For women, survivor's pension increases living standards from -36% +16% (overcompensation by 16 percentage points) in the bottom quartile, while it increases from -39% to 0% in the top quartile. Overcompensation in the bottom quartiles moreover allows women to remain above the poverty threshold, thereby contributing to redistribution as well as to the assistance goal of the survivor's pension. The French survivor's pension is not unified under one overarching scheme but has, instead, been historically shaped by different schemes pursuing different goals. In order to improve survivor's pensions, it is first necessary to redefine those goals.

3.6 Tables

Table 3.3: The effect of widowhood on living standard, men

	Pre-Survivor's Pension Living Standards					Post-Survivor's Pension Living Standards				
	All	Q1	Q2	Q3	Q4	All	Q1	Q2	Q3	Q4
6 years before event	968*** (0.000)	984*** (0.000)	341 (0.113)	186 (0.499)	2,299*** (0.001)	1,040*** (0.000)	987*** (0.000)	361* (0.068)	279 (0.249)	2,563*** (0.000)
5 years before event	330** (0.031)	597*** (0.001)	165 (0.273)	126 (0.593)	417 (0.376)	480*** (0.001)	663*** (0.000)	251* (0.068)	289 (0.187)	773* (0.086)
4 years before event	461*** (0.001)	770*** (0.000)	239* (0.077)	44 (0.764)	803* (0.068)	566*** (0.000)	818*** (0.000)	290** (0.023)	178 (0.172)	1,062** (0.014)
3 years before event	714*** (0.006)	721*** (0.000)	176** (0.015)	261** (0.048)	1,601* (0.078)	671*** (0.009)	682*** (0.000)	127* (0.06)	255** (0.044)	1,600* (0.077)
2 years before event	619*** (0.001)	665*** (0.000)	245*** (0.000)	91 (0.381)	1,421** (0.037)	514*** (0.007)	550*** (0.000)	164*** (0.002)	-5 (0.958)	1,336** (0.05)
Year of spouse's death	-527*** (0.002)	335 (0.107)	134 (0.509)	-422 (0.151)	-1,937*** (0.000)	2,797*** (0.000)	2,715*** (0.000)	2,600*** (0.000)	2,526*** (0.000)	3,353*** (0.000)
1 year after event	2,018*** (0.000)	2,141*** (0.000)	1,582*** (0.000)	1,547*** (0.000)	2,867*** (0.000)	5,323*** (0.000)	4,480*** (0.000)	4,012*** (0.000)	4,507*** (0.000)	8,109*** (0.000)
2 years after event	1,249*** (0.000)	2,370*** (0.000)	1,854*** (0.000)	1,308*** (0.000)	-178 (0.677)	4,599*** (0.000)	4,723*** (0.000)	4,302*** (0.000)	4,304*** (0.000)	5,155*** (0.000)
3 years after event	431*** (0.003)	2,372*** (0.000)	1,328*** (0.000)	552*** (0.002)	-1,887*** (0.000)	3,859*** (0.000)	4,743*** (0.000)	3,821*** (0.000)	3,605*** (0.000)	3,617*** (0.000)
4 years after event	601*** (0.008)	2,333*** (0.000)	1,520*** (0.000)	847*** (0.000)	-1,716** (0.027)	4,099*** (0.000)	4,750*** (0.000)	4,032*** (0.000)	4,014*** (0.000)	3,900*** (0.000)
5 years after event	688** (0.011)	2,311*** (0.000)	1,871*** (0.000)	600** (0.015)	-1,607* (0.087)	4,120*** (0.000)	4,716*** (0.000)	4,321*** (0.000)	3,722*** (0.000)	3,914*** (0.000)
6 years after event	618** (0.026)	2,626*** (0.000)	1,870*** (0.000)	485 (0.139)	-2,056** (0.029)	3,927*** (0.000)	4,882*** (0.000)	4,229*** (0.000)	3,524*** (0.000)	3,328*** (0.000)
Observation	9,882	1,738	2,931	2,554	2,659	9,882	1,738	2,931	2,554	2,659
R-square within	0.0058	0.0702	0.0349	0.0137	0.0084	0.0375	0.2418	0.1715	0.106	0.0196

*** p<0.01, ** p<0.05, * p<0.1

Source: EDP men widowed between 2011 and 2016, EDP (2019 edition).*Note:* regression results.

Table 3.4: The effect of widowhood on living standard, women

	Pre-Survivor's Pension Living Standards					Post-Survivor's Pension Living Standards				
	All	Q1	Q2	Q3	Q4	All	Q1	Q2	Q3	Q4
6 years before event	338** (0.049)	1,419*** (0.000)	-220** (0.049)	-231 (0.297)	53 (0.926)	253* (0.098)	1,357*** (0.000)	-120 (0.195)	-43 (0.829)	133 (0.8)
5 years before event	301** (0.037)	1,088*** (0.000)	-242*** (0.004)	-225 (0.178)	281 (0.571)	263** (0.043)	1,084*** (0.000)	-100 (0.144)	-129 (0.392)	435 (0.343)
4 years before event	219** (0.031)	779*** (0.000)	-212*** (0.001)	-253*** (0.01)	248 (0.485)	189** (0.042)	775*** (0.000)	-111** (0.03)	-178** (0.035)	408 (0.223)
3 years before event	352** (0.014)	766*** (0.000)	70 (0.123)	-42 (0.644)	483 (0.377)	262* (0.06)	695*** (0.000)	31 (0.432)	-54 (0.524)	507 (0.346)
2 years before event	229*** (0.000)	636*** (0.000)	212*** (0.000)	-14 (0.796)	72 (0.664)	133*** (0.002)	545*** (0.000)	112*** (0.001)	-3 (0.949)	-13 (0.935)
Year of spouse's death	-14,704*** (0.000)	-8,502*** (0.000)	-12,431*** (0.000)	-14,420*** (0.000)	-22,712*** (0.000)	-4,320*** (0.000)	-2,102*** (0.000)	-3,588*** (0.000)	-4,267*** (0.000)	-6,846*** (0.000)
1 year after event	-9,207*** (0.000)	-4,345*** (0.000)	-7,331*** (0.000)	-8,993*** (0.000)	-15,183*** (0.000)	1,131*** (0.000)	1,984*** (0.000)	1,435*** (0.000)	1,126*** (0.000)	133 (0.513)
2 years after event	-9,562*** (0.000)	-4,091*** (0.000)	-7,103*** (0.000)	-9,002*** (0.000)	-17,105*** (0.000)	769*** (0.000)	2,214*** (0.000)	1,681*** (0.000)	1,194*** (0.000)	-1,874*** (0.000)
3 years after event	-10,210*** (0.000)	-4,214*** (0.000)	-7,636*** (0.000)	-9,533*** (0.000)	-18,536*** (0.000)	104 (0.246)	2,075*** (0.000)	1,158*** (0.000)	633*** (0.000)	-3,227*** (0.000)
4 years after event	-9,909*** (0.000)	-4,099*** (0.000)	-7,348*** (0.000)	-9,041*** (0.000)	-18,554*** (0.000)	394*** (0.009)	2,228*** (0.000)	1,502*** (0.000)	1,130*** (0.000)	-3,207*** (0.006)
5 years after event	-9,977*** (0.000)	-4,106*** (0.000)	-7,128*** (0.000)	-9,542*** (0.000)	-18,721*** (0.000)	268** (0.029)	2,201*** (0.000)	1,658*** (0.000)	639*** (0.000)	-3,423*** (0.000)
6 years after event	-9,922*** (0.000)	-3,883*** (0.000)	-6,830*** (0.000)	-9,373*** (0.000)	-19,473*** (0.000)	204 (0.181)	2,331*** (0.000)	1,843*** (0.000)	764*** (0.000)	-4,287*** (0.000)
Observation	23,670	3,954	7,406	6,468	5,842	23,670	3,954	7,406	6,468	5,842
R-square within	0.2498	0.3934	0.5702	0.3790	0.2271	0.0381	0.1646	0.2223	0.0759	0.0236

*** p<0.01, ** p<0.05, * p<0.1

Source: EDP women widowed between 2011 and 2016, EDP (2019 edition).

Note: regression results.

3.7 Appendix

3.7.1 Attrition due to mortality

Attrition happens when individuals exit a data-set for one or more years during the observation period. The EDP is an administrative panel, which has lower attrition than a non-administrative panel. Nevertheless, people can still temporarily or permanently disappear from the EDP. The most common types of exits from the EDP are death or entering a collective living facility such as a nursing home. Attrition is very likely in our sample because it comprises individuals over 55 years old, with an average age of 77.5 years. In our sample, 3,018 men and 3,817 women died between their spouse's death and 2017 (end of observation period).

If attrition is selective, it can be a problem for estimating the impact of widowhood because bias may arise if the poorer widows and widowers die first and exit the data-set while the richer stay until the end of the observation period. Considering that richer widows face a larger drop in living standard, I may be overestimating the overall decrease in living standards after spousal death. To assess whether attrition has generated bias in my estimates, I use descriptive statistics to ascertain whether the sub-sample of deceased widows is similar to that of widows surviving until the end of the observation period (see table 3.5).

The deceased widows and widowers are older than those who survived. They also appear to be slightly less well off, having 1,000 euros less than survivors both in living standards and in retirement pensions before the spouse's death. What is more, the poverty rate of the deceased is 2 percentage points higher. Differences in the shares of household income and property owners are small and appear negligible. Finally, there is a moderate difference in monthly survivor's pensions, which are slightly less for deceased widows and

Table 3.5: Descriptive statistics according to gender and mortality

	Men		Women	
	Deceased widower	Surviving widower	Deceased widower	Surviving widow
Average age at widowhood	83	76	82	76
Mean yearly living standards (euros)	23,404	24,433	22,606	23,730
Mean annual individual income (euros)	22,136	23,107	9,073	10,530
Share of survivor's pension beneficiaries (%)	78	80	98	98
Mean monthly survivor's pension (euros)	338	383	907	929
Rate of poverty (at 60% of median income)	8.58	6.6	8.54	5.85
Contribution to household income (%)	74	72	31	32
Share of landowners (%)	82	83	82	83
Observations	3,018	6,864	3,817	19,853

Source: EDP (2019 edition).

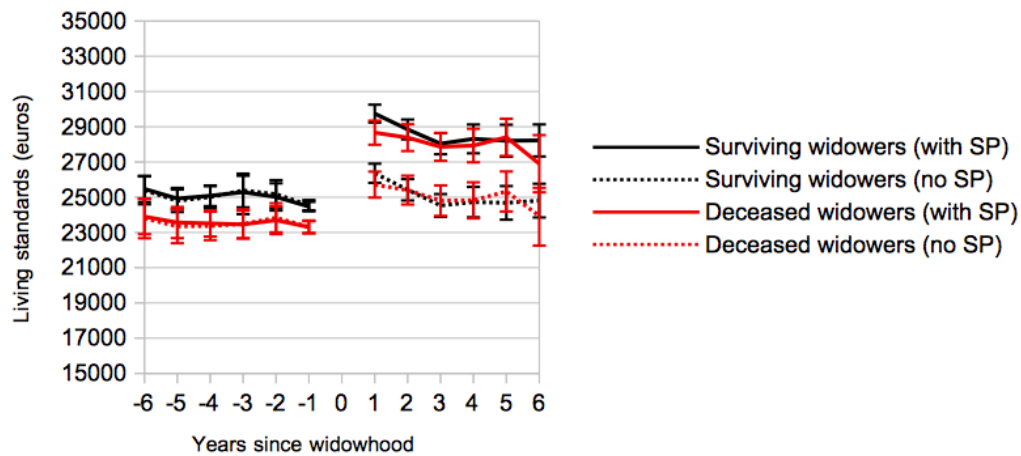
Sample: Retired widows and widowers, 55 years old and older. The deceased widowed groups comprise individuals who died between their spouse's death and 2017. The widowed individuals in the other groups survived until the end of the observation period.

widowers. The deceased groups appear to be less well off than the survivors. Though the differences are small (with the exception of age at spousal death), selective attrition is a legitimate concern that could affect my result.

To assess if bias is caused by these moderate differences in economic status, I run my fixed effects specification on both groups (see figures 3.9 and 3.10). Descriptive statistics show that pre-widowhood living standard levels are slightly different, but the trends and coefficient after spousal death are similar. Bearing in mind both this and that the coefficient's confidence interval overlaps, we cannot conclude to different effect of widowhood for the two groups. Upon widowhood, the deceased widower's living standards increase by 23%; and they still increase by 10% even after excluding the survivor's pension, which therefore means that the pension adds a 13 percentage-point increase to their living standards. The picture is similar for the sample of surviving widowers, whose living standards

increase by 22% with a survivor's pension and by 7% without it. The survivor's pension thus adds 15 percentage points to the living standards of these men. Both samples are equally similar for the women, as the living standards of the widows increase by 5% with a survivor's pension and they decrease by 39% when excluding it. Thus, survivor's pensions offset the drop in living standards by 44 percentage points for women. Attrition through death does not significantly change the results.

Figure 3.9: Evolution in living standards among men according to attrition groups



Source: EDP men widowed between 2011 and 2016, EDP (2019 edition). N = 3,018 deceased widowers and 6,864 surviving widowers.

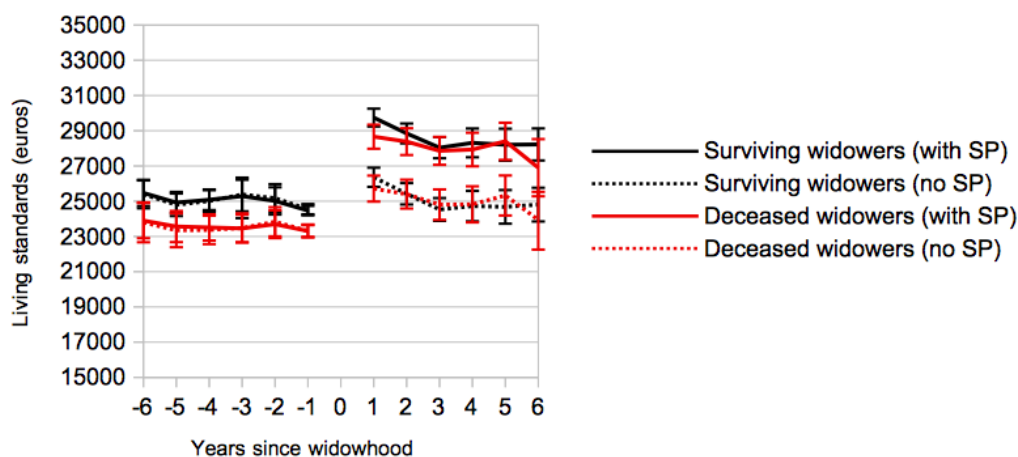
Note: the figure plots the regression coefficients and model intercept at 95% confidence intervals.

Lecture: one year into widowhood, surviving widowers' living standards are 5,278 euros more annually than their level one year before bereavement. When survivor's pension are excluded from the measure of living standards, their living standards increase by 1,811 euros.

3.7.2 Sensitivity to equivalence scales

Living standards are a common measure that the literature uses to estimate how the survivor's pension achieve the smoothing target. A living standards measure is based on

Figure 3.10: Evolution in living standards among women according to attrition groups



Source: EDP women widowed between 2011 and 2016, EDP (2019 edition). N = 3,817 deceased widows and 19,853 surviving widows.

Note: the figure plots the regression coefficients and model intercept at 95% confidence intervals.

Lecture: one year into widowhood, surviving widows' living standards are 1,132 euros more annually than their level one year before bereavement. When survivor's pension are excluded from the measure of living standards, their living standards decrease by 9,281 euros.

aggregating income and by adjusting for household size using consumption units. Any estimate based on living standards is thus sensitive to the choice of equivalence scale. My previous regression used the OECD-modified equivalence scale, which I chose because it allows for international comparisons and adequately matches the consumption structure of older people.

However, using that scale in the context of widowhood studies has been criticised because it assumes residential mobility. That is, people will change homes in cases of economic or household shock. Although it has been shown that widows tend to move after widowhood, moving is less likely for homeowners than tenants (Bonnet et al. [2007]). In my sample, 83% of individuals are home owners one year before widowhood. As a response to

Table 3.6: Comparison of equivalence scales

	Original Scale	Alternative Scale
Consumption unit for a two-adult household	1.5	1.39
Consumption unit for a one-adult household	1	1
Income level needed to maintain living standards (as % of couple's pre-widowhood income)	67	72

Note: the original scale is the OECD-modified equivalence scale. The alternative scale is the Hourriez and Olier scale.

that criticism, Hourriez and Olier [1998] calculated an alternative equivalence scale. Table 3.6 summarises some important differences between that scale and the OECD-modified scale.

In some ways, the alternative scale takes into account more economies of scale than the original OECD-modified scale. Given that consumption units for a couple are between 1 and 2, the closer a couple is to 1, the greater their scale economies. This has two implications with regard to my research. First, the same income will be subject to higher pre-widowhood living standards with the alternative scale than with the original one. Second, a higher income is needed to compensate widows upon widowhood. Under conditions of residential mobility, the survivor now needs 72% of his or her pre-widowhood couple income to maintain constant living standards. This is likely to affect some of my results regarding the compensation level of survivor's pensions.

To assess the sensitivity of my results to the equivalence scale, I use both the OECD and alternative equivalence scales to measure the living standards on a sample of widowed individuals transitioning from a two-adult household one year before the spouse's death to a single-adult household one year after. When reduced to that specific household trajec-

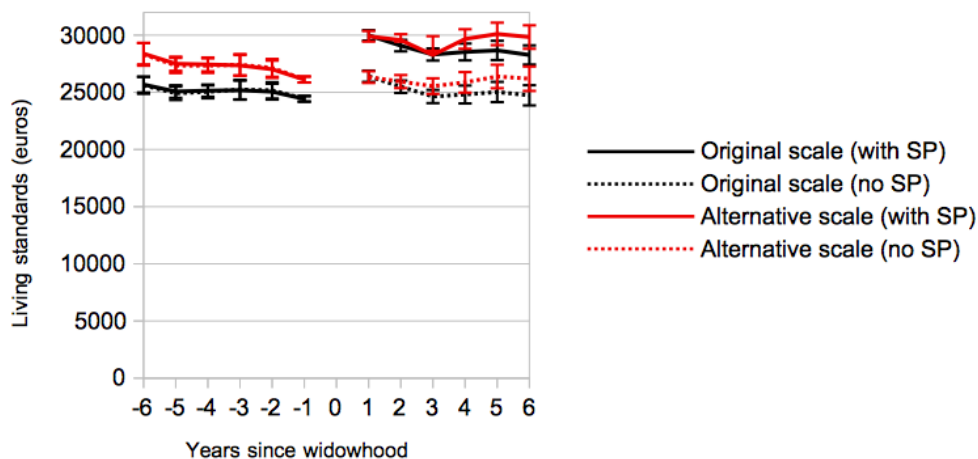
tory, our sample contains 7,976 men and 19,732 women.

Figure 3.11, shows the influence of the equivalence scales on the sample of men. As expected, average pre-widowhood living standards are higher when using the alternative scale rather than the original one. Our baseline OECD-modified scale shows that, one year after widowhood, living standards increase by 23% when including survivor's pensions and 8% without them, thus demonstrating a 15-percentage point contribution of survivor's pensions to that gain. Gains are smaller with the alternative baseline: 15% with survivor's pensions and 1% without them. Though the estimates of the gains are lower, survivor's pensions still increase living standards by 14 percentage points. Regression results on men are very similar with both equivalence scales.

Figure 3.12, shows the influence of the equivalence scales on the sample of women. Although the same mechanisms are at play in both samples of men and women, the impact on women is more notable. The baseline living standards of women increase by 4% when including survivor's pensions, and they decline by 47% without them. Survivor's pensions offset the drop in living standards by 51 percentage points. With the alternative equivalence scale, women's living standards decrease regardless of whether or not the survivor's pension is included (by 3% with it and 46% without it). Survivor's pensions still offset the drop by 43 percentage points. The alternative equivalence scale shows that the living standards of women in our sample no longer increase but instead experience a moderate and temporary drop; as, four years into widowhood, they are not significantly distinct from the year preceding it.

Given that the results show a moderate difference between the two equivalence scales, one may reasonably ask which scale should be employed. From the perspective of a positive comparison over time and of countries, it is better to use the OECD-modified equivalence

Figure 3.11: Influence of both equivalence scales on men



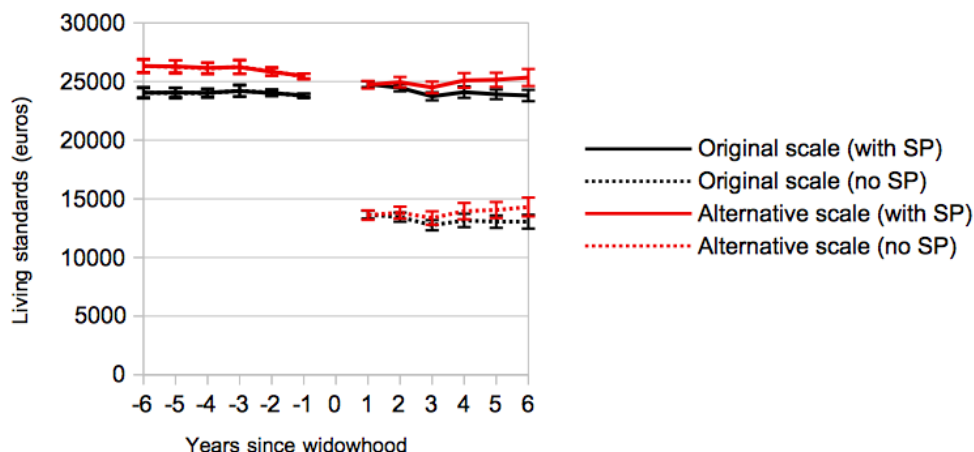
Source: EDP men widowed between 2011 and 2016, EDP (2019 edition). N = 7,976 men and 19,732 women. SP = survivor's pension.

Note: the figure plots the regression coefficients and model intercept at 95% confidence intervals.

Lecture: one year into widowhood, widowers' living standards are 5,556 euros more annually than their level one year before bereavement with the original scale. When survivor's pension are excluded from the measure of living standards, their living standards increase by 1,967 euros.

scale used by most papers on living standards. However, taking a normative viewpoint, using the present results on survivor's pensions in order to guide policy-making requires first answering the following question: Is it better for the widowed to change homes after a spouse's death? All in all, the results are similar with both equivalence scales. Men's living standards increase upon widowhood, thus showing an evident overcompensation due to the survivor's pension. Women's average living standards either rise moderately or fall moderately, then stabilise at pre-widowhood levels. The survivor's pension thus offsets a large drop in living standards for women.

Figure 3.12: Influence of both equivalence scales on women



Source: EDP women widowed between 2011 and 2016, EDP (2019 edition). N = 7,976 men and 19,732 women. SP = survivor's pension.

Note: the figure plots the regression coefficients and model intercept at 95% confidence intervals.

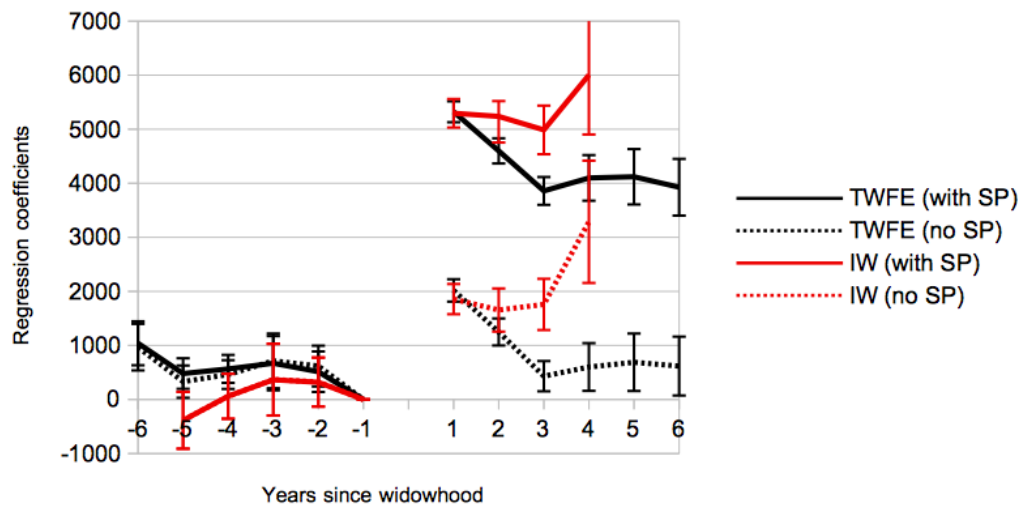
Lecture: one year into widowhood, widows' living standards are 949 euros more annually than their level one year before bereavement with the original scale. When survivor's pension are excluded from the measure of living standards, their living standards decrease by 10,115 euros.

3.7.3 Alternative method for treatment estimation

Two-way fixed effects regression have been widely used to estimate difference-in-differences designs with panel data. Yet the use of those models with a staggered treatment has been questioned in recent years (Roth et al. [2023]). Our sample is composed of individuals who are widowed in different years, which mean that treatment is staggered. Our data include 6 treatment cohorts (one for each year of spouse death between 2011 and 2016). In the case of specifications with event studies (with indicators coding time-periods relative to treatment), Sun and Abraham [2021] criticized the classical two-way fixed effects. First, their paper highlights the difficulty to interpret the TWFE coefficient as an average treatment

effect because of the weights it uses to aggregate cohort-specific treatment effects. Second, the paper shows that TWFE coefficients are at risk of being biased when the treatment effect homogeneity assumption is breached. Contamination arises between different period coefficients. To solve these problems they propose an alternative estimation method of treatment effect with DID design, event studies specification and staggered treatment. It relies on measuring cohort-specific average treatment effects and aggregating them with easily understandable weights: the cohorts' shares of the sample for the period in which effect is estimated. We use Sun and Abraham's method as a robustness test for our TWFE regression.

Figure 3.13: TWFE and Sun-Abraham's estimators, men sample



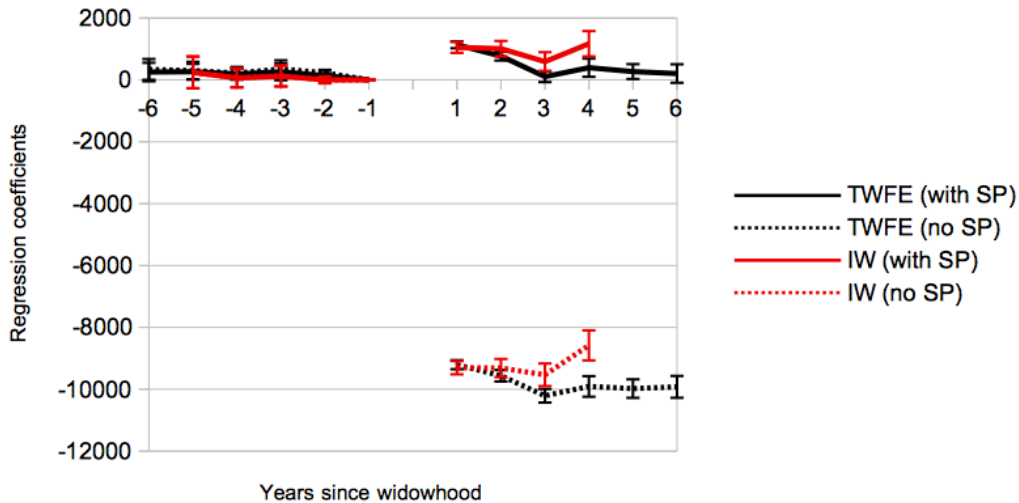
Source: EDP men widowed between 2011 and 2016, EDP (2019 edition). N = 9,882.

Note: the figure plots the regression coefficients and model intercept at 95% confidence intervals.

Lecture: one year into widowhood, men's living standards are 5,323 euros more annually than their pre-bereavement level according to TWFE, they are 5,323 euros less according to Sun and Abraham's IW estimator.

The Sun and Abraham's estimator (also called "interaction-weighted estimator" or IW estimator) uses a control group. In the present settings, the last cohorts of widowed is used

Figure 3.14: TWFE and Sun-Abraham's estimators, women sample



Source: EDP women widowed between 2011 and 2016, EDP (2019 edition). N = 23,670.

Note: the figure plots the regression coefficients and model intercept at 95% confidence intervals.

Lecture: one year into widowhood, men's living standards are 1,131 euros more annually than their pre-bereavement level according to TWFE, they are 1,131 euros less according to Sun and Abraham's IW estimator.

as a control group. To implement it, years 2016 and 2017 are dropped from the sample. As a result, the Sun and Abraham estimator cannot evaluate effects more than 4 years away from widowhood.

Figures 3.13 and 3.14 show results obtained by TWFE and Sun and Abraham's IW estimators. On both men and women's samples, results are similar between the two estimators before widowhood and up to two years following spouse's death.

Before widowhood, confidence intervals overlap. Results cannot be said to be significantly different. IW coefficients are non-significant. Sun and Abraham's method can also be used as a test of the absence of pre-trend. The fact that coefficients before widowhood are not significantly different from zero implies that there is no pre-trend on average in the two samples.

After widowhood, confidence intervals overlap up to two year after bereavement for men and up to three years for women. Coefficients more remote from spouse death significantly differ between the two methods. Sun and Abraham's IW estimator's coefficients are significantly higher than the TWFE's. There may be some contamination of the TWFE's coefficients happening on the medium run. By comparing our result with TWFE to the Sun and Abraham estimator, it can be concluded that on the short run (two first years following widowhood) our result are unbiased. On the medium run, they are biased downward. Only short run result should be used.

Chapter 4

Late divorce and delayed
retirement: changes in the labor
supply upon grey divorce

4.1 Introduction

The investment of the labor market by women during the 20th century is a major macroeconomic evolution. It continues today through the increasing activity of older women (Goldin and Katz [2017]). In France, between 1990 and 2020, the labor force participation rate of women aged 50 to 64 increased twice as much as that of men¹. In a context of an aging population and call for extending the working life, the micro-economic causes of such an evolution are of interest.

The demographics of divorce have evolved too. Divorce is affecting more and more older individuals. On the one hand, the baby-boomer generation who experienced the democratization of divorce is arriving at advanced ages, often already divorced. On the other hand, the risk of divorce after the age of 50 has been increasing since the 1980s, and more rapidly than divorce at younger ages. This phenomenon has been called the "gray divorce revolution", in reference to the hair color of these new divorcees (Brown and Lin [2012]). In France, Solaz [2021] shows that since the 2000s, the risk of divorcing after 50 is increasing while the risk of divorcing at a younger age is stabilizing. This revolution and the changing labor supply of older women may be linked at the micro-level. Indeed, divorce is likely to affect late labor force participation and thus retirement decisions in multiple ways. The determinants of this trade-off can be grouped into three groups (Szinovacz and DeViney [2000]): determinants framing the possibility of retiring (regulations of the retirement system and the person's economic situation), those relating to the will to leave working life (the non-economic costs and benefits of remaining in employment) and factors independent of one's will (health, labor demand). Divorce is

¹Between 1990 and 2020, men's labor force participation rate increased from 57% to 70% and women's from 38% to 64.5%. Those figures hold for people aged between 50 and 64 years old. Source: "Femmes et Hommes, l'égalité en question", INSEE Référence, 2022

likely to affect all three groups of factors, for women as well as for men. Divorce implies a decline in household income and household wealth (Sharma [2015] ; Munnell et al. [2018] ; Kapelle and Baxter [2021]) that may affect the possibility of retirement. The income shock is known to be stronger for women than for men (Uunk [2004] ; Le Bourdais et al. [2016] ; Bonnet et al. [2021]) and maybe encouraging them more to prolong their presence in the labour market. Separation calls into question the sociability and therefore the non-economic cost of work. Sociability with the spouse, one of the mechanism behind the joint retirement economic models (Stancanelli and Van Soest [2012] ; Michaud et al. [2020] ; Kruse [2021]), fades away. In heterosexual couples where the man is often older than his wife, he tends to wait to retire until she is also old enough to leave the labor market (Szinovacz and DeViney [2000]). Divorce could open up the possibility for women to extend their time in employment and accelerate men leaving theirs. In both cases, as a result of the breakup and the disappearance of the couple's sociability, the ties with colleagues could be revalued and motivate the divorcees to postpone retirement. Finally, divorce affects health. More specifically, men's health may deteriorate after a divorce (Leopold [2018] ; Barbuscia et al. [2022]). It could limit their ability to work. On the contrary, for women, it could be associated with a reduction of care time to give to an aging spouse or even to dependent in-laws. It would free up time to pursue paid work. Divorce activates multiple mechanisms with sometimes contrary effects. It is interesting to be able to identify an overall effect on retirement for men and women.

In this context, grey divorces are of particular interest. Upon divorce, among other changes in earnings, a person cannot rely anymore on their former partner's income. Adapting the labor supply is an important mechanism allowing individuals to compensate for that economic shock. People divorcing early in their life cycle have many years to adapt and thus cushion the shock without necessarily prolonging their working life. People divorcing

after 50 have less time. It is likely that divorce's impact on retirement and late labor market participation is greater for the oldest divorcees. Moreover, the economic shock of divorce is larger in the case of late divorces (Cimelli et al. [2023]). Retirement can be a second economic shock. In France, the replacement rate with respect to the last month in employment is less than 100%. It tends to be higher for men than for women because they have more often incomplete careers². Hence, individual income decreases upon retiring and in a larger amount for women and than men. For people still working when divorce's economic shock hits, it is a matter of delaying a second shock but also of increasing future resources by accumulating pension rights or savings. It seems particularly important to question the opportunities that grey divorcees have to adapt their labour supply and retirement plans to reduce divorce induced fall in income.

Few articles deal with the impact of divorce on retirement. Indeed, while a large body of literature deals with the impact of the labor supply, particularly women's, on divorce (Poortman and Kalmijn [2002] ; Jeandidier and Bodson [2012] ; Vignoli et al. [2018]), fewer articles deal with the reverse causality, that of divorce on labor supply. Among these works, a small number focuses on retirement behavior. The latter often question the long-term impact of divorces occurring early in the life cycle. For women, being divorced is associated with a greater probability of being active in the labor market at an advanced age, but this is not the case for men (Smeaton and McKay [2003] ; Finch [2014] ; Damman et al. [2015]). These long-term evaluations tend to rely on cross-sectional data with retrospective information on divorce and are often unable to draw causal conclusions due to selection effects and confounding processes. This article is the first to evaluate a short and medium term causal effect on retirement in the case of grey divorce, using panel data.

²For the retired born in 1946, the median replacement rate of the last wage is 74% for men and 72.5% for women. Source: H. Senghor, "Le taux de remplacement du salaire par la retraite diminue au fil des générations", Etudes et Résultats, DREES, 2015

This study focuses on France. France is an interesting country to study the link between late divorce and retirement for three reasons. First, France is a country that is affected by both the changes in women's labor supply and divorce at older ages. Second, its pension system gives incentives to workers to extend their working lives. People going through a negative economic shock may be more sensitive to those incentives. France has a pension system in which divorce does not affect retirement pension. The system is contributory, a person's retirement pension is determined by their own work history. Divorce ends couple's income and expense pooling. The costs of specialization falls on the person who has invested the most in domestic work. A high contribution degree in the retirement system accentuate that cost when retirement comes. Yet, in France each additional year quarter worked can increase the future pension and cushion the shock. To conclude, France is an interesting field of study because its labor market may be difficult to navigate for older workers (Beck et al. [2017]). Not every grey divorcee might be able to stay remain on the labor market, and some might opt to exit it through retirement (Coile and Levine [2011]).

The article answers the question: does gray divorce imply prolongation of work activity for men and women? It contributes to the literature by measuring the causal effect of divorce on retirement behavior. To do so, it uses the Permanent Demographic Sample, an administrative panel representative of the French population over the period 2011-2019. I use the recent econometric estimation strategy of Sun and Abraham [2021] to evaluate a difference-in-differences with event studies in a staggered treatment framework with dynamic effects. That method is new in the literature on the economic consequences of divorce. The second contribution of this paper is in the identification of an effect of divorce on men's retirement behavior. In particular, it shows that three years after separation, grey divorce induces a drop in the share of pensions in personal income for men similar to that of women. Finally, this article highlights two of the mechanisms underlying the effect

of divorce on retirement behaviour (variation in living standards and estrangement from the labour market).

The article is organized as follows. First, the literature on the impact of divorce on the labor supply and in particular on retirement is introduced (Section 4.2.1). Then, the French institutional context framing the retirement choice is described (Section 4.2.2). The third part presents the database used as well as the methodology employed and discusses the credibility of the hypotheses necessary for its exploitation (Section 4.3 and Section 4.4). The results are then presented (Section 4.5) and discussed (Section 4.6).

4.2 Theoretical and institutional frameworks

4.2.1 Literature review

A first branch of the literature shows that an exogenous increase in the risk of divorce leads to a rise in women's labor supply (Stevenson [2007] ; Bargain et al. [2010] ; Fernández and Wong [2014]). These articles use changes in divorce laws as a natural experiment. They do not focus on the behavior of those who actually face divorce. They highlight a causal impact of the risk of divorce and not of divorce itself. A second branch of the literature attempts to measure the latter. It suggests that divorce causes women to increase their labor supply. On the extensive margin of labor supply, Thielemans and Mortelmans [2019] find a positive impact of divorce for women. Bonnet et al. [2021] in the French context showcase a similar effect for both women and men, although the effect on men is less pronounced. On the intensive margin, Couch et al. [2011] show in the United States that divorce acts as a pivotal moment in women's career and is associated with a stable increase in their labor income over the long run. This article also suggests that women who faced divorce may

have higher pension rights in the future. These articles focus on individuals confronted with divorce early in their life cycle. To our knowledge, only one article undertakes a similar research program in the case of gray divorces. Slavov and Wei [2023] show on U.S. data that gray divorce is associated for women with an increase in their labor supply on both the intensive and extensive margins. Men's labor supply, on the contrary, decreases. However, these very interesting results do not directly address the issue of retirement.

A few papers tackle the impact of divorce on labor supply through the lens of retirement. These works address the question of the long-term effects of divorce; they also deal with divorces occurring early in the life cycle and not with grey divorce. They show an asymmetric effect of divorce on retirement for men and women. Men's retirement decision appears to be little affected by marital history (Smeaton and McKay [2003] ; Finch [2014] ; Damman [2016]). The same is not true for women. In the case of the Netherlands, Damman et al. [2015] prove that single divorced women intend to retire later than continuously married women. Beyond intention to retire, they also leave the workforce later. Re-partnering seems to limit the effect of divorce, with little difference between remarried divorcees and continuously married women. Interestingly, the article also highlights mediating variables, with women in better health or with poorer economic status being more likely to delay retirement. In a US context, Olivetti and Rotz [2017b] find similar effects of divorce on labor supply later in life. Using the timing of the introduction of unilateral divorce in multiple U.S. states, they also show that the increased likelihood of divorce causes women to increase their labor force participation after age 50. This effect is identified for women at low risk of divorce and is greater the later in their life cycle the increase in the probability of divorce occurs. This result seems consistent with the idea that women facing a late divorce would have less time to rectify their income trajectories after the divorce.

4.2.2 Institutional context

France has a pay-as-you-go retirement system. Pensions are managed by different pension schemes. The scheme to which an individual belongs is determined by his or her sector of activity. The rules for accessing the pension differ between schemes. However, a large majority of pensioners depend in part on the general private sector scheme or on schemes aligned with its rules. It is therefore that scheme that will be taken as a reference to describe the environment in which divorced people face the choice of retirement.

In the French retirement system, eligibility for a retirement pension and its value are determined by several factors: the length of the career (number of quarters during which the worker contributed to a retirement scheme), age, wages received throughout the working life and number of children. It is therefore the individual's own career that will determine his or her pension rights. In particular, divorce has no impact on a person's retirement pension³.

Age is a major determinant of retirement. In 2020, the statutory minimum retirement age in the general private sector scheme is 62⁴. Retiring earlier is possible under specific designs such as the early retirement for long careers design, the permanent disabilities designs or retirement planning for disabled persons. In 2020, the average retirement age is 62 for men and 62.6 for women all schemes combined⁵. Age plays a second role

³Marriage only has an impact on the pension after the spouse's death. Indeed, the widow or widower can claim a survivor pension which is a fraction of the deceased's pensions served to the survivor until death. It is a derived right to pension. Divorce does not automatically cause the loss of that right. In the general private sector scheme, divorce does not cause the loss of this right, but living in a new union has an impact on eligibility because of mean testing. In the civil servant's regime, it is not divorce that makes one lose the survivor pension. It is the survivor remarrying after divorce. In case of remarriage of the deceased ex-spouse, the survivor pension is shared between the surviving spouse and ex-spouses pro rata to the years of marriage.

⁴The statutory minimum retirement age has been changed in the last decade in France. It used to be 60. Yet a retirement reform in 2010 increased it to 62. More information on that are available in the sample subsection of the paper.

⁵Source: Les retraités et les retraites – édition 2022, DREES

in determining the value of retirement pension. In the general private sector scheme, retirement pensions are determined by applying a replacement rate to the average income of the 25 best years of insurance in this scheme. This replacement rate is calculated based on the insurance duration. Leaving before the required insurance duration for a full rate (50%) reduces the actual replacement rate. That mechanism is called the "décote", 1.25 percentage points are withdrawn from the full rate for each quarter not contributed. Workers can limit the deterioration of their rate by working until they have reached the required length of contribution for a full rate or the age of 67⁶, at which point the full rate is automatically granted. If they continue to work after age 62 and have reached the full rate, each new quarter contributed increases the replacement rate by 1.25 percentage points. This is the "surcote". The "décote" is capped, but the "surcote" is not. That system was introduced by the 2003 pension reform. The reform increased the gain from working longer with a large impact on the ageing labor force (Blanchet et al. [2019]).

The political will to develop the labor market engagement of older workers is also expressed by the development of options for combining retirement and work. There are several ways in France to combine work and retirement incomes. The first way only applies to poly-pensioners, people depending on several pension schemes. It is possible for them to liquidate their rights with one scheme without liquidating their rights with another scheme hence staggering their retirement process. The second way is through the progressive retirement design. Entering that policy, employees over 60 years old can start working part-time. Their income is supplemented by a part of their retirement pension. During the progressive retirement period, the employee continues to accumulate pension rights and their pension will be recalculated upon full retirement. The third way is to enter a design

⁶The 2010 reform also increased the "full rate" age from 65 to 67. That raise was implemented progressively for different generations.

explicitly called "combining retirement and employment". A person claims their retirement rights and receives their pension, while continuing to work and therefore receiving income from the labor market. That combination was subject to conditions, yet a 2009 reform loosened them⁷. This prolonged activity does not allow to acquire new rights to retirement⁸.

In this context, an individual receiving a negative income shock prior to retirement has several options and strong incentives to continue working.

4.3 Data

4.3.1 Dataset

The work presented in this article is based on data from the Permanent Demographic Sample (*Échantillon Démographique Permanent*, EDP). This is an administrative panel that annually follows a representative sample of 4.4% of the French population⁹. The EDP is fed by multiple sources, the paper only uses data from the tax returns. Covering fiscal data from 2010 to 2018, these data make it possible to track changes in income and marital status each year. The temporal scope of the panel makes it possible to analyze the short- and medium-term effects of divorce (up to 6 years after the divorce). The administrative nature of the data provides more reliable information and a lower attrition rate than is

⁷Before 2009, the combination was constrained by an income ceiling that could not be exceeded and the obligation to stop working for at least six months before resuming work. From 2009 on, these rules no longer apply to people who have access to the full rate (by duration of contribution or age) and more than the statutory minimum retirement age. If the person does not meet these conditions the pre-2009 conditions apply.

⁸Before 2015, the continued activity allowed to generate new retirement rights if it took place in the framework of a pension scheme different from the one that liquidated the worker's rights. Since 2015, no activity within the legal framework of "combining employment and retirement" generates new rights.

⁹A person enters the EDP depending on birth date. EDP collects information on people born the four first days of April, July and October, and January 2nd, 3rd, 4th and 5th.

usually the case with survey data. The size of the EDP also allows to observe a sufficient number of grey divorces to obtain significant results.

4.3.2 Variables

The fiscal data from the EDP give us access to demographic information about individuals (age, gender...), their marital trajectories and the evolution of their income. In France, a marriage or a divorce must be reported to the tax authorities when filing the annual income tax return. The date of divorce is the date of the couple's legal separation. Fiscal data contain rich information on the income of individuals. It is through income that retired individuals are characterized. An individual's income in the EDP can be composed of labor income (wages, self-employment earnings), unemployment benefits and retirement pensions. First the ratio of own pensions to the individual's total income¹⁰ is calculated¹¹. From that variable complementary indicators are created.

- Indicator of being retired : this second indicator is equal to 1 when the individual's income is composed of more than 95% of pensions¹².
- Indicator of combining income from work and retirement : it is non-null when the individuals earns both income from work (salary, self-employment benefits, unemployment benefits) and retirement (pension) above 5% and below the 95% limit¹³.

¹⁰For people with no individual income, that ratio is normalized to 0.

¹¹People with no income have their ratio normalized to 0. There is about 8% of men and 20% of women with no income that match with our sample age limits.

¹²The first year with more than 95% of income made of retirement pension is not necessarily the first year in retirement. Indeed, if part of the previous year is worked, though the person is retiring, the ratio likely not reach the 95% threshold. The indicator is corrected to code as "retired" those mixed first year of retirement.

¹³Consistent with the previous footnote mixed first year are considered as year of retirement, as a consequence they are not considered as a year of labor market and retirement income combination.

Combination can happen before or after the person is retired according to the preceding indicator.

The use of these variables allows us to better understand the retirement process and to assess the possible behaviors of combining work and retirement. Indeed, variation in the ratio of pension to income can be either linked with people retiring or combining pension income and labor income¹⁴.

4.3.3 Sample

The analyses presented are conducted on EDP individuals whose legal status is "married" in 2010. These individuals are therefore at risk of divorce during the observation window. Two groups are formed: a treatment group, composed of people who divorce between 2011 and 2018, and a control group that encompasses people who remain continuously married over the period. An age condition is added, the analysis presented here is restricted to individuals between 57 and 61 years old at the time of the divorce¹⁵. In our sample, the legal retirement age in the general pension scheme¹⁶ was comprised between 60 and 62 years¹⁷. Adopting the age range of 57 to 61 allows us to focus on individuals who face the choice of retirement in the short term. The fact that they have not yet reached age 62 also

¹⁴Full return to the labor market after having been fully retired is likely not an issue as our sample's age limit imply that little individuals are retired before divorce.

¹⁵A counterfactual divorce date is chosen randomly people in the control sample. The same age limit as for the treated applies to their counter-factual age at divorce. That divorce date is only used in descriptive result. In regression, as divorce never happens, their divorce date is coded as missing.

¹⁶In 2019, 83% of the retired received a personal retirement pension from that scheme. Source: "Panorama des retraites", DREES, 2021.

¹⁷Our sample includes people born between 1950 and 1961. For the one born from 1955 onward, the legal retirement age is 62 years old. For the one before the 1st of July, 1951, the legal retirement age is 60 years old. Between those dates the legal retirement age was increased progressively.

limits the differences in retirement behavior between the control and treatment groups¹⁸. A last condition applies to individuals joining the sample: income data must be available at least in one of the years preceding the divorce. This condition is essential to measure the ratio between pensions and individual earnings for the first time. Men and women are separated into two samples to assess gender differences in reaction to a gray divorce. To conclude, 56,736 men and 52,298 women are part of the samples. Among them there are 3,196 men and 2,208 women facing divorce during the observation window. To analyse the mechanisms underlying the relationship between divorce and retirement, sub-samples are used. They are introduced in subsection 4.5.2 and subsection 4.5.4.

4.4 Empirical strategy

4.4.1 Sun and Abraham's estimator

We seek to isolate the effect of divorce on retirement. Having both panel data and a control group, one would like to implement a difference-in-differences design with an event studies specification. However, our context does not allow for a classical difference-in-differences design where the treatment (divorce) is administered at the same time for all treated individuals. Indeed, we follow individuals who divorce in different years. Our treatment is staggered. Our data include 8 treatment cohorts (one for each year of divorce between 2011 and 2018).

Two-way fixed effects regressions have been widely used to estimate difference-in-differences designs with panel data. Yet the use of those models with staggered treatment

¹⁸The age interval responds to a double injunction: to observe enough divorces (it is difficult to reduce the age interval with regards to that) and to follow the individuals long enough to observe retiring (the divorce should not happen too early in the individual trajectories).

has been questioned in recent years. In the case of specifications with event studies, Sun and Abraham [2021] criticized the classical two-way fixed effects for the biases it introduces (contamination between coefficients) and the ambiguity of interpretation of its coefficients. To solve these problems they propose an alternative estimation method, which will be used in the present paper.

The goal is to estimate the average treatment effect on the treated, j years from treatment:

$$ATT^j = \sum_{e=2011}^{2018} CATT_{e,j} \times P(E_i = e | E_i \in [2010 - j; 2018 - j]) \quad (4.1)$$

- i identifies the individuals
- e identifies the divorce cohorts, $e \in [2011; 2018]$ ¹⁹. E_i is the divorce cohort of individual i .
- j is the year relative to divorce, $j \in [-8; 7]$.

This parameter is a weighted average of the $CATT_{e,j}$. They are cohort-specific average treatment effect on the treated for j years relative to divorce. $CATT_{e,j}$ are weighted using the sample shares of each divorce cohort e in the relevant period j .

To estimate the $CATT_{e,j}$, the following regression is estimated:

$$Y_{it} = a_i + \sum_{j \neq -2} (b^{e,j} \times B_{it}^j \times 1[E_i = e]) + c_t + d \times D_{it} + e_{it} \quad (4.2)$$

¹⁹The un-treated are in their own treatment/divorce cohort, e for them is considered to be infinite.

Similarly as before, i identifies the individual, t the year, j the divorce period and e the divorce cohort.

- Y_{it} is the outcome (here, variables characterizing retirement).
- a_i is an individual fixed effect.
- c_t is a year fixed effect.
- D_{it} are control variables that are not constant over time. Here I use age indicators²⁰.
- B_{it}^j is the distance to divorce. It is a variable equal to 1 when the individual i is located at j years of his divorce, in year t .
- e_{it} is the idiosyncratic error term.

The reference year is set two years before the divorce for reasons discussed below. The standard errors are clustered at the individual level to take into account individual-based auto-correlation in standard-errors.

The $b^{e,j}$ are the $CATT_{e,j}$. Once estimated, they make it possible to calculate the parameter ATT^j that is of interest to us and is interpreted as a weighted average of the average effect of the divorce on retirement at year j for different cohorts.

4.4.2 Assumptions' credibility

The method proposed by Sun and Abraham, like other DID estimation methods, is based on several assumptions to identify the effect of a treatment:

²⁰The French pension system introduces discontinuity between age and retirement by creating threshold ages. For this reason, I use indicators rather than a continuous age variable.

1. The trends of the treatment and control groups would have been the same in the absence of treatment.
2. There is no anticipatory effect, no effect of the treatment before the start of treatment. At the very least, the initiation of that effect must be dated. That is to say, there are observable periods before the start of anticipation effects.
3. The treatment effect is homogeneous between cohorts. The impact of divorce on retirement is not different when the divorce occurs in 2012 or in 2016, for example.
4. There is no reverse causality, which means retirement behaviors does not cause divorce.

Because the parallel trends hypothesis implies an alternative reality (one in which the treated group did not receive treatment), it is not possible to test it directly. However, it is possible to judge its credibility by answering the following questions:

- Are individuals in the treatment and control groups similar?
- Are the treatment and control groups on parallel trends before the treatment is implemented?

To answer the first question, we can refer to Table 4.1. This table summarizes the characteristics of the two groups, for both men and women, prior to the year (real or counter-factual) of divorce. The treatment and control groups are very similar in terms of age, individual income and contribution to couple income before divorce. A t-test comparison of means between treated and un-treated with a 0.05 p-value shows that the difference in age is significant. Yet the similarity in age is reassuring because age is paramount to retirement behaviour. Remaining differences in age should not be an issue as age indicators

are control variables in the specification presented above. The t-test show no statistically significant difference for individual income and contribution to couple income pre-divorce. It is interesting because both weighs on the magnitude of divorce negative impact on living standards which is one of the main mechanism suspected to channel divorce's impact on retirement behavior. Some important differences remain between the two groups. Individuals in the control groups seem to have higher living standards²¹ than those in the treatment groups. They also have more children in their households, seem to be less affected by unemployment, and their spouses are more often already retired. Divorcing men seem to be more inactive while divorcing women less than their married counterpart. T-testing shows significant differences in all those variables. As a conclusion, these descriptive elements provide an ambiguous answer to the question of the credibility of the parallel trends hypothesis.

The answer to the second question can be found in figure 4.1. This graph plots the average evolution of the ratio of pensions to personal income. It increases over time, representing mostly an rising share of retirees in the sample. Because of our age limit the ratio is low before the year of divorce. However, it increases until it reaches 80% to 90%, which suggests our sample allows to study many retirement transition. One can observe that the curves of the treated groups and the control groups are merged until one year before divorce²². Then they separate, with the treated groups' curves remaining below those of the control groups. That suggests a correlation between grey divorce and delayed retirement. It also implies that the treatment and control groups follow similar trajectories before divorce. This lends credibility to the parallel trends hypothesis. Moreover, an

²¹An household living standards is defined as aggregated household income adjusted for its size. The present living standards uses the OECD modified equivalence scale to compare households of different sizes.

²²Only "treated" women seem to differ slightly seven years before divorce, but the sample size so long before divorce is quite small.

Table 4.1: descriptive statistics

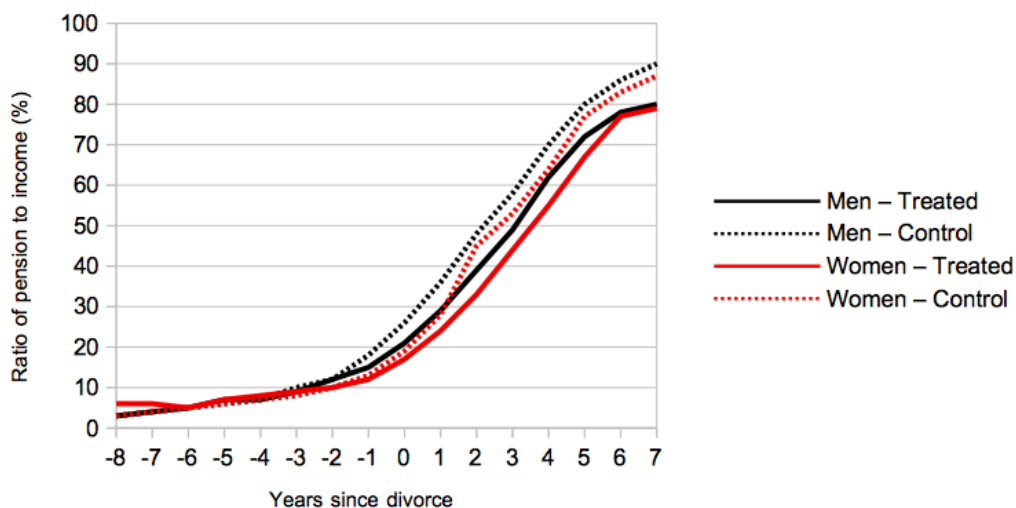
	Men		Women	
	Treated	Control	Treated	Control
Age (t)	58.8	59	58.8	59
Living standards (t-2)	26432	29106	27658	29782
Personal income (t-2)	33427	34400	22106	21347
Contribution to couple income (% in 2010)	65.5	65.8	38.1	33.2
Living with children (% en t-2)	62.1	49.5	44.6	37.9
Unemployed (% en t-2)	9.3	6.8	8.1	7.3
Living with retired partner (% in 2010)	6	7.4	19	24.9
Nor active nor retired (% in t-2)	7	4.5	19	21.6

Source: EDP (2019 edition).

Note: the values in the table for age, living standards, personal income and contribution to couple income are sample average. The other variables are the sample share of unemployed, people living with children and their household or whose partner is retired. When labelled (t-2), the values are measured two years before divorce (or "fake" divorce for the control group).

anticipation effect may exist one year before divorce. It may also be an effect of the separation itself because of the time lag between the date of legal divorce and the date of de facto separation. The Sun and Abraham method can help to shed light on this. Indeed, by evaluating the parameter ATT^j for a negative j , it is possible to test whether trends are parallel before divorce or not. Significantly non-zero coefficients would show differences in trajectories that may indicate a break with the parallel trend hypothesis. If the significant coefficients are close to the event and the coefficients of previous periods are not significant, they may be interpreted as anticipation effects.

Figure 4.1: descriptive trend of pension to personal income among men and women



Source: EDP individuals aged between 57 and 61 years old, EDP 2019

Note: mean ratio of retirement pension to individual income by year relative to divorce. An alternate divorce year is defined randomly for the control group.

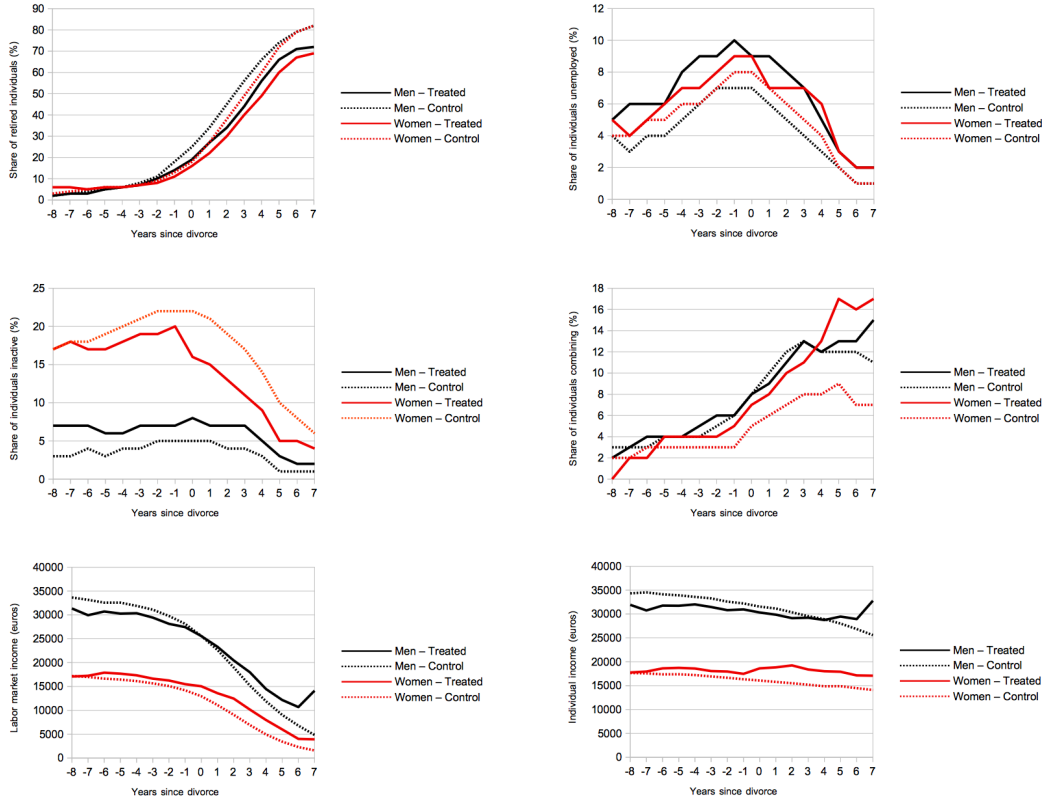
A potential divergence between treatment and control groups relative to the pension ratio is *de facto* limited by the age group definition. More information on labor market behaviors may be needed to ascertain comparability. Similar descriptive plot as figure 4.1

were crafted (see figure 4.2). Outcomes are labor income, individual income²³, share of the retired, share of the unemployed, share of the inactive, share of the people combining pension and labor income. Differences in levels appears between the treated and control groups, except for the share of retired which is closely linked to the pension ratio. From five years before divorce to one year before divorce, treated and control groups seem to mostly follow similar trajectories when it comes to the share of people combining pension and labor market income, individual income, the share of unemployed, the share on people nor active on the labor market nor retirement. There appear to be a convergence in labor market income and individual income for men. Yet no similar diverging trend seem to appear for women. Those element appear to give a positive assessment of parallel trends in labor market behavior before divorce.

To conclude, any estimate of the impact of divorce on retirement is based on the assumption that what is being estimated is not reverse causality. The answer to this question is not obvious. Indeed, much of the literature on the links between divorce and labor market behaviors deals with the impact of women's labor supply on marital separations. There is no consensus in the literature on the existence of such a reverse causality (Poortman and Kalmijn [2002] ; Jeandidier and Bodson [2012] ; Vignoli et al. [2018]). It seems to depend on national contexts. Vignoli et al. [2018] puts forward the hypothesis that the effect of women's labor supply on divorce may be less salient in countries where the divorce procedure is easy, and where family policies support family-work conciliation and mono-parental families. France could fit into this framework. This literature deals with the intensive and extensive margins of women's labor supply. Nonetheless, with respect to the extensive margin, retirement is rarely tackled. Doorley and Stancanelli [2019] show that there is a

²³Labor income includes earnings from wage and self-employment, unemployment benefits. Individual income adds to it retirement pensions.

Figure 4.2: descriptive trend of several labor market outcomes



Source: EDP individuals aged between 57 and 61 years old, EDP 2019

Note: average by year relative to divorce. An alternate divorce year is defined randomly for the control group.

negative correlation between retirement and being married for men. Yet a similar correlation does not appear for women. In the case of gray divorces, Lin et al. [2018] shows that pivotal life cycle event such as retirement are positively associated with the probability of divorce. Yet this correlation disappears once the determinants of divorce earlier in the life cycle are taken into account. The answer to the question of reverse causality in the case of retirement is therefore still ambiguous.

4.5 Results

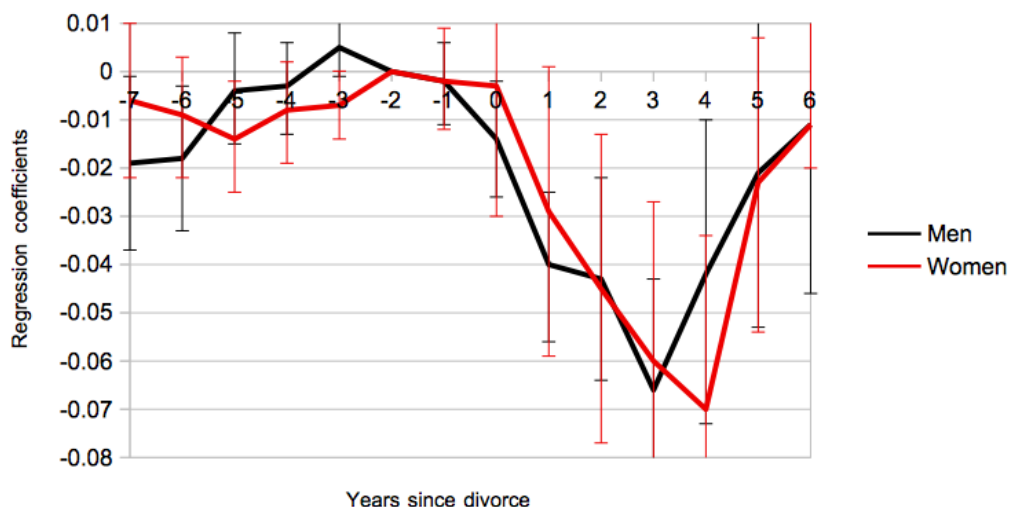
4.5.1 Share of pension in individual income

Figure 4.3 shows the effect of divorce, the weighted average of Sun and Abraham's cohort-specific treatment effects, on the ratio of pensions to personal income. First, we observe that the ATT^j coefficients are not significantly positive in the four years preceding divorce for men and women. This suggests that there are no pre-trends, the trajectories of the control groups and the treatment groups are parallel during that period. This reaffirms the credibility of the parallel trends hypothesis and suggests that there is no anticipatory effects one year before the divorce like the descriptive results seemed to indicate. Starting the year of divorce for men, and two years after for women, the ATT^j coefficients are significantly negative. The effect of divorce is also dynamic. The negative effect increases in magnitude until three year after divorce for men, four years for women, and then it decreases. Three year after union dissolution, divorce reduces the share of pensions in a woman's income by 6 percentage points and by 6.5 percentage points for men. At that same point, the effect of divorce on men and women cannot be said to be statistically different. That negative effect of divorce on the share of pensions in a person's income can be explained in two mechanisms: by an increase in the combination of pensions and work income or by a delay in retirement. The other outcomes can help us to better understand the origin of the negative effect.

4.5.2 Probability to be retired

Figure 4.4 shows the effect of divorce on the probability of being retired. We see that the coefficients ATT^j for negative j are not significant. The trajectories of the control

Figure 4.3: effect of grey divorce on the ratio between pensions and personal income



Source: EDP individuals aged between 57 and 61 years old, EDP (2019 edition). N = 56,736 for men ; 52,298 for women.

Note: regression results. Confidence intervals are at the 95% level.

Lecture: divorce causes a 0.04 (4 percentage points) decrease in the ratio to retirement pension to individual income among men, one year after legal separation with respect to the reference year (two years before divorce).

and treatment groups are therefore parallel before the divorce. A significantly negative effect appears one year after divorce for men. The negative effect grows until three year post-divorce and then decreases. The fact that divorce affects men's retirement is a new result. For women, a statistically significant negative effect appears two years into divorce, it grows to 4 years after divorce and then decreases and disappears. Three year into union dissolution, divorce decreases the probability of being retired by 0.07 for men and by 0.05 for women. Once again, confidence intervals do not allow to claim men and women's effect are of different magnitudes.

To better understand the effect of divorce on retirement, our working samples are split according to working status in the reference period (two year before the actual or counter-

Figure 4.4: effect of grey divorce on the probability to be retired



Source: EDP individuals aged between 57 and 61 years old, EDP (2019 edition). N = 56,736 for men ; 52,298 for women.

Note: regression results. Confidence intervals are at the 95% level.

Lecture: divorce causes a 0.03 decrease in the probability to be retired among men, one year after legal separation with respect to the reference year (two years before divorce).

factual divorce year). Our first sub-sample (sub-sample 1) is made of people active on the labor market (in employment or unemployed). There 42,844 men fitting that description (among them 2,423 divorcees) and 32,995 women (1,468 divorcees). Our second sub-sample (sub-sample 2) is made of people neither active on the labor market nor retired. There are 2,232 men (187 divorcees) and 9,600 women (356 divorcees). Including inactive non-retired individuals is important. Castelain [2023] shows that in 2021 in France, among people aged from 55 years old to 69 years old, 16% are nor employed, nor retired. That share increases when people get closer to the retirement age. Those situation are all the more prevalent following reforms that have pushed back the statutory retirement age (Dubois and Koubi [2017]). This situation, which is often forced upon people and especially women, is an

in-between between work and retirement. That group is likely to have a very different behavior as it is composed of people that have been inactive for a while (often women) or that are no longer able to work but are sometimes too young to retire.

Figure 4.5 shows that in the active sample, divorce has a larger negative effect on the probability to retire than in the general sample. No pre-trends appear, in the four years preceding divorce. Three years after divorce the probability to be retired has been decreased by 0.06 for men and 0.085 for women compared to the reference period. Confidence intervals still overlap between the two groups. Figure 4.6 shows very different result for the "inactive" sample. There appears to be no impact of divorce on inactive men's retirement. Yet, that was to be expected as the sample size is very small. For women, on the other hand, the probability to be retired seems to increase with respect to the reference period. Three years after divorce, their probability to be retired is higher than 2 years before divorce by 0.11. This result suggests that some of the inactive women chose to stay out of the labor market through retirement rather than re-entering it after divorce and inactivity. The stratification of samples used show that divorce's impact on retirement is not homogeneous. It is strongly negative for women already on the labor market but is strongly positive for women out of it that are not retired. It hints at the fact that the increased labor participation may not be a strategy available for all women who have to deal with the economic consequences of divorce.

4.5.3 Combination of labor market and retirement earnings

Figure 4.7 shows the effects of divorce on the probability of combining retirement income with labor market activity. Here again, we observe that the effect of divorce before separation is non-significant. The parallel trend hypothesis is not called into question by that

Figure 4.5: Sub-sample 1 and retirement

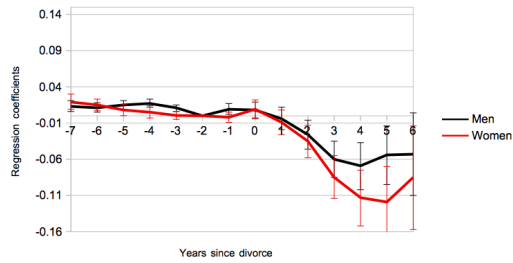
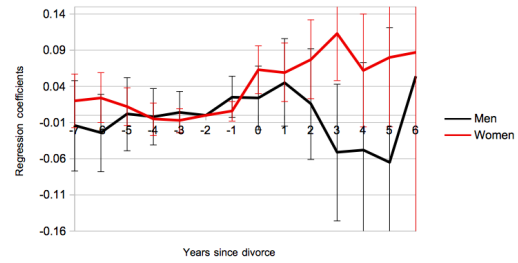


Figure 4.6: Sub-sample 2 and retirement



Source: EDP individuals aged between 57 and 61 years old, EDP (2019 edition). N = 42,844 for active men, 32,995 for active women. N = 2,232 for inactive not retired men, and 9,600 for inactive not retired women.

Note: regression results. Confidence intervals are at the 95% level.

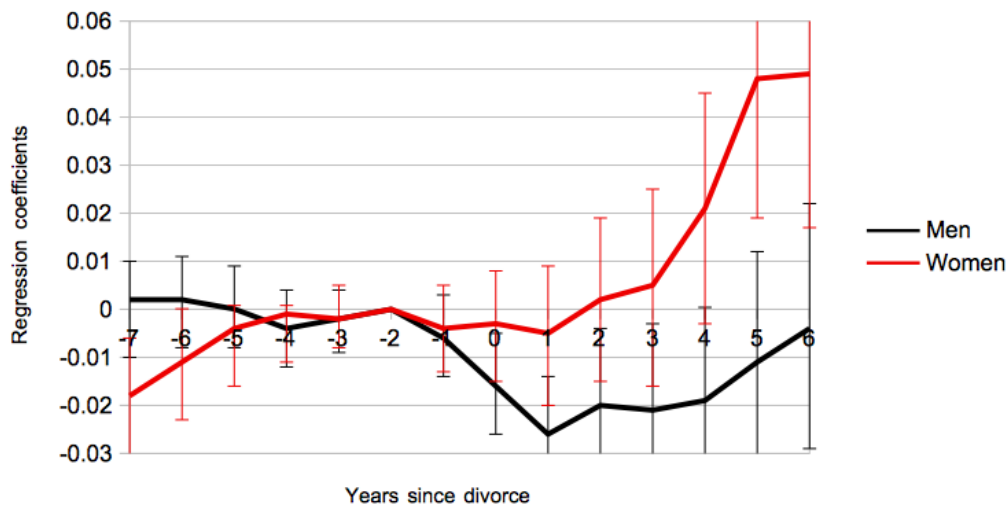
Lecture: divorce causes a 0.059 increase in the probability to be retired among women out of labor market and non-retired in the reference period, one year after legal separation with respect to the reference year (two years before divorce). It causes a 0.01 decrease in the probability to be retired for women active on the labor market in the reference period.

result. For men a modest negative significant effect appears from one year into divorce until four years later. This effect is surprising, and may be an extension of men's delaying retirement through not claiming any pension. Women have a very different trajectory. No coefficient is significant in the first years following divorce. Yet a positive effect happen 5 to 6 years after divorce. Five years after divorce their probability to combine income from retirement and work is higher by 0.05 than in the reference period²⁴. The previous result showed that women postponed retirement, but that after four years their probability to retire returns to their pre-divorce path. The result on income combination seem to hint at the fact that for the women not retiring after four years, combination may be a way to keep on avoiding a second economic shock. An alternative explanation might be that some persons that retired earlier have resumed a labor market activity to complement their income. This result on women is consistent with the descriptive elements given in the French literature on combining work and retirement. In particular, Dardier [2021] shows

²⁴As for retirement, the effect has a larger magnitude when regression are run on sub-sample 1 only. Five years after divorce

that not being in a couple increases the probability of combining work and retirement for women, while no correlation is detected for men. That literature is often focused on the determinant of job-holding after retirement related to past labor market outcome. Our result invites to take into account familial and marital events.

Figure 4.7: effect of grey divorce on the probability of combining work and retirement



Source: EDP individuals aged between 57 and 61 years old, EDP (2019 edition). N = 56,736 for men ; 52,298 for women.

Note: regression results. Confidence intervals are at the 95% level.

Lecture: divorce causes a 0.013 increase in the probability to combine retirement and labor market incomes among men, one year after legal separation with respect to the reference year (two years before divorce).

4.5.4 Mechanism: variation in living standards upon divorce

Several mechanisms may explain the link between divorce and retirement behavior. Among these, the loss of income and living standards associated with divorce could play a central role. If this is the case, individuals who lose the most in terms of living standards during divorce will delay their retirement more to avoid a second economic shock or accumulate

more pension rights. We would like to test this hypothesis.

To do this, we could estimate the effect of divorce on the probability to be retired according to the nature and intensity of the variation in living standards at divorce. However, variation in living standards is itself affected by retirement behavior. To overcome this difficulty, we are going to substitute the actual variation in living standards with a variable that is correlated to it: the contribution to the couple's income before divorce. The literature has shown that the contribution to the couple's pre-separation income is a major determinant of the intensity of variation in living standards at the time of separation (Bonnet et al. [2021]).

To test the hypothesis that the intensity of economic loss at the time of divorce motivates delayed retirement, we will measure the impact of divorce on the probability of retirement by gender, for several level of contribution to couple's income.

These groups are created on the basis of the median share of an individual's income²⁵ in the couple's aggregated individual incomes in 2010, the start year of observation. From this threshold, a group of "high" contributors (people contributing above the median) and a group of "low" contributors (people contributing below the median) are formed. The threshold is measured by gender and is therefore very different for men and women. Sample sizes are documented in table 4.2.

For men:

- The low contributor group encompasses men who contribute less than 64% of their couple's income.
- The high contributor group encompasses men who contribute more than 64% of their couple's income.

²⁵For each individual, this income includes income from work (wage and self-employment earnings), retirement pensions and unemployment benefits.

Table 4.2: Sample size with stratification

	Men		Women	
	Divorced	Married	Divorced	Married
High contributors	1,491	25,926	1,103	24,328
Low contributors	1,491	25,926	970	24,460
All	2,982	51,852	2,073	48,788

Source: EDP individuals aged between 57 and 61 years old, EDP (2019 edition).

Note: information on the ex-partner's income is missing for some individuals. Hence, sample sizes displayed in the "all" line are slightly smaller than the sample sizes announced on the "sub-sample" section of the paper.

At the time of a divorce, individuals in the low contributor group are at risk of experiencing a drop in living standards. Members of the high-contributor group, on the other hand, are likely to experience an increase in living standards. We therefore expect divorce to have a negative effect on the probability of being retired in the first group, and a zero or positive effect in the second.

For women:

- The low-contributor group encompasses women who contribute less than 36% of their couple's income.
- The high contributor group encompasses women who contribute more than 36% of their couple's income.

At the time of a divorce, individuals in the low-contributor group are at risk of experiencing a drop in living standards. Members of the high-contributor group are also likely to experience a drop in their living standards, as their level of contribution remains mostly below the 67% required to have constant or rising living standards at divorce²⁶. Yet, their

²⁶When the equivalence scale chosen is the modified-OECD scale, on an assumption of fixed incomes and disregarding the presence of children.

living standards may decrease less than the low contributors'. We therefore expect divorce to have a negative effect on both groups, but the negative effect to be more pronounced in the case of the low contributors.

Figure 4.8: Men sample

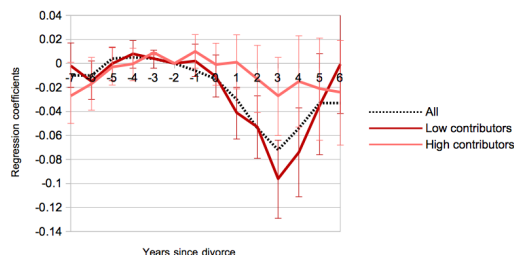
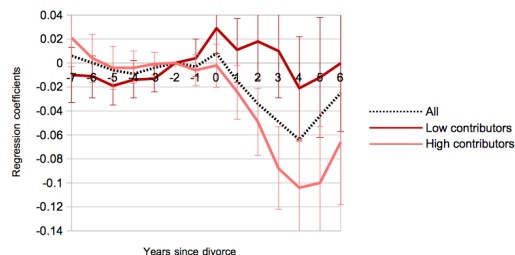


Figure 4.9: Women sample



Source: EDP individuals aged between 57 and 61 years old, EDP (2019 edition). N = 27,417 for men, 25,431 for women, who are "high contributors". N = 27,417 for men, 25,430 for women, who are "low contributors".

Note: regression results. Confidence intervals are at the 95% level.

Lecture: divorce causes a 0.022 decrease in the probability to be retired among women in the high contributors group, one year after legal separation with respect to the reference year (two years before divorce). It causes a 0.011 increase in the probability to be retired for women in the low contributors group.

Table 4.8 shows our results for the men sample. The coefficients associated with the effect of divorce on the probability of being retired are not significant in the high contributors' group. On the contrary, in the low contributors' group, the coefficients are significantly negative from the year following divorce, and remain so up to four years after the event. These results are consistent with the hypothesis tested. The retirement behavior of high contributors, men for whom living standards are not expected to fall following divorce, is not affected by divorce. On the contrary, low contributors, i.e. men whose living standards are expected to fall as a result of divorce, delay their retirement. Our pooled-sample results seem to be mainly driven by the low-contributors' group. It should be noted, however, that the confidence intervals for the two sets of coefficients partially overlap, so it is not possible to assert that they are significantly different every year, coefficients are significantly distinct only three years after divorce.

Table 4.11 presents our results for the women sample. The coefficients associated with the effect of divorce on the probability of being retired are not significant in the low-contributors' sample. On the contrary, in the high-contributors' sample, the coefficients are significantly negative from two years up to five years post-divorce. This result is not entirely consistent with those predicted by the hypothesis at test. We observe negative coefficients among high contributors, who in this sample are also at risk of a drop in living standards upon divorce. They delay their retirement, which is in line with the hypothesis. However, this effect is no less negative than the one observed for low contributors. On the contrary, the impact of divorce on the retirement behavior of the latter is neutral. This is surprising, but should be interpreted in the light of the fact that this group includes women who are neither retired nor employed and have a zero income. We observed earlier that this group tended to leave the labour market permanently and retire at the time of divorce.

When this population is excluded from the group of small contributors, a different result emerges. Divorce implies a drop in the ratio of pensions to income and in the probability of being retired (see figure 4.10). The sign of the variation is consistent with the living standards variation mechanism. However, one could have expected a more negative effect for this group of low contributors than for the group of high contributors. On the contrary, the coefficients are more negative for the high contributors. However, the difference between the coefficients of the two groups is not significant. This result invites us to qualify the weight of the hypothesis of a shock of living standards motivation to postpone retirement. Other mechanisms are also at work. Two possibilities here:

- First, low contributor women's income may be supplemented by public transfers (family allowances, housing, welfare benefits) or private transfers (child maintenance, spousal alimony), limiting their effective variation in living standards and thus their

incentive to prolong their presence on the labour market.

- Second, low contributor women may encounter obstacles on the labour market to extend their working lives.

Figure 4.10: Ratio of pension to income

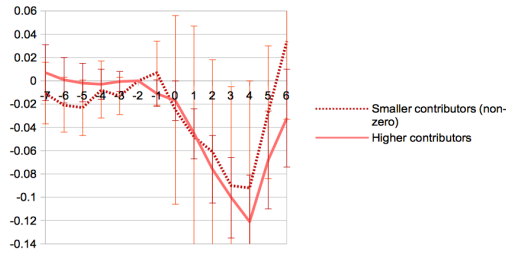
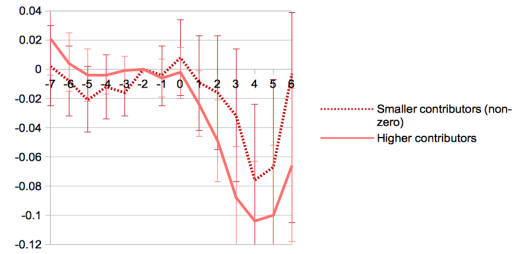


Figure 4.11: Being retired



Source: EDP individuals aged between 57 and 61 years old, EDP (2019 edition). N = 25,430 for women, who are "low contributors". N = 15,645 when women contributing 0 to their couple's income are excluded.

Note: regression results. Confidence intervals are at the 95% level.

Lecture: divorce causes a 0.004 decrease in the probability to be retired among women in the low contributors group (zero contribution excluded), one year after legal separation with respect to the reference year (two years before divorce). It causes a 0.004 increase in the probability to be retired for women in the low contributors group (zero contribution included).

Our results prove a degree of validity of the mechanism explaining the impact of divorce on retirement by the loss of living standards. They also show that this mechanism is not sufficient to explain all behaviours, and that it is essential to analyse the position of individuals with regard to employment, and to test other mechanisms that may be simultaneously at work.

4.6 Conclusion and limitations

Estimating the impact of a late divorce on retirement is interesting and important for several reasons. From a retirement perspective, in the context of an aging population, there is a need to better understand the determinant of retirement. Through the lens of

divorce, the major impact it has on people's economic resources, and especially women's, leads to question the levers of action that they have to smooth it out. In the case of grey divorces, that question is all the more worrying since the magnitude of the shock could tip older women who encounter it into economic vulnerability or even poverty.

Our results suggest that individuals' retirement behaviors adapt following a divorce. Divorce implies in the years following union dissolution a decrease in the ratio of pension to income for women. That decrease is channelled through a temporary fall in the probability to retire. That negative effect is higher for women invested in the labor market before divorce. There is a positive effect for those already inactive but not yet retired. Those results are new, as there has not been to my knowledge any causal estimation of the impact of grey divorce on retirement before. Grey divorce seems to push women to postpone their exit from the labor force when they are not already estranged from the labor market. Our results show that men's retirement behavior is also affected by divorce. Similarly to women, men's ratio of pension to income and probability to retire temporarily decrease upon grey divorce. To our knowledge, the articles tackling the impact of divorce on retirement find that divorce has no impact on men's retirement, with the exception of one article which highlights an effect contrary to ours. The theoretical reflection that we conducted in the introduction led to an ambiguous anticipated results as well. Factors such as deteriorating health and the absence of a joint retirement decision could lead one to believe that men would withdraw from the labor market more quickly once divorced. The negative effect of divorce on the standard of livings and the importance of sociability with colleagues could, on the contrary, lead one to expect an inverse effect, similar to that identified for women. Those mechanism appear to be dominant. Further tests on the underlying mechanisms were undertaken. Using past contribution to the couple's income, we find that men's behaviour is consistent with the fall in living standards as main driver of the effect of

divorce on retirement theory. Men more likely to be negatively affected by divorce in their living standards delay their retirement, while men not at risk do not adapt. Evidence is less clear cut for women. The women at risk of a large fall in living standards do not adapt while women at risk of a smaller fall in living standards adapt and delay their retirement. When women with a zero contribution to their couple's pre-divorce income (i.e. non-retired inactive women) are excluded, the negative effect on retirement is apparent. Yet it is slightly smaller than that of women who contribute more to their couple's income. The hypothesis of a drop in living standards is insufficient to explain the low contributors' behavior. Those most in need do not or cannot mobilize the labor market, which is worrying. Alternative hypotheses need to be tested to better understand the causes and consequences of this behavior.

Our results have several blind spots, the analysis of which could perhaps provide a better understanding of some women's behavior.

First of all, we do not evaluate the influence of children on retirement behavior. However, before divorce, a large proportion of individuals in the treated groups still had dependent children. This is the case for 62% of men and 45% of women divorcing during the observation period. Children can have several influences on the custodial parent's labor supply. Children increase household expenses, increasing the drop in living standards at the time of divorce. This should increase the incentive to return to work or continue working. However, private and public support mechanisms exist (child maintenance payments, single-parent allowance). This additional income could reduce women's need to stay in the workforce for longer. In conclusion, children can limit the time available to parents to adapt their labor supply. The effect of children is ambiguous for the custodial parent. Despite a greater prevalence of shared custody when the children are older, as is often the case in grey divorce cases, it is possible that women in the "low contributor" group, having

perhaps invested more in the care-giver role, are more often the sole custodial parent. Children could therefore provide a key to explaining this group's behavior. However, we are unable to test the impact of children on the sub-sample of low-contributor women. Indeed, stratifying this group according to the presence of children in the household before divorce would result in samples too small to draw causal conclusions. Similarly, the evolution of private transfers (compensatory allowance) and public transfers (benefits, social minima) at the time of divorce is not taken into account. A significant increase in these sources of income could explain the limited incentive to increase one's job supply. Eventually, our analysis focuses solely on labor supply. However, the labor market demand could be a limiting factor for older workers.

This reflection on the ability of women who have specialized in domestic work to return to the labor market in the event of a late divorce opens the way to new scientific investigations. It also calls into question public policy, as recent findings show that grey divorce has a very negative impact on women's standards of living, particularly for women who have invested little in the labor market (see chapter 1).

Chapter 5

General conclusion

The three articles presented in this dissertation aim to assess the economic consequences of union dissolution happening in the second part of the life cycle. They do so with a systematic analysis of the protective power of public policies, and a focus on gender differences. They are united by their goal, the use of administrative panel data and of difference-in-differences design applied to staggered treatments.

5.1 Main results

5.1.1 Measuring living standards' variation upon divorce and widowhood after 50

Chapters 2 and 3 measure the variation in living standards (aggregated household income adjusted for household size) caused by divorce and widowhood, after age 50.

Following a grey divorce, both men's and women's living standards fall. Between the year before divorce and the year after, men's living standards fall by 5% and women's by

24%. While the consequences of divorce seem similar before and after age 50 for men, this is not the case for women, who appear more economically fragile when divorce comes late in the life cycle.

Conversely, our results show that upon widowhood, on average, both men's and women's living standards rise. Between the year before and the year after spouse's death, men's living standards increase by 22% and women's by 5%.

Divorce and widowhood share certain characteristics:

- Men are less disadvantaged than women after dissolution.
- The gender gap of the variation in living standards (gap between men's and women's variation in living standards caused by dissolution) is similar (19 percentage points for divorce and 17 for widowhood).
- There is a gradient of living standards' variations following dissolution. Analysis by quartile shows that the gradient is negative with regard to pre-dissolution position in the distribution of living standards. Higher the position, more negative (or less positive) is the variation in living standards.
- Specialization plays a paramount role. The variation in living standards of divorcees and in pre-survivor's pension living standards of the widowed is largely correlated with the level of contribution to the couple's income before union dissolution. This is consistent with our diagnosis of a micro-economic issue with the costs of intra-couple specialization.

According to the present results, between divorce's and widowhood's economic consequences after 50, there is one major difference. Divorce is associated with a loss of living standards, while widowhood is associated with a gain in living standards. That difference

fades away when pre-solidarity living standards are considered instead of post-solidarity living standards. Divorce has no significant impact on the pre-transfer living standards of men over 50. For women, it implies a drop of around 35%. Widowhood causes an average 6% rise in men's living standards when survivor's pensions are excluded. It generates a 38% drop in living standards for widows. When excluding solidarity mechanisms, the impact of union dissolution on women after age 50 appears to be a negative living standards shock of similar magnitude in the case of divorce and widowhood.

5.1.2 Assessing the french protection policies against divorce and widowhood after 50

Chapters 2 and 3 measure the protective power of public policies. In the case of grey divorce, public (family and housing allowances, welfare benefits) and private transfers (child maintenance, spousal alimony) are investigated. These transfers play a different role for men and women and tend to have an equalizing effect. They help to reduce the gender gap in variation in living standards after divorce from 35 percentage points to 19 percentage points. Transfers cause a moderate fall in living standards for men. They largely cushion the variation in women's living standards, with public and private transfers each having a significant impact. Public transfers, however, appear to be more crucial in limiting variations in women's living standards. The importance of these transfers varies according to position in the pre-dissolution living standards distribution. Public transfers play a more important role in the lower half of the distribution. Their role diminishes in the second half of the distribution, while that of private transfers increases. This result is consistent with the existence of means testing in the social solidarity system and with the injunction of court-set pensions to take into account both the creditor's needs and the debtor's resources.

In the case of widowhood, the focus was on survivor's pensions. Survivor's pensions contribute to increasing living standards upon spouse's death for both men and women. In the case of men, pre-survivor's pension living standards increase upon widowhood. Survivor's pensions therefore add to an already favorable situation. On average, according to the goal of constant living standards, it overcompensates men. Women's pre-survivor's pension living standards fall substantially upon bereavement. On average, survivor's pension compensates for this drop, and slightly exceeds expectations of smooth living standards around widowhood. There is only partial overcompensation. Survivor's pensions contribute to reducing the gender gap in the variation in living standards following widowhood from 44 percentage points to 15 percentage points. It compensates more the relative variation in living standards at the bottom of the pre-dissolution living standards distribution. This over-compensation enables these women to remain above the poverty line. Yet, the survivor's pension amounts involved are higher at the top of the distribution.

This analysis shows that the cost of the economic consequences of union dissolution is largely socialized by the pension system in the case of widowhood and the welfare state's general safety net in the case of divorce. At the quartile level, looking at relative variations in living standards, the system appears to be globally redistributive. In particular, women at the bottom of the pre-dissolution living standards distribution are more protected in terms of relative variation in living standards than women at the top of the distribution.

It was emphasized earlier that the major difference between the economic consequences of divorce and widowhood after age 50 lies in the fact that the widowed's living standards rise while divorcees' fall. The survivor's pension appears to largely explain this difference.

Regarding the objectives underlying the French system, one can observe the following:

- The assistance objective, which aims to protect from poverty, is directly ensured by the general safety net in the case of divorce, while in the case of widowhood,

survivor's pensions mostly replace it.

- The insurance objective, defined as smoothing living standards across matrimonial states, is not reached in the case of divorce. In the case of widowhood, survivor's pension achieve it, and on average exceeds this objective. This is consistent with the fact that the insurance objective seems less ambitious in the case of divorce than in the case of widowhood in the French system (partial smoothing v. total smoothing).
- The patrimonial objective is more complicated to assess, since it requires more precise knowledge of the individual's marriage history and commitment to the labour market. It remains a blind spot in our analysis, even though I underlined its interest in chapter 1. I find that the policies studied help to reduce the gendered gap in pre-solidarity variations in living standards resulting from union dissolution at a collective level. While this re-balancing is desirable from the point of view of gender equality, it does not allow us to assess the objective of restoring and redistributing the gains from marriage at the time of divorce or widowhood. The evaluation of this objective appears to be a stimulating avenue for future research and a public policy issue, as discussions on this facet of the system remain rare compared with those regarding the smoothing of living standards.

The changing demographics of union dissolution after 50, with relatively more grey divorcees and fewer widows, means that in the contemporary public policy landscape we are witnessing the growth of a less well-protected population. This demographic change will have an impact on survivor's pension expenditure. Because of women's increasing pensions and a weaker prevalence of marriage, survivor's pensions' expenditure are already set to fall in the general private sector scheme (Di Porto and Ghernaout [2020]). This development opens the way to thinking about a potential redistribution from the management of the

economic consequences of widowhood to those of late divorce, through new public policy tools.

5.1.3 Understanding individual strategies (market levers) to cope after 50

Chapter 4 looks at adaptation strategies that individuals facing an union dissolution can put in place to prevent too much decrease in living standards. It deals with labor supply's adaptation and aims to measure the causal effect of grey divorce on retirement behaviour. It suggests that both men and women prolong their participation in the labour market following a grey divorce. In particular, it shows that in the years following dissolution, for those aged 57-61 years old, the ratio of pensions to income decreases for 5 years before returning to its pre-divorce trajectory. The same applies to the probability of being retired, meaning grey divorce tends to delay retirement. This chapter shows that the loss in living standards associated with divorce is one of the drivers of this effect for men. The case of women is more complex, and there seems to be barriers to self-insurance on the labour market for female grey divorcees. We can see that active women delay their retirement, while inactive, non-retired, women accelerate it. Similarly, the half of women contributing the least to couple's income (less than 36%) prior to divorce do not appear to be prolonging their working lives more than higher contributor women to compensate for the associated economic shock. Close to retirement women appearing to have invested more in the domestic sphere are not or cannot fully use the labour market as a source of individual insurance against the cost of divorce. This result is worrying. Indeed, chapter 3 shows that women who contribute less than 40% to their couple's income experience a 29% drop in their standard of living. Future work will need to evaluate precisely the strategies available

to these women to limit the variation in their standard of living, and the interconnection between public and private transfers, labour supply and remarriage options.

5.2 Limitations and further research

5.2.1 Measure of living standards under criticism

Each chapter of this dissertation has its own limitations, linked to the assumptions used. These differences also mean that comparison between the results of Chapters 2 and 3 should be viewed with a critical eye. On the one hand, from a technical point of view, estimation methods and working sample selections are not identical. On the other hand, the analysis is not entirely symmetrical: I have not assessed the role of public transfers beside survivor's pensions in the case of widowhood, nor the consequences of the latter on labor supply. Beyond those chapters' specificity, one overall limitation is apparent in the dissertation as a whole: it relies heavily on the concept of living standards. There are many criticisms of living standards as a statistical measure.

First, the calculation of equivalence scales may not be correct for all forms of household. The modified OECD equivalence scale may not correctly capture the consumption structure of widows (Hourriez and Olier [1998]). We address this limitation in chapter 3 and propose a series of results using an alternative scale that takes into account the fact that widows, most of the time, do not adapt their housing demand following the loss of their spouse. In a similar vein, the OECD scale may not adequately capture the expenses associated with single parent families and non-custodial parents (Martin and Périvier [2018]). This may have limited consequences on chapter 2 as the probability of a divorce with children to end with shared custody increases with the age of children and therefore the age of parents

(Algava et al. [2019]). Yet, all in all, our results are partly sensitive to the equivalence scales chosen.

The second shortcoming of living standards is that it does not generally take into account people's wealth, particularly housing. Having a low income, and therefore low living standards, does not mean the same thing depending on whether the individual has to pay rent with that low income or owns his or her own home. Adding "imputed rent" to the standards of living measure provides a more complete picture of an individual's economic living conditions (Driant and Jacquot [2005]). This is likely to be all the more important when looking at elderly populations, as in the French context they tend to hold more assets, particularly real estate, than younger populations (Baclet [2006]).

Finally, common measures of living standards assume equal sharing of resources within the household. Research in family economics has shown, however, that resources are not always pooled or equally shared, which can lead, for example, to the existence of pockets of poverty in households considered "non-poor" (Mercier and Verwimp [2017] ; De Vreyer and Lambert [2018] ; Lise and Seitz [2011]). Through a positive analysis lens, measuring a standard of living not conditioned by the equal sharing assumption would improve our knowledge of the economic consequences of union dissolution. In that framework, a woman may have better living standards after divorce, even if she contributed little to household income, because she might had access to a smaller share of household income than the one assumed by equal sharing during marriage. Such an analysis would require consumption data to assess the degree of pre-divorce consumption pooling. However, this was not possible with our data, which are only income data. From a normative point of view, that of public policies framing the economic consequences of dissolution and the degree of compensation they seek to achieve, leaving aside the hypothesis of equal sharing deserves further discussion. Currently, social systems use indicators of traditional living standards

and the resulting poverty thresholds to monitor the economic situation of people whose unions are ending. For the purposes of evaluating its actions and making international comparisons, it seems justified to exploit similar statistical tools. According to the insurance goal of union dissolution policies, pre-dissolution living standards are considered as a reference point for transfers. In the case of widowhood, contemporaneous public policies tend to achieve smooth living standards between that reference period and the widowed period. Adapting another living standards target detached from the sharing assumption may raise issues. To reduce micro-economic intra-couple inequality and macro-economic gender inequality, it may not be desirable for public policies to define a transfer level target based on pre-dissolution already unequal situation.

5.2.2 Further research

This thesis leaves several questions unanswered. These questions have been highlighted in the chapters' conclusions, as well as in this general conclusion. Among these questions, four lines of research emerge to extend my current work.

First, the portrait of the economic consequences of union dissolutions after the age of 50 needs to be completed with an analysis of wealth's variation upon dissolution. The aim is to gain a better understanding of the consequences of divorce and widowhood on living conditions, and to complete or qualify our diagnosis in terms of gender equality. At the present time, such a project is complex to carry out on French data. For this reason, I'm taking part in a research group working on Dutch data. Indeed, the Netherlands benefits from exhaustive administrative panel data, richer than France in terms of wealth. Our aim is to study how wealth varies following widowhood.

Second, the consequences of union dissolution after age 50 on inter-generational trans-

fers need to be explored. Union dissolution changes family ties. It is therefore likely to modify exchanges between generations, whether between parents and their adult children, or between parents and their own older ascendants. Divorce and widowhood are likely to differ in their disruption of these transfers, whether monetary or in kind. Among the exchanges at stake, those associated with care for the elderly are likely to have an impact on individual health, and are of particular interest in our ageing societies. As with the previous extension, the aim is to complete the picture of the impact of union dissolution on the living conditions of the over-50s.

I would like to deepen and broaden the present analysis of individual strategies for managing the costs of union dissolution. On the labour market, we need to deepen our understanding of the mechanisms linking divorce and retirement. In particular the question of a reverse causality, from retirement to divorce but also from the anticipation of retirement to divorce, should be raised. Next, it would be interesting to extend our analysis of the links between union dissolution and retirement to widowhood, as well as to assess variations in the labor supply on the intensive margin. Finally, we need to estimate the gains made by older individuals when they mobilize the labor market to reduce the cost of union dissolution. To what extent do these strategies make it possible to limit the ripple effect of union dissolution on living standards at the time of retirement? This analysis is an important public policy issue, since it involves determining whether individuals have the possibility of protecting themselves, *ex-post*, against the consequences of union dissolution over the short period separating them from retirement.

Finally, in the wake of a rising number of grey divorces and the lower prevalence of widowhood after 50, this dissertation discusses the need to keep policies aimed at dealing with their economic consequences among older people separated. Demographic trends raise another question. Cohabitation is more and more widespread among the over-50.

Cohabitation also gives rise to dissolution of union through separation or death of one of the partners. In France, these late informal union dissolutions, as they are unlikely to involve children, are not subject to any state supervision of their economic consequences. An interesting avenue of research would be to characterize these cohabiting unions after the age of 50 and the resulting dissolutions. A second step would be to measure the economic consequences of union dissolution for these couples. The magnitude of the variation in living standards is likely to be different because of the specific characteristics of cohabiting couples that distinguish them from married couples, and of the way in which policies treat this type of union. Entering and staying in an informal union can be interpreted as a voluntary renunciation of the rights and duties associated with marriage, including protection against dissolution. However, it is likely that cohabiting couples are afflicted by the same cognitive biases as married couples, preventing them from protecting themselves against the negative consequences of union dissolution. Testing this hypothesis would be interesting from a scientific point of view. The result of this test would also be of interest from a gender equality policy point of view. It could lead us to pursue our criticism of the legitimacy of the segmentation of divorce and widowhood policies, by questioning the legitimacy of this segmentation by type of union.

Appendix A

Identifying and dating formal unions' dissolution using EDP socio-fiscal data

A.1 Introduction

The EDP is a representative sample of the French population. The individuals tracked by the EDP (hereafter referred to as EDP individuals or EDP person) are those born in France between January the 2nd and the 5th, and the first four days of April, July and October. This amounts to 4.38% of the French population. The EDP combines several sources of panel data: civil registry, census, electoral files, DADS (employer data) and socio-fiscal data (tax data). Because of its size, representativeness and panel nature, the EDP is a key database for studying the economic and social behaviour of the French people.

Socio-fiscal data from tax returns was added to the sample in 2014, based on 2011 returns for 2010. These data provide a rich source of information on individual incomes. They also make it possible to track changes in the household composition of EDP individuals for each year between 2011 and 2019, including changes in their marital status.

In the EDP, socio-fiscal data share the latter characteristic with census and administrative civil registry data. However, socio-fiscal data seems to be a more suitable source of information for identifying union dissolution. On the one hand, civil registry data can be used to identify and date marriages, births and deaths. This is not the case for end-of-union events: divorce, widowhood, end of civil partnership ("pacs") due to separation or death of one of the partners. These changes do not entail the drafting of a civil status bulletin, which would be added to the EDP file. This information can only be obtained if the individual remarries, which represents a self-selected sub-sample of all EDP individuals whose union has ended. On the other hand, the census provides information on the marital status of an EDP individual in the year of census. For all individuals, one can compare current census status with earlier censuses' status to identify a matrimonial transition such as divorce or widowhood. However, it is not possible to know when the event took place

between the two follow-up waves. Waves can be quite spaced out¹, which implies little precision in marital event dates. Socio-fiscal databases make it possible to identify this type of transition from one year to the next and, in the majority of cases, give the precise date (day/month/year) of the event. They are therefore the most useful EDP source to accurately track union dissolutions, whatever their type, from 2010 onwards.

It is therefore necessary to describe how to extract this type of information. In this working paper, several methods are presented for identifying and dating union dissolutions.

This appendix is restricted ourselves to the end of formal unions. This is because socio-fiscal data is the only accurate source of information on union dissolutions in the EDP, whereas there are alternatives for identifying marriages. We are interested in formal unions because they are the subject of direct questions in tax returns, and because we have exhaustive population statistics with which to compare these EDP headcounts. As part of the present dissertation, this appendix focuses on the over-50. Yet the methods exemplified can be applied to younger cohorts.

The appendix is organised as follows. First, tax returns' questions on marital status and trajectories are reviewed (Section A.2.1). This contextualisation will enable us to introduce simple methods of identifying marital dissolution based on two main variables coding marital status and marital history (Section A.2.2). So-called "advanced" methods will be presented, using the two primary ones (Section A.2.2). Second, the calculation of the headcount of widowed and divorced people in the exhaustive population is introduced as a benchmark against which to compare the effectiveness of previous methods (Section A.3). Finally, the results produced by these different methods in the EDP is compared with data from the general population (Section A.4).

¹Currently census happens through annual census survey. Data collection a wave is spread across five years.

A.2 Methods for identifying union dissolutions in the EDP

A.2.1 Tax returns, marital status and transitions

The EDP's socio-fiscal databases have three variables for tracking individuals' matrimonial trajectories:

- CIDECI: codes the marital status. For a tax return in year $t + 1$ of income for year t , CIDECI gives the EDP person's status on December, 31st of year t (which is equivalent to January the 1st of year $t + 1$). CIDECI can take the following values: "married", "divorced/separated", "widowed", "civil partner", "single" and "attached adult/dependent".
- ZOXYZD: provides information about the last known marital event for a person. It can take the following values: "breakdown of civil partnership", "entering a civil partnership", "marriage", "divorce/separation", "death of spouse".
- DACOED: is a variable linked to ZOXYZD. It gives the date of the last marital event². ZOXYZD do not display last events pre-2000.

All three variables will be used to identify union dissolution and date the event.

Socio-fiscal data is derived from tax returns. To better understand the pitfalls associated with some of the identification methods, it is important to understand the rules

²If several matrimonial events take place in the same year, only the last event will be reported in ZOXYZD and DACOED. If a person is married, divorced and remarries in the same year, their CIDECI will show "married" and ZOXYZD will display "marriage". Without checking the date of marriage using DACOED, or the spouse's details (which are not always available), one might overlook that a union dissolution has taken place. To check that this remarriage is indeed the result of a divorce and not a widowhood, the data in the socio-fiscal databases would have to be checked against the administrative civil registry information

governing information from these returns in the year a formal union is ending.

- If the spouse of the EDP person dies in the year t , the survivor will have to file two tax returns in $t + 1$. One of these returns covers the period in t when the deceased spouse is alive and the surviving spouse is therefore married. The second covers the period when the surviving spouse is widowed. Widowers are part of a set of EDP individuals with multiple declarations and therefore several lines in the database, one per declaration. The use of CIDECI to identify widows and widowers will depend on the method used to reduce multiple declarations to a single line in your database³.
- If an EDP person separates from their spouse in year t , only one tax return should be completed in $t + 1$. The year of separation is considered as a fully separated year, even if part of it was spent with the ex-spouse. The pitfall in this case is not that of multiple declarations but that of identifying civil partnership break-ups, the latter being confused with divorces by ZOXYZD. Although the variable claims to identify civil partnership terminations, this is not the case in practice.

A.2.2 Methods for identifying union dissolutions in the EDP

Level 1 methods

Two simple methods exist for identifying union dissolutions.

The CIDECI method consists of comparing the CIDECI variable in year t 's tax returns, which indicates the marital status on December, 31st of the year $t - 1$, with year $t + 1$'s

³To reduce multiple declarations to a single line, a possible method is the following:

1. Duplicates (identical lines) are identified. Only one of the duplicated lines is kept.
2. Among the remaining multiple lines, we use the "TYPE DECL" variable to identify the main income tax and council tax return

CIDECI, indicating the marital status on December, 31st of the year t .

- A person is seen as becoming widowed in year t on the basis of a marriage if their CIDECI in t indicates that they are married, and their CIDECI in $t + 1$ indicates that they are widowed.
- A person is seen as divorcing during year t if their CIDECI in t indicates that they are married, and their CIDECI in $t + 1$ indicates that they are divorced or single.

The ZOXYZD method consists of using the DACOED in year $t + 1$ to identify matrimonial events that took place in t . ZOXYZD for year $t + 1$ enables us to separate the ends of unions into two groups: ends of unions due to a break-up and those due to the death of one spouse. The use of the CIDECI for the year t indicating the marital status on January the 1st of year t makes it possible to separate these events according to whether the dissolved union was a marriage or a civil union.

Level 2 methods

Each of the level 1 methods for identifying union dissolution has blind spots. The "mixed" method consists of linking the two easier methods to identify all union dissolution.

The "small panel method" is based on tax returns from year $t + 2$ to complete event count in t with the mixed method. Looking at one more year allows to:

- Recover some union dissolution whose declaration was delayed, thanks to a DACOED indicating t as the union's year of dissolution in $t + 2$ declaration (relating to the year $t + 1$).
- Extend the trajectory of people for whom we do not have the $t + 1$'s tax return, but we do have that of t and $t + 2$. The CIDECI is absent in $t + 1$. Yet, it can be

corrected by applying the CIDECEI method assuming that the CIDECEI in $t + 2$ is the same as that in $t + 1$.

The "full panel method" uses all the years in the panel to elucidate as many matrimonial trajectories as possible and completes the previous methods. The method consists of identifying individuals for whom CIDECEI is absent for two or more consecutive years. Most of the trajectories of these individuals are not elucidated by the previous methods, as the absence of CIDECEI is often linked to that of ZOXYD. Since the trajectory has not yet been identified, the last CIDECEI indicates that the individual is married. If the first CIDECEI after the missing period indicates that the individual is single or divorced, a divorce has occurred during the years of lack of information. If the CIDECEI indicates that the individual is widowed, a widowhood has occurred. The year of dissolution is randomly imputed to one of the missing years.

A.3 Counting newly divorced and widowed people in exhaustive statistics

A.3.1 Counting divorcees in France

Administrative exhaustive figures on the number of new divorcees in France come from the Secretary of Justice's magazine: *Références Statistiques Justice*. In table A.1 are shown numbers of new divorcees by year between 2011 and 2016. In that table, divorcees encompasses people for whom a divorce decree or a property separation decree has been handed down. It should be noted that this definition differs slightly from that adopted by the tax return. People may declare themselves "divorced/separated" if a judgment has been

Table A.1: New divorcees, over 50, headcount for 2011-2016, full population

	Men	Women	Total
2011	43,798	32,873	76,671
2012	43,146	32,478	75,624
2013	43,460	32,834	76,294
2014	44,251	33,423	77,674
2015	45,628	34,755	80,383
2016	48,680	37,244	85,924

Source: Secretary of Justice. Data last updated in 2019.

Sample: men and women over 50 years old the year when their divorce decree is proclaimed. France.

handed down, but also if they have been authorised by the judge to declare themselves separated, even though the divorce has not been officially pronounced yet. The EDP refers more to a *de facto* situation than to a legal situation in the case of divorce.

For each year in the table there are more divorced men than divorced women. This can be explained by the age structure of heterosexual couples. The spouses of men over 50 are more likely to be under 50 than the spouses of women over 50.

A.3.2 Counting widows and widowers in France

There is currently no freely available yearly official administrative count of new widows and widowers by age and sex in France. The number of newly widowed should be estimated. In table A.2, new widowers aged over 50 are identified on the basis of the number of individuals of the other sex who have died married, in the INSEE death tables. Thus, the number of widowed men in 2012 is the numbers of married women who had died aged 47.5 and older in 2012. To find the number of new widows aged over 50 we use the number of men who died after the age of 52.5. The age at which we start counting deceased married men was

Table A.2: New widows and widowers, over 50, headcount for 2011-2016

	Men	Women	Total
2011	58,762	149,255	208,017
2012	61,014	153,348	214,362
2013	60,726	153,103	213,829
2014	60,001	149,461	209,462
2015	64,590	152,404	216,994
2016	67,556	148,791	216,347

Source: INSEE, civil registry data.

Sample: men and women over 50 years old the year when their spouse dies. France.

Note: the average age-gap in couple in France is used to identify the newly widowed :

- New widowers over 50 years old = (Number of married women over 48 dead in the year) + (((Number of married women over 47 dead in the year) - (Number of married women over 48 dead in the year))/2)
- New widows over 50 years old = (Number of married men over 53 dead in the year) + (((Number of married men over 52 dead in the year) - (Number of married men over 53 dead in the year))/2)

}

determined by the average age difference between heterosexual married couples in France. This difference is 2.5 years⁴. Our figures for newly widowed in the general population are therefore only estimates based on that age-gap assumption.

The table A.2 shows that at each period there are more widows than widowers, which is consistent with a lower mortality rate for women and an age gap in favour of men within heterosexual couples.

A.4 Comparing the EDP to exhaustive statistics

The tables A.3 and A.4 present headcounts for newly widowed and divorce measured through our five methods between 2011 and 2016 using the EDP. The column entitled

⁴Source: INSEE.

Table A.3: New divorcees, over 50, headcount for 2011-2016, EDP

	CIDECI	ZOXYZD	Mixed	Small panel	Full panel	Target
<i>Men</i>						
2011	1674	1715	1790‡	1797‡	1797‡	1957
2012	1771	1797	1879‡	1891‡	1891‡	1930
2013	1801‡	1827‡	1915†	1933†	1933†	1952
2014	1962‡	2004‡	2085†	2099†	2106†	1985
2015	2066	2054†	2161‡	2168‡	2183‡	2067
2016	2016	2117	2240	2256	2278	2210
<i>Women</i>						
2011	1100	1200	1308‡	1321‡	1321‡	1384
2012	1167	1247	1356‡	1374‡	1374‡	1370
2013	1157	1245‡	1342†	1364†	1364†	1394
2014	1228	1348‡	1436†	1450†	1468†	1426
2015	1296	1369†	1463‡	1473‡	1493‡	1512
2016	1312	1475	1551	1576	1615	1625

Source: 2019 EDP.

Sample: men and women, 50 years old and older in the year of union dissolution.

Note: a t-test was used to compare the share of divorced (resp. widowed) in the population 50 years old and older in the EDP and in the general population. Double-daggers (‡) signal when the shares were not significantly distinct with a 0.05 p-value. Simple daggers (†) signal when the shares were not significantly distinct with a 0.1 p-value.

"target" shows the theoretical number of union dissolutions that the EDP should have under the assumption that it represents on average 4.4% of the population of men aged over 50 and 4.2% of women aged over 50.

Regardless of sex or type of union dissolution, the gap between the numbers found by one method and the target in the general population closes when we move from level 1 methods (ZOXYZD and CIDECI) to level 2 methods (mixed, small panel, full panel). This result was expected. In fact, the mixed and panelised methods are based on the level 1 methods and add information to them. They should therefore be preferred. Despite this

Table A.4: New widows and widowers, over 50, headcount for 2011-2016, EDP

	CIDECI	ZOXYZD	Mixed	Small panel	Full panel	Target
<i>Men</i>						
2011	2224	2146	2297	2310	2310	2626
2012	2397	2339	2489	2496	2496	2729
2013	2407	2320	2495	2506	2506	2728
2014	2433	2348	2522	2531	2532	2691
2015	2509	2391	2568	2574	2575	2972
2016	2395	2283	2454	2475	2482	3068
<i>Women</i>						
2011	5651	5739	5914	5922	5922	6282
2012	5735	5808	6004	6010	6010	6468
2013	5852	5961	6136	6143	6143	6598
2014	5746	5834	5998	6001	6003	6375
2015	5968	5972	6122	6138	6140	6629
2016	6025	6059	6290†	6232†	6324†	6491

Source: 2019 EDP.

Sample: men and women, 50 years old and older in the year of union dissolution.

Note: a t-test was used to compare the share of divorced (resp. widowed) in the population 50 years old and older in the EDP and in the general population. Double-daggers (§) signal when the shares were not significantly distinct with a 0.05 p-value. Simple daggers (†) signal when the shares were not significantly distinct with a 0.1 p-value.

convergence, there is still a gap with the target. The proportion of people aged over 50 facing divorce between 2011 and 2016 was calculated from initial headcounts. Statistical t-tests comparing an empirical proportion with a theoretical proportion were performed to determine whether the difference between the EDP's share and the exhaustive population's share can be attributed to the randomness of sampling in a representative sample of the French population. The results are summarised in tables A.3 and A.4. The hypothesis of equality between these proportions is not rejected in the case of divorce for level 2 methods. This is consistent with our previous observation that more advanced methods identify more trajectories and are closer to the target. Therefore these level 2 methods seem appropriate for identifying divorces. The null hypothesis is rejected in the case of widowhood, whatever the method. Significantly fewer cases of widowhood are identified than should be in a random sample of the French population.

It is more difficult to identify the onset of widowhood than divorce. Widowhood differs from divorce in several ways that may explain this difference.

1. The gap may be wider because of failure to count newly widowed in the exhaustive population. As explained earlier, unlike divorce, there is no direct measure of yearly people entering widowhood. An indirect measure is created.
2. The gap may be wider because of failure to sample elderly people in the EDP in a fashion representative of the exhaustive population. The tax data in the EDP is based on the FILOSOFI system (*fichier localisé social et fiscal*). FILOSOFI excludes people living in collective accommodation, such as retirement and nursing homes. Widowhood occurs late in life, at a time when a person's health and independence may be failing, and the spouse's death may result in entering an institution. Widowers entering retirement homes as a result of their widowhood may therefore

tend to drop out of our sample. Divorcees over the age of 50 would be less affected by this sampling effect, as they are on average younger than widowed people.

3. The gap may be wider because of failure of the method to switch from multiple observation to one observation per person, per year. Widows and widowers complete two tax returns for the year of the spouse's death, which create two lines in the database. Widowhood is more sensitive to the method to select one line by individual during data-set cleaning.
4. The gap may be wider because of the identification methods presented. These methods fail when two marital transitions occur in the same year, such as divorce and remarriage. In the case of widowhood, two types of double transitions are possible: widowhood followed by remarriage and widowhood followed by death. In both cases, the widowed person will not be identified. Supplementing information from tax data with marriage and death certificates from the civil registry could narrow the gap with the target.

A.5 Conclusion

This paper presents the different methods for identifying formal union ends in the EDP. Five methods are presenting using exclusively socio-fiscal data (tax returns): two level 1 methods (CIDECI and ZOXYZD) and three level 2 methods (building on the previous methods: mixed, reduced panel, full panel). The numbers of divorced and widowed persons calculated using these methods are compared with those that would be expected given that the EDP is a representative sample of 4.4% of the French population. On the one hand, this comparison allows to establish that the level 2 methods do not identify a percentage of

divorced people significantly different from the exhaustive population. On the other hand, the five methods identify significantly fewer cases of widowhood than expected. A number of avenues are suggested to explain this discrepancy.

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Appendix B

French sum-up / Résumé français

Cette thèse de doctorat porte sur les conséquences économiques des dissolutions d'union dans la deuxième partie du cycle de vie, c'est-à-dire impliquant des personnes âgées de 50 ans et plus. Les unions étudiées sont les unions formelles et plus particulièrement les mariages de couples hétérosexuels. Ce type d'unions peut se terminer par la séparation des conjoints (divorce) ou le décès de l'un d'entre eux (veuvage). Cette thèse traite de ces deux types de dissolution.

B.1 Enjeux : une évolution démographique, un questionnement économique

B.1.1 La situation matrimoniale après 50 ans : plus de divorcés, moins de veuves

Le vieillissement des sociétés européennes a suscité un intérêt accru pour la vie de couple des personnes âgées. Cet intérêt a permis de constater que les statuts matrimoniaux des plus de 50 ans ont évolué de façon notable depuis les années 1980. En France, entre 1987 et 2017, on observe une tendance à la diversification des statuts matrimoniaux. Cette tendance est caractérisée par une hausse de la prévalence du divorce et une baisse de celle du veuvage.

L'état civil montre que le mariage est toujours l'arrangement matrimonial le plus fréquent entre 1987 et 2017 (graphique 1.1 et 1.2). Ce fait est à nuancer au prisme du genre. L'âge avançant, le mariage est plus fréquent pour les hommes que pour les femmes. En effet, ces dernières sont plus touchées par le veuvage et se remarient plus rarement après la dissolution de leur union (Vespa [2012] ; Schimmele and Wu [2016]). Á 50 ans, en 2017, 57% des hommes et 55% des femmes sont mariés. Cependant à 75 ans, seules 57% des femmes sont mariées contre 76% de hommes. La proportion de personnes divorcées de plus de 50 ans a augmenté entre 1987 et 2017. En moyenne, sur la période, la part des divorcés dans la population de 50 ans passe de 12% à 14% et de 4% à 10% dans la population des 75 ans. Inversement, la part des personnes veuves diminue. Ce phénomène touche particulièrement les femmes. Entre 1987 et 2017, la part de veuves dans la population féminine de 50 ans est passée de 5% à 3%, et de 47% à 32% dans la population des 75 ans. Pour conclure, la part des personnes « jamais mariées » augmente à 50 ans,

passant de 8% pour les femmes et 10% pour les hommes en 1987, à 26% et 30% en 2017 respectivement. Ces diverses dynamiques ont un impact ambigu sur le stock de mariés sur la période. Leur part diminue à 50 ans du fait de l'accroissement des populations divorcées et « jamais mariées ». Cependant, en conséquence d'une réduction du nombre de veuves, la part des mariés augmente à 75 ans. Á 50 comme à 75 ans, la composition de la population selon l'état matrimonial est plus diversifiée en 2017 qu'elle ne l'était en 1987.

Entre 1987 et 2017, la génération du baby-boom a rejoint les plus de 50 ans. Dans sa jeunesse, cette génération a connu de profonds changements de la mise en couple et des ruptures d'union. En vieillissant, elle semble rencontrer des nouvelles évolutions : une expansion des divorces après 50 ans et un déplacement du veuvage vers des âges plus élevés.

- Divorcer après 50 est plus fréquent qu'auparavant. La proportion de la population divorcée à un age donné, appelée aussi prévalence du divorce, masque l'âge auquel le divorce survient. L'augmentation de la prévalence du divorce après 50 ans est liée à deux facteurs : le vieillissement de la large génération des baby-boomers qui a connu la démocratisation du divorce et arrive déjà plus divorcée que ses prédécesseurs à l'âge de 50 ans, et l'augmentation de l'incidence du divorce après cet âge. Cette augmentation de l'incidence du divorce (ou taux de divorce) a été appelée la « révolution des divorces gris » (Brown and Lin [2012]). Elle a été constatée dans plusieurs pays développés (Alderotti et al. [2020]). La France connaît également sa révolution. En France, le taux de divorce est en baisse dans la population générale depuis le début des années 2000. Cependant, il continue d'augmenter chez les plus de 50 ans. Entre 2005 et 2017, le taux de divorce est passé de 11.9 à 13.7 pour les hommes de 50 à 55 ans et de 9.7 à 11.7 pour les femmes du même âge. Après 60 ans, le taux de divorce est passé sur la même période de 2.2 à 2.8 pour les hommes et de 1.5 à 2 pour les femmes (Solaz [2021]).

- Du fait de l’allongement de l’espérance de vie, le veuvage intervient plus tardivement dans la trajectoire des individus (Dabergott [2022]). En France, entre 2010 et 2020, parmi les personnes veuves de plus de 50 ans, la part des 75 ans et plus est passée de 63% à 75% pour les hommes et de 56% à 61% pour les femmes. Les gains d’espérance de vie se traduisent par un allongement de la durée de vie en couple (Pennec and Gaymu [2011]). L’écart d’espérance de vie entre hommes et femmes se réduit. Cela contribue à rendre le ratio entre veufs et veuves moins déséquilibré qu’auparavant. En France, entre 2010 et 2020, la part de hommes parmi les personnes nouvellement veuves de plus de 50 ans est passée de 28% à 34%. Les hommes semblent cependant rester moins longtemps assignés à ce statut que les femmes : ils se remarient davantage ou meurent plus rapidement dans le sillage de leur conjointe.

Le couple a une incidence sur les conditions de vie des personnes vieillissantes (Gaymu et al. [2008]). En particulier, les personnes âgées vivant seules ont tendance à avoir un niveau de vie inférieur à celui des personnes en couple du même âge (Arnold and Lelièvre [2015] ; COR [2019]). Cela va de pair avec un taux de pauvreté plus élevé. Les femmes sont particulièrement touchées, ce qui conduit certains auteurs à mettre en garde contre une « paupérisation des femmes âgées » (Nozay [2009]). Ce différentiel est préoccupant et interroge. D’une part, il peut être lié à un effet de sélection : les personnes dont l’union est dissoute présenteraient des caractéristiques distinctes associées à des résultats économiques moins positifs. D’autre part, cet écart peut également être une conséquence directe de la dissolution d’union. Cette thèse s’emploie à évaluer les ramifications de cette seconde hypothèse.

B.1.2 La dissolution d'union : un choc économique généré

Une dissolution d'union peut constituer un choc économique important pour les personnes impliquées. Elle entraîne des coûts immédiats tels que les frais de justice, d'obsèques, de déménagement, etc. Ces coûts de court terme, qui peuvent être substantiels ne sont pas l'objet de cette thèse. Plus conséquent et plus durable, les dissolutions d'union affectent le flux de revenus du ménage, son patrimoine et les économies d'échelle associées à la vie collective. Notre analyse porte sur ce second type de conséquences.

Lorsqu'une union prend fin, la mise en commun des ressources s'arrête. Les revenus de l'ex-partenaire ne sont plus disponibles. Le choc est donc d'autant plus grand que le conjoint contribuait largement aux ressources du ménage. Ceci explique pourquoi en moyenne l'effet d'une dissolution d'union sur les revenus est plus négatif pour les femmes que pour les hommes. Aujourd'hui, les femmes contribuent toujours moins aux revenus de leur ménage que leur conjoint. En 2011, les femmes âgées de 18 à 59 ans ont contribué en moyenne à 36% des revenus agrégés de leur couple. Ce chiffre cache de grandes différences par statut matrimonial. Les femmes mariées ne contribuent qu'à hauteur de 34%, tandis que les femmes célibataires contribuent à 41% (Morin [2014]). Parallèlement la dissolution d'union affecte le patrimoine du ménage. Le divorce et le veuvage impliquent généralement la liquidation de la communauté des biens. Le processus de liquidation est déterminé par le régime matrimonial choisi au moment du mariage. En France le régime par défaut est la communauté de biens réduite aux acquêts. Tous les biens acquis pendant le mariage sont communs. Cependant, les biens possédés avant l'union ne sont pas inclus. à ce partage de biens, s'ajoutent d'autres transferts entre époux par le biais de la succession pour le veuvage ou de la prestation compensatoire pour le divorce.

Lorsqu'une personne quitte le ménage, les dépenses de ce dernier diminuent. Toutefois,

en général, les frais ne diminuent pas proportionnellement à la taille du ménage. Cela est dû aux économies d'échelle générées par la mise en commun des ressources et des dépenses. Le niveau de vie est une mesure utilisée pour comparer la situation économique de ménages de tailles différentes. Il peut également être utilisé pour comparer un ménage dans le temps à la suite d'un changement de sa composition. Le niveau de vie est défini comme le revenu disponible du ménage ajusté à sa taille par une échelle d'équivalence. Les échelles d'équivalence sont utilisées pour quantifier les économies d'échelle. En particulier, lors de la dissolution d'une union, deux influences s'exercent sur le niveau de vie : comme expliqué précédemment le revenu agrégé diminue, de même que les dépenses. Or, ces dernières sont prises en compte par l'échelle d'équivalence qui est une fonction croissante de la taille du ménage. Ces deux mécanismes ont un effet ambigu sur le niveau de vie, l'un le poussant à la baisse et l'autre à la hausse. L'effet dominant dépend de la contribution aux revenus du ménage des individus. Le graphique 1.3 illustre le cas particulier de l'évolution du niveau de vie d'une personne vivant seule après une dissolution d'union, à revenu constant en utilisant l'échelle d'équivalence modifiée de l'OCDE. Pour une contribution aux revenus du ménage/couple avant dissolution inférieure à 67%, le niveau de vie diminue entre la période en couple et la période seul. L'effet ressources domine. Pour une contribution supérieure à 67% au contraire le niveau de vie augmente après séparation. L'effet de réduction des dépenses prend le pas. Bien que la dissolution ait le plus souvent un effet négatif sur les revenus disponibles d'un ménage, elle n'a pas systématiquement un effet négatif sur son niveau de vie. Lorsqu'on considère cette mesure de la situation économique des ménages, on constate que la dissolution d'union peut créer des « gagnants » et des « perdants ».

Les individus disposent d'un certain nombre de leviers ou stratégies, pour amortir le choc économique issu d'une dissolution d'union. Ces leviers, peuvent être actionnés avant la fin de l'union (effet d'anticipation) ou après (effet d'adaptation). Trois familles de leviers

sont généralement listées par la littérature:

- Les leviers de marché. Les individus peuvent se tourner vers les marchés pour améliorer leur situation économique. La littérature a mis en évidence deux marchés principaux : le marché du travail et le marché du mariage. La baisse de revenus causée par la dissolution d'union peut être partiellement ou totalement évitée en remplaçant le revenu de l'ex-conjoint par un revenu personnel accru (via une augmentation de l'offre de travail sur la marge intensive ou extensive) ou par les revenus d'un nouveau partenaire de vie.
- Les leviers de la solidarité familiale. Les personnes faisant face à une dissolution d'union peuvent recevoir le soutien de leur famille par le biais de transferts monétaires ou en nature. En cas de divorce, la loi peut organiser cette solidarité par des transferts privés obligatoires (pensions alimentaires ou prestations compensatoires).
- Les leviers de la solidarité sociale. Les personnes confrontées à une dissolution d'union peuvent mobiliser les transferts publics. Ces transferts peuvent être ciblés, réservés aux personnes dont l'union prend fin : allocation veuvage, pension de réversion, allocation parent isolé, etc. Il peut également s'agir de transferts sociaux non ciblés sur la base de la dissolution d'union, mais auxquels les individus gagnent accès en raison de l'effet négatif de la dissolution sur leurs revenus : allocations familiales, allocation logement et minima sociaux. . .

Les conséquences économiques de la dissolution d'union sont susceptibles de différer selon du moment où cette dernière intervient dans le cycle de vie : par l'effet cumulé revenus/dépenses/économies d'échelle ainsi que par l'accessibilité des leviers. Les couples plus âgés évoluent dans un paysage économique spécifique. Ils ont tendance à avoir plus de patrimoine (Baclet [2006] ; Gleizes et al. [2018]). Ils sont moins susceptibles d'avoir

des enfants à charge dans leur ménage. Cela implique un accès réduit à certains transferts sociaux ciblant les familles. Les couples âgés ont un accès limité à l'auto-assurance sur le marché du travail en raison de la proximité de la retraite. Pour les personnes en emploi, la retraite peut représenter un choc économique secondaire. Pour les inactifs, les personnes au chômage ou les retraités, le retour à l'emploi peut s'avérer plus compliqué que pour les personnes jeunes (Beck et al. [2017] ; Blanchet et al. [2019] ; Coile and Levine [2011]). Le marché du mariage est également plus défavorable avec le vieillissement. Cela concerne principalement les femmes. En raison d'un taux de mortalité plus élevé chez les hommes et de l'écart d'âge des couples hétérosexuels en faveur de ces derniers, le nombre de partenaires potentiels est plus faible pour les femmes âgées. La littérature montre que les femmes se remarient moins que les hommes à tous les âges après une dissolution d'union, cependant l'âge creuse cet écart (Raley and Sweeney [2020]).

B.2 L'intervention de l'État : une justification et des motivations à redéfinir à la lumière de profondes mutations sociales

B.2.1 Les enjeux micro- et macro-économiques des dissolutions d'union

La dissolution d'une union peut provoquer un choc économique pour les personnes impliquées. Elle soulève deux problèmes en termes d'égalité de genre auxquels l'État peut s'intéresser :

- Un enjeu micro-économique : l'opportunisme dans le couple et ses conséquences en

termes d'équité et d'efficacité. Selon le modèle unitaire de l'économie de la famille, un couple choisit comment allouer sa force de travail entre le travail domestique et le marché du travail, afin de maximiser le bien-être de l'unité. Cet arbitrage donne généralement lieu à un certain degré de spécialisation, l'un des membres du couple effectuant davantage de travail domestique et l'autre s'investissant davantage dans les activités rémunérées du marché (Becker [1991] ; Landes [1978]). Des échanges constants entre les services du travail domestique et le revenu du marché du travail se déroulent au sein des couples. Les revenus du marché du travail devraient être positivement influencés par la spécialisation puisque la personne ayant le plus grand potentiel de gain à l'extérieur profite de responsabilités réduites dans le foyer et peut donc consacrer plus de temps à ses activités rémunératrices. Lorsqu'une union se dissout, à la suite d'un divorce ou d'un veuvage, cet échange prend fin. La personne qui s'est spécialisée sur le marché du travail continue à bénéficier des revenus générés par cet engagement, qui sont potentiellement plus élevé que si la spécialisation n'avait pas eu lieu. Ce revenu peut permettre d'externaliser les futurs travaux domestiques ou conférer une position avantageuse sur le marché du mariage pour créer une nouvelle union. La spécialisation en l'absence de protection pose un double problème. Elle pose un problème d'équité tout d'abord, la personne qui a investi le travail domestique ne peut plus profiter des fruits de son investissement (le revenu amélioré du conjoint) et a un désavantage pour réinvestir le marché du travail (coût d'opportunité). Un problème d'équité, ensuite, car cette situation perdante peut pousser les couples à ne pas se spécialiser de façon optimale et aboutir à une production insuffisante de travail domestique et de *care*.

- Un enjeu macro-économique : les dissolutions d'unions augmentent l'inégalité macro-

économique genrée des niveaux de vie en mettant en lumière les inégalités d'ordinaire cachées dans le couple. Lorsque les femmes sont en couple, l'écart femme-homme de salaires n'implique pas une différence de niveaux de vie. En effet, les mesures traditionnelles du niveau de vie supposent un partage égal des ressources dans le ménage, une hypothèse de plus en plus discutée. Lorsque le couple se dissout et que les femmes ne bénéficient plus de la mise en commun des ressources, les différences entre les salaires masculin et féminin se traduisent par des différences de niveau de vie. Les inégalités salariales entre les hommes et les femmes se sont réduites au cours des dernières décennies grâce à la hausse de l'éducation et de la participation des femmes au marché du travail. En 2000, le salaire moyen des femmes était inférieur de 28% à celui des hommes, en 2019, il l'est encore de 22% (Roussel [2022]). Pourtant, les femmes continuent d'occuper des emplois moins bien rémunérés, de travailler davantage à temps partiel (Georges-Kot [2020]) et de connaître plus d'épisodes d'inactivité au cours de leur carrière (Beaufils [2022]). Ces facteurs contribuent à une situation économique moins favorable pour les femmes que pour les hommes. Les pensions de retraite étant calculées sur l'ensemble de la carrière, les inégalités sur le marché du travail se traduisent également par des différences de pension. Selon Geraci and Lavigne [2016], en 2011, l'écart femme-homme de pension des français de plus de 65 ans est de 40%. Ces inégalités ne sont pas près de disparaître (Bonnet et al. [2012]). Elles invitent à se poser particulièrement la question des dissolutions d'union survenant tard dans le cycle de vie.

Pour un Etat intéressé par ces enjeux macro-économique et micro-économique, deux types de politiques existent : les politiques *ex-ante* et les politiques *ex-post* de traitement des conséquences économiques des dissolution d'union. Les politiques *ex-ante* agissent de façon préventive en aidant les femmes à devenir économiquement indépendantes tout au

long de leur vie. Cette thèse porte sur les politiques *ex-post* qui cherchent à alléger le coût de la dissolution une fois que cette dernière a eu lieu, souvent par le biais de transferts.

B.2.2 En France, un système asymétrique du traitement *ex-post* du divorce et du veuvage

En France, les conséquences économiques du divorce sont traitées principalement par les notaires et les tribunaux. Les principales dispositions sont la pension alimentaire pour les enfants et la prestation compensatoire pour les époux.

- La pension alimentaire est une contribution économique du parent non-gardien à l'entretien des enfants. Elle n'est pas associée au mariage mais à la parentalité. Elle est fixée dans le cadre d'un accord entre les ex-conjoints ou d'une décision de justice. Il existe des lignes directrices indicatives en matière de pensions alimentaires. Celles-ci tiennent compte du coût des enfants, des ressources du créancier et de celles du débiteur. Depuis 2014, un organisme de sécurité sociale (la caisse d'allocations familiales, CAF) sert d'intermédiaire entre les parents pour le paiement de la pension alimentaire. Pour les divorces impliquant des enfants, cette nouveauté contribue à une nouvelle « interdépendance » entre traitement judiciaire du divorce et sécurité sociale (Grivel [2022]). En 2012, les mères avaient la garde exclusive de leurs enfant dans 74% des décisions de divorce et des procédures impliquant des enfants nés hors mariage. Dans ce cadre, le juge décide d'une pension alimentaire dans 83% des cas. Le parent débiteur est presque toujours le père (97%). Lorsque les parents se mettent d'accord sur la pension, le montant médian est de 150 euros par mois et par enfant. En cas de désaccord, il est plus faible : autour de 120 euros (Belmoktar [2016]).
- La prestation compensatoire en France est un indemnité qui peut prendre la forme

d'une rente ou d'une somme forfaitaire. Elle est versée par le conjoint dans la meilleure situation économique à l'autre après le divorce. La pension alimentaire entre époux ne peut être demandée que par les couples mariés. Elle est déterminée de manière consensuelle avec l'aide des avocats ou par le juge dans le cas d'un contentieux. Il n'existe pas de barème indicatif, mais un ensemble de critères qui peuvent être pris en compte par les juges. Ces critères portent sur les caractéristiques de l'union (durée du mariage, conséquences des choix professionnels par rapport à l'investissement matrimonial) et des ex-partenaires (santé, patrimoine, situation professionnelle, situation de retraite). L'absence de barème rend le montant d'une prestation compensatoire difficile à anticiper. Les femmes semblent réticentes à les demander (Nozay [2009]). En 2016, seules 30% des femmes divorcées âgées de 55 à 64 ans ont bénéficié d'une prestation compensatoire. En 2013, 10% des divorces ont donné lieu à une prestation compensatoire (Belmokhtar and Mansuy [2016]). Neuf fois sur dix, le bénéficiaire est l'épouse. La prestation compensatoire entre époux est aujourd'hui principalement versée sous forme de capital, d'un montant moyen de 25 000 euros. Seule une prestation sur dix est versée sous forme de rente. Dans ce dernier cas, elle s'élève à environ 500 euros par mois, pour une valeur totale de 126 000 euros. Conformément aux critères retenus par les juges, les prestations compensatoires concernent davantage les couples âgés. L'âge moyen du débiteur est de 50.5 ans et celui du bénéficiaire de 48.3 ans, pour une durée moyenne de 20 ans de mariage. Les prestations sous forme de rente tendent à impliquer des couples encore plus âgés.

En France, les conséquences économiques du veuvage sont principalement couvertes par le système de sécurité sociale. Les principales politiques sont l'allocation de veuvage et la pension de réversion.

- L'allocation veuvage est une prestation temporaire versée, sous condition de ressources, aux personnes de moins de 55 ans ayant perdu leur conjoint. L'allocation peut être perçue pendant 2 ans et s'élève à 662.7 euros par mois en 2023. Toutefois, elle peut être réduite si la somme des ressources de la veuve et de l'allocation dépasse le plafond (828.375 euros par mois en 2023). L'allocation veuvage est suspendue en cas de remariage. Cette politique ne concerne qu'un nombre limité de personnes : 7,500 en 2014 . La quasi-totalité des bénéficiaires sont des femmes (97%). Les personnes qui en bénéficient sont majoritairement âgées de 50 à 54% (58%).
- La pension de réversion est une pension à vie versée aux personnes qui ont perdu leur conjoint. Elle représente une fraction de la pension de retraite du conjoint décédé. On parle de "droit dérivé". Comme l'allocation veuvage, la réversion est gérée par les régimes de retraite, avec des règles différentes pour chaque régime. Par exemple, il existe une limite d'âge dans le régime général des salariés du secteur privé (55 ans), dans les régimes complémentaires du privé (60 ans), mais pas dans le régime des fonctionnaires. Le taux de réversion, c'est-à-dire la part de la pension du conjoint qui est reversée à la veuve est de 54% dans le premier régime, 60% dans le second et 50% dans le dernier. Une condition de ressources s'applique dans le régime général du privé mais pas dans les deux autres. La condition de ressources prend en compte les revenus du survivant mais également ceux des autres membres du ménage, ce qui est original dans le paysage international (Geraci and Lavigne [2016]). Dans le régime général, le remariage ne suspend donc pas automatiquement le droit à la pension de réversion. En revanche, la suspension est immédiate chez les fonctionnaires et le remariage supprime le droit dans les complémentaires. En 2017, 4.4 millions de personnes ont bénéficié d'une pension de réversion, tous régimes confondus. Les

bénéficiaires sont en moyenne âgés de 79 ans. La majorité d'être eux sont des femmes (88%). En moyenne, pour les femmes, la pension de réversion représente 23% de leur pension totale.

En France, les politiques publiques relatives aux conséquences économiques des dissolutions d'union diffèrent fortement entre divorce et veuvage. Cependant, ces politiques partagent des motivations et des objectifs communs définissant le niveau idéal de transfert à adopter. Plus précisément trois objectifs similaires sont attribués aux pensions de réversion et aux prestations compensatoires (Bonnet and Hourriez [2012a]; Sterdyniak [2019]; ApRoberts [2008]; Tréguier [2022] ; Bourreau-Dubois and Doriat-Duban [2012] ; Bourreau-Dubois et al. [2016] ; Dandoy et al. [2016]).

- Un objectif d'assistance pour protéger contre la pauvreté. Les transferts consécutifs à la dissolution d'une union doivent permettre aux bénéficiaires d'éviter de tomber dans la pauvreté.
- Un objectif de maintien du niveau de vie. Les transferts s'apparentent à une assurance et doivent permettre le maintien total ou partiel du niveau de vie au moment d'une dissolution d'union. Ici, l'objectif divergent souvent selon qu'on traite du divorce ou du veuvage. Dans le cas du veuvage, un maintien complet du niveau de vie est souvent prévu. L'aire du niveau de vie, c'est-à-dire les revenus que doivent inclure son calcul, peut varier. Dans le cas du divorce, l'objectif est dans le cas français un maintien "partiel" permettant d'éviter de trop grandes disparités de niveaux de vie entre les anciens conjoints.
- Un objectif patrimonial. Il s'agit de partager les gains du mariage. Il y a deux interprétations possibles à cette logique. D'une part, le transfert peut venir reconnaître et restituer la contribution de la personne spécialisée dans le travail domestique aux

revenus sur le marché du travail de son conjoint (restaurer un retour sur investissement). D'autre part, il peut s'agir de compenser par les transferts les sacrifices consentis par une personne dans sa propre carrière professionnelle (rembourser un coût d'opportunité).

Dans le système français actuel, la pension de réversion et la prestation compensatoire s'inspirent de chacun de ces objectifs. Des demandes régulières de clarification sur la scène nationale font écho à un débat international.

B.3 Structure de la thèse et résultats

B.3.1 Données et stratégies empiriques

Cette thèse cherche à évaluer l'effet des dissolutions d'union (divorce, veuvage) sur différentes variables économiques (revenus et niveau de vie). L'évaluation de ces conséquences nécessite de suivre la trajectoire économique des individus à travers différents statuts matrimoniaux. Pour s'y employer, la littérature recommande l'utilisation de données de panel. Un panel est une base de données dans laquelle le même individu est observé à plusieurs dates. Comparer des personnes mariées, divorcées ou veuves à un même moment dans le temps est trompeur. La différence de situations économiques que l'on observe entre ces groupes n'est pas nécessairement due à la dissolution d'union. Elle peut être le fait d'un effet de sélection. L'observation d'un individu marié dans un premier temps puis divorcé (ou veuf) permet de remédier à ce problème. Grâce aux données de panel, les variations internes peuvent être utilisées pour estimer l'effet d'une dissolution d'union. Pour cette raison, seules des données de panel sont utilisées dans la présente thèse. Plus précisément, elle utilise des données de panel administratif.

Je travaille sur un ensemble de données françaises, celles de l'Échantillon Démographique Permanent (EDP). En raison de sa règle de sélection, l'EDP est représentatif de la population nationale. L'EDP documente les trajectoires des personnes résidant en France nées les quatre premiers jours des mois d'octobre, d'avril, de juillet, ainsi que les 2, 3, 4 et 5 janvier. L'échantillon recueille des informations sur 4.4% de la population française. Les dissolutions d'union sont des événements rares, ce qui rend difficile leur étude, en particulier l'analyse d'effets hétérogènes nécessitant de former des sous-échantillons de travail selon l'âge par exemple. La taille de l'EDP implique que nous ne sommes pas confrontés à cette limitation. L'EDP rassemble plusieurs sources d'informations (état civil, données fiscales, données des employeurs, listes électorales, recensement, etc.). Dans cette thèse, seules les données fiscales sont exploitées. Les données fiscales sont la source de l'EDP qui fournit l'observation la plus détaillée des dissolutions d'union (Costemalle [2017] et annexe A), ce qui est primordial au travail entrepris. Elles présentent deux autres avantages. Premièrement, ces données couvrent la période 2010-2019. Cette expansion temporelle permet d'observer de nombreuses dissolutions d'union et d'évaluer leurs conséquences à moyen terme. Le moyen terme est intéressant car l'une de nos hypothèses est que les couples âgés confrontés à la dissolution d'union disposent de moins de leviers d'amortissement du choc économique (en particulier quand il s'agit des leviers de marché). Ces données sont récentes et contribuent donc à une mise à jour de la littérature à l'aune de la situation économique des années 2010. Deuxièmement et de façon déterminante : les données administratives sur les revenus sont généralement plus précises et fiables que les données d'enquête.

Mesurer l'effet causal des dissolutions d'union est assimilé dans cette thèse à l'estimation de l'effet d'un traitement ne pouvant pas faire l'objet d'une randomisation. Le modèle adopté est celui de la différence de différences (*difference-in-differences*, DID) avec un traitement échelonné. Un traitement est échelonné lorsque les unités traitées le sont à

des dates différentes. Afin d'avoir suffisamment d'événements à analyser, il est en effet nécessaire d'utiliser pleinement les données de l'EDP en incluant les personnes dont l'union se termine pour toutes les années entre 2010 et 2019. Ainsi le traitement étudié par cette thèse relève des modèles à traitement échelonné. La littérature sur la DID avec traitement échelonné a considérablement évolué au cours des années que j'ai consacrées à cette thèse. Ces évolutions ont toujours lieu. Les différents chapitres de ce manuscrit sont représentatifs de cette évolution rapide et de la volonté de leur auteur de s'adapter à ce nouvel état de nos connaissances économétriques.

L'estimation de l'effet causal d'un traitement soulève une question qualifiée de « problème fondamental de l'inférence causale ». Schématiquement, pour un individu observé au cours de deux périodes, non-traité en période 1 et traité en période 2, il n'est pas possible d'observer cette même personne en période 2 à la fois dans l'état traité et non-traité. L'évolution d'une période à l'autre, si elle est indicative, pourrait néanmoins être la conséquence d'autres effets dynamiques et non du traitement. Le contre-factuel idéal (observer la même personne dans les deux états à la même date) n'existe pas. Pour estimer l'effet du traitement, il nous faut donc trouver un groupe de contrôle pour jouer le rôle de contre-factuel. Ce groupe doit être tel qu'en l'absence de traitement sa trajectoire et celle du groupe traité auraient été identiques. La validité de la DID dépend de cette hypothèse qui est appelée « hypothèse des trajectoires parallèles » (parallel trend assumption). Cette hypothèse ne peut pas être testée directement, toujours en raison du problème fondamental de l'inférence causale. Les groupes de contrôle utilisés dans cette thèse ont été choisis de façon à rendre cette hypothèse crédible.

- Pas de groupe de contrôle. Dans le chapitre 3, aucun groupe de contrôle n'est utilisé. Ce chapitre traite du veuvage pendant la retraite. Les revenus des retraités ne varient que peu dans le temps. Un groupe de contrôle n'a donc pas semblé nécessaire pour

prendre en compte la trajectoire temporelle de notre variable expliquée par delà les évolutions macro-économiques annuelles captées par les indicatrices d'années. Ce chapitre utilise davantage une différence simple qu'une différence-de-différences.

- Un groupe de contrôle composé de personnes qui ne sont « jamais traitée » (*never-treated*). Ce groupe est composé de personnes continûment mariées pendant la période d'observation, elles ne font pas face à une dissolution d'union. Il est utilisé dans le chapitre 4 et l'annexe du chapitre 2. Dans le chapitre 4 l'échantillon est réduit aux 57-61 ans, pour étudier le début des trajectoires de départ en retraite. Le groupe des « jamais traité » est choisi car les trajectoires n'ont pas encore pu se disjoindre, en raison de l'âge minimal de départ à la retraite et car le large nombre d'individus permet d'atteindre une grande puissance statistique.
- Un groupe de contrôle composé de personnes qui ne sont « pas encore traitées » (*later-treated*). Ce groupe est composé de personnes dont on sait qu'elles connaîtront une fin d'union avant la fin de la période d'observation mais pour laquelle nous ne mobilisons que les observations précédant l'événement. Cette méthode est utilisée dans le chapitre 2 et l'annexe du chapitre 4. Un tel groupe est de plus en plus utilisé dans le lignée de Fadlon and Nielsen [2021]. Les événements matrimoniaux peuvent être soumis à des processus de sélection, ce qui invite à ne pas faire des « jamais traités » notre premier choix. Les « futurs traités » subissent le même processus de sélection et ont des anticipations similaires de l'avenir lorsque l'écart entre les dates de traitement est modéré. En l'absence d'effets d'anticipation, il est possible d'utiliser leur trajectoire avant dissolution comme un contre-factuel de ce qu'aurait été la trajectoire du groupe traité en l'absence de traitement.

Tout au long de cette thèse, l'effet analysé est celui d'un traitement échelonné. Le

cadre DID a, par le passé, généralement été appliqué aux données via les regressions à double effets fixes (*two-way fixed effects*, TWFE). Ces régressions tirent leur noms des deux séries d'effets fixes qu'elles utilisent : les effets fixes d'unité (ici, individus) et les effets fixes temporels (annuels). Cette approche fait l'objet de critiques. Elle a donné lieu, ces dernières années, à une abondante littérature économétrique qui analyse la validité de cette déviation de l'approche DID traditionnelle sans traitement échelonné (Roth et al. [2023]). Lorsque l'effet à estimer est dynamique (varie en fonction du nombre de période écoulées depuis le traitement de chaque unité), la littérature utilise la modélisation via étude d'événement (*event study*). Le traitement n'est pas codé par une indicatrice unique agrégeant toutes les périodes post-traitement. Il est modélisé par un ensemble d'indicatrices identifiant différentes périodes par rapport au début du traitement. Le TWFE sous forme d'*event study* avec traitement échelonné a notamment été analysé et critiqué par (Sun and Abraham [2021]). Dans leur article, les auteurs montrent que même lorsque les hypothèses centrales de la DID sont satisfaites, le coefficient du TWFE d'une période donnée peut être contaminé par les coefficients des autres périodes et ainsi s'avérer biaisé. Cela se produit parce que le coefficient TWFE est une somme pondérée des effets spécifiques à plusieurs périodes. On retrouve l'idée développée dans Sun and Abraham [2021] que le TWFE procède à des comparaisons interdites et n'a pas un procédé transparent d'agrégation de ces comparaisons. Les poids pour les périodes contaminantes peuvent être non-nuls et difficiles à interpréter. Les auteurs proposent donc un calcul alternatif qui estime le traitement moyen sur les traités pour la période j comme la somme des effets moyens du traitement spécifiques aux cohortes en j , pondérés par la part de ces cohortes dans l'échantillon à la période j . Cette nouvelle méthode est utilisée dans le chapitre 4 et est également incluse dans les annexes des chapitres 2 et 3 afin d'évaluer la robustesse des estimations qui ont été produites par TWFE avant l'expression des critiques à l'égard de cette méthode

d'estimation.

B.3.2 Résultats généraux

Les trois articles présentés dans cette thèse visent à évaluer les conséquences économiques de la dissolution d'union dans la seconde partie du cycle de vie. Ils le font en analysant systématiquement le pouvoir compensatoire des politiques publiques et en mettant l'accent sur les différences et inégalités femme-homme. Ils sont unis par : leur objectif, l'utilisation de données de panel administratif et de modèles de différence-de-différences appliqués à un traitement échelonné.

Quelle variation de niveau de vie les hommes et les femmes de plus de 50 ans encourent-ils après une dissolution d'union ?

Les chapitre 2 et 3 mesurent la variation de niveau de vie causée par le divorce et le veuvage après 50 ans.

À la suite d'un divorce gris, le niveau de vie des hommes et des femmes diminue. Entre l'année précédant le divorce et l'année le suivant, le niveau de vie des hommes diminue de 6% et celui des femmes de 24%. Si les conséquences du divorce semblent similaires avant et après 50 ans pour les hommes, ce n'est pas le cas pour les femmes qui apparaissent plus vulnérables économiquement après un divorce gris. À l'inverse, nos résultats montrent qu'en cas de veuvage, le niveau de vie des hommes et des femmes augmente en moyenne. Entre l'année précédant et l'année suivant le décès du conjoint, le niveau de vie des hommes augmente de 22% et celui des femmes de 5%.

Le divorce et le veuvage partagent certaines caractéristiques :

- Les hommes sont moins désavantagés que les femmes après ces événements.

- L'écart agrégé moyen femme-homme de variation du niveau de vie est similaire (19 points de pourcentage pour le divorce, 17 pour le veuvage).
- Il existe un gradient dans la variation des niveaux de vie suite à une dissolution. L'analyse par quartile montre que ce gradient est négatif. Plus la position dans la distribution des niveaux de vie pré-dissolution est élevée plus la variation de niveau de vie à l'issue de la dissolution est négative (ou moins positive).
- La spécialisation conjugale joue un rôle primordial. La variation du niveau de vie des divorcés et des veufs pré-pensions de réversion est largement corrélée au niveau de contribution aux revenus du couple avant dissolution. Ceci est cohérent avec notre diagnostic d'une répartition problématique des coûts et gains associés à la spécialisation conjugale.

Au-delà de ces points de recoupement, une différence majeure apparaît entre conséquences économiques du divorce et du veuvage après 50 ans. Alors que le divorce cause une baisse de niveau de vie, le veuvage est, lui, associé à un gain de niveau de vie. Les variations de niveau de vie pré-mécanismes de solidarité présentent un paysage différent. Avant transferts privés et publics, le divorce n'a pas d'impact significatif sur le niveau de vie des hommes de plus de 50 ans. Pour les femmes, le divorce implique, pré-transfert, une baisse moyenne de 35% du niveau de vie. Le veuvage entraîne une hausse moyenne de 6% du niveau de vie pré-réversion des hommes. Il implique une baisse de 38% du niveau de vie pré-réversion des veuves. Avant les mécanismes de solidarité, l'impact de la dissolution d'union sur les femmes de plus de 50 ans est un choc négatif de niveau de vie d'une ampleur similaire que le choc soit créé par un veuvage ou un divorce.

Quelle protection contre le choc économique de la dissolution d'union est assurée après 50 ans par le système français ?

Les chapitres 2 et 3 mesurent le pouvoir compensatoire des politiques publiques. Dans le cas du divorce gris, l'analyse est centrée sur le rôle protecteur des transferts publics et privés. Ces transferts jouent un rôle différent pour les hommes et les femmes. Ils contribuent à réduire l'écart femme-homme moyen dans la variation des niveaux de vie issue du divorce. Ce écart passe de 35 points de pourcentage pré-transfert à 19 points de pourcentage post-transferts. Les transferts entraînent une baisse modérée du niveau de vie des hommes, mais il n'a pas été possible d'isoler un effet différencié des transferts publics et des transferts privés sur leur trajectoire. Ces transferts amortissent largement la variation du niveau de vie des femmes, les transferts privés et publics ayant chacun un impact significatif. Les transferts publics apparaissent cependant plus déterminants pour limiter la variation de niveau de vie des femmes. L'importance de ces transferts varie en fonction de la position des individus dans la distribution des niveaux de vie pré-divorce. Les transferts publics jouent un rôle plus important dans la moitié inférieure de la distribution. Leur rôle diminue dans la seconde moitié de la distribution, tandis que celui des transferts privés augmente. Ce résultat est cohérent avec l'existence de conditions de ressources dans le système social français et l'injonction faite aux pensions fixées par les tribunaux de tenir compte à la fois des besoins du créancier et des ressources du débiteur.

Dans le cas du veuvage, l'accent a été mis sur les pensions de réversion. La réversion contribue à améliorer le niveau de vie suite à un veuvage, tant pour les hommes que pour les femmes. Dans le cas des hommes, le niveau de vie pré-réversion augmente au moment du veuvage. La réversion vient donc s'ajouter à une situation déjà favorable due à la plus grande contribution des hommes aux revenus de leur ménage et aux unités de consom-

mation. En moyenne, la réversion surcompense les hommes lorsqu'est fixé l'objectif d'un niveau de vie constant. Le niveau de vie des femmes pré-réversion diminue considérablement. En moyenne, la pension de réversion compense cette baisse et dépasse légèrement les attentes d'un niveau de constant autour du veuvage. La sur-compensation est partielle. Les pensions de réversion contribuent à réduire l'écart femme-homme des variations de niveau de vie au moment du veuvage de 44 points de pourcentage à 15 points de pourcentage. Elles compensent davantage la variation relative des niveaux de vie dans la partie inférieure de la distribution des niveaux de vie pré-veuvage. Cette surcompensation permet aux femmes de ce groupe de rester au dessus du seuil de pauvreté. Cependant, les montants de pension concernés sont plus élevés dans la partie supérieure de la distribution.

Cette analyse montre que le coût des conséquences économiques des dissolutions d'union est largement socialisé par le système de retraite dans le cas du veuvage et par le filet de sécurité général dans le cas du divorce. Notre analyse par quartile montre que le système est globalement redistributif. En particulier, les femmes situées dans le bas de la distribution sont plus protégées en termes de variation relative du niveau de vie que les femmes du haut de la distribution.

Il a été souligné précédemment que la principale différence entre les conséquences économiques du divorce et du veuvage après 50 ans réside dans le fait que le niveau de vie des veufs augmente alors que celui des divorcés diminue. Le système de réversion explique en grande partie cette différence.

En ce qui concerne les objectifs qui sous-tendent le système français, les articles constituant cette thèse permettent de dresser le bilan suivant :

- En cas de divorce, l'objectif d'assistance semble être directement assuré par le filet de sécurité sociale et par le système de retraite dans le cas du veuvage.

- L'objectif d'assurance, défini comme le lissage du niveau de vie à travers les états matrimoniaux, n'est pas atteint en cas de divorce gris. En cas de veuvage, la réversion permet de remplir ce but et en moyenne dépasse la cible.

- L'objectif patrimonial est plus complexe à évaluer car il nécessite une connaissance plus précise de l'histoire matrimoniale de l'individu et de son engagement sur le marché du travail. Il reste un point aveugle de notre analyse, malgré l'intérêt de cette approche théorique, souligné dans le chapitre 1. Je constate que les politiques étudiées contribuent à réduire au niveau collectif (par opposition au niveau intra-couple) l'écart entre les sexes dans la variation de niveau de vie pré-solidarité issue de la dissolution d'union. Si ce ré-équilibre est souhaitable du point de vue de l'égalité des sexes, il ne permet pas d'évaluer l'objectif de restitution (Carbone and Brinig [1990]) des gains du mariage au moment du divorce ou du veuvage. L'évaluation de cet objectif apparaît comme une piste de recherche stimulante pour l'avenir et un enjeu de politique publique car les discussions sur cette facette du système restent rares par rapport à celles concernant le lissage du niveau de vie.

L'évolution démographique des dissolutions d'union dans la seconde moitié du cycle de vie, plus de divorcés et moins de veufs, signifie dans le paysage contemporain des politiques publiques que nous assistons à la croissance d'une population moins bien protégée contre les dissolutions d'union dans laquelle les femmes sont particulièrement fragilisées.

Comment les personnes faisant face à une dissolution d'union après 50 ans mobilisent-elles les leviers de marché pour compenser le choc économique de la dissolution ?

Le chapitre 4 examine les stratégies d'adaptation que les personnes confrontés à des dissolution d'union mettent en place pour éviter une baisse trop importante de leur niveau de vie. Il traite de l'adaptation de l'offre de travail et vise à mesurer l'effet causal du divorce gris sur le départ en retraite. Ces travaux montrent que les hommes et les femmes prolongent leur participation au marché du travail à la suite d'un divorce tardif. En particulier, ils mettent en évidence que durant les cinq années qui suivent le divorce, pour les personnes se séparant juste avant l'âge légal de départ à la retraite, le ratio des retraites sur les revenus diminue. Il en va de même pour la probabilité d'être retraité. Ce chapitre montre que la perte de niveau de vie associée aux divorces est l'un des moteurs de cet effet pour les hommes. Le cas des femmes est plus complexe et il semble qu'il y ait des obstacles à leur auto-assurance sur le marché du travail. On constate que les femmes actives retardent leur retraite alors que les femmes inactives, non retraitées, l'accélèrent. De même, la moitié des femmes contribuant le moins au revenu de leur couple avant le divorce (moins de 36%) ne semblent pas prolonger leur vie professionnelle pour compenser le choc économique. À l'approche de la retraite, les femmes qui semblent avoir investi davantage dans la sphère domestique n'utilisent pas le marché du travail comme une source d'assurance individuelle contre le coût du divorce. Ce résultat est inquiétant. Le chapitre 2 montre que les femmes qui contribuent pour moins de 40% aux revenus de leur couple voient leur niveau de vie baisser de 29%. Les travaux futurs devront évaluer précisément les options dont disposent ces femmes pour limiter la variation de leur niveau de vie ainsi que l'interconnexion entre les transferts publics et privés, l'offre de travail et les options de remariage dans leur cas.