Broken homes and empty pantries: The impact of partnership dissolution on household economic resources

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Abstract

This study investigates the impact of a couple's break-up on the economic resources of the household by studying changes in income and food purchases around the time of separation in a panel of French households. I estimate a household fixed effects model to account for unobserved time-invariant household characteristics while controlling for additional time-varying covariates. Household income and food purchases decrease suddenly and significantly at the time of separation and remain lower than pre-separation levels for several years after the break-up. The decrease in food purchases appears to translate into a slight decrease in the female's body mass index (BMI). While the decline in income is more pronounced for households with higher pre-separation income, the decline in food purchases and BMI mainly affects households in the lowest pre-separation income tercile, suggesting that these changes are due to insufficiency of financial resources rather than individual preferences.

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1. Introduction

Over the last decades, the number of children growing up in single-parent households in France has steadily increased. The share of single-parent families out of families with children under 25 years old has more than doubled from 9.4% in 1975 to 24% in 2016 (INSEE, 2019a). France is not an isolated case. In the US, for example, over one-quarter of all children under 21 years have one of their parents living outside of their household in 2015 (Grall, 2015). Cross-sectional data show that the average standard of living per person in single-parent families is one-third lower than the average for other families. After redistribution, 20% of single-parent families are considered poor at the poverty line equivalent to 50% of median income, compared to 7% of couples with children INSEE (2019b). This has important implications for public policy, given that lower economic resources are associated with worse adult and children's outcomes including poorer psychological and physical health, lower academic achievement, and more behavioural problems (Amato, 2000, 2014; McLanahan et al., 2013; Tach and Eads, 2015). Well targeted policies supporting vulnerable families are likely to avoid costly negative outcomes in future (OCDE, 2011) but necessitates information on how and when precisely the family's needs are affected.

A large body of research has investigated the economic consequences of union dissolution, showing that women experience significant declines in income following a separation. Estimates of the decline in income one year after divorce range from 23% to 40% (Hoffman, 1977; Duncan and Hoffman, 1985b; Bianchi and McArthur, 1991; Holden and Smock, 1991; McLanahan and Sandefur, 1994; Peterson, 1996; Galarneau and Sturrock, 1997; McKeever and Wolfinger, 2001; Avellar and Smock, 2005; Tach and Eads, 2015). For men, the effects have been found to be more heterogeneous and overall less severe (Smock, 1994; Galarneau and Sturrock, 1997; McManus and DiPrete, 2001). Concerning food purchases, some few studies investigate associations between changes in marital status and eating behaviours focusing mostly on a limited set of food items (Lee et al., 2004; Vinther et al., 2016). In most studies, the effects of separation on household income have been estimated by comparing changes in income across two time periods, before and after the break-up occurs. However, when the comparisons are restricted to only two points in time they overlook the possibility of dynamic adjustments to changes in relationship status. It is thus difficult to draw firm conclusions about the time-path of the economic consequences of separation Teachman and Paasch (1994); Page and Stevens (2004). Estimates based on simple "before and after" comparisons are also likely to be biased if the effect is not immediate and constant over time (Laporte and Windmeijer, 2005). In addition, most of the studies do not include a control group.

Dynamic adjustments to changes in relationship status are more rarely investigated as the necessary data - longitudinal data on a large representative number of households including information on both relationship status and household economic resources for an extended period of time - are not always

readily available.Among the rare studies which examine the time-path of income and consumption following divorce, many are based on non-representative, dated samples and, most importantly, do not employ regression analysis which means that there is no adjustment for any time-varying covariates (Weiss, 1984; Duncan and Hoffman, 1985a,b; Peterson, 1989; Stirling, 1989). There exist only few recent longitudinal studies employing regression analysis to investigate the time-path of income and consumption after separation. Using US data, Page and Stevens (2004) study household income and food expenditures by estimating household fixed effect models and controlling for additional time-varying covariates. Fisher and Low (2016) also estimate household fixed effects models to investigate changes in income separately for low, middle and high income households in the UK but they do not control for time-varying household characteristics. De Vaus et al. (2014), De Vaus et al. (2017) and Fisher and Low (2009) study the time-path of income using data from Australia, six OECD countries and the UK, respectively. While controlling for some observable household and individual characteristics, they do not account for unobserved heterogeneity. To this point, I am not aware of any recent study investigating the time-path of income and consumption following partnership dissolution in France.

In this study, I use data from a panel of French households to investigate the impact of a couple's break-up on household income and food purchases as proxies for household economic resources. I estimate a household fixed effects model to account for any unobserved time-invariant household characteristics and control for a range of time-varying household covariates including the employment status of both spouses. I look at changes in income and food purchases in the years shortly before, during and after separation relative to a reference period of 3 years or more preceding the event to account for the possibility of dynamic adjustments to changes in relationship status. This avoids the potential bias from simple "before and after" comparisons if the effect is not immediate and constant over time. I further examine whether the changes in food purchases translate into changes in the body mass index (BMI) of the household members or changes in the healthiness of their diets in terms of the share of unhealthy food products purchased. Similarly to Fisher and Low (2016), I perform heterogeneity analyses by grouping households according to their average pre-separation per-capita household income. In addition, I estimate the effects separately for households with and without children.

I find that household income as well as food purchases decrease suddenly and significantly at the moment of separation and remain significantly lower than pre-separation levels several years thereafter. The effects I find in the French data are less pronounced than what has been reported by Page and Stevens (2004) using US data. While I find that household income declines by 23% in the year following separation and food purchases by around 17%, Page and Stevens (2004) reports a decline in income by 50% and a drop of 35% in food purchases. Albeit less strong, the effects of separation appear to last longer for the French households compared to their American counterparts. I do not find evidence for

a recovery over time whereas Page and Stevens (2004) find that food purchases recover partially after 6 years as they are then only 6% lower than pre-separation level and household income is 23% lower than pre-separation levels. Page and Stevens (2004) attributes this recovery mainly to re-marriage which I rarely observe in the French data. The decline in food purchases is accompanied by a slight decrease in the body weight of the newly single female.I further find that the share of unhealthy food purchases increases around the time of separation, suggesting that households adopt less balanced diets. The decrease in food purchases and female partner's BMI could have positive effects on health through a reduction in overweight. However, the adoption of less balanced diets is likely to have negative health consequences.

The decline in income is more pronounced for households with higher pre-separation income levels. This is consistent with results from Fisher and Low (2016) who find that women in the highest income households before divorce suffer the largest and most persistent falls in their standard of living compared to those from the lowest income households. However, I find that the decrease in food purchases and BMI mainly affects households in the lowest pre-separation income tercile. If we assume that preferences for weight loss or the incidence of separation-related depression do not differ across households with respect to pre-separation income levels, finding stronger declines in food purchases and female partner's BMI in the poorest tercile of the households but not in the richest tercile suggests that these changes are due to insufficient financial resources. While Fisher and Low (2016) identify higher-income households as particularly affected, my results point toward low-income households being particularly vulnerable as they appear less able to smooth necessary consumption. This result underlines the importance of investigating not only household income but also consumption to make statements about which households are particularly exposed to post-separation hardship. Changes in household food purchases are arguably a more direct measurement of changes in economic resources than changes in income as the former inform us about the ability to maintain a certain level of necessary expenditures in the presence of a negative income shock.

2. Method

2.1. Data

I use data on household characteristics and food purchases from a representative sample of 61,000 French households collected by *Kantar Worldpanel* covering the period 2005 to 2014.[1] This data include

[1]Kantar is a private company specialised in the construction of consumer panels and analysis for market research purposes similar to AC Nielsen in the US. The firm provides households with hand-held scanners which are used to scan all food purchases of every good with a bar code. Food items without a bar code are entered manually by the panellist. For more information, refer to the *Kantar Worldpanel* website at https://www.kantarworldpanel.com/global/Consumer-Panels.

information on household composition, household income (pensions and alimony payments are counted as well),and the socioprofessional category, age, gender, height, weight, education level, and occupation status of each household member. Information on household food purchases include product type, quantity, price and purchase date. All data concerning individual and household characteristics are updated on a yearly basis. Therefore, the time interval used in this study is the year. Household food purchases are constructed as the amount of annual product purchases, both in terms of total expenditures denominated in Euro and total quantity purchased measured in grams. I further define the share of unhealthy food products as the amount of annual purchases of ready meals products (pizza, sauerkraut, cassoulet, etc.), salt-fat products (finger food, chips, crackers, appetisers) and sugar-fat products (candy, chocolate, cookies, pastry, ice cream, jam, etc.) over the total amount of annual household food purchases. I use the information on weight, height and age to construct household calorie needs and the body mass index (BMI) of each household member[2]. No data is available concerning purchases of food eaten away from home but households report the number of meals typically eaten at home by day of the week. This variable serves me as a proxy for household eating habits in terms of food eaten at home. Table A1 provides descriptive statistics.

The data do not include direct information on the marital status of the household members but individuals are attributed codes according to their status within the household. Status 1 corresponds to the female partner (the panellist responsible for food purchases) and status 2 to the male partner (the household head), whereas status 3 and 4 denote additional female and male household members (mainly children). I define separation as the departure from the household of an individual of status 1 or status 2.[3] I am therefore looking at the separation of both cohabiting and married couples without being able to distinguish between these groups. Out of the total of 1,447 households for which I observe separation, only 230 are cases of a female partner leaving the household. The effects I estimate are therefore mainly the impact of a male partner leaving the household. On average, 0.4% of the households in the sample separate in any given year.[4] This separation rate is lower than the rate observed at the level of the French general population which is situated around 1%.[5] This could be due to households dropping out of the sample when faced with difficult times such as separation. If this is indeed the case, then I am

[2]Body mass index (BMI) is calculated by dividing the individual's weight by the square of height and is commonly used to measure corpulence.

[3]It is possible that the departure of an individual is due to death rather than separation. However, most often, the end of the union follows a separation, with few deaths occurring before age 65 (INED, 2018; INSEE, 2015). The results are robust when I consider a sub-sample of younger individuals.

[4]There are 61,204 different households in the sample out of which I observe 45,610 for at least 2 years and for which I can potentially observe separation. I count 1,447 separations in the years 2006 to 2013 (I cannot observe separations in the year 2005 and 2014 because I do not observe household composition in 2004 and 2015). This comes to 1,447/8 households separating per year over the 45,610 households in which I can potentially observe separation.

[5]According to data from INSEE, an average of 290,000 couples separate in a year between 2009 and 2012 (INSEE, 2015) which corresponds to roughly 1% of the households being concerned with separation in any given year considering there are 28,800,000 households in France (number in 2014 according to INSEE).

not observing the effects of separation on the hardest-hit households, meaning that my estimates could be lower bounds for stronger true effects.

2.2. Empirical Strategy

Using data for households in which couples separate at some point during the observation window and a comparison group of household in which the couple did not separate, I estimate the following household fixed effects model

$$R_{ht} = \beta X_{ht} + \gamma D_{ht} + \alpha_h + \rho_t + \epsilon_{ht}.$$

where R_{ht} denotes the measure of household economic resources in terms of household income or food purchases of household h at time t. The separation of the cohabiting couple is captured by D_{ht} which is a vector of dummy variables indicating that a separation has taken place in a future, current, or previous year. While the household fixed effects α_h control for any *time-invariant* household characteristics other *time-varying* household characteristics could still influence both the probability of separation and household economic resources. I therefore control for a vector of time-varying household covariates, X_{ht}. This vector includes family size to account for changes in family composition that accompany resource changes[6] in addition to the age and the employment status of both spouses. Controlling for the employment status is important as job loss could be both correlated with the probability of separation and with household income and consumption. The year fixed effects ρ_t control for economy-wide income and consumption changes over time, including business cycle effects and trends in income and consumption over time. Finally, ϵ_{ht} is the random error. In some of the regressions, the outcome variable R_{ht} is replaced with the share of unhealthy food products purchased or the BMI of the household members as proxies for the potential health effects related to the changes in economic resources. In the regressions on food purchases, I include in addition household calories needs constructed as the sum of the basal metabolic rate (BMR) of each family member using their height, weight, age and gender, and the average meals eaten at home per capita in a typical week as measure for potential changes in the proportion of food eaten at home.

I estimate a household fixed effect model to account for any unobserved time-invariant household characteristics that may be correlated with both the probability of separation and income or food consumption. If couples from households with lower economic resources are more susceptible to separate, for example, then failing to control for household fixed effects will yield estimates that will be biased toward finding larger losses. Including a control group of households in which the couple does not separate is important to estimate how much more economic resources households would have had if the couple

[6]This variable captures changes in household size other than the departure of one of the spouses.

had remained together. Most previous studies simply compared household income in a particular period before the separation to income in a particular period after the separation and therefore make no such comparison.

Other unobserved time-varying characteristics could still lead to biased estimates. For example, previous research has shown that marital dissolution is associated with an effect on health that occurs before the actual change in marital status as well as an effect at the time of dissolution (Blekesaune and Barrett, 2005; Laporte and Windmeijer, 2005).[7] Increased intra-household conflict which remains unobserved could also impact household consumption prior to separation. Unfortunately, I cannot control for such unobserved changes but I account for the possibility of dynamic adjustments in household income and food consumption by using a vector of dummy variables, D_{ht}, indicating that separation takes place in a previous, current or future year. This specification should capture any changes in household income and purchases over time including changes related to unobserved time-varying characteristics prior to separation. If, for example, a negative health shock leads to loss of income and reduced consumption prior to the separation I am likely to observe these changes. However, if the changes in health, income, consumption and family composition happen simultaneously (within the same year) I cannot tell apart the effect of the health shock from the effect of separation.

Accounting in such a way for dynamic adjustments is important. A step variable approach may overstate or understate the average annual losses associated with separation depending on which "before" and "after" years are chosen. If household experience losses in economic resources prior to the separation, a variable comparing the average level of economic resources before and after the separation would ignore the preceding effect and underestimate the immediate effect. Investigating dynamic adjustments is also interesting as the short-term effects of separation may differ from the long-term effects(Page and Stevens, 2004; Laporte and Windmeijer, 2005). A step variable could potentially overestimate the long-term effect if households recover relatively quickly after the separation. These are important considerations for policy makers who want to design optimal policies depending on the timing, strength and duration of the effects of separation. I look at changes in income and food purchases in the years shortly before, during and up to 9 years after separation relative to a reference period of 2 years or more preceding the event.

I use both household income and food purchases as proxies for household economic resources. Besides the measures of economic resources, I use diet composition in terms of the share of unhealthy food products purchased and the BMI of the different household members as proxies for potential health effects related to the changes in economic resources. It has been argued that consumption measures are

[7] Others find that sickness appears to be a consequence of rather than a reason for separation Dahl et al. (2015).

preferable to income measures because income understates the financial resources available, and because consumption is a more direct measure of well-being (Meyer and Sullivan, 2004; Page and Stevens, 2004). Food expenditure is the sort of necessary expenditure that is interesting to policy makers. However, it is also relatively inelastic with respect to changes in economic resources. Household are likely to use their savings or to reallocate their budget by diminishing other expenses such as leisure and durable goods to maintain some minimum threshold of food consumption. I therefore expect to see fewer variation in food purchases compared to any other kind of consumption.

I conduct heterogeneity analyses for which I group households according the their pre-separation per-capita income the presence of children, the sex, employment status and the relationship status (eventual re-partnering of the remaining spouse) to investigate whether separation impacts economic resources more severely in some types of households. If saving and budget reallocation are important mechanisms, I expect food consumption to be most responsive to income shocks in low-income households, which may be less able to smooth their consumption. Differential effects in households with and without children could be due to different childcare arrangements and labour supply response of parents.

3. Results

Columns 1 and 2 of Table 1 show how the main variables of interest - household income and food purchases as proxies for household economic resources - evolve in the period ranging from 1 year before and up to 9 years after separation relative to the reference period of 2 years or more before the break-up. Relative to the reference period, household income starts to decline by 3.9% in the year just before separation. It then drops sharply by 15.2% and 22.7% in the year of separation and the year just following the event and remains 21% to 25% below its pre-separation level thereafter. The quantity of household food purchases decline by 6.1% in the year of separation, albeit this drop is only statistically significant at the 5% level. Food purchases then drop by 17.2% and 19.2% in the first and second year after separation, respectively. After that, food purchases remain at least 16% lower relative to the pre-separation reference period. The changes in food expenditures mirror the changes in food quantities purchased and are therefore not shown here.

Not only do I find that household income and food purchases decrease after separation, but it also appears that these changes are accompanied by decreases in the weight of the female partner. The evolution of the female's BMI is shown in Column 3 of Table 1. In the year prior to separation, the BMI starts to decline slightly by 0.4%. In the year of separation and the 2 following years, the BMI drops is around 1% lower than in the pre-separation period. From year three onward, the female's BMI appears to have recovered to its pre-separation level. I do not find any effects on children's BMI. Finally, I find

Table 1: Evolution of household income, food purchases and partner BMI around the time of separation

	Income	Food purchases	Partner's BMI	Share unhealthy food
1 year before	-0.0389***	0.0275	-0.00403*	0.0494***
	(0.010)	(0.019)	(0.002)	(0.012)
Year of separation	-0.152***	-0.0606*	-0.0102***	0.108***
	(0.012)	(0.025)	(0.002)	(0.015)
1 year after	-0.227***	-0.172***	-0.0117***	0.103***
	(0.014)	(0.028)	(0.002)	(0.017)
2 years after	-0.231***	-0.192***	-0.00884**	0.0780***
	(0.016)	(0.033)	(0.003)	(0.021)
3 years after	-0.214***	-0.167***	-0.000505	0.0651*
	(0.019)	(0.041)	(0.004)	(0.027)
4 to 9 years after	-0.250***	-0.175***	0.00485	0.0818**
	(0.024)	(0.043)	(0.005)	(0.031)
Observations	203840	179140	178252	178691
R^2	0.111	0.030	0.013	0.032
Year fixed effects	Yes	Yes	Yes	Yes
Household fixed effects	Yes	Yes	Yes	Yes

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$. Robust standard errors clustered over household in parenthesis. All models include household and year fixed effects and controls for household size, activity status and age of both spouses. Regressions on food purchases include in addition household calorie needs and the average number of meals eaten at home in a week.

evidence for changes in diet composition around the moment of separation which is reported in Column 4 of the same Table. In the years before separation, the share of unhealthy food purchased over the total quantity of food purchased increases by about 5% and then increases sharply in the year of separation to a level 10% higher relative to the reference period. During the entire period of observation, the share of unhealthy food purchases remains more than 6% higher than its pre-separation level. Finding a decrease in BMI suggests that overall caloric intake has reduced following the decline in food purchases, despite the shift to a less healthy diet consisting of more salty, sweet, fatty and convenience foods, which are relatively calorie-dense food products.

All models include household fixed effects, year fixed effects and a range of controls for time-varying household and individual characteristics including household size, employment status and age of both spouses. In the regressions on food purchases, I add controls for total household calorie needs and the average number of meals eaten at home in a typical week to adjust for potential changes in the proportion of food eaten at home relative to food eaten away from home. The results remain qualitatively similar when I look at different reference periods. Tables A2 and A3 in the Appendix show results up to 2 and, respectively, 3 years before separation compared to a reference period of 3 or, respectively, 4 years or more prior to separation. The results are also robust to using different income and food consumption

equivalent scales such as per capita income and food purchases as shown in Table A4 in the Appendix or income and food purchases divided by a consumption unit measure to account for household economies of scale as shown in Table A5 in the Appendix.

To investigate heterogeneous effects with respect to household income, I divide households into terciles according to household income per capita averaged over the pre-separation period. Panel A in Table 2 shows the results for first income tercile including the poorest households, panel B presents results for the second tercile whereas panel C reports results for the third tercile which means the richest households. Household income declines more strongly in households with higher pre-separation income. This is not surprising if the higher pre-separation income reflects the relatively high salary of the spouse who then leaves the household. Despite the relatively smaller decrease in household income experienced by the household in the first income tercile, the effect of separation on food purchases in these households is stronger than in households with higher pre-separation income. In the first and second year after separation, the poorest households reduce their food purchases by over 30% compared to the pre-separation reference period. For households in the second and third income tercile, food purchases decrease by at most 15% with many of the effects not being statistically significant. The effects on the female's BMI are also concentrated in households from the first income tercile for which I observed a reduction of around 2%. The BMI does not appear to change in households from the second and third income tercile as the coefficients are mostly not statistically significant and close to zero. The share of unhealthy food relative to the total quantity of food purchased increases for all households, albeit less strongly in households from the first income tercile. Households belonging to the first income tercile already consume a higher share of unhealthy foods prior to separation compared to households from the second and third income terciles and may therefore have less margin to increase this share even further at the time of separation. One possible interpretation of these results is that households adopt a less healthy, potentially higher calorie diet, but overall calorie intake still decreases due to lower food purchases, with particularly strong effects among low-income households, where the change in diet is less pronounced and the decrease in food purchases more substantial. The results are qualitatively similar when using the reference period of 3 years or more prior to separation (see Table A6 in the Appendix).

Table 2: Evolution of outcome variables around separation, by pre-separation household income

	Income	Food purchases	Partner's BMI	Share unhealthy food
Panel A - First income tercile				
1 year before	-0.0705***	0.00207	-0.0115**	0.0377
	(0.018)	(0.035)	(0.004)	(0.021)
Year of separation	-0.0982***	-0.155***	-0.0187***	0.0695**
	(0.020)	(0.046)	(0.004)	(0.024)
1 year after	-0.134***	-0.331***	-0.0234***	0.0769**
	(0.022)	(0.059)	(0.005)	(0.028)
2 years after	-0.125***	-0.309***	-0.0170**	0.0249
	(0.028)	(0.063)	(0.006)	(0.036)
3 years after	-0.0767*	-0.289***	-0.00532	-0.0298
	(0.030)	(0.087)	(0.008)	(0.052)
4 to 9 years after	-0.134***	-0.160*	0.0151	0.0303
	(0.039)	(0.063)	(0.012)	(0.052)
Panel B - Second income tercile				
1 year before	-0.0326*	0.0437	-0.00342	0.0751***
	(0.017)	(0.032)	(0.003)	(0.021)
Year of separation	-0.150***	-0.00616	-0.00987**	0.141***
	(0.020)	(0.043)	(0.003)	(0.025)
1 year after	-0.255***	-0.134**	-0.00699	0.118***
	(0.024)	(0.047)	(0.004)	(0.030)
2 years after	-0.263***	-0.122*	-0.00614	0.106**
	(0.028)	(0.051)	(0.004)	(0.038)
3 years after	-0.275***	-0.0929	0.00247	0.0912*
	(0.034)	(0.058)	(0.006)	(0.041)
4 to 9 years after	-0.316***	-0.113	-0.00165	0.0681
	(0.042)	(0.082)	(0.008)	(0.052)
Panel C - Third income tercile				
1 year before	-0.00891	0.0255	0.000954	0.0333
	(0.016)	(0.031)	(0.003)	(0.019)
Year of separation	-0.200***	-0.0320	-0.00409	0.110***
	(0.020)	(0.036)	(0.003)	(0.023)
1 year after	-0.278***	-0.0690*	-0.00680	0.111***
	(0.022)	(0.034)	(0.004)	(0.029)
2 years after	-0.289***	-0.153**	-0.00512	0.0980**
	(0.026)	(0.052)	(0.004)	(0.032)
3 years after	-0.270***	-0.130*	0.0000534	0.122**
	(0.032)	(0.066)	(0.006)	(0.042)
4 to 9 years after	-0.288***	-0.246***	0.00175	0.136**
	(0.042)	(0.072)	(0.006)	(0.053)

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$. Robust standard errors clustered over household in parenthesis. All models include household and year fixed effects and controls for household size, activity status and age of both spouses. Regressions on food purchases include in addition household calorie needs and the average number of meals eaten at home in a week.

I also find that changes in all outcome variables are larger in households where children are present at the time of separation and, in particular, in households with minor children, compared to households with adults only. See Tables A7 and A8 in the Appendix. Income declines by at most 18% from its pre-separation level in households without children compared to decreases of over 30% in households with children. Food purchases drop by a maximum of 16% in households without children, whereas households with children reduce their food purchases by over 24% and households with minor children reduce them by over 27% in the first two years after separation. Households with children are more likely to belong to the first and second income tercile compared to adult-only households. However, the differences between these family types are not driven by different pre-separation income levels. The stronger effects in households with children could be due to lower labour market participation of parents who need to reconcile market labour with childcare. It may also be related to the fact that children are potentially registered in the household although they are not present at all times in case the spouses agreed on alternating custody. My data does not allow me to differentiate between these effects. Looking at income terciles *within* each family type, I find that the effects are stronger in the poorest tercile of households with children compared to the poorest tercile of adult-only households. Results are less strong for the second and third income terciles but again relatively stronger for households with children compared to adult-only households.[8]

Further heterogeneity analyses with respect to the sex, employment status and relationship status of the remaining partner remain inconclusive. Estimating the effects separately for the different sub-groups yield results which are not statistically significant, probably due to limited statistical power. I observe only 230 cases in which the female partner leaves the household, 132 cases in which the remaining partner is inactive at the moment of separation and only 116 cases in which the remaining partner starts a new relationship during the period of observation.

4. Discussion and conclusion

This paper provides evidence for long-lasting declines in the economic resources of households after the separation of the couple. Using panel data on household characteristics and food purchases in France, I estimate a household fixed effects model to account for any unobserved time-invariant household characteristics while controlling for additional time-varying covariates. Household income as well as food purchases decrease suddenly and significantly at the moment of separation and remain significantly lower than pre-separation levels for several years after the break-up. The decline in food purchases is accompanied by a slight decrease in the female's BMI. The share of unhealthy food purchases increases

[8]Tables are made available upon request.

around the time of separation, suggesting that households adopt a less healthy diet. While the decline in income is more pronounced for households with higher pre-separation income levels, the decrease in food purchases and BMI mainly affects households in the lowest pre-separation income tercile.

Declines in household income and food purchases at the time of separation have previously been reported in the literature. The results from this study are most comparable to the findings from Page and Stevens (2004) who also estimate household fixed effect models but using data from the US. Page and Stevens (2004) report that household income and food purchases decrease during and several years after separation but the magnitude of the decline in their data is larger compared to the decline I find in the French data. While I find that household income declines at most by 23% in the year following separation and food purchases by around 17%, Page and Stevens (2004) reports a decline in income by 50% and a drop of 35% in food purchases in the year following separation. This difference in the strength of the effect could be due to the more generous welfare systems in France compared to the US. Public spending on family benefits including spending in cash, services and tax breaks in 2017 amounts to over 3.5% of GDP in France whereas it is only about 1% in the US (OECD, 2017). Another possibility is that the differences are due to the different time periods considered.[9] The effects appear to last longer for the French households. I do not find evidence for a recovery in the income and consumption losses over time contrary to Page and Stevens (2004) who find that households partially these losses. After 6 years, food consumption is 6% lower and income 23% than pre-separation level compared to the initial drops of 35% and 50%. Page and Stevens (2004) attributes this recovery to the fact that a substantial fraction of divorced mothers remarries. I rarely observe such re-partnering in the French data. Finding a decline in the female's BMI is consistent consistent with some previous studies (Lee et al., 2004; Eng et al., 2005) but results have been ambiguous as other studies point rather towards weight gain after divorce or separation (Mata et al., 2018).

The decline in income is more pronounced for households with higher pre-separation income levels. This is consistent with results from Fisher and Low (2016) who find that women in the highest income households before divorce suffer the largest and most persistent falls in their standard of living compared to those from the lowest income households. However, I find that the decrease in food purchases and BMI mainly affects households in the lowest pre-separation income tercile. While Fisher and Low (2016) identify higher-income households as most affected, my results point toward low-income households being particularly vulnerable as they appear less able to smooth necessary consumption. This underlines the importance of investigating not only household income but also consumption to see which households are particularly exposed to post-separation hardship. Changes in household food purchases are arguably

[9]Page and Stevens (2004) use data from the 1968 through 1993 waves of the Panel Study of Income Dynamics whereas I use data on households from 2005 to 2014.

a more direct measurement of changes in economic resources than changes in income as these changes inform us about the ability of the household to maintain certain necessary expenditures in the presence of a negative income shock.

The household fixed effects pick up any time-invariant household characteristics, whereas the vector of time-varying household covariates controls for some of the changes in household characteristics that could be both correlated with the probability of separation and the outcome variables and therefore lead to biased estimates. Job loss, for example, could be both correlated with the probability of separation and with household income and consumption but is controlled for in all of the regressions. However, bias may still arise from other unobserved time-varying household characteristics, such as for example the health of the household members. Sudden illness of one of the spouses could both increase the probability of separation and reduce household income and food purchases. Assuming that such shocks do not lead instantaneously to physical separation - partners may first try to cope with the new situation or need at least some time to prepare for leaving the household - but that household income and consumption are affected almost immediately, I should observe changes in income and consumption prior to actual separation. Yet, this is not what I observe in the data. Household income and the female partner's BMI are relatively stable in the years prior to separation. Food purchases actually increase before the sudden and sizeable drop in the year following the break-up.

The declines in food purchases and the female's BMI could be due to changes in household preferences rather than a result of a negative income shock related to separation. The newly single individual may want to buy less food and lose weight to increase her chances of finding a new partner. Depression and loss of appetite could also potentially be the reason for decreased food purchases and weight loss rather than a decrease in household financial resources. Individuals could also change the way they report food purchases. [10] However, such explanations become less plausible considering that the decline in household food purchases and female's BMI are concentrated in households from the lowest pre-separation income tercile and that the effects appear to be as good as absent in the households from higher terciles. If we assume that preferences for post-separation weight loss, the incidence of separation-related depression and loss of appetite, and food and weight recording behaviour do not differ across households with respect to their pre-separation per capita household income, then finding stronger declines in food purchases and female's BMI in the poorest tercile of the households but not in the richer terciles suggests that these changes are due to insufficiency of financial resources. The results are consistent with the hypothesis that food expenditure is relatively income inelastic as households use their savings to maintain some minimum threshold of food consumption. Households with lower pre-separation income probably had

[10] Note that I control for the number of meals so that I control for the proportion of food eaten at home/away from home. So this is not a question of changing eating behaviour in terms of eating out more often.

less capacity to save and could therefore not smooth their consumption at the time of separation whereas richer households were better able to cushion the effects. This suggests that public assistance is not sufficient to eliminate the economic suffering associated with partnership dissolution, even in a country with relatively strong welfare safety nets such as France.

The decrease in food purchases and the female partner's weight loss following separation, although potentially involuntary, could have positive effects on health, for example through a reduction in overweight. I find some evidence that spouses whose BMI is situated in the lowest tercile prior to the separation appear not to lose weight as the changes in BMI are concentrated in the second and third BMI terciles. However, I also find that the share of unhealthy food purchases increases shortly before, during and after separation, suggesting that households adopt less balanced diets. I am not able to make any statement about the net effects on health.

This paper presents evidence for important declines in economic resources after separation from which households do not recover several years after the break-up. While the decline in income is more pronounced for households with higher pre-separation income, the decline in food purchases and BMI mainly affects households in the lowest pre-separation income tercile, suggesting that poor households are not able to smooth even the most necessary kind of consumption across the income shock. The existing welfare safety net in France appears insufficient to eliminate the economic suffering associated with partnership dissolution. Although the phenomenon is not sufficiently documented, it is estimated that 35% of individuals do not receive the child support payments that have been legally granted (Auvigne et al., 2016). The government's efforts to decrease the number of child support payment arrears through the creation in 2017 of the Agency for the Recovery of Child Support Arrears (ARIPA for the French "Agence de recouvrement des impayés de pension alimentaire") have been judged insufficient.[11] Before or in addition to considering an eventual increase in public assistance or mandatory child support payments, policy makers should make sure that the current legislation is fully enforced. Such policy is not only a question of fairness to assure that both parents share the responsibility for their common dependants but mitigating the decline in economic resources also avoids potentially costly negative outcomes in the future, such a lower human capital accumulation.

[11] See for example `http://www.leparisien.fr/societe/christelle-dubos-nous-voulons-en-finir-avec-l-enfer-des-pensions-alimentaires-impayees-30-04-2019-8063001.php`.

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Appendix

Table A1: Summary statistics

	Control group			Treatment group		
	Mean	Std. Dev.	n	Mean	Std. Dev.	n
Household size	2.64	1.38	195133	2.44	1.25	8707
Age Spouse 1	46.63	15.32	195133	50.34	16.2	8707
Age Spouse 2	48.13	15.42	195133	50.76	17.31	8707
Spouse 1 is inactive = 1	0.3	0.46	195133	0.36	0.48	8707
Spouse 2 is inactive = 1	0.25	0.43	195133	0.34	0.47	8707
Household calorie needs	3543	1808	182682	3214	1655	8312
Meals eaten at home per day	2.19	1.18	181474	2.06	1.05	8495
Household income	2650.57	1433.85	195133	2439.2	1328.1	8707
Quantity of food purchased	581845	439243	195133	662913	416899	8707
BMI spouse 1	24.89	4.87	182163	24.84	4.81	7976
Share of unhealthy food purchased	0.21	0.13	195133	0.21	0.12	8707

Table A2: Evolution of household income, food purchases, female partner's BMI and share of unhealthy food products purchased over total amount of food purchased around the time of separation

	Income	Food purchases	Partner's BMI	Share unhealthy food
2 years before	0.00187	0.113***	-0.000404	0.0653***
	(0.009)	(0.020)	(0.002)	(0.012)
1 year before	-0.0382***	0.0724***	-0.00419	0.0753***
	(0.011)	(0.021)	(0.002)	(0.015)
Year of separation	-0.152***	-0.0159	-0.0104***	0.133***
	(0.013)	(0.027)	(0.002)	(0.017)
1 year after	-0.226***	-0.127***	-0.0119***	0.129***
	(0.015)	(0.029)	(0.003)	(0.019)
2 years after	-0.231***	-0.146***	-0.00900**	0.104***
	(0.017)	(0.034)	(0.003)	(0.022)
3 years after	-0.213***	-0.119**	-0.000678	0.0930***
	(0.020)	(0.043)	(0.004)	(0.027)
4 to 9 years after	-0.250***	-0.125**	0.00467	0.111***
	(0.025)	(0.044)	(0.005)	(0.032)
Observations	203840	179140	178252	178691
R^2	0.111	0.030	0.013	0.033

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$. Robust standard errors clustered over household in parenthesis. All models include household and year fixed effects and controls for household size, activity status and age of both spouses. Regressions on food purchases include in addition household calorie needs and the average number of meals eaten at home in a week.

Table A3: Evolution of household income, food purchases and partner BMI around the time of separation

	Income	Food purchases	Partner's BMI	Share unhealthy food
3 years before	0.00905	0.100***	-0.000681	0.0469**
	(0.011)	(0.023)	(0.002)	(0.015)
2 years before	0.00571	0.156***	-0.000699	0.0854***
	(0.012)	(0.023)	(0.003)	(0.017)
1 year before	-0.0343*	0.116***	-0.00449	0.0956***
	(0.014)	(0.024)	(0.003)	(0.018)
Year of separation	-0.148***	0.0274	-0.0107***	0.154***
	(0.015)	(0.028)	(0.003)	(0.020)
1 year after	-0.222***	-0.0831**	-0.0122***	0.150***
	(0.016)	(0.031)	(0.003)	(0.022)
2 years after	-0.227***	-0.102**	-0.00931**	0.125***
	(0.018)	(0.035)	(0.003)	(0.025)
3 years after	-0.209***	-0.0727	-0.000992	0.115***
	(0.021)	(0.043)	(0.004)	(0.030)
4 to 9 years after	-0.245***	-0.0794	0.00436	0.132***
	(0.026)	(0.045)	(0.006)	(0.034)
Observations	203840	179140	178252	178691
R^2	0.111	0.031	0.013	0.033

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$. Robust standard errors clustered over household in parenthesis. All models include household and year fixed effects and controls for household size, activity status and age of both spouses. Regressions on food purchases include in addition household calorie needs and the average number of meals eaten at home in a week.

Table A4: Evolution of per-capita household income, food purchases and partner BMI around the time of separation

	Income	Food purchases
1 year before	-0.0455***	0.0240
	(0.010)	(0.019)
Year of separation	-0.0179	0.0235
	(0.013)	(0.025)
1 year after	-0.0931***	-0.0851**
	(0.015)	(0.028)
2 years after	-0.0971***	-0.103**
	(0.017)	(0.033)
3 years after	-0.0872***	-0.0821*
	(0.019)	(0.041)
4 to 9 years after	-0.114***	-0.0830
	(0.024)	(0.043)
Observations	203840	179140
R^2	0.350	0.031

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$. Robust standard errors clustered over household in parenthesis. All models include household and year fixed effects and controls for household size, activity status and age of both spouses. Regressions on food purchases include in addition household calorie needs and the average number of meals taken at home in a week.

Table A5: Evolution of household income and food purchases per consumption unit around the time of separation

	Income	Food purchases
1 year before	-0.0484***	0.0212
	(0.010)	(0.019)
Year of separation	-0.0315*	0.0143
	(0.012)	(0.025)
1 year after	-0.111***	-0.0996***
	(0.014)	(0.028)
2 years after	-0.119***	-0.123***
	(0.016)	(0.033)
3 years after	-0.109***	-0.101*
	(0.019)	(0.041)
4 to 9 years after	-0.139***	-0.104*
Observations	203840	179140
R^2	0.241	0.023

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$. Robust standard errors clustered over household in parenthesis. All models include household and year fixed effects and controls for household size, activity status and age of both spouses. Regressions on food purchases include in addition household calorie needs and the average number of meals taken at home in a week.

Table A6: Evolution of outcome variables around separation, by pre-separation household income

	Income	Food purchases	Partner's BMI	Share unhealthy food
Panel A - First income tercile				
2 years before	-0.0165	0.0785*	-0.00877*	0.0631**
	(0.018)	(0.036)	(0.004)	(0.020)
1 year before	-0.0774***	0.0349	-0.0152**	0.0640*
	(0.021)	(0.040)	(0.005)	(0.025)
Year of separation	-0.105***	-0.122*	-0.0224***	0.0958***
	(0.023)	(0.049)	(0.005)	(0.028)
1 year after	-0.140***	-0.298***	-0.0270***	0.103**
	(0.025)	(0.061)	(0.005)	(0.032)
2 years after	-0.132***	-0.277***	-0.0206**	0.0508
	(0.029)	(0.066)	(0.006)	(0.039)
3 years after	-0.0839**	-0.254**	-0.00910	-0.00247
	(0.032)	(0.090)	(0.009)	(0.053)
4 to 9 years after	-0.141***	-0.125	0.0112	0.0584
	(0.040)	(0.066)	(0.012)	(0.053)
Panel B - Second income tercile				
2 years before	0.0119	0.0852*	0.00290	0.0689**
	(0.017)	(0.037)	(0.003)	(0.023)
1 year before	-0.0279	0.0769*	-0.00227	0.102***
	(0.020)	(0.035)	(0.004)	(0.026)
Year of separation	-0.146***	0.0268	-0.00872*	0.167***
	(0.023)	(0.045)	(0.004)	(0.029)
1 year after	-0.250***	-0.101*	-0.00583	0.145***
	(0.026)	(0.050)	(0.005)	(0.033)
2 years after	-0.259***	-0.0882	-0.00496	0.134**
	(0.030)	(0.053)	(0.005)	(0.041)
3 years after	-0.270***	-0.0572	0.00370	0.120**
	(0.036)	(0.059)	(0.006)	(0.044)
4 to 9 years after	-0.311***	-0.0757	-0.000379	0.0980
	(0.043)	(0.083)	(0.008)	(0.053)
Panel C - Third income tercile				
2 years before	0.0107	0.158***	0.00233	0.0612**
	(0.013)	(0.030)	(0.003)	(0.021)
1 year before	-0.00491	0.0849*	0.00184	0.0562*
	(0.017)	(0.035)	(0.003)	(0.024)
Year of separation	-0.196***	0.0274	-0.00321	0.133***
	(0.021)	(0.040)	(0.003)	(0.026)
1 year after	-0.274***	-0.00969	-0.00592	0.134***
	(0.023)	(0.038)	(0.004)	(0.031)
2 years after	-0.285***	-0.0927	-0.00422	0.121***
	(0.027)	(0.055)	(0.004)	(0.035)
3 years after	-0.265***	-0.0661	0.00100	0.147***
	(0.033)	(0.068)	(0.006)	(0.044)
4 to 9 years after	-0.283***	-0.180*	0.00272	0.162**
	(0.043)	(0.073)	(0.007)	(0.054)

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$. Robust standard errors clustered over household in parenthesis. All models include household and year fixed effects and controls for household size, activity status and age of both spouses. Regressions on food purchases include in addition household calorie needs and the average number of meals eaten at home in a week.

Table A7: Evolution of outcome variables, by family type

	Income	Food purchases	Partner's BMI	Share unhealthy food
Panel A - Households without children				
1 year before	-0.0285*	0.00908	-0.00342	0.0339*
	(0.012)	(0.023)	(0.002)	(0.016)
Year of separation	-0.112***	-0.0237	-0.00706**	0.121***
	(0.015)	(0.030)	(0.002)	(0.019)
1 year after	-0.179***	-0.122***	-0.00794**	0.106***
	(0.017)	(0.032)	(0.003)	(0.023)
2 years after	-0.182***	-0.167***	-0.00450	0.0797**
	(0.020)	(0.040)	(0.003)	(0.028)
3 years after	-0.171***	-0.146**	0.000819	0.0632
	(0.023)	(0.050)	(0.005)	(0.033)
4 to 9 years after	-0.210***	-0.151**	0.00112	0.0947*
	(0.029)	(0.051)	(0.006)	(0.037)
Panel B - Households with children				
1 year before	-0.0588***	0.0501	-0.00534	0.0706***
	(0.015)	(0.032)	(0.003)	(0.017)
Year of separation	-0.215***	-0.111**	-0.0149***	0.0909***
	(0.018)	(0.042)	(0.004)	(0.021)
1 year after	-0.305***	-0.246***	-0.0177***	0.101***
	(0.021)	(0.049)	(0.004)	(0.024)
2 years after	-0.313***	-0.228***	-0.0159**	0.0762**
	(0.025)	(0.055)	(0.005)	(0.029)
3 years after	-0.290***	-0.198**	-0.00257	0.0693
	(0.035)	(0.071)	(0.007)	(0.044)
4 to 9 years after	-0.321***	-0.213**	0.0130	0.0553
	(0.044)	(0.078)	(0.010)	(0.053)
Panel C - Households with minor children				
1 year before	-0.0769***	0.0857*	-0.00798*	0.0826***
	(0.018)	(0.040)	(0.004)	(0.019)
Year of separation	-0.247***	-0.105*	-0.0193***	0.112***
	(0.021)	(0.052)	(0.004)	(0.023)
1 year after	-0.338***	-0.265***	-0.0212***	0.135***
	(0.025)	(0.061)	(0.005)	(0.028)
2 years after	-0.341***	-0.278***	-0.0195**	0.127***
	(0.032)	(0.069)	(0.006)	(0.035)
3 years after	-0.297***	-0.238**	-0.00934	0.148**
	(0.047)	(0.091)	(0.008)	(0.049)
4 to 9 years after	-0.336***	-0.331**	0.000275	0.160*
	(0.067)	(0.115)	(0.013)	(0.066)

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$. Robust standard errors clustered over household in parenthesis. All models include household and year fixed effects and controls for household size, activity status and age of both spouses. Regressions on food purchases include in addition household calorie needs and the average number of meals taken at home in a week.

Table A8: Evolution of outcome variables, by family type

	Income	Food purchases	Partner's BMI	Share unhealthy food
Panel A - Households without children				
2 years before	-0.000313	0.114***	0.00116	0.0550**
	(0.014)	(0.024)	(0.002)	(0.018)
1 year before	-0.0327*	0.0382	-0.00359	0.0537*
	(0.017)	(0.029)	(0.003)	(0.021)
Year of separation	-0.113***	0.00863	-0.00754**	0.152***
	(0.019)	(0.036)	(0.003)	(0.023)
1 year after	-0.185***	-0.0912*	-0.00806*	0.138***
	(0.021)	(0.037)	(0.003)	(0.027)
2 years after	-0.186***	-0.116**	-0.00674	0.113***
	(0.024)	(0.043)	(0.004)	(0.032)
3 years after	-0.164***	-0.0760	-0.00303	0.0805*
	(0.028)	(0.054)	(0.005)	(0.036)
4 to 9 years after	-0.215***	-0.141**	0.000629	0.120**
	(0.032)	(0.053)	(0.006)	(0.039)
Panel B - Households with children				
2 years before	0.00124	0.113**	-0.00158	0.0843***
	(0.015)	(0.038)	(0.003)	(0.018)
1 year before	-0.0786***	0.0924*	-0.00501	0.113***
	(0.019)	(0.037)	(0.004)	(0.022)
Year of separation	-0.242***	-0.0844	-0.0144***	0.127***
	(0.021)	(0.046)	(0.004)	(0.025)
1 year after	-0.322***	-0.196***	-0.0181***	0.139***
	(0.023)	(0.053)	(0.005)	(0.028)
2 years after	-0.334***	-0.169**	-0.0147**	0.108***
	(0.027)	(0.058)	(0.005)	(0.032)
3 years after	-0.314***	-0.110	-0.00188	0.0982*
	(0.036)	(0.072)	(0.007)	(0.046)
4 to 9 years after	-0.331***	-0.173*	0.00793	0.0588
	(0.049)	(0.084)	(0.011)	(0.055)
Panel C - Households with minor children				
2 years before	-0.00616	0.120**	-0.00492	0.107***
	(0.017)	(0.046)	(0.003)	(0.020)
1 year before	-0.0989***	0.124**	-0.00955*	0.129***
	(0.022)	(0.045)	(0.004)	(0.025)
Year of separation	-0.276***	-0.0821	-0.0207***	0.150***
	(0.024)	(0.057)	(0.005)	(0.028)
1 year after	-0.355***	-0.226***	-0.0231***	0.179***
	(0.027)	(0.066)	(0.006)	(0.033)
2 years after	-0.361***	-0.216**	-0.0193**	0.170***
	(0.034)	(0.073)	(0.006)	(0.039)
3 years after	-0.315***	-0.123	-0.01000	0.206***
	(0.049)	(0.087)	(0.008)	(0.050)
4 to 9 years after	-0.325***	-0.304**	-0.00795	0.199**
	(0.081)	(0.118)	(0.012)	(0.072)

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$. Robust standard errors clustered over household in parenthesis. All models include household and year fixed effects and controls for household size, activity status and age of both spouses. Regressions on food purchases include in addition household calorie needs and the average number of meals taken at home in a week.