AAPG2024	LELI	JCJC
Coordinated by :	Simon Rabaté	Duration : 48 months
CES 41 Axis D.3-Contemporary societies: state, dynamics and transformations		

Life Events and Lifetime Inequality

Summary table of persons involved in the project:

Partner	Name	First name	Current position	Role & responsibilities in the project	Involvement (person.month)
INED	Rabaté	Simon	Researcher at INED	Project coordinator, Involved in all WPs	36p.month
	Tréguier	Julie	Postdoctoral researcher at DIW Berlin	Involved in WP1 and WP2	18p.month
	Tô	Maxime	Economist at Institut des politiques publiques	Involved in WP2 and WP3	6p.month
	Van der Berge	Wiljan	Assistant Professor at Utrecht University	Involved in WP1	3p.month
	Tenand	Marianne	Researcher at Centraal planbureau	Involved in WP1	6p.month
	Lecoursonnais	Mael	PhD Student at Linköping University	Involved in WP2	12p.month
	TBD	TBD	TBD	Phd Student: Involved in WP1, WP2 and WP3	36p.month

Any changes that have been made in the full proposal compared to the pre-proposal.

The main change made to the proposal was motivated by one important limitation raised by the first report: that the project was not connected enough to other social sciences' research on inequality, in particular sociology. We acknowledged this criticism and adapted the project as follows: we now connect our research more directly to the literature on cumulative disadvantages and we added to the team two researchers in sociology (one in the main team, one in the advisory board). We believe that these changes significantly improved the consistency and potential outreach of the project.

The proposal budget has increased by 6.1% (from 280,000€ to 297,043€) due to the following adjustments. First, the general costs for staff expenses have been re-evaluated due to increase in administration costs and forecast inflation for the years to come. Second, the initial version of the proposal planed the recruitment of one experienced post-doctoral researcher for 36 months. During the elaboration of the full proposal, it appeared that the project was well suited for a PhD position. We therefore now request funding for one PhD (36 months) and one post-doc (15 months).

I. Proposal's context, positioning and objective(s)

a. Objectives and research hypotheses

Context. Income inequality has garnered significant attention in the economic literature over the past decades, leading to notable advancements in comprehending its scale, evolution, and underlying determinants. Nevertheless, there has been a relative lack of focus on lifetime income inequality, that is inequality in the income individuals receive over the course of their life. Arguably, a lifetime perspective is best suited to capture divergence and disparity in individuals' life trajectories. Lifetime

inequality can be different from instantaneous inequality, that is inequality measured at one given point in time. Reasons therefor are multiple, and may lead lifetime inequality to be either smaller or larger than instantaneous inequality. On the one hand, events associated with extreme individual income variations (e.g. unemployment episodes, large variation in profits for entrepreneurs, inability to work due to sickness, or childbirth) drive instantaneous inequality upward while keeping lifetime inequality at low levels if they are infrequent, transitory, and equally distributed among the population. On the other hand, if these events have long-term consequences, affect people differently at different levels of the income distribution (for instance, if adverse events are more frequent and more severe for low-income groups), and are correlated with one another, income trajectories of high- and low-income groups are likely to drift apart over the life cycle. This would imply higher lifetime inequality compared with instantaneous inequality.
Whether the former or the latter mechanism prevails remains largely unknown. **Understanding how life events affect income trajectories is therefore crucial to assess how income inequality accumulates over the life-course, and eventually translate into lifetime inequality.**

Aim and objectives. **LELI will provide an in-depth quantitative analysis of the effects of life events over income trajectories and lifetime inequality**. We will leverage exhaustive longitudinal administrative data from France and the Netherlands and state-of-the-art econometric methods to address the four following questions: i) how do life events affect individuals' income trajectories ? ii) what is the buffering role played by public policies, and in particular the tax-and-transfers system ? iii) how do life events correlate and cumulate over the life-cycle and translate into lifetime inequality and iv) how do the consequences of life events differ between two different institutional contexts, namely those of France and the Netherlands.

Research hypotheses. This research proposal builds upon a set of hypotheses stemming from both theoretical and empirical literatures in social sciences, which we aim at confronting with the data. These hypotheses are schematically represented in the Figure below.

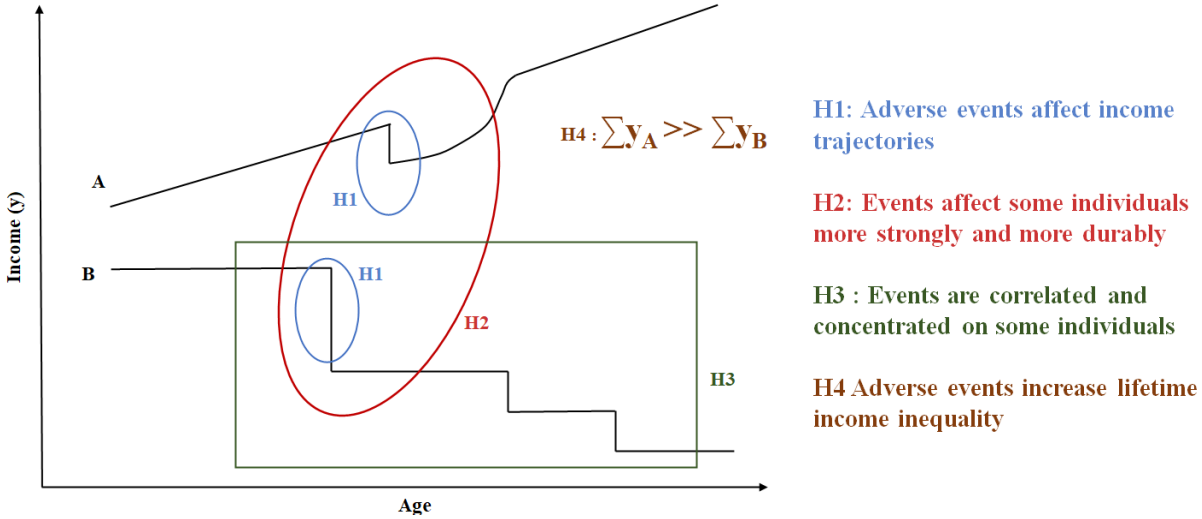
Our first hypothesis (H1) is that individuals' life trajectories can be profoundly affected by various disruptive events. Research in social sciences has long acknowledged the role of adverse events, such as job loss or own or parental divorce, in shaping individuals' life trajectories. Adverse events are associated with lower wealth, lower educational attainment, higher criminality, and worse health. In this project, we focus on one outcome that proxies these dimensions: income. We expect an adverse event to generate a drop in income, which is all the more marked when the event is unexpected and significant. We also hypothesize that individuals may have access to some form of family insurance (e.g. income from spouses) or public insurance (e.g. unemployment benefits) that can alleviate the effect of the event-related income shock.

Our second hypothesis (H2) is that individuals are differently impacted by life events. A given event is likely to translate into bigger and more persistent income shocks if the impacted individual is more vulnerable (Torche *et al.,* 2024) and can rely less on family and public insurance. For a given type of event, we can therefore expect differential effects depending on the socio-economic characteristics of the individual and the institutional setting (or country) the event occurs in.

A third hypothesis (H3) is that negative life events tend to correlate, accumulate and interact in different ways. Adverse events more frequently hit more vulnerable individuals and have stronger effects on them, leading them more vulnerable and more subject to subsequent events. This process creates a dynamic of cumulative disadvantage, whereby disadvantages of one individual or group grow over time (Merton (1968); DiPrete and Eirich (2006)).

The fourth and ensuing hypothesis (H4) is that the accumulation of adverse events on some individuals is an important driver of lifetime income inequality. The overall effect of cumulative disadvantage on overall lifetime inequality will depend on the importance of the phenomenon, both in terms of incidence and magnitude for impacted individuals.

Figure 1: Illustration of research hypotheses



Scientific Barriers to be lifted. We have identified three main scientific barriers to lift in order to study the effect of life events on income trajectories and resulting lifetime income inequality.

Data availability: The proposed research questions can only be addressed using rich and granular data. These data should have: (i) information on a range of life events, related to family structure, employment and health status, (ii) information on income before and after taxes and transfers (iii) a longitudinal structure, and (iv) a large sample size enabling heterogeneity analyses.

Causal effect of events: The research questions imply the identification of causal effects of events on individuals' income trajectories. This comes with two main challenges. First, we need to find appropriate control groups, i.e individuals that are (i) not affected by the events and (ii) sufficiently comparable to the affected ones to be a good proxy of their counterfactual trajectory, had the event not occurred. Second, the selected approach to estimate such effects (staggered difference-in-differences) has recently known a profound reassessment: even with good control groups, the standard approaches are subject to bias due to heterogeneous effects between groups (see e.g. Baker *et al.*, 2022) that may require the use of more sophisticated models (e.g. Sun and Abraham, 2021).

International comparison: Some of the analyses of the research project will be conducted jointly for France and the Netherlands. This requires an in-depth knowledge of both countries in terms of data availability and quality, as well as institutional and policy context.

To lift the aforementioned scientific barriers, we propose a 4-year research agenda that will rely on rich administrative panel data from the Netherlands and France. This agenda will gather a team of promising and experienced researchers from both countries, with diversified and complementary expertise in economics and sociology (see Section II.a). The team's strong skills in policy evaluation and the identification of causal effects will make it possible to use recently developed models to retrieve the causal effects of life events. The research outputs of this proposal will bring a substantial contribution to the understanding of the impact of life events on income trajectories and how they

contribute to the development of inequality over the life course. This will inform theory and decision makers on how to improve on the insurance provided to individuals against the accumulation and interactions of adverse events life can bring.

b. Position of the project as it relates to the state of the art

Contribution 1: The causal effect of disrupting events on income trajectories

State of the art. A rich and dynamic literature in economics and sociology has studied the causal effects of various disruptive life events on income trajectories. They often rely on a difference-in-difference approach, comparing the trajectories of impacted individuals to individuals who are comparable but have not been impacted (or will only be impacted later). This includes for example the analysis of job loss (Delen *et al.*, 2018), divorce (Raz-Yurovich, 2013; Bonnet *et al.*, 2021), own or spousal health shocks or spousal death (Fadlon and Nielsen, 2021). Recent papers study the correlation between different events, e.g. health shocks and job loss in Ahamme *et al.* (2021) and divorce and job loss in Anderson *et al.* (2021).

Originality and novelty. We intend to contribute to this literature in several ways. The main novelty of our approach is that we study a large set of life events in a consistent and integrated approach. We are then able to compare the relative importance of life events in individuals' income trajectories, and the extent to which some risks or some specific subgroups of the population are not sufficiently insured by existing public policies. Second, we can leverage the specificity of the Netherlands in terms of the quality of administrative data and its institutional setting to provide original elements on the effect of specific events. We plan to analyse two elements that have not yet been studied, namely the role of spouse alimony in the case of divorce and the role of the public health care system in case of child long term health shock.

Contribution 2: The determinants of lifetime inequality

State of the art. Our ambition to analyse the correlated effects of life events on lifetime inequality relates to two strands of the literature, which are to this day largely unconnected. The correlation of (negative) life events over the life course is at the heart of the cumulative (dis)advantage literature in sociology (DiPrete et Eirich, 2006). Recent research has shown that adverse events – such as union dissolution (Hogendoorn et al., 2022) or a health shock (Leopold and Leopold, 2018) – occur most often in disadvantaged groups, and that adverse events can correlate and accumulate over the life course and reinforce inequality between social groups (Fasang and Aisenbrey, 2022). This literature considers the effect of life events on various outcomes and does not primarily focus on income trajectories and does not *per se* quantify lifetime income inequality. One strand of the economic literature focuses on the analysis of income dynamics over the life course, and has been boosted by the access to administrative registers in recent years. Changes in income dynamics can be decomposed between transitory and permanent shocks, analysed over the life cycle and across the earnings distribution (Guvenen *et al.*, 2021). The comparison of the dynamics of individual income before and after tax can be used to analyse how much insurance taxes and transfers provide (De Nardi *et al.*, 2021). Recent extensions include the description of lifetime inequality resulting from the accumulation of shocks over the life cycle (Guvenen *et al.*, 2022; Garbinti *et al.*, 2023).

Originality and novelty. While the empirical methods we mobilize (modelling of income dynamics) and the concept we use (lifetime income inequality) lean primarily toward the economic literature, the contributions we intend to make are of broad interest for social sciences. First, we connect the literature on the causal effects of disruptive events to the literature on cumulative disadvantage, by

analysing the effect of events and their correlation over time on income trajectories. Second, we propose a micro foundation for permanent income shocks and their correlation over time. While shocks are usually defined in the economic literature as mere deviations from the income trajectory. By unveiling the actual life events behind the observed income shocks, we intend to bring new lights in the understanding of the development of lifetime inequality. Third, by comparing the income trajectories before and after transfers, we provide a novel analysis of the role played by public policies tto limit occurrence or the magnitude of "vicious circles" in which more vulnerable individuals face the risk of diverging income trajectories

Contribution 3: International comparison

State of the art. In both of the main strands of the social science literature we contribute to, international comparison has grown in importance over the last years. Regarding the literature on disruptive events, recent research have studied the differences between countries in the effect of life events on income trajectories (e.g. Garcia-Gomez (2011) for a health shock or Bertheau *et al.* (2023) for job loss) or in the correlation between life events (Di Nallo *et al.* 2021). The comparison between countries aims at assessing how much the effect of a life event varies from one institutional setting to the other. International comparison is also a widespread component of the analysis of inequality in general (e.g. Blanchet *et al.*, 2022)) and income dynamics in particular (e.g. Bowlus and Robin, 2012; Guvenen *et al.,* 2022). International comparison is essential to assess the relative importance of inequality in a given country, and to analyse country-specific determinants (macroeconomic context, institutions and labour market policies, etc.).

Originality and novelty The current frontier of international comparison is to carry it on the administrative register of each country, using consistent data and methods (as in Guvenen *et al.* (2022) and Bertheau *et al.* (2023)). This approach is more demanding as it requires access to administrative data and a deep knowledge of every country specific data and institutional context. On the other hand, the size and reliability of the administrative data offer allow for richer and more compelling comparisons between countries. The originality of our approach is to propose an international comparison that combines the use of administrative records with the analysis of the specific role played by the tax and transfer system in the effect of event and income. The literature mentioned above either analyses the role of tax and transfers using survey data, or limits itself to labour earnings. However, analysing the effect of different institutional contexts is crucial to understanding government insurance against adverse life events. Our project brings therefore an important addition to the existing literature. France and the Netherlands are geographically close, but very different in terms of cultural context (e.g.. employment of women) and choices regarding social insurance policies (e.g.. importance of unemployment or disability insurance). We therefore expect this comparison to bring new insights regarding the context-dependence of the effect of life events.

c. Methodology and risk management

The LELI project consists of three main scientific work packages (WP1, WP2 and WP3) and a Project Management work package (WP4). The scientific WPs are organized in such a way as to build up a cohesive research program in the next four years.

Overall feasibility of the project.

LELI relies on (a) access to rich longitudinal administrative data in the two target countries and (b) the use of microeconometric methods for the description of earnings dynamics and the estimation of the causal effect of life events. The PI has secured access to the relevant administrative data on the Dutch side, namely tax data on the full universe of the population linked to a rich set of other administrative

records used to identify the occurrence of events. The access to administrative tax data in France will be arranged through the Secure Access Data Center (CASD) when the project starts. LELI will then rely on state-of-the-art techniques in applied econometrics (non-parametric panel data analysis and difference-in-differences approaches) to analyse the consequences of life-events on earning dynamics. We describe in more details the data and empirical approaches in the presentation of the work packages below.

We have identified two main risks regarding the completion of the proposed research agenda. First, we face a risk regarding **the scope** of the research proposal, as we are considering a wide set of life events, which all come with their peculiarities in terms of existing literature, institutional settings, data and conceptual challenges. Second and relatedly, our main envisioned contributions are based on the **comparability** of life events and their effect over life course, with one another and across countries. Both risks are inherent to the scientific ambition of the project but can be mitigated as follows: (i) a careful evaluation of the requirements associated with each component of the research proposal, (ii) a large and skilful research team matching these requirements. Further, we plan to follow a *minimum viable product* approach in which the global architecture of the analysis will be implemented from the beginning on a subset of events. Additions of events then follow to enrich the results and reach the research objectives, but any difficulty associated with one particular life event will not be a bottleneck for the advancement of the project.

WP1: The effect of life-events on income trajectories

In WP1, we study the effect of various life-events on income trajectories using Dutch data. WP1.1 aims to construct a large dataset of demographic, employment, or health related events. In WP1.2, we estimate the causal effect of events on income trajectories and assess how much individuals are protected against those events through family insurance and public insurance. We then focus on dimensions that have not yet been extensively studied in the literature, namely the role played by spousal alimony on the effect of divorce (WP1.3) and the effect of child health shock (WP1.4).

Researchers involved: Simon Rabaté, Marianne Tenand, Julie Tréguier, Wiljan van der Berge

WP1.1: Creation of life event datasets

Objectives: In WP1.1, we construct an *event dataset* which contains, for the entire Dutch population and for the period of observation (from 2003 to 2026, last year expected to be available in 2028), information about the occurrence of the life events we consider in this research project.

Methods: WP1.1 consists mostly in intertwined conceptual and data work regarding the definition and measurement of life events. We first list the life events we intend to consider. Following the research framework described above, we focus on negative disruptive life events. We therefore target events that are likely to have substantial, negative and unpredicted impact on income trajectories. We consider the following types of events. *Direct events* that impact individuals in person, such as job loss and health shocks; *family events* that affect the overall structure of the household such as birth of a child, couple separation or widowhood; and *indirect events* impacting relatives, such as severe health shocks of children, spouses, or parents.

We then identify those events in the Dutch administrative records. They contain close to exhaustive information on birth and death records, household composition, family links, marital status, income and employment, health care consumption, that we can use to identify the occurrence of events. In some cases, such as child birth or spousal death, identification of events is straightforward using birth

and death records. Job loss is less clearly identified because we only observe employers and income (e.g. unemployment benefits) and therefore miss the cases where individuals immediately find another job. We will mobilize administrative datasets on job separation to remedy that. Couple separation is also equivocal, as focusing on divorce or registered partnership using municipal registries may be too strict, and considering all cohabiting adults as a couple may be too loose a definition. Finally, a particular attention shall be put on the definition of health shocks. We will use detailed records on hospitalization and healthcare consumptions to identify large and significant health events. Generally speaking, when event definition is not straightforward, we plan to provide alternative definitions in order to test the sensitivity of our results to the choice we make.

We obtain a dataset that regroups information on the occurrence of events. We provide general descriptive statistics on the incidence of events: overall incidence in the population and correlations with some socio-demographic characteristics. With two main objectives: to check the validity of our event definitions and to guide the choice for the heterogeneity analyses performed in WP1.2.

Expected results and outputs: The main output of WP1.1 is the event dataset (D1.1), which will contain, for each individual and each event definition we consider, the list of event occurrences at the annual level for the years 2003 to 2026. This dataset will be used as input for the other work packages.

WP1.2: The effect of life events on income trajectories

Objectives: WP1.2 is the core of WP1. We estimate the causal effect of life events on income trajectories. By estimating the effect at different levels – individual, spouse, household – we can assess the insurance to adverse events provided by the household. By estimating the effect on different income concepts – before and after transfers and taxes –, we can analyse the insurance provided by the government. By estimating the impact of events on different subgroups, we can analyse the extent to which subpopulations are differentially affected by and insured against different life events. We use a similar approach across events in terms of methodology and data to provide a comparative analysis of the direct and insurance effects of events.

Methods: The first step of WP1.2 is the construction of panel datasets that we use to estimate the effect of events on income trajectories. To do so, we combine our event dataset with income data from the tax records for years 2003 to 2026. We focus on the first event observed by individual and event type, and we restrict our analysis to events occurring between 2007 and 2021 in order to be able to observe at least four years of income before and after the event. For each event, we combine all individual observations centred around the event date to construct our estimation datasets. We augment it with additional socio-demographic information from other sources.

We then use these data to estimate the causal effect of events on income trajectories. The main and usual challenge is to have a good counterfactual - what would have been the income trajectory in the absence of the event? - that we can compare with the observed income. Several approaches can be considered to find the relevant control group. The most direct approach is to compare the treated individuals with those who never experienced the shock. However, it is likely that there is a selection effect and that the individuals who experienced the shock do not have the same characteristics as the others. One way of dealing with this is to construct the control group using matching techniques so that the individuals in the treatment and control groups are identical in terms of the characteristics that explain income. However, this approach has some limitations: it does not account for unobserved heterogeneity between the treated and untreated groups, and conditioning on pre-event characteristics can introduce bias due to mean reversion effects (Daw and Hatfield, 2018). An

alternative is to construct the control group from individuals who were treated later (Fadlon & Nielsen 2021). Subject to the parallel trend assumption, which holds when the timing of the event is exogenous, this allows us to compare the post-event responses of affected individuals with the counterfactual behaviour of hypothetical, ex-ante similar unaffected individuals. A final possibility is to combine the two approaches and compare early and later treated individuals who are similar on important characteristics. All these approaches will be systematically tested and compared for the different events, with the aim of selecting one approach that can be used in all cases.

Using consistent methods and data across events, we estimate their effects on the following outcomes. We first estimate the direct effect of events on individual earnings, before any taxes or transfers. For couples, we can then compare this direct effect to the effect on total household pre-tax income, and estimate the insurance provided by the household structure. This insurance come from two mechanisms. First, if other sources of income are available within the household, the drop in income following an event will have a smaller impact relative to total household resources. Second, there can be an effect of the event on the income trajectories of other household's members. The effect on spouses' labour supply can be positive, in order to compensate for the income drop (added-worker effect). It can also be negative, if the spouse is hit by a coincident shock or reduces its labour supply to care for the impacted spouse (correlated effect). Another form of insurance against negative income shocks is provided by the tax and transfer system. Two mechanisms are at work. First, in the Netherlands as in many countries, various insurance schemes compensate for the income drop through additional public transfers. Benefits may be directly related to the realized income risk (e.g. unemployment benefits in case of job loss) or part of global anti-poverty policies (e.g. welfare benefits for low-income). This implies that, on average, the drop in total income will be of smaller magnitude than the drop in pretax income. A second insurance is generated by the tax system: as individuals receive less income, they will pay less taxes. We measure the magnitude of this government insurance by comparing the direct effect on primary income to the effect on disposable income, after tax and transfer. Finally, given our large sample size, we can estimate the direct and insurance effects for different subgroups, based on age, education, household composition, and wealth.

Expected results and outputs: We expect to produce an innovative academic paper that presents the effect of different events on income trajectories in a unified framework (D1.2). We expect to show which are the most important events in the life course of individuals and how much protection is provided by household and state insurance. We also expect to identify specific categories of the population that are particularly vulnerable to certain events. These results may have important policy implications for the design of insurance policies, which will be discussed in the academic paper and in a companion policy brief for a wider audience (D1.3).

WP1.3: The effect of spouse alimony on income trajectories following a divorce

Objectives: WP1.3 will provide an additional analysis on the effect of divorce and focus on the insurance role played by spouse alimony. Alimony is a court-ordered payment awarded to a former spouse as part of a divorce agreement. The purpose of alimony is to provide financial support to a spouse who has a lower income or, in some cases, no income at all. It is organized by the state, but it meets the needs of individuals according to their family situation before the divorce (in relative terms, not absolute) and is determined according to the financial capacity of the payer rather than the needs of the recipient. Most payments are made by male spouses to female spouses, in particular to lone mothers, who are at high risk of income poverty. We use a recent reform reducing the maximum duration of alimony payment to assess the role of alimony in compensating for the negative shock to living standards that can follow a divorce.

Methods: The Netherlands reformed its alimony system in 2018, reducing the period over which spouse alimony is paid. We evaluate this reform to have a better understanding of the insurance effect of alimony on the income of divorced people. The reform introduced a discontinuity in the duration of spouse alimony. Before 1 January 2020, alimony could last up to 12 years, provided the couple had been married for more than 5 years or had children. From 1 January 2020, alimony lasts for 5 years maximum, with certain exceptions. We carry out a regression discontinuity design (RDD) using the discontinuity in the divorce date, or a difference in difference where the control group is composed of individuals who divorced before 1 January 2020 and the treatment group is composed of individuals who divorced after. We study the effect of spouse alimony reduction on the income trajectory of divorcees, in terms of primary and disposable income, and for both the receiver and payer spouses. We study individuals' response to the reform, differentiating by gender, income level, contribution to total household income before the divorce, number of children, among others.

Expected results and outputs: We expect to publish a scientific paper presenting an evaluation of the reform of spouse alimony in the Netherlands (D1.4). We will study the role of spouse alimony in insuring against the risks of divorce, and we expect to identify specific groups of the population that rely heavily on this insurance. We expect our findings to shed light on how to better design public policies to insure people against divorce risks.

WP1.4: The effect of a child health shock on parental outcomes

Objectives: In WP1.4, we focus on a specific event that has received a growing attention in the literature: the effect of one's child health shock on the income trajectories of parents. We first aim at confirming in the Dutch context the results found elsewhere, namely that this event has important effects on an individual's earnings trajectories, especially for mothers (e.g. Adhvaryu *et al.*, 2023; Martinez and Smith, 2023). Secondly, we study the potential interaction effect with other life events by analysing the effect on parental health (Vaalavuo et al, 2023) and separation (Gunnsteinsson and Steingrimsdottir, 2019). Third and lastly, we focus on long-term child illness and leverage the heterogeneity in the provision of long-term care and adapted day care across municipalities to study the effect of public insurance in mitigating the effect of the event on parental outcomes.

Methods: The first two steps of the analysis directly follow from the approach of WP1.1 and WP1.2. We first define and measure the children's health events in the data. In addition to the health care consumption and hospitalization data mentioned above, we will add information on long-term care provision. Since this data is available in a consistent way from 2015 onwards, WP1.4 will focus on events occurring after this date. We then follow the approach of WP2.2 by estimating the causal effect of children's health shock on the income trajectories of parents. We will also consider alternative outcome variables such as own health (measured through health care consumption and drug consumption) and marital status. Third and lastly, we will analyse the heterogeneity in the effect by geographical area and correlate this with measures of the generosity of the decentralized long term care system (Vermeulen, 2015). We thus aim at providing evidence of substitution between public and private care providing that would translate into milder adverse effects on parental outcomes when public insurance is provided.

Expected results and outputs: We expect to publish a scientific paper (D1.5) providing an extensive analysis of the effect of child health shock on parental income, health and marital trajectories. By analysing the role of long-term care provision in mitigating permanent health shocks, we intend to make an original contribution to this growing literature.

WP1: Risk assessment and deliverable

Risk assessment: There are two related risks associated with WP1: (i) the number of events considered is too large in terms of the empirical and conceptual workload associated with each event, and (ii) comparability across events may not be ensured if we cannot consistently estimate the same types of models for all events. We believe that the first risk is limited because several events have already been studied by team members (job loss, spousal death, childbirth) and this experience has shown that the marginal addition of an event can be small in terms of data workload. Second, if there are some difficulties in estimating the causal effect for a given event, we consider the following options: (i) focus on an alternative (more exogenous) definition of events (ii) remove the event from the whole analysis. As mentioned above, the workflow is organised in such a way that event-specific issues do not impede the general progress of the research agenda.

Deliverables: Publication of scripts in open access (D1.1), three scientific articles (D1.2, D1.4, D1.5) with the results of WP1.2, WP1.3 and WP1.4, and one policy brief based on WP1.2 (D1.3).

WP2: Life-events correlations and lifetime inequality

WP2 studies the correlations between different events and their implication for lifetime inequality. In WP2.1, we use the event dataset constructed in WP1 to describe the correlation of events over the life-cycle using sequence analysis. The correlation of events also has implications regarding lifetime inequality, as the repetition of adverse events over the life cycle is likely to generate divergent income trajectories between individuals. In WP2.2, we estimate a model of earning dynamics that incorporates the effect of correlated events. The model allows for counterfactual simulations of earning trajectories that help understanding the importance of events and correlation between them to explain particular features of lifetime income distribution and more broadly to understand the role of these shocks in terms of lifetime inequality.

Researcher involved: Mael Lecoursonnais, Simon Rabaté, Maxime Tô, Julie Tréguier,

WP2.1: Correlation between life events over the life cycle

Objectives: Previous analyses have focused on adverse life events separately, but the existence of temporal correlations between events may partly explain the results found in WP1. The aim of this work package is to measure the correlations between these life events over time. This descriptive analysis will be derived for different population groups defined by fixed characteristics such as parental background, educational level, gender or national origin.

Methods: The analysis will be based on individual panel data recording life events constructed in WP1.1. A first analysis will focus on the joint occurrence of different life events during the life cycle to measure the extent to which some individuals are more prone to experience multiple life events. In a second step, we will focus more precisely on the time correlation between events in order to establish to what extent the likelihood of an event is increased when other events happen. In practice, we will use correlation measures to understand the associations between different adverse life events. This includes examining these associations in a given year and over the life course to understand whether some adverse life events are more likely to co-occur with one another, or if they are more likely to trigger other adverse life events. To describe the panel data more comprehensively, we will use existing tools from multichannel sequence analysis and trajectory analysis (such as group-based multivariate trajectory modelling) to analyse the temporal ordering of life events, and extract typical trajectories (Rod et al., 2020) that summarizes the complex sequences of groups of individuals.

Expected results and outputs: We expect to produce an academic paper providing an extensive descriptive analysis of the complex relationship between adverse life events over the life-course and destined to a demographic journal (for example *Demography*). Recent research has emphasized the connectedness of adverse life events (Rod et al., 2020), and we expect that a substantial fraction of the population experience multiple adverse life events at the same time or over their life course. Doing so, we intend to shed light on the multiplicity of adversity trajectories and their association with socioeconomic background, which we will investigate further in WP2.2.

WP2.2: Event correlations and lifetime inequality

Objectives: The objective of the second part of WP2 is to link life events to household and individual income over the life-cycle. We will propose an econometric dynamic model accounting for the joint determination of life events and income. Doing so will allow us to measure to what extent life events shape lifetime income trajectories and lifetime inequality.

Methods: The econometric model will account for the joint determination of life events, and income. The model covers the years of life course which are concerned by the previously defined life events. Typical econometrics methods for dynamic non-linear panel data models (Bowlus and Robin, 2012; Arellano and Bonhomme, 2017) will be used in WP2.2. The model is dynamic in the sense that the probability of realization of life-events and income depend on past life events. Potential correlation between two different types of life events in the same period is also accounted for. Current earnings will also be linked to the past and present occurrence of life events. Based on the estimated model, the importance of life events and their correlation over life-course on lifetime inequality will be assessed from counterfactual simulations. In practice, parameter estimates will be obtained using maximum likelihood methods. Unobserved heterogeneity will be incorporated into the model through correlated random effects (Wooldridge, 2005).

Expected results and outputs: We plan to produce three sets of results, which together form a promising academic paper. First, impulse response functions will be used to measure the importance of a given life event on income trajectory. We can compare earnings trajectories of individuals who experience a life event at a given age to counterfactual ones who do not experience such shock. Second, the model allows to perform counterfactual simulations shutting down the existing correlation between life events. Then, the comparison of predicted distribution of lifetime earnings allows us to understand the importance of the correlation to explain inequality and particular features of the lifetime income distribution such as skewness and kurtosis (Guvenen *et al.,* 2022). Finally, different earnings concepts can be used in the model to account for different insurance mechanisms and measure their impact on lifetime inequality. Focusing first on individual labour income provides a first approximation of *gross* lifetime inequality. Using household income accounts for potential household reactions to individual shocks that may attenuate the magnitude of life events effects on earnings. Comparing initial inequality to after-tax and benefit income inequality finally allows us to understand to what extent the socio-fiscal system insures against the consequences of life events.

WP2: Risk assessment and deliverables

Risk assessment: We believe the risk of WP2 to be limited. Both WP use widely spread empirical methods that are likely to be applicable to our data. One potential issue is that including many realizations of past events and many events in the model may be too demanding for the data and generate computational issues. This risk can be mitigated by reducing the complexity of the model.
Deliverables: Two scientific articles (D2.1, D2.2) with the results of WP2.1, WP2.2.

WP3: Comparison between France and the Netherlands

In WP3, we replicate some of the results obtained in the Dutch context (WP1 and WP2) in the context of France. We use as much as possible similar data and empirical strategies, to be able to draw conclusions on the importance of context regarding the incidence and effect of events. In WP3.1, we construct an event data for France, and compare it to the one constructed in WP1.1 to study the incidence of events, and their correlation over time. In WP3.2 we compare the effect of life events in both countries, focusing on how the differences in the tax-and-transfer systems lead to differences in the degree of insurance provided for each type of event. In WP3.3 we compare the difference in earnings profiles and associated lifetime inequality.

Researcher involved: Simon Rabaté, Maxime Tô, Julie Tréguier

WP3.1: Comparison of life event incidence and correlation

Objectives: In WP3.1, we construct an *events dataset* based on the example of the one built in WP1.1, which contains for a representative sample of the French population and for the period of observation (from 2011 to 2024, the expected last year of data available by the end of the project). We restrict the analysis to events that can be consistently defined in French and Dutch data: divorces and job losses.

Methods: The dataset to study events in France is the *Échantillon Démographique Permanent* (EDP) gathering data about more than 4% of the population. Information contained in the data come from distinct administrative sources such as employer data (*panel salariés*), and tax data (*Fideli-Filosofi*). From that data, it is possible to observe different types of events of interest. We focus on the combination of two particular events: divorce and job losses that are well observed from the data. Job losses are observed from the employer data which is available since 2002 for the whole sample, and since 1967 for a subset of individuals. Divorce is observed from the tax data (Costemalle, 2017) included in the data since 2011. This restricts the use of the data to more than 10 years.
Based on this dataset, the definition and measure of the two life events will be similar to the one proposed in WP2.1, which will ease the comparison between the two countries in terms of life event incidence and correlation. Before turning to analysing the effects of events on income trajectories in WP3.2, we compare the incidence of events we obtain for both countries. We try to relate the potential differences observed to country-specific characteristics in terms of data source, socio-economic characteristics of the population and institutional setting.

Expected results and outputs: The expected output of WP3.1 is an event dataset similar to the one produced in WP1.1 (D3.1). It will contain, for individuals from both countries, a list of event occurrences at the yearly level. This dataset will be used as an input of WP3.2 and WP3.3.

WP3.2: Comparison of the effect of life events on income trajectories

Objectives: In WP3.2 we analyse and compare the impact of our selected events (divorce and job loss) on income trajectories in France and the Netherlands. The aim of the comparison is to compare the extent to which income losses are comparable between countries for similar types of events: divorce and job loss. To this end, as in the case of the Dutch data, we compare the effect of events on primary and disposable household income in the French data to measure the degree of insurance against adverse events provided by the tax and transfer system.

Methods: The fiscal data from EDP described in WP3.1 also allows us to decompose household disposable income into primary individual income from all household members (labour income,

individual benefits, alimony, etc.), and tax and benefits at the household level. It is thus possible to link the timing of life events to changes for all different income concepts, and to measure the degree of insurance. We then construct estimation datasets by linking the income panel data to the event datasets from both countries. We replicate the analysis of WP1.2 on the French data, by analysing the causal effects of shocks on different income concepts (individual *vs.* household income, pre-tax *vs.* post-tax income). We also plan to re-do the analysis on Dutch data on a subsample that is more comparable to the French one. In particular, we may want to restrict the estimation window of the Dutch data to have the same as in the French case (2011 to 2024), in order to neutralize potential differences between countries that could come from different years selection.

Expected results and outputs: We expect the effect of events to vary between countries. In terms of job loss, with less generous unemployment benefits and lower unemployment rate in general in the Netherlands, we can expect job loss to have a smaller impact on average but long-term unemployment to be more detrimental. In terms of divorce, we expect the direct effect to be more important in the Netherlands because of the bigger earnings difference between men and women, but this could be counterbalanced by the fact that couples are more advantaged by the tax and transfer system in France. Overall, we believe that the two selected events will be meaningful illustrations of the importance of the institutional context for assessing the effect of events. Those results will be regrouped with the analyses of WP3.3 in a paper comparing the two countries in terms of the effect of events on income trajectories and their effect on overall lifetime inequality (D3.2).

WP3.3: Comparison of the effect of life events on lifetime inequality

Objectives: In WP3.3, we build on the framework of WP2.3 and compare earning profiles and associated lifetime income inequality in France and the Netherlands.

Methods: We estimate a simpler version of the model of earning dynamics described in WP2.3 where we only include the two events, we focus on in WP3. We estimate the same model on a similar dataset (in terms of variables and years) for France and the Netherlands. We compare the earning profile we obtain in both countries and compute the resulting lifetime income inequality. We compare the importance of life events in two ways. First, we compare the income profiles for pretax and post-tax income to assess the importance of governmental insurance. Second, as in WP2.2, we generate impulse response functions to life events to compare the overall influence they have on lifetime income trajectories, as predicted by the model.

Expected results and outputs: We expect the model to capture important differences in earning dynamics and inequality between France and the Netherlands and to illustrate the extent to which those differences can be explained by the effect of life events and governmental intervention. Those results will be regrouped with the analyses of WP3.2 in a paper comparing the two countries in terms of the effect of events on income trajectories and their effect on overall lifetime inequality (D3.2).

WP3: Risk assessment and deliverables

Risk assessment: The feasibility risk of WP3 is reduced by the limited number of events we considered. This choice however raises the scientific risk that the contribution of WP3 is too limited. We believe this risk is limited given the relevance and the novelty of the approach. If it appears not to be the case, we will consider the following options to mitigate this risk: (i) adding additional events to the analysis, in particular health-related events that may be possible to incorporate to the analysis using the health

data matched with the EDP, (ii) adding additional countries to the comparison pool (e.g. Sweden or Germany, where some researchers of the team work).

Deliverables: Publication of scripts in open access (D3.1), one scientific article (D3.2) with the results of WP3.2 and WP3.3, and a policy brief based on those results (D3.3)

WP4: Project management and organization

The aim of this WP is to ensure effective planning, implementation, coordination, and achievement of the project's results.

The project will be coordinated by Simon Rabaté up to its successful completion. He will manage the project with the support of the other team members and INED. We have identified a number of sub-tasks that need to be undertaken in order to ensure efficient project management and organization:

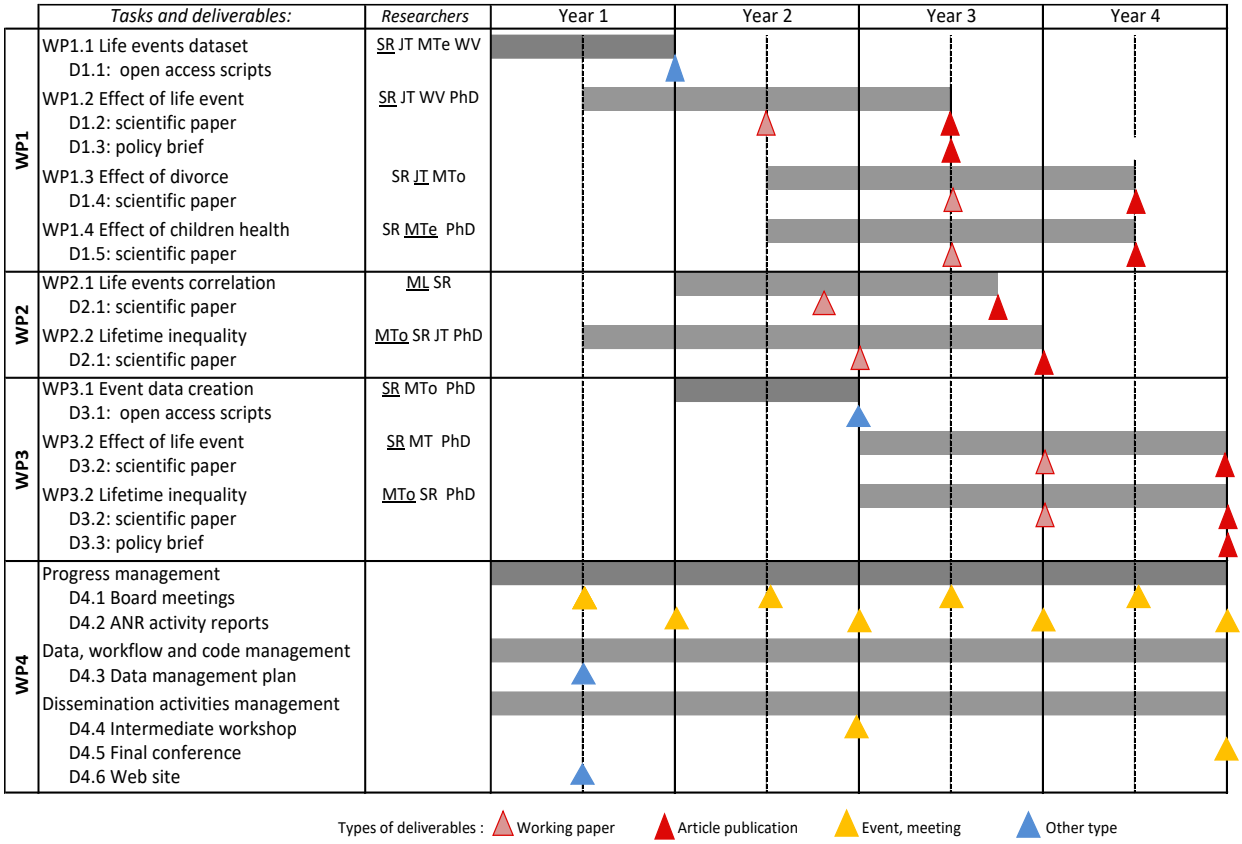
(i) Progress management. The overall project management will be ensured by the coordinator. He will supervise the internal and external communication, organize meetings, keep track of the advancements, ensure that the deliverables are submitted in time, open a discussion for solutions every time difficulties arise, and prepare intermediate and final reports to the ANR. In order to share the coordination burden and mitigate the risk of not reaching the research goals, two organisational features are implemented: (i) for each work package, a sub-coordinator will assist the main coordinator in supervising the progresses of the research, (ii) every year, the realisations and plan for the next steps are presented to the advisory board to ensure the realisation of the research agenda.

(ii) Data, workflow and code management. Given the complexity of our project in terms of data, a special care will be given to the understanding and documentation of the sources and to the organisation of the workflow from raw data to final results. At the start of the project, we will establish a data management plan where we will describe the nature and use of the dataset. Throughout all the project, we will engage into processes ensuring the reproducibility of the research outcomes (Bontemps and Orozco, 2021). All source coded will be put online and regularly updated at each publication stages. We also plan to take part in the growing community of users of register data in both France and the Netherlands (see Section III).

(iii) Dissemination activities management. Aside from the dissemination of data knowledge mentioned above, the scientific results of LELI will be disseminated in scientific journals, international working paper series and policy briefs. They will also be presented to international conferences, seminars and workshops. In addition, we will create a webpage of the project, and organize a intermediate workshop and a final conference. We will also take an active role in engaging the public by organizing several outreach activities (see Section III). All these dissemination activities will be coordinated by the coordinator with the help of Service Communication at INED, and dedicated services at the Institute of public policy and Centraal planbureau.

Deliverables: D4.1 Advisory board meetings, D4.2 Periodic and final ANR activity reports; D4.3 Data management plan; D4.4 Workshop organization, D4.5 Final conference organization, D4.6 Web site.

The following Gantt chart lists the different WPs, and associated deliverables. We add a column for the researchers (referred to by their initials) who are planned to participate on the subprojects. We underline the name of sub-coordinators of each WP.



II. Organisation and implementation of the project

a. Scientific coordinator and its consortium / its team

The coordinator will team up with five promising young researchers with international profiles from both France and the Netherlands. Of particular significance is the established history of extensive and successful collaborations between the coordinator and team members. This pre-existing synergy and familiarity among the team ensure a solid foundation for the envisioned team organization, fostering effective teamwork and the seamless integration of their complementary skills and knowledge.

Simon Rabaté (Coordinator) : Researcher at the French Institute for Demographic Studies (INED) since 2021 and associate economist at the Netherlands Bureau for Economic Policy Analysis (CPB, The Hague) since 2018 and at the Institute of Public Policies (IPP, Paris) since 2016. He is an applied economist, specialized in the fields of public, labour and population economics. He has already produced a large body of literature directly in line with the LELI project, in two main directions. First, he has extensively studied the effect of life events on income trajectories, in analyses of retirement (Rabaté et al., 2024), childbirth (Rabaté and Rellstab, 2022) or spousal death (Rabaté and Tréguier, 2024). Second, he has made several contributions to the inequality literature (Leenders *et al.*, 2023; Bruil *et al.*, 2022), with a focus on its lifetime dimension trough the analysis of redistribution in the pension system (Bozio *et al.*, 2019). His work has been published in leading generalist and top field economic journals (including the *Journal of Public Economics*, *American Economic Journal: Economic Policy*, *Labour Economics*) as well as French journals. The link between public policy, scientific knowledge and public debates is at the heart of his research agenda and activities, as illustrated by the dissemination of scientific research through policy briefs - both in France (e.g. Bonnet *et al.*, 2013) and the Netherlands (e.g. Adema *et al.*, 2020) -, blog and media interventions.

Maël Lecoursonnais, PhD student in sociology at Linköping University (Sweden) and was visiting INED in 2023. He works on the multidimensional determinants of spatial inequalities, from a life-course perspective. Both the themes he works on (determinants of inequalities) and the conceptual and empirical tools he uses (life course analysis using administrative data) are directly aligned with the research agenda of LELI, in particular with WP2 which analyses the correlations of life events over the life course. He would join the team as a post-doc after his PhD defense (early 2025).

Julie Tréguier, Researcher at DIW Berlin. She works on topics related to family, labour and inequality, including fruitful past and current work collaboration with the coordinator (Bozio *et al.*, 2023; Rabaté and Tréguier, 2024). Her expertise in policy evaluation and causal identification, and her knowledge of both the French and Dutch data and institutional settings gives her a pivotal role in the research proposal, in particular for WP1 and WP3.

Marianne Tenand, Researcher at CPB and visiting fellow at Erasmus University Rotterdam. She is a well-established health economist and will bring her expertise to the team on this topic, in particular regarding the conceptual and practical issues regarding the identification of health events using healthcare and hospitalization data (WP1.1) and the institutional setting of long-term care provision to children (WP1.4).

Wiljan van der Berge, Assistant Professor in Utrecht University and researcher at CPB. His research topics include the long-term and multidimensional effect of labour market shocks. His expertise in econometrics and his acquaintance with the Dutch data and institutional setting will be key in WP1.

Maxime Tô, Researcher at IPP Paris. He works on various topics including family, labour, and public economics. He has work extensively with the collaborator, on both scientific (e.g. Bozio *et al.*, 2023) and dissemination outcomes (e.g. Bozio *et al.*, 2019). His expertise in micro-econometrics will be leveraged for both the analysis of causal effect of events in WP1 and the modelling of income dynamics WP2. His knowledge of the French tax data is also essential to the success of WP3.

The team will be completed by a **PhD student**, who will carry out analyses on both French and Dutch data. An **advisory board** will provide guidance and advice along the course of the project. It is composed by **Antoine Bozio** (EHESS and IPP) and **Egbert Jongen** (Leiden University and CPB), two senior economists and renowned experts of tax and transfer systems in France and the Netherlands, and **Zachary van Winkle** (Sciences-Po) an assistant professor in sociology specialized in the interplay between demography and social inequality over the life-course.

Capacity to promote coordinator's scientific independence LELI would be an important step in the coordinator's academic career for several reasons. First, he would have the opportunity to develop his own research agenda and establish it as a more central component of the INED unit he has recently joined. Secondly, he will be able to secure access to both French and Dutch administrative data. This is essential for the development of the coordinator's research agenda, which aims to produce results directly relevant to the French public debate, while continuing to take advantage of the opportunities offered by the quality of the Dutch data to address ground-breaking research questions. Thirdly, LELI would pave the way for the long-term development of the coordinator's career. It would give him the opportunity to produce research results that will increase his scientific visibility. It would strengthen and expand his scientific contacts with French and foreign researchers, which should lead to new ideas and subsequent projects. In addition, his experience as a scientific coordinator and co-supervisor of a doctoral thesis will be valuable in the perspective of obtaining accreditation as a doctoral supervisor (*Habilitation a Diriger des Recherches*).

Implication of the scientific coordinator and partner's scientific leader in on-going project(s)

Name of the researcher	Person.month	Call, funding agency, grant allocated	Project's title	Name of the scientific coordinator	Start – End
Simon Rabaté	6	ANR (JCJC 2021)	WIDE	Marion Leturcq	2022 – 2026
Simon Rabaté	1.5	Agirc-Arrco	Partenariat de recherche agirc arrco ipp 2023	Maxime Tô	2023-2025

b. Implemented and requested resources to reach the objectives

To ensure that the project will achieve scientific excellence within the terms and objectives set in this proposal, we request additional staff to help us with the research, as well as financial resources to access administrative data through the secure data hub both in France (CASD) and the Netherlands (Statistics Netherlands). Financial resources will be needed to disseminate the results of the project. Including the administrative costs, the total amount requested for the project is 297,042.8€ for a total of 48 months. Below is a detailed description of the different costs involved.

Requested means by item of expenditure and by partner

		INED
Staff costs		195 450.00
Instruments and material costs (including scientific consumables)		39 976.00
Building and ground costs		-
Outsourcing / subcontracting		-
General and administrative costs & other operating expenses		24 000.00
	Administrative management & structure costs**	37 616.80
Sub-total		259 426.00
Requested funding		**297 042.80**

Staff costs (195, 450 euros). We request funds to recruit a post-doctoral researcher and a PhD Student As post-doctoral researcher based at INED, we plan to recruit M. Lecoursonnais for 15 months spread over 2 years and a half. In case he eventually cannot join the project, we will look for alternative profile with the same set of skills, namely a training in sociology and some experience with sequence analysis. A PhD student will be recruited to work directly on the comparison between the Netherlands and France. We are looking for a profile with a strong background in microeconometrics and some experience with administrative data. Visiting stays with partner institutions in the Netherlands could be organized. The PhD will be based between INED and IPP, under the joint supervision of the coordinator and Antoine Bozio.

General and administrative costs and other operating expenses (24,000 euros). We request a budget for key activities: in person meetings between the French and Dutch parts of the team; publication and dissemination costs; participation to important conferences (EALE, ESPE); organization of the intermediate workshop and final conference.

Instruments and material costs IT (39,976 euros). One laptop will be purchased for the recruited staff (1500 euros). The rest is the estimated cost for access to French and Dutch administrative Data.

Management and structure (37,616.80 euros). 14.5% of the subtotal (259,426 euros).

III. Impact and benefits of the project

Impact: LELI contributes to the "Axe D.3" of the AAPG 2024 by **providing an assessment of how adverse events are shaping individual economic trajectories and income inequality**. We consider an unprecedently large set of events – **demography, employment and health** related – encompassing most potentially life changing events. We analyze the effect of events on individual income but also the extent to which those effect are dampened by family insurance as well as governmental insurance, trough taxes, **social protection** and transfers. LELI will thus provide evidence-based support to policy-makers i) to better identify events that are not well insured and their cumulative role in the formation of lifetime inequality, ii) to design more efficient public policies **to protect individuals impacted by correlated adverse events and thus contribute to a measurable reduction of economic inequalities**.

Scientific dissemination: The LELI team intends to produce six research papers, that will be presented and discussed in prominent economic seminars and workshops. Further, the team will organize two scientific events: a one-day workshop at the midpoint of the project and a broader two-day conference at the end, that will be open to policy-makers and to a wide public. The one-day workshop will be seamlessly integrated into the annual conference of AFEPOP, the recently established French Association of Population Economics, in which the coordinator plays a pivotal role as a founding member and member of the directorate committee. Most members of our team are actively engaged in international research networks and projects that exhibit substantial overlap with the objectives of LELI. This collaborative environment will not only foster dynamic progress within the project but also lay the groundwork for potential future extensions.

Open Science: Our project is committed to adhering to an Open Science approach. To ensure transparency, accessibility and reproducibility of the research, all project codes and materials will be made available and regularly updated on a dedicated Git repository. Importantly, we plan to benefit from and contribute to the existing networks linking producers and users of register data. In the Netherlands, the coordinator plan to actively collaborate with national research infrastructure ODISSEI (Open Data Infrastructure for Social Science and Economic Innovations). In France, the coordinator will benefit from the infrastructures developed at INED through the *Big_Stat* project (ANR-16-CE41-0007). In both countries, we aim at developing code sharing practices, by publishing code libraries that can be used and improved by the research community.

Societal impact: Our team operates in institutions that are at the forefront of both cutting-edge research and the dissemination of findings to policymakers and the broader public. Police-makers will be integrated in the aforementioned final conference with a roundtable. As a natural extension of our research endeavours, the papers generated through LELI will be distilled into concise policy papers, suitable for platforms such as IPP and CPB policy briefs. These policy papers are designed to initiate discussions with citizens, journalists, and policymakers alike. All members of the teams have an extended experience and a particular interest in the elaboration of such specific contents. We therefore have high expectations regarding the outreach of the results of this research project in those different spheres of the public debate, and the subsequent impact it may have in terms of policy making and the design of social insurances in the years to come.

Website: Dissemination elements towards our different targets – academics, policy experts and citizens – will be gathered in a dedicated website. INED encourages research initiatives *via* its "Mini-Sites" located on the INED website. This accessible format has previously proven effective in advancing global research endeavours. Hosted on INED's servers, these pages are linked within the INED site, amplifying visibility and guaranteeing the longevity of project websites beyond funding periods.

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